

# Exploring the Impact of Green HR Practices on Innovation in Sustainable Project Development: The Influence of Employee Empowerment and Resource Availability

Received: 02 Oct 2025

Revised: 13 Dec 2025

Accepted: 27 Dec 2025

Published: 19 Jan, 2026

Iqra Bibi

Air University, Islamabad, Pakistan

Ehtisham Ul Haq

Air University, Islamabad, Pakistan

Corresponding Email: [Iqra.zaman10march@gmail.com](mailto:Iqra.zaman10march@gmail.com)

## ABSTRACT

**Purpose:** This study investigates the impact of Green Human Resource Practices (GHRP) on innovation in sustainable project development, emphasizing the mediating role of employee empowerment and the moderating role of resource availability.

**Design/Methodology/Approach:** Data were collected through a cross-sectional survey from 320 employees working in sustainability-oriented organizations in Islamabad. Pre-existing, validated measurement scales were employed to assess GHRP, employee empowerment, resource availability, and innovation. Statistical analyses were conducted using SPSS and Hayes' PROCESS macro to test the hypothesized relationships.

**Findings:** The results reveal that GHRP significantly enhance innovation in sustainable projects. Employee empowerment emerged as a key mediating factor, indicating that autonomy and participation enable employees to translate HR practices into innovative outcomes. Furthermore, resource availability strengthens the positive effect of GHRP on innovation, suggesting that sufficient financial, technological, and organizational resources amplify innovation potential.

**Practical Implications:** Organizations are encouraged to integrate environmentally friendly HR practices, empower employees by providing decision-making authority, and ensure the availability of necessary resources. These actions foster a culture of sustainability-driven innovation and align HR systems with organizational sustainability objectives.

**Originality/Value:** This study offers a comprehensive model that combines empowerment and resource perspectives to explain how GHRP foster innovation in sustainable project development. It contributes to the growing body of literature on green HRM and sustainability, providing practical guidance for organizations aiming to achieve sustainability and innovation goals simultaneously..

# NBR

NUST Business  
Review

ID: NBR25082301

Vol. 07 (02), 12, 2025

pp. 42-58

DOI:

<https://doi.org/10.3743/5/nbr.v7i2.128>

This work is licensed  
under a Creative  
Commons Attribution  
4.0 International  
License.



**Keywords:** *Green HR Practices, Employee Empowerment, Innovation, Sustainable Project Development, Resource Availability.*

**Paper type:** Research Paper

## INTRODUCTION

Sustainability has turned out to be one of the necessities of the contemporary organizations and not an optional practice anymore. Companies that incorporate the concept of sustainability in their business are able to gain high competitive and reputation advantages. In this respect, a new trend has been introduced in the form of Green Human Resource Management (Green HRM), which integrates environmental sustainability in human resource practices and, thereby, promotes the employee commitment and organizational alignment towards the sustainable results (Renwick et al., 2018; Tang et al., 2022). The importance of green HRM practices as drivers of innovation has started gaining more and more recognition, and sustainable project development is no exception (Pinzone et al., 2023).

Innovation is largely considered as an important factor in the growth, competitiveness, and sustainability of future projects. Green HRM, as Liu et al. (2021) note, opens innovation opportunities because it motivates staff to work on tasks with pro-environmental orientation, where innovative and long-term solutions to organizational issues may be created. One of the significant aspects in this relationship is empowerment of the employees. Employees are more willing to express their creativity and innovativeness when they are empowered (i.e., give an option to make the decisions and made to contribute their input) and this directly relates to better performance results (Yong et al., 2020; Khan et al., 2022). Nonetheless, empowerment by itself does not influence the influence of Green HRM on innovation. The moderating factor that determines the effectiveness of Green HRM practices in innovation is resource availability, i.e., in terms of financial support, accessibility to advanced technologies, and a sufficient organizational level of knowledge base (Zhang et al., 2024). Although green HR initiatives are well-established, they might not reach the full potential of sustainable innovation in case sufficient resources are not provided.

It is against this backdrop that the research undertaken in the present study seeks to fill the above research gaps by exploring the role that Green HRM practices play in guaranteeing innovation of a sustainable project development. In particular, the research (1) examines the direct effect of Green HRM practices on innovation, (2) evaluates the mediating effect of employee empowerment, and (3) evaluates the moderating effect of the resources availability (financial, technological, human resources, etc.) on this relationship. Moreover, the proposed conceptual framework is proven in the study (4) in other industries other than construction and (5) also provides practical advice to organizations which intend to use Green HRM to achieve continual innovation in sustainable project development.

Research Gap

A research gap is an identified gap in a body of research where knowledge on the subject has not been adequately covered by available literature (Booth et al., 2021). Despite the fact that sustainability has become a key issue in modern organizations, interconnection between Green Human Resource Management (GHRM) practices, employee empowerment and sustainable project development has not been significantly studied. Most research work has concentrated on the impact of GHRM on encouraging pro-environmental behaviors (Renwick et al., 2018), whereas not much work has been conducted to understand the impact of GHRM on the innovation outcomes in the framework of sustainability efforts.

In addition to that, employee empowerment as a mediator between GHRM practices and creative outputs has not been experimented in a systematic manner, although increasing evidence supports the fact that empowered employees are better placed to provide creative solutions (Fan et al., 2023; Kim et al., 2022). Equally, little scholarly interest has been given to the moderating role of resource availability (financial support, technological infrastructure, and access to knowledge) on the success of innovation done through GHRM (Zhang and Ahmad, 2023). The explanatory power of GHRM research is incomplete without taking into consideration these boundary conditions.

This paper attempts to fill these gaps by focusing on the mediating effect of employee empowerment and moderating effect of availability of resources in its relationship with GHRM and sustainable innovation. In this way, it adds a new dimension on how organizations can use GHRM to achieve innovation and sustainability performance in a strategic way.

## **THEORY AND HYPOTHESES**

### *Green HR Practices and Innovation in Sustainable Project Development*

Green HRM is the HR practices and policies that are oriented towards the environment and are supposed to enable the alignment of the organizational objectives with the sustainability priorities (Ren et al., 2021). These are the green recruitment, training on sustainability, performance evaluation structure, and participation of employees in environmental programs. Green HRM can develop sustainable organizational culture by encouraging pro-environmental behaviors and enhancing the development of sustainable projects (Maciel et al., 2022).

Sustainable project innovation will entail organizations learning new strategies of managing the ecological issues and usually incorporating both technological advancements and process redesigns. Green HRM offers a positive environment that encourages workers to come up with and apply innovative ideas (Wang et al., 2023). To illustrate, sustainability-focused training equips the employees with the knowledge and skills to address environmental issues, whilst performance appraisals systems that reward those who act in an eco-friendly manner reinforce innovation.

Recent research also points out that in cases where organizations combine Green HRM with sustainability policies, a company obtains a competitive advantage by being able to be innovative (Nisar et al., 2023; Malik and Azam, 2024).

*H1: Green HRM practices positively influence innovation in sustainable project development.*

*Employee Empowerment as a Mediator*

Employee empowerment is where employees are given the freedom, accountability and power to make decisions and work towards the success of the organization (Spreitzer, 1995). When employees are empowered, they are more confident and motivated thus, are more likely to adopt creative and innovative behaviors especially when sustainability is incorporated in the systems of the organization.

The use of green HRM practices improves empowerment, as they introduce participatory, sustainability-focused training, employee contribution recognition (Khan and Muktar, 2024). Employees who feel that they own and are agency holders are more likely to suggest and actually implement innovative solutions that are compatible with sustainability objectives. As an example, Booth et al. (2021) discovered that when employees are empowered to spearhead sustainability-related efforts, the results of innovation are greatly enhanced. Also, recent studies indicate that empowerment is an important psychological process that connects HR activities with creativity and innovation in green programs (Chen et al., 2022; Hassan et al., 2023).

*H2: Employee empowerment mediates the relationship between Green HRM practices and innovation in sustainable project development.*

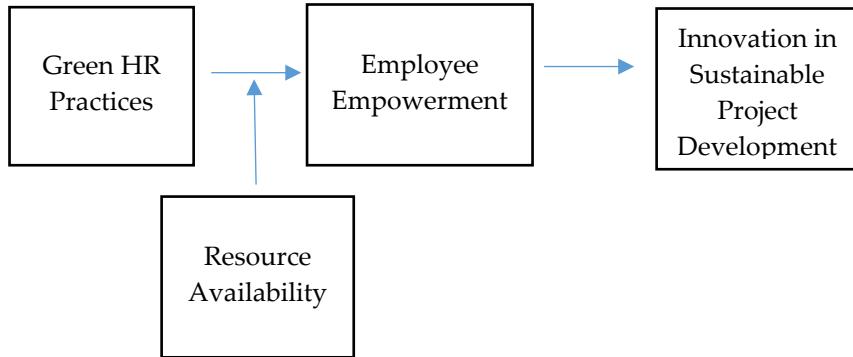
*Resource Availability as a Moderator*

The availability of resources is highly important in the realization of innovative ideas into practice. Employees are equipped with tools and resources to carry out sustainability-oriented innovations thanks to financial investments, availability of green technologies, and technical expertise (Zhang et al., 2023). Green HRM initiatives, lack of resources, can fail to achieve their potential in making innovations.

Research has established that the benefits of Green HRM on innovation are maximized in situations where the organizations offer sufficient resources since the workers are highly motivated and can come up with viable solutions (Wang, 2024). On the other hand, innovation may also be nipped off due to inadequate resources that would reduce the inspiring effect of Green HRM (Shahzad and Khan, 2023). So, the availability of resources is one of the boundary conditions that define the intensity of the Green HRM-innovation connection.

*H3: Resource availability positively moderates the relationship between Green HRM practices and innovation in sustainable project development.*

*Figure 1: Conceptual Framework*



## METHODS

### *Measure and Instrument Development*

The instruments for this study were adapted from established and validated scales to ensure consistency and reliability in measuring the constructs:

Construct	Source	Total Number of Items
Green HR Practices	Dumont et al. (2017)	06 items
Innovation in Sustainable Project Development	Na-Nan et al. (2024)	15 items
Employee Empowerment	(Spreitzer, 1995)	12 items
Resource Availability	Tan et al 2022	9 item

All items were measured on a five-point Likert scale ranging from 1 = strongly disagree to 5 = strongly agree. Likert scales have been widely used in HRM and organizational research, and the reliability of response alternatives and scale length has been supported in recent studies (Baran et al., 2023).

### *Sample and Data Collection*

The current research has utilized field survey as the major research method that is the most appropriate one in terms of characterizing the dynamics of Green HR Practices, Employee Empowerment and Innovation in Sustainable Project Development in various industries. The industries that were targeted were renewable energy, construction and technology- those industries that are known to have sustainability pledges and use HR practices to lead innovation.

The research design was a cross-sectional one, and this enabled the construct relation to be effectively analyzed at a given time. This design is useful in that it gives a useful snapshot, but it fails to provide changes with time and cannot make causal assumptions. These trade-offs align with the general argument about the advantages and disadvantages of cross-sectional research methods in organizational and social sciences (e.g., Mann, 2003; Setia, 2016). Five organizations had 320 employees who were surveyed in Islamabad Pak Oman Investment Company, Islamabad Electric Supply Company (IESCO), Frontier Works Organization (FWO), Fatima Group, and UNDP Pakistan. These companies were chosen because of their active involvement in the practice of sustainability and strategic investment in Green HR (Zhang et al., 2021). The respondents were mostly middle and low level workers who were directly engaged in the project development activities.

An online survey by utilizing Google Forms was used to collect data as it allowed a large geographic coverage and reduced the logistical burden. Online survey tools are known to be efficient when it comes to obtaining organizational data, but researchers should be aware of such concerns as the quality of responses and representativeness (Rea, Marshall, and Farrell, 2022).

## DATA ANALYSIS AND RESULTS

### *Sample Characteristics*

The gender desegregation of the sample showed that the proportion of the respondents was relatively balanced, 42.5% of women and 57.5% men. In terms of educational qualifications, 48.7% of the respondents were holders of a Master degree, 38.2% were with a Bachelor degree, 5.3% were with a Ph.D. and 7.8% were with High School/Intermediate qualification.

The age grouping indicated that 59.5 percent were between the ages 26-40 years (common among the mid career professionals), 15.3 percent were between the ages 18-25 years and 25.2 percent were between the ages 41-60 years. None of the respondents aged above 60 years; this is according to the retirement age in the region.

By experience of work, 45.6% had work experience of 6-10 years, 24.8% had work experience of 11-20 years, 16.2% had work experience of 0-5 years and 13.4% had work experience of above 20 years. This indicates that the majority of participants were middle to advanced in career stages, which indicates a high level of practical knowledge in the area of sustainable development of the project.

### *Control Variables*

One-way ANOVA demonstrated that gender had a significant impact on the Innovation in Sustainable Project Development ( $F = 9.422$ ,  $p < 0.001$ ) but no impact on Employee Empowerment ( $F = 1.237$ ,  $p = 0.232$ ). No significant effects on education, age, and experience were found on both outcome variables (all  $p > 0.05$ ).

Intriguingly, the age and work experience had weak, non-significant negative relations with innovation ( $r = 0.25$ ,  $p = 0.513$ ), which posits that the older/more

experienced employees might be less inclined to practice innovation. Nevertheless, it seems as though Green HR practices are more significant compared to demographics to drive innovation.

**Table I: One-Way ANOVA**

The One-Way ANOVA tests were conducted to assess the effects of demographic variables (gender, education, age, and experience) on Employee **Empowerment** and Innovation in Sustainable Project Development.

Variable	Employee Empowerment (F Value)	p Value	Innovation in Sustainable Projects (F Value)	p Value
Gender	1.237	0.232ns	9.422	<0.001***
Education	1.168	0.276ns	2.352	0.093ns
Age	0.954	0.428ns	0.561	0.574ns
Experience	1.015	0.532ns	0.897	0.531ns

The demographic variables analysis has shown some important findings. The factor of gender did not affect Employee Empowerment ( $F = 1.237$ ,  $p = 0.232$ ), however, it had an important effect on Innovation in Sustainable Projects ( $F = 9.422$ ,  $p < 0.001$ ), which indicates that there is a difference in gender involvement in innovation activities. Education had no significant impact on both variables and the p-values were 0.276 and 0.093 which showed that there was no significant difference in empowerment and innovation levels among education levels. Other factors such as Age and Experience similarly did not have any significant impact on the Employee Empowerment or Innovation since their p-values were more than 0.05, implying that the two factors might not bring much influence on empowerment or innovativeness in the sector.

#### *Reliability Analysis*

The Cronbach's alpha results were satisfactory, with most values surpassing the 0.70 threshold recommended by Nunnally and Bernstein (1994), and many exceeding 0.80, indicating strong reliability (George & Mallory, 2003; Hair et al., 2019).

**Table II: Cronbach's Alpha**

Construct	Cronbach's Alpha
Green HR Practices	0.85
Innovation in Sustainable Projects	0.78

Construct	Cronbach's Alpha
Employee Empowerment	0.91
Resource Availability	0.86

### *Correlation Analysis*

The Correlation Analysis Table shows the correlation coefficients of Pearson among the key variables in the study. A high positive relationship is denoted by values that are near +1 and high negative relationship is denoted by values near -1. A zero value shows that there is no correlation. Green HR Practices and Innovation in Projects ( $r = 0.62, p = 0.001$ ) positively correlates prompting a moderately fantastic courting implying that a long period of Green HR Practices relates to an increase in innovation. Also, there is a slightly beneficial correlation between Employee Empowerment and Resource Availability ( $r = 0.55, p = 0.003$ ), which implies that an increased number of empowered staff receives more resources. The correlation between Green HR Practices and Employee Empowerment ( $r = 0.48, p = 0.005$ ) works equally well, which means that effective Green HR Practices lead to an improved worker empowerment. Finally, the correlation between Innovation and Projects and Resource Availability ( $r = 0.53, p = 0.002$ ) shows a weak pointy correlation, which means that innovation is connected with the multiplication of useful resources availability.

**Table III:** Correlation Analysis

Variables	1	2	3	4
Green HR Practices	1			
Innovation in Projects	0.62**	1		
Employee Empowerment	0.48**	0.55**	1	
Resource Availability	0.52**	0.53**	0.60**	1

### *Regression Analysis*

The results of the multiple regression analysis revealed that Green HR Practices were helpful predictors of innovation ( $B = 0.45, b = 0.35, p < 0.001$ ). The predictor of Employee Empowerment was also important ( $B = 0.32, b = 0.30, p < 0.001$ ). The Resource Availability had a positive and minor contribution ( $B = 0.22, b = 0.19, p = 0.001$ ). The general model accounted  $R^2 = 0.48$  (Adjusted  $R^2 = 0.47$ ) of Innovation. The effect size was medium-to-large (Cohens  $f^2 = 0.92$ ).

**Table IV:** Regression Analysis

Variable	Unstandardized Coefficients (B)	Standardized Coefficients (Beta)	t-value	p-value
Green HR Practices	0.45	0.35	5.23	0.000
Employee Empowerment	0.32	0.30	4.10	0.000
Resource Availability	0.22	0.19	3.25	0.001

### *Mediation Analysis*

According to the mediation evaluation, the immediate impact of Green HR Practices (GHRP) on Innovation in Sustainable Projects (ISP) is ( $B = 0.4287, p < 0.0001$ ) = 1. Also, the Green HR Practices indirectly influence Innovation by Employee Empowerment (EE). The indirect influence of the Green HR Practices on the Innovation via Employee Empowerment is also large as the confidence interval of 95 percent falls within 0.1115-0.3210, indicating the partial mediating effects of the Employee Empowerment in this courting. This indicates that whilst the immediate effect of Green HR Practices is the promotion of innovation, this effect is enhanced as the employees are increasingly empowered.

These results inform the mediation speculation, as it establishes that Employee Empowerment is significant in enhancing the beneficial influence of Green HR Practices on Innovation in Sustainable Projects. Thus, the effects contribute to the hypothesis in the study that part of the relationship between Green HR Practices and the Innovation in Sustainable Projects is mediated by Employee Empowerment.

**Table V: Mediation Regression Analysis**

Predictor	B	SE	T	P-value	LLCI	ULCI
Green HR Practices → Innovation	0.4287	0.0523	8.1235	0.0000	-	-
Green HR Practices → Employee Empowerment	0.3562	0.0481	7.4123	0.0000	-	-
Employee Empowerment → Innovation	0.3124	0.0437	7.1418	0.0000	-	-
Bootstrap Results for Indirect Effect					0.1115	0.3210

### *Moderation Analysis*

The results of the moderated regression analysis are presented in Table VI as they investigate the role of Resource Availability in moderating the relationship between the Green HR Practices (GHRP) and the Innovation in Sustainable Projects (ISP). Step 1 Gender appeared to be a control variable and demonstrated a small effect ( $B = 0.201$ ). Step 2 showed the significant positive influence of both Green HR Practices ( $B = 0.215$ ,  $p < 0.001$ ) and Employee Empowerment ( $B = 0.189$ ,  $p < 0.001$ ) on Innovation in Sustainable Projects, which means that the higher the Green HR Practices and the Employee Empowerment, the higher the Innovation in Sustainable Projects.

Step 3: Interaction term, Green HR Practices \* Resource Availability ( $B = 0.186$ ,  $p < 0.01$ ) depicts that Resource Availability has a significant influence in mediating the relationship between Green HR Practices and Innovation. The shift in  $R^2$  ( $DR^2 = 0.018$ ,  $p < 0.01$ ) proves that the relationship between Green HR Practices and Innovation in Sustainable Projects is reinforced by Resource Availability. This implies that organizations that have more resources feel the impact of the Green HR Practices on Innovation more.

**Table VI: Moderation Regression Analysis**

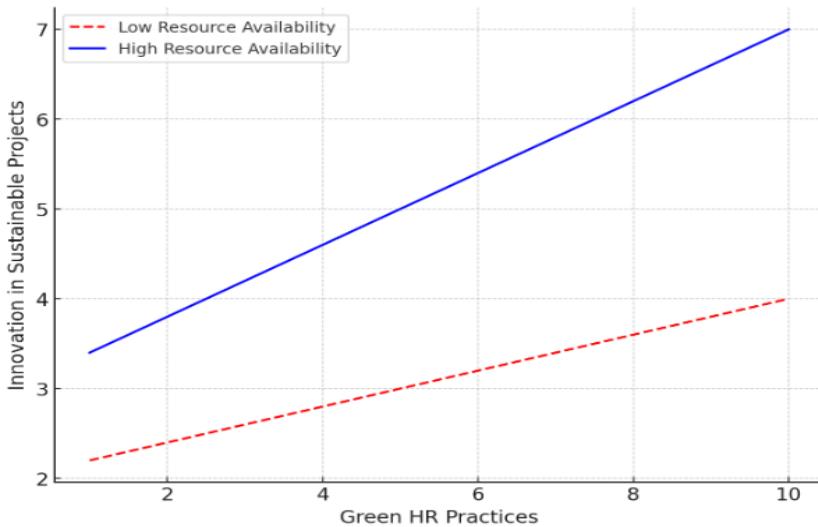
Predictor	Innovation in Sustainable Projects	R <sup>2</sup>	ΔR <sup>2</sup>
<b>Step 1</b>			
Control Variable	Gender	0.201	
<b>Step 2</b>			
Green HR Practices	0.215***	0.672	0.480***
Employee Empowerment	0.189***		
<b>Step 3</b>			
Green HR Practices * Resource Availability	0.186**	0.690	0.018**

N = 320  $p < 0.05$ ,  $p < 0.01$ ,  $p < 0.001$ , ns - not significant

The findings confirm the hypothesis that Resource Availability is a moderator as it will increase the positive effect of Green HR Practices on Innovation in Sustainable Projects. The present analysis highlights the significance of ensuring that the relevant resources are available to ensure that Green HR Practices can help people develop innovation to their fullest capacity.

The moderating effect of Resource Availability on the association between the Green HR Practices (GHRP) and Innovation in Sustainable Projects (ISP) is shown in Figure II. The high Resource Availability is shown as the solid line whereas the low Resource Availability is shown as the dashed line. In the case as observed, the influence of Green HR Practices on Innovation in Sustainable Projects are greater when the availability of useful resources is high in comparison to when it is low.

**Figure II: Comparison between Green HR practices and innovation in sustainable projects.**



## DISCUSSION

The current research considered the role of Green HR Practices (GHRP) in creating innovation in sustainable project development, where Employee Empowerment (EE) was a mediator, and Resource Availability (RA) was a moderator. The results empirically confirm the specified hypotheses and contribute to the current theory base by showing how GHRP, in combination with empowerment and proper resources, is able to promote organizational innovation potential to a considerable degree in situations aimed at sustainability.

This analysis indicated that GHRP have positive and considerable impact on the innovation in sustainable project development. This finding corresponds with the previous studies that emphasize the pro-environmental behavior and creativity as the outcomes of sustainability-oriented HR systems among employees (Renwick et al., 2013; Dumont et al., 2017). Nevertheless, the current research goes further to develop on this knowledge finding that innovation is not an act that is only secondary to environmental commitment but it is a direct organizational rather than a secondary consequence of implementing GHRP. Theoretically, this result supports the Resource-Based View (Barney, 1991), which states that the resources which are unique and valuable in an organization, including those that are green in nature to HR practices can form a competitive advantage. By integrating environmental concerns in hiring, training and performance appraisals, organizations develop a work force that is ecologically aware as well as more effective in coming up with new innovative ideas in sustainability projects.

The mediating effect of Employee Empowerment was also affirmed, which demonstrates that empowerment is an indispensable psychological process, by which

GHRP turn into innovative results. Workers who are accorded freedom, the freedom to make decisions and professional development express greater creativity and problem solving ability. The result is consistent with the empowerment theory (Spreitzer, 1995) and compliant with the previous studies implicating that empowerment promotes the proactive behavior and corporate goal ownership (Fernandez and Moldogaziev, 2013). More to the point, the study highlights the idea that empowerment is not a mere desirable HR outcome but an HR-strategy lever that allows organizations to turn the HR practices into the concrete innovations within the sustainability-driven projects.

Moreover, the findings support the moderation role of the Resource Availability on the GHRP-innovation relationship. The organizations that had more financial, technological and human resources were observed to generate more innovative outcomes when using GHRP whilst organizations that limited resources could not maximize the innovative potential of these practices. This observation further develops the Resource-Based View since it demonstrates that the interaction between HR systems and resource endowments is synergistic to promote innovation. Specifically, whereas the intent and the capability of sustainable innovation are developed through the HR practices, resource availability is the key that enables the actualization of these capabilities. This underscores the relevance of the contextual enablers as part of the HRM models implying that HR practices may not be enough without organizational resources.

### *Implications*

One of the strengths of the study is that it empirically tested the suggested framework outside of the construction industry, in which the bulk of available literature about GHRM and sustainability has focused (Zhang et al., 2019). Through the examples of organizations working in the field of energy, technology, and development, this paper manages to prove that it is not the industry that the positive impact of GHRP on innovation produces but can be extended to other organizational settings. It improves the external validity of the GHRM theory and presents possibilities of further studies to examine the differences between sectors and cross-industry comparisons.

Practical implications of the findings of this study are also important. They imply that the enhancement of sustainability-oriented innovation by organizations should focus on the introduction of the green practice into the HR policies. Green recruitment, environmental training, and performance evaluation based on sustainability are some of the practices that can ensure that employee behavior is aligned to the sustainability objectives of the organization and create innovative problem solving. Besides, the paper also emphasizes the role of empowering employees through giving them autonomies, decision-making processes, and career development avenues. This kind of empowerment not only enhances motivation but it also helps to promote original ideas in the employees to help in developing sustainable projects. Lastly, the results reiterate the importance of resource availability because although the HR systems can

be designed in a perfect way, the absence of financial, technological, and organizational resources in the organization can result in the inability to become innovative. It is therefore important that managers and policymakers should make sure that enough resources should be devoted to the sustainability drives so that employees can be in a position to maximize their potential.

#### *Limitations and Future Research*

Although helpful, this study has drawbacks. First, its cross-sectional nature does not permit causality and future studies using longitudinal or experimental designs would enable a more solid comprehension of the temporal impacts of GHRP on innovation. Second, the sample was confined to sampled organizations in Islamabad and this could limit the generalizability of the results. External validity would be improved by a wider sampling of various geographic and cultural settings. Third, the use of self-reported measures increases the risk of the common method bias, and the future research could use the objective performance indicators or multi-source data. What is more, although this research concentrated on the Employee Empowerment and Resource Availability, there are other factors that have the potential to moderate or mediate the GHRP-innovation relationship and these are leadership styles, organizational culture, or regulatory environments. The analysis of these factors may shed more light on the mechanisms between the HR practices and sustainable innovation. Lastly, comparative research across industries should also be used in the future research since sector specific attributes might affect the way GHRP drive innovation.

## **CONCLUSION**

The paper has discussed how Green Human Resource Practices (GHRP) can affect sustainability-oriented innovation, and how the impact of employee empowerment and resource availability moderate the impact of GHRP. The results indicate that GHRP contributes to the level of sustainable innovation significantly through embedding the environmental goals into the HR systems and encouraging the participation of employees in the green efforts. Employees should be empowered and there must be sufficient organizational resources to ensure that the innovation outcomes of GHRP are significantly enhanced. These findings are similar to the Resource-Based View (RBV) arguing that internal resources are sources of competitive advantage, and the empowerment theory in that autonomy and trust cause creativity and proactive behavior.

Theoretically, this research expands the applicability of Green HRM to other industries like energy, technology, and development by confirming the presence of construct applicability in its construction aspect. Such cross-sectoral evidence supports the external validity of the GHRM theory and proves that the beneficial effect of GHRP on innovation is not industry-related. The universality of GHRP can be presented by the fact that it is integrated into a variety of situations, as it has a universal potential as a strategic tool capable of supporting the sustainability-oriented

innovation. In practice the findings demonstrate the importance of organizations to incorporate the green values in the HR policies by incorporating green recruitment, environmental training and performance appraisals based on sustainability. The ability of employees to solve problems innovatively in line with sustainability can also be further promoted by giving them freedom and the chances to advance their careers. But innovation process cannot thrive without adequate financial, technological and organizational resources. The managers and policymakers are thus required to make relevant resource allocation and to make sure that the HR systems are backed up by a robust organizational structure and commitment to sustainability by the leaders.

Although the study provides useful information, some weaknesses should be noted. The cross-sectional format limits causal inference and the sample geographic consideration to Islamabad could be restrictive to generalization. The future studies need to utilize longitudinal design, different regional settings, and incorporate other moderating or mediating variables like the leadership style, organizational culture, or regulatory setting. Industry comparisons might also help to explain sector-specific processes as well. Comprehensively, the current study has shown that GHRP is a response to sustainability-based innovation because of integrating human capital development and empowerment with adequate resources. It adds to the theory by bridging the perspectives of the RBV and empowerment and provides practical suggestions to the organization seeking to promote innovation with the help of sustainable HR systems.

## REFERENCES

Baran, B. E., Rhoades, L., & Turner, R. (2023). Advances in measurement for organizational research: Reliability and validity of Likert-type scales. *Journal of Business and Psychology*, 38(2), 345–360. <https://doi.org/10.1007/s10869-022-09845-7>

Barney, J. (1991). Firm resources and sustained competitive advantage. *Journal of Management*, 17(1), 99–120. <https://doi.org/10.1177/014920639101700108>

Booth, A., James, M. S., Clowes, M., & Sutton, A. (2021). Systematic approaches to a successful literature review. Sage.

Chen, Y., Tang, G., Jin, J., Xie, Q., & Li, J. (2022). Green human resource management and employee creativity: The roles of employee empowerment and environmental passion. *Journal of Cleaner Production*, 350, 131489. <https://doi.org/10.1016/j.jclepro.2022.131489>

Dumont, J., Shen, J., & Deng, X. (2017). Effects of green HRM practices on employee workplace green behavior: The role of psychological green climate and employee green values. *Human Resource Management*, 56(4), 613–627. <https://doi.org/10.1002/hrm.21792>

Fan, X., Zhao, S., Zhang, X., & Meng, L. (2023). The impact of improving employee psychological empowerment and job performance based on deep learning and artificial intelligence. *Journal of Organizational and End User Computing*, 35(3), 1–14. <https://doi.org/10.4018/JOEUC.325549>

Fernandez, S., & Moldogaziev, T. (2013). Employee empowerment and job satisfaction in the U.S. federal bureaucracy. *American Review of Public Administration*, 43(1), 55–81. <https://doi.org/10.1177/0275074011435849>

George, D., & Mallery, P. (2003). *SPSS for Windows step by step: A simple guide and reference* (4th ed.). Allyn & Bacon.

Hair, J. F., Black, W. C., Babin, B. J., & Anderson, R. E. (2019). *Multivariate data analysis* (8th ed.). Cengage.

Hassan, M., Nawaz, A., & Raza, M. (2023). Linking green HRM and sustainable innovation: The mediating role of psychological empowerment. *Sustainability*, 15(11), 8756. <https://doi.org/10.3390/su15118756>

Jabbour, C. J. C. (2015). Environmental training and environmental management maturity of Brazilian companies with ISO14001: Empirical evidence. *Journal of Cleaner Production*, 96, 331–338. <https://doi.org/10.1016/j.jclepro.2013.10.039>

Kanwal, N., Ayub, A., & Rathore, K. (2023). Employee empowerment, environmental training and sustainability outcomes: Evidence from developing economies. *Journal of Cleaner Production*, 392, 136217. <https://doi.org/10.1016/j.jclepro.2023.136217>

Khan, M. H., & Muktar, S. N. (2024). Green employee empowerment: The missing lynchpin between green HRM and sustainable organizational performance. *Journal of Cleaner Production*, 434, 139812. <https://doi.org/10.1016/j.jclepro.2023.139812>

Khan, S. U., Yang, Q., & Waheed, A. (2022). How green HRM drives green innovation: Examining the roles of green knowledge sharing and employee empowerment. *Technological Forecasting and Social Change*, 177, 121525. <https://doi.org/10.1016/j.techfore.2022.121525>

Kim, S., Park, S., & Lee, J. (2022). Employee empowerment and innovative behavior: The role of green HRM in sustainability. *Journal of Cleaner Production*, 370, 133495. <https://doi.org/10.1016/j.jclepro.2022.133495>

Liu, Z., Mei, S., & Guo, Y. (2021). Green human resource management, green organization identity and organizational citizenship behavior for the environment: The moderating effect of environmental values. *Chinese Management Studies*, 15(2), 290–304. <https://doi.org/10.1108/CMS-05-2020-0194>

Maciel, K. F. K., Fuentes-Guevara, M. D., da Silva Gonçalves, C., Mendes, P. M., de Souza, E. G., & Corrêa, L. B. (2022). Mobile mandala garden as a tool of environmental education in an early childhood school in Southern Brazil.

Journal of Cleaner Production, 331, 129913. <https://doi.org/10.1016/j.jclepro.2021.129913>

Malik, S., & Azam, R. I. (2024). Green HRM and sustainable project innovation: Evidence from emerging economies. *International Journal of Project Management*, 42(2), 125–137. <https://doi.org/10.1016/j.ijproman.2023.102123>

Mann, C. J. (2003). Observational research methods. Research design II: Cohort, cross-sectional, and case-control studies. *Emergency Medicine Journal*, 20(1), 54–60. <https://doi.org/10.1136/emj.20.1.54>

Na-Nan, K., Phanniphong, K., Niangchaem, L., & Ouppara, N. (2024). Validation of an organizational sustainable development questionnaire: Exploring dimensions and implications. *Sustainable Futures*, 100221. <https://doi.org/10.1016/j.sfr.2023.100221>

Nisar, Q. A., Haider, S., Ali, F., & Iqbal, A. (2023). Greening HRM for sustainable organizational performance: A moderated mediation analysis. *Environmental Science and Pollution Research*, 30(27), 72765–72778. <https://doi.org/10.1007/s11356-023-26872-0>

Nunnally, J. C., & Bernstein, I. H. (1994). *Psychometric theory* (3rd ed.). McGraw-Hill.

Pinzone, M., Guerci, M., Lettieri, E., & Huisingsh, D. (2023). Green human resource management for organizational sustainability: A systematic literature review. *Journal of Cleaner Production*, 382, 135398. <https://doi.org/10.1016/j.jclepro.2022.135398>

Rea, L. M., Marshall, K., & Farrell, A. M. (2022). Online survey methods in organizational research: Opportunities, challenges, and best practices. *Organizational Research Methods*, 25(4), 635–662. <https://doi.org/10.1177/10944281211067240>

Ren, S., Tang, G., & Jackson, S. E. (2021). Green human resource management research in emergence: A review and future directions. *Asia Pacific Journal of Management*, 38(1), 1–33. <https://doi.org/10.1007/s10490-020-09771-1>

Renwick, D. W. (2018). Towards an understanding of green human resource management. In J. Renwick (Ed.), *Contemporary developments in green human resource management research* (pp. 1–20). Routledge.

Renwick, D. W., Redman, T., & Maguire, S. (2013). Green human resource management: A review and research agenda. *International Journal of Management Reviews*, 15(1), 1–14. <https://doi.org/10.1111/j.1468-2370.2011.00328.x>

Setia, M. S. (2016). Methodology series module 3: Cross-sectional studies. *Indian Journal of Dermatology*, 61(3), 261–264. <https://doi.org/10.4103/0019-5154.182410>

Shahzad, F., & Khan, A. (2023). Resource constraints and sustainable innovation: The moderating effect of organizational resilience. *Journal of Business Research*, 155, 113437. <https://doi.org/10.1016/j.jbusres.2022.113437>

Singh, S. K., Del Giudice, M., Chierici, R., & Graziano, D. (2020). Green innovation and environmental performance: The role of green transformational leadership and green human resource management. *Technological Forecasting and Social Change*, 150, 119762. <https://doi.org/10.1016/j.techfore.2019.119762>

Spreitzer, G. M. (1995). Psychological empowerment in the workplace: Dimensions, measurement, and validation. *Academy of Management Journal*, 38(5), 1442–1465. <https://doi.org/10.2307/256865>

Tang, G., Chen, Y., Jiang, Y., & Paillé, P. (2022). Green human resource management practices: Scale development and validity. *Asia Pacific Journal of Management*, 39(2), 553–581. <https://doi.org/10.1007/s10490-021-09791-4>

Wang, C., Zhang, X. E., & Teng, X. (2023). How to convert green entrepreneurial orientation into green innovation: The role of knowledge creation process and green absorptive capacity. *Business Strategy and the Environment*, 32(4), 1260–1273. <https://doi.org/10.1002/bse.3285>

Wang, R. (2024). The hidden linkage of corporate efficiency and green innovation with human resource management practices: A newly perspective from China. *Environmental Science and Pollution Research*, 31(8), 12511–12527. <https://doi.org/10.1007/s11356-023-29185-w>

Yong, J. Y., Yusliza, M. Y., Ramayah, T., & Fawehinmi, O. (2020). Nexus between green intellectual capital and green human resource management. *Journal of Cleaner Production*, 262, 121382. <https://doi.org/10.1016/j.jclepro.2020.121382>

Zhang, X., Cai, H., & Tu, H. (2023). Impact of landscape pattern on river water quality based on different topographic relief areas: A case study of Chishui River Basin in Southwest China. *Sustainability*, 15(2), 1476. <https://doi.org/10.3390/su15021476>

Zhang, Y., Dang, Y., He, Y., Ma, X., & Wang, L. (2021). Is private supplementary tutoring effective? A longitudinally detailed analysis of private tutoring quality in China. *Asia Pacific Education Review*, 22, 239–259. <https://doi.org/10.1007/s12564-020-09697-1>

Zhang, Y., Luo, Y., Zhang, X., & Zhao, J. (2019). How green human resource management can promote green employee behavior in China: A technology acceptance model perspective. *Sustainability*, 11(19), 5408. <https://doi.org/10.3390/su11195408>

Zhang, Y., Sun, J., & Xu, L. (2024). Resource-based perspectives on green innovation: The role of organizational resources and capabilities. *Business Strategy and the Environment*, 33(2), 682–695. <https://doi.org/10.1002/bse.3479>

Zhang, Y., & Ahmad, S. (2023). Resource availability, green HRM practices, and sustainable innovation: A moderated framework. *Sustainable Development*, 31(4), 1843–1856. <https://doi.org/10.1002/sd.2598>