Journal for Social Science Archives

Online ISSN: 3006-3310
Print ISSN: 3006-3302
Volume 3, Number 2, 2025, Pages 806 – 818
Journal Home Page
https://jssarchives.com/index.php/Journal/about

The Role of Green Innovation on Organizational Performance: Moderation of Human Resource Practices

Dr. Sahrish Taj[1], Dr. Syed Sheheryar Ali kazmi[2], Marwat Khan[3] & Fahad Asghar[4]

[1]*Adjunct Faculty, Lahore College for Women University, Lahore, Email:* sahrish.taj@gmail.com
[2]*Sr. HR Officer, Lady Reading Hospital, Peshawar, Email:* sheheryarali7@gmail.com
[3]*Professor, CECOS University of IT and Emerging Sciences, Peshawar, Email:* marwat@cecos.edu.pk
[4]*Visiting Lecturer, Department of Commerce, Thal University Bhakkar, Email:* fahadasghar214@gmail.com

ARTICLE INFO

Article History:

Received:	*May*	*02, 2025*
Revised:	*May*	*25, 2025*
Accepted:	*June*	*05, 2025*
Available Online:	*June*	*16, 2025*

Keywords:

Green Innovation, Organizational Performance, HR Practices, Construction industry

Corresponding Author:
Dr. Sahrish Taj
Email:
sahrish.taj@gmail.com

ABSTRACT

Society must collaborate to achieve green growth goals. Businesses play a crucial role in promoting environmentally friendly and sustainable development as market participants. The rise of green innovation has allowed businesses to enhance organizational performance. This study employs resource-based theory to examine human resource practices that mediate interventions. The cross-sectional research involved 350 employees from the construction industry in Lahore, Peshawar, Karachi, and Islamabad. The dataset includes a survey of employees from the Pakistani construction industry. The research utilized a quantitative analysis technique based on regression and a moderated approach. The results of SPSS data demonstrated that green innovation enhances organizational performance. The interaction analysis also revealed that green HR practices such as training, performance assessment, and employee involvement enhance this interaction, thereby supporting the moderating influence on GI and OP. The results have highlighted the strategic importance of aligning HR systems with sustainability objectives to gain the maximum benefits of green innovation. The research contributes to the existing literature on sustainable business and gives practical recommendations to companies willing to incorporate environmental responsibility into their business and people strategies.

Introduction

Concern over climate change, environmental degradation, and resource depletion has changed how organizations operate in recent years. Under pressure from governments, stakeholders, and society, enterprises across industries are rethinking their strategic priorities and embracing sustainability-oriented innovation. Environmental or eco-innovation is creating new goods, processes, practices, or business models that reduce environmental harm and promote sustainability (Abadzhiev et al., 2022). Green innovation improves competitiveness and reduces environmental impact, unlike traditional innovation. Scholars and practitioners are studying how green innovation affects organizational performance as sustainability becomes a major corporate objective (Wang et al., 2021).

This perspective expands organizational performance beyond financial measurements. It includes environmental efficiency, employee satisfaction, operational excellence, brand reputation, and long-term resilience (Shahzad et al., 2020). By fostering sustainable practices that reduce environmental impacts, green innovation contributes to organizational performance. An organization can gain competitive advantage and enhance its brand reputation by integrating eco-friendly technologies and processes. Furthermore, green innovation contributes to long-term resilience by ensuring that companies adapt to regulatory changes and changing consumer preferences. It is important to align business objectives with societal and environmental responsibilities through a holistic approach to organizational performance. By prioritizing sustainability, organizations not only meet regulatory requirements but also attract eco-conscious consumers and investors. Consequently, companies can contribute positively to the environment and the community while securing a profitable and stable future. Organizations can implement key performance indicators that track reductions in carbon emissions, energy consumption, and waste production. Regular sustainability audits and assessments can help identify areas for improvement and ensure compliance with environmental standards. Additionally, gathering feedback from stakeholders, such as employees and customers, can provide valuable insights into the perception and effectiveness of green initiatives (Kuo et al., 2022). These changes move from reactive environmental compliance to proactive innovation-driven sustainability.

However, green innovation is complicated. Technology, processes, corporate culture, structure, and people resources must often be changed. Sustainability needs staff participation, knowledge exchange, and ongoing learning and improvement. HRPs are crucial here. HR practices can help or hinder green innovation. Green HR practices include eco-centric recruitment, green training, sustainability-based performance evaluations, and incentive systems that encourage eco-conscious act (Nigatu, Degoma, & Tsegaye, 2024). These methods foster green innovation and motivate people to achieve organizational performance.

Despite the growing relevance of green innovation, empirical studies on its effects on organizational performance and HRPs' moderating function are scarce (Huynh et al., 2024; Kuo et al., 2022). Green innovation and HR practices are usually studied separately without considering how they affect performance. This obscures how organization might use human capital to promote environmental innovation. Furthermore, environmental legislation and consumer expectations change quickly, requiring a more integrated green strategy that considers technology and human factors (Abadzhiev et al., 2022).

As global business becomes more competitive, sustainability is considered a differentiator that boosts corporate reputation and stakeholder trust. Green innovation responsible companies attract customers, investors, and talent. Thus, green innovation is essential for environmental compliance and corporate success. Green innovation projects depend on internal skills, especially human resources, for success. Innovation is driven by employees, whose attitudes, talents, and devotion may make green initiatives successful (Tjahjadi et al., 2020). Thus, HR approaches that link employee behavior with sustainability goals can boost green innovation's impact on corporate outcomes.

HR methods shape employees' environmental beliefs and behaviors by developing organizational culture. Through onboarding, leadership development, and recognition, HR systems can encourage employees to embrace sustainability as a shared company goal. This cultural alignment encourages individual green behavior and collective innovation (Wang et al., 2021). HR practices and green innovation reinforce one other, improving organizational performance.

In developing countries like Pakistan, where environmental issues are severe and industrial expansion is a policy priority, green innovation in organizational strategy has great promise. However, lack of awareness, resources, and institutional support sometimes hinders green activities (Bombiak & Marciniuk-Kluska, 2018). Human resource practices can foster internal change in such situations. Organizations may overcome external constraints and achieve meaningful environmental outcomes by investing in staff development, developing a culture of sustainability, and aligning HR processes with green goals. Thus, HR practices' moderating impact in green innovation and organizational success is even more important in emerging economies.

Green innovation is also expanding due to digital transformation and Industry 4.0. AI, IoT, and big data analytics enable smarter, more sustainable operations. Again, workforce preparation and capabilities determine the effectiveness of these technologies. Technology-driven green projects can benefit from digital upskilling, cross-functional collaboration, and innovation-oriented leadership in HR (Shah et al., 2021). Therefore, technological, environmental, and human resource initiatives provide promising prospects to enhance performance in the digital age within organizations.

Leadership and managerial commitment are also needed in green innovation (Arici & Uysal, 2022). It will need the backing of the top management, clear sustainability objectives and adequate funds to be successful. These elements have to be operationalized through HR systems that make strategy operational. Green innovation choices can be enhanced by performance management systems that enlist environmental measures, incentive structures that compensate green accomplishments, and growth programs that target sustainability (Huynh et al., 2024). An organization behaves and has the capability because of HR practices, and hence green innovation and performance relationship is moderated by HR practices.

Modern standards of employment, particularly among younger generations, should be taken into consideration too. Workers are more concerned about having meaningful work that resonates with them and compared to earlier years, employees are not simply interested in salaries but also want other aspects that show their values, such as environmental responsibility. Incorporation of green innovation into business-related functions and the explication of such ideas via HR activities assist corporations in recruiting, maintaining, and engaging individuals (Kuo et al., 2022). Employee engagement can improve motivation, innovation and performance through alignment of employee values and company strategy. The relationship between green innovation and organizational success is complex and affected by internal and external factors. Human resource practices are a strategic moderator that can boost or hinder green innovation. Green innovation may thrive in firms that develop a supportive culture, train and motivate personnel, and connect HR systems with environmental goals. This study empirically examines how HR practices impact the relationship between green innovation and organizational performance in emerging economies. It bridges theory and practice by providing concrete insights into how firms may strategically align their human capital systems with their green innovation goals to improve performance.

Literature Review

Green Innovation

Green innovation, also referred to as eco-innovation and sustainable innovation is the development and adoption of new services, new goods, new processes or practices that limit the negative impacts on the environment and enhance sustainability as an organization expands (Singh et al., 2020). Consumers of traditional innovation are driven by profits, whereas green innovation sees efficiency in resources used, wastes reduced, energy conservation and pollution kept away. Green innovation encompasses environment-friendly products, process innovation (clean technologies or energy-efficient processes), organization innovation (sustainable management systems) and marketing innovation (green branding) (Soewarno et al., 2019).

Due to environmental awareness, customer desire for green products, and governmental pressure, this idea has grown. Green innovation boosts competitiveness, stakeholder relations, and environmental compliance (Fernando et al., 2022). Green innovation boosts CSR, firm image, and market differentiation (Singh et al., 2020). However, it demands tremendous commitment, cross-functional teamwork, and strategic alignment with organizational strengths and culture.

Organizational Performance

Multidimensional organizational performance measures how well an organization meets its goals. Profit, return on investment, and market share were used to evaluate performance. Modern performance evaluation goes beyond customer satisfaction to include innovative capacity, environmental effect, staff involvement, and operational efficiency. This comprehensive vision understands that long-term success requires sustained value creation for all stakeholders, not just financial gain (El-Kassar & Singh, 2019).

In green innovation, organizational performance shows how well a corporation blends environmental concerns with strategic aims. Sustainable methods can lower operational costs (by energy savings or waste reduction), improve reputation, and boost employee morale (Anwar & Abdullah, 2021). Green innovation improves organizational performance in both tangible (efficiency, cost-saving) and intangible (brand loyalty, stakeholder trust) ways (Singh et al., 2020). Performance should be seen as a balance between economic, environmental, and social consequences, not only financial.

HR Practices

Human resource practices are the rules, methods, and activities that manage and grow an organization's people to meet strategic goals (Kuo et al., 2022). Recruitment, selection, training, performance review, salary management, and employee interaction are typical methods. When properly linked with business goals, these strategies boost employee motivation, innovation, and productivity.

Recent developments include Green Human Resource Management (GHRM), which incorporates environmental goals into HR procedures. Green recruitment, eco-friendly training, and sustainability-based performance indicators help GHRM staff become environmentally conscious

(Kuo et al., 2022). Green innovation can be fostered by hiring pro-environmentalists, training them in sustainable methods, and tying rewards to environmental outcomes. HRPs moderate employee participation in and support of green initiatives. Research shows that strategic HRPs boost employee commitment to sustainability goals and help green strategies succeed (Anwar & Abdullah, 2021).

Hypothesis development

GI and organizational Performance

Previous studies have demonstrated that green innovation not only adds to the success of organizations but also improves the performance of those organizations (Vasileiou et al., 2022). Along the same line, previous studies demonstrate that an ambidextrous company, which is superior in engaging in both exploitative and exploratory innovations, tends to achieve better organization performance (Abadzhiev et al., 2022). In a similar vein, earlier research has shown that an ambidextrous corporation, which is superior in engaging in both exploitative and exploratory innovations, tends to achieve greater organization performance (Huo et al., 2023). The assumption that GI can improve OP is based on this hypothesis. According to Tjahjadi et al. (2020) organizations that are primarily focused on exploiting their employees are typically competent enough to properly deal with problems by modifying their operations and procedures. On the other hand, construction companies have a great tendency to encourage technical growth by introducing fresh products and services that can lead to superior OP (Shah et al., 2021). Additionally, construction companies have a strong tendency to innovate. According to Huynh et al. (2024), a company that is aiming to enhance effective OP implementation, GI and placing a strong emphasis on sustainable practices that both reduce their impact on the environment and encourage innovation in their goods, processes, or business models. The majority of construction companies were able to successfully apply their expertise to exploitative and exploratory acts of environmental practices. GI ability and improved performance of people are two factors that determine whether or not a firm is able to effectively achieve better overall performance. Therefore, it is proposed that:

H1: Green innovation boosts organizational performance significantly.

HR practices and GI

Human Resource (HR) activities are essential to induce green innovation (GI) since they provide workers with the skills, motivation, and space to implement environmentally sustainable ideas. Research has revealed that green-oriented HR practices, including eco-friendly recruitment training, performance appraisal and reward systems, have positive impacts on green innovation (Anwar & Abdullah, 2021). An example can be given about Kuo et al. (2022) reported that green HR practices resulted in a marked improvement in GI in construction, and (Shah & Soomro, 2023) found that construction firms had a higher level of innovation when green HR policies were aligned with employee motivation. This connection was further confirmed by a study conducted (Shahzad et al., 2023), as the authors pointed out that the green HRM is seen by employees as a type of organizational support, which promotes innovative practices. Further, a study of Soewarno et al. (2019) suggested that green performance management mediates the HR-GI relationship, and stakeholder pressure acts as a contextual factor, which increases the estimate. Arici & Uysal (2022) highlighted that HR practices are significant mediators of the HR-to-innovation route. However, previous empirical research is based on cross-sectional studies or self-reported data, so causation is hard to draw; most empirical studies on green HR practices are operational-level, with fewer studies being done on HR practices, i.e., digitalization and talent analytics; and most studies are industry and region-specific, drawn within the Asian manufacturing and hospitality sector, with little cross-analysis of other industries or institutional contexts (Vasileiou et al., 2022). Such constraints underscore the necessity of cross-sectoral research to gain deeper insights into the mechanisms and boundary conditions with which the HR practices yield green innovation. Hence,

H2: HR practices boost green innovation.

HR practices, GI and organizational performance

Scholarly consensus has risen in recent years to the importance of Human Resource (HR) practices in supporting green innovation (GI) and improving organizational performance (OP). With the growing trends of organizations implementing environmental strategies to achieve sustainability objectives and counter external forces, organization of human resource-based practices into the innovation-performance dialectic has become important. Green innovation can be defined as novel products, processes, or practices that minimize environmental damage and enhance ecological efficiency (Mousa et al., 2025; Zaidi et al., 2025). Nonetheless, GI presence alone does not imply an automatic result of improved performance unless it is successfully supported and maintained with the help of strategic HRM measures. This forms the foundation of the moderating hypothesis (H3), which states that HR practices have a positive effect on the relation between green innovation and OP.

Green recruitment and selection, training and development, performance management, and reward systems are some of the practices used using human resources that can help to develop a workforce that not only cares about the environment, but is also inspired to practice innovative measures. Shahzad et al. (2023) suggest that green HRM can initiate the implementation of eco-innovations through integrating the value of green innovation into the company culture and the psyche of employees. However, companies that offer green training opportunities allow their workers to comprehend their environmental objectives and to be inventive in a manner that conforms with GI practices (Arici & Uysal, 2022). GI rewarding performance appraisal systems collaborate to increase the motivation to advance and execute eco-responsible innovations, thereby turning GI into quantifiable performance outcomes, including cost savings, brand image, and regulatory adherence (Ha et al., 2024).

The moderating effect of HR practices is particularly relevant in circumstance where green innovation implementation is multi-faceted and involves considerable cross-functional cooperation. In those situations, HR practices can bolster absorptive capacity, the plasticity of firms to identify, absorb, and utilize new knowledge and thereby augment the connection between green innovation and performance (Shah et al., 2021). Moreover, individual organizations working in developing nations or countries with limited resources are also unable to implement GI skills, awareness, or dedication. In this case, the practices of HRM, which emphasize employee empowerment and the development of green leadership, can serve as enablers, and the process of innovation will be more efficient and influential.

Although the literature has expanded over the years regarding green HRM and green innovation, it remains scarcer in terms of rigorous empirical research on whether there is an interaction effect between HR practices and the green innovation-opportunity relationship. Some past research has analyzed direct relationships between green HRM and performance (Shahzad et al., 2023) or green

HRM and innovation (Khan et al., 2024). But very little has probed the way HR practices and green innovation interplay to affect OP. In addition, the results are based mostly on manufacturing industries in developed countries, which urges the continued applicability of the results to service industries or developing economies, including Pakistan, where environmental challenges are urgent, and institutional backing of GI and its protections is underprivileged (Anwar & Abdullah, 2021). This introduces a serious research gap and highlights the need to explore the boundaries within which green innovation contributes to performance change. Hence, proposed that:

H3: HR practices positively moderate green innovation and OP.

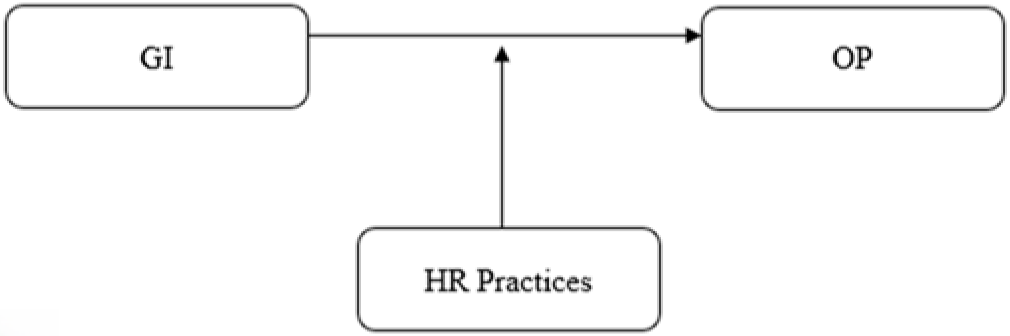

Figure 1: Conceptual Framework

Methodology

This quantitative, cross-sectional study examined how green innovation improves organizational performance, with human resource practices as a moderating variable. In Lahore, Peshawar, Karachi, and Islamabad, where sustainability is becoming more important, 350 employees in the construction industry completed a structured questionnaire using convenience sampling. Validated 5-point Likert scales measured green innovation, organizational performance, and HR practices. SPSS (version 25) were used for descriptive statistics, reliability testing (Cronbach's alpha), correlation, regression, and moderation analysis to test hypotheses and model associations. This strategy ensures the findings' robustness and generalizability across Pakistan's growing economy's different sectors.

Descriptive Statistics

Using data from 350 respondents, the base variable features were identified. The green innovation mean was 3.76 and its standard deviation was 0.68, indicating a great organization perception of green innovation. The organizational performance mean score was 3.84 (SD = 0.71), meaning that the majority of participants believed their organizations performed well. The mean was 3.91 with a standard deviation of 0.64, which shows HR-propelled sustainability activities within the participating organizations. The data was also confirmed to be normal, as the skew and kurtosis scores were inside the range of +/-1, which denotes that the assumptions of normal distribution were not as far stretched as to imply a significant deviation.

Table 1: Descriptive Statistics

Variable	N	Mean	S. D	Skewness	Kurtosis
GI	350	3.76	0.68	-0.42	-0.35
OP	350	3.84	0.71	-0.39	-0.28
HR practices	350	3.91	0.64	-0.46	-0.21

Reliability Analysis

Cronbach's alpha was used to test the reliability of each construct. The green innovation scale had a Cronbach's alpha of 0.88, indicating good internal consistency. The reliability score of 0.91 on organization performance was excellent, since the items accurately measured it. Cronbach's alpha indicated the reliability of measurement because it was 0.89 in human resource practices. The values above 0.70 (Nunnally & Bernstein, 1994) enable the reliability of the instruments to conduct subsequent analysis.

Table 2: Reliability Analysis (Cronbach's Alpha)

Scale	No. of Items	Cronbach's Alpha
Green Innovation	6	0.88
Organizational Performance	7	0.91
Human Resource Practices	5	0.89

Correlation Matrix

To analyze the interactions among the variables, Pearson correlation coefficients have been determined. The association between green innovation and the performance of an organization indicated a strong and statistically significant positive affiliation with $r = 0.612$, $p < 0.01$. The HR practices and green innovation were also positively correlated ($r = 0.547$, $p < 0.01$) meaning that, as the HR practices increases, the green innovation activities improve as well. Also, there was a strong positive correlation between HR practice and organization performance ($r = 0.591$, $p < 0.01$), implying that HR support is an indicator of improved organizational performance. These powerful positive correlations are early indications of the hypothesized relationships in the study.

Table 3: Correlation Matrix

Variables	1	2	3
1. Green Innovation	1		
2. Org. Performance	0.612**	1	
3. HR Practices	0.547**	0.591**	1

** p< 0.01

Hypothesis Testing

Linear regression was used to determine the direct effect of green innovation on organizational performance. The significant model ($F = 116.84$, $p < 0.001$) with R2 =0.375 indicates that 37.5 per cent of the variance within organizational performance can be attributed to green innovation.

Green innovation will improve performance in organizations, as indicated by the standardized beta value (0.612, t = 10.81, p < 0.001). This confirms the principal assertion of the study that green innovation enhances OP.

Table 4: GI & OP

Predictors	B	t	R^2	F	Sig.
Green Innovation	0.612	10.81**	0.375	116.84	.000

To investigate whether human resource practices moderate the relationship between green innovation and organization performance, Hayes (2013) PROCESS Macro (Model 1) was used. The entire model was of significance (R 2 = 0.428, F = 87.23, p <0.001), meaning the interaction factor brings in significant explanatory power besides the main factors. Its interaction with HR practices was not negligible (beta = 0.164, t = 3.46, p = 0.001) and showed that HR practices have a positive moderating effect between green innovation and performance of the organization. Simple slopes analysis indicated that the relationship between green innovation and performance was significantly greater or stronger at the high level of the HR practices, and the relationship with green innovation and performance increased toward nonexistence at the low level of HR practices. This proves that human resource policies and systems strengthen the efficiency of green innovation initiatives in performance results.

Table 5: Moderation Analysis (PROCESS Macro Model 1)

Model Component	β	S.E	t	p
Green Innovation (GI)	0.482	0.062	7.77	.000
HR Practices (HRP)	0.393	0.058	6.77	.000
GI × HRP (Interaction Term)	0.164	0.047	3.46	.001
R^2	0.428			
F (overall model)	87.23			.000

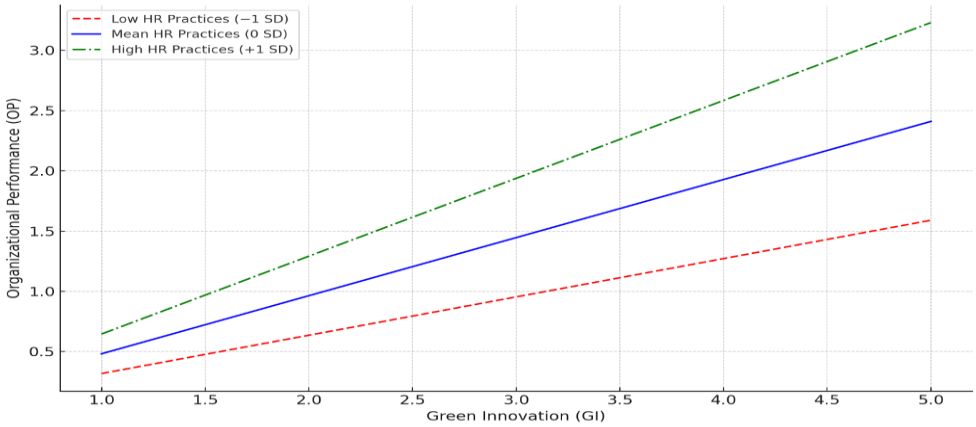

Figure 2: Moderating Slope

Discussion

In recent years, the intersection of green innovation has garnered increasing scholarly attention, particularly regarding their impact on green innovation and OP. Empirical evidence from small lodging enterprises in Pakistan reveals that GI factor i.e. eco-innovation or environmental innovation played significant role in fostering OP, which in turn enhances organizational performance. These findings align with previous research (Baquero, 2024) and researchers stressed the significance of enhancing company GP as one of the most strategic strategies for enterprises to acquire a long-term green innovation organizational performance.

The results of the present research are among the strongest empirical confirmations of H2, which states that HR practices contribute positively to green innovation. The latter emphasizes the importance of HR as a strategic partner in promoting GI practices. The data prove that the introduction of HR practices, including, but not limited to, environmentally aligned recruitment, performance appraisals, training, and employee engagement activities, provides organizations with the foundation needed to introduce green innovation and have it thrive. Further, the results are consistent with existing literature (Baquero, 2024), which finds that certain HR practices, including green training, green rewards, and engagement of employees in sustainability initiatives, turn out to be strong determinants of green innovation. As an example, green training helps employees to acquire technical and reasoning skills to solve environmental challenges, and the reward systems encourage eco-friendly practices.

As revealed by the findings, the H3 is confirmed, meaning that HR practices can reinforce the connection amid green innovation and performance. This implies that the benefits of green innovation on the outcome, including efficiency, reputation, and sustainability, are stronger when organizations possess favorable HR systems, including the use of green recruitment, training in the environmental field, and incentives concerning performance. This is consistent with the findings of the earlier research (Ribeiro et al., 2022; Shahzad et al., 2023), according to which human resource management is strategic in producing high returns on innovation. The HR practices also offer the frameworks and drivers needed by employees to realize and maintain green innovations successfully. The presence of this HR support is needed so that green initiatives can achieve their performance benefits. To attain this value, therefore, an organization should integrate green innovation in favorable HR system. This observation is especially crucial to the managers who intend to connect environmental approaches with performance objectives, via human capital.

Theoretical implications

This research has a number of theoretical implications. Firstly, it supplements the green human resource management (GHRM) literature by introducing HR practices as a moderating factor that positively controls the connection between green innovation and organizational performance. This is unlike in previous research, where the HR practices were generally taken as immediate antecedents of innovation or performance. Second, the results contribute and extend the resource-based view (RBV), underscoring that strategically built heterogeneous resources, like green HR systems, could augment the value attained by innovation capabilities. Thirdly, the work adds value to the contingency theory by demonstrating that green innovation is only effective when it is accompanied by HR strategies that are aligned with environmental objectives. Finally, conducting the study in small accommodation businesses in a developing economy helps bridge contextual gap and implies that even within resource-poor environments, HR activity can have a substantial effect on the innovation performance relationship that would be useful in further cross-cultural or cross-industrial research.

Practical implications

The paper has also a number of practical implications to managers and policymakers. To begin with, it shows the significance of linking HR practices with green innovation initiatives in a bid to optimize organizational performance. The businesses must make sure that their HR practices, such as recruiting, training, and appraisal, are ecologically driven and embracing sustainability. Second, managers are advised to invest in green HR competencies including delivering specific environmental training programs, developing sustainability reward systems, and engaging employees in environmentally sounding decision-making. Thirdly, the development of a green organization culture characterized by the promotion of leaders' dedication, staff involvement, and ongoing environmental practice betterment in business firms. Finally, in small and medium-sized enterprises that have scarce technical or financial resources, low-cost but high-influence HR interventions, such as peer recognition, green champions, and informal eco-awareness initiatives, can remain very effective in increasing the success of green innovation projects. These real-life measures ensure the notion that HR is not merely a support service but a strategic player that can contribute to the sustainability and innovation results.

Limitations

Although this study provides valuable insights into the moderating effect of HR practices on the relationship between green innovation and organizational performance, it is important to acknowledge its limitations. First, a cross-sectional design was utilized in the research, which does not allow for any causal inferences between the variables. Temporal relations would be better determined around the change when using longitudinal data. Second, the research was conducted on the construction industry, which can restrict the applicability of the results to other sectors or larger institutions, especially in developed economies. Thirdly, the data relied on self-reporting, which may introduce reporting bias, social desirability effects, or common method variance. While efforts were made to reduce these biases, they could not be completely eliminated. Finally, the study focused solely on three main HR practices (green ability, motivation, and opportunity) without considering other contextual or organizational factors (such as leadership style, organizational culture, or external environmental pressures) that could also influence the correlation between innovation and performance.

Future Research Directions

The aforementioned limitations suggest some future research directions. First, the researchers in the future ought to utilize longitudinal or experimental designs to handle more details of how HR practices influence green innovation and performance in the long run. Second, the scope could be extended to cover more fields and geographical contexts to provide increased applicability of the results in terms of generalizability as well as the possibility of studying a comparison between industries and geographic contexts. Third, it might be interesting to test other moderating/mediating factors in future studies (i.e., organization culture, leadership commitment, or regulatory environment) to consider coming out with a more holistic model of sustainability performance. Fourthly, it would also be helpful to review the characteristics of technological changes, including digital HR systems or green performance analytics, and their role in increased GHRM efficacy in innovation. Finally, the qualitative methods like case studies or interviews might help to obtain more specific information about the implementation issues and the on-ground processes of aligning one to another HR practices and the HR practices and green innovation process.

References

1. Abadzhiev, A., Sukhov, A., Sihvonen, A., & Johnson, M. (2022). Managing the complexity of green innovation. *European Journal of Innovation Management, 25*(6), 850-866.
2. Anwar, G., & Abdullah, N. N. (2021). The impact of Human resource management practice on Organizational performance. *International journal of Engineering, Business and Management (IJEBM), 5*.
3. Arici, H. E., & Uysal, M. (2022). Leadership, green innovation, and green creativity: A systematic review. *The Service Industries Journal*, *42*(5-6), 280-320.
4. Baquero, A. (2024). Linking green entrepreneurial orientation and ambidextrous green innovation to stimulate green performance: a moderated mediation approach. *Business process management journal, 30*(8), 71-98.
5. Bombiak, E., & Marciniuk-Kluska, A. (2018). Green human resource management as a tool for the sustainable development of enterprises: Polish young company experience. *Sustainability, 10*(6), 1739.
6. El-Kassar, A.-N., & Singh, S. K. (2019). Green innovation and organizational performance: The influence of big data and the moderating role of management commitment and HR practices. *Technological Forecasting and Social Change, 144*, 483-498.
7. Ha, N. M., Nguyen, P. A., Luan, N. V., & Tam, N. M. (2024). Impact of green innovation on environmental performance and financial performance. *Environment, Development and Sustainability, 26*(7), 17083-17104.
8. Huo, B., Liu, X., & Li, S. (2023). The impact of justice on information sharing and innovation performance: a social exchange theory perspective. *Journal of Business & Industrial Marketing, 38*(11), 2519-2532.
9. Huynh, H. T. N., Nguyen, N. T. T., & Vo, N. N. Y. (2024). The influence of knowledge management, green transformational leadership, green organizational culture on green innovation and sustainable performance: The case of Vietnam. *Journal of Open Innovation: Technology, Market, and Complexity, 10*(4), 100436.
10. Khan, W. A., Minghai, Y., & Marwat, A. (2024). Impact of HR Configuration on Organisational Innovation with Mediation Role of Intellectual Capital. *Asia-Pacific Journal of Management Research and Innovation, 20*(1), 7-14.
11. Kuo, Y.-K., Khan, T. I., Islam, S. U., Abdullah, F. Z., Pradana, M., & Kaewsaeng-On, R. (2022). Impact of green HRM practices on environmental performance: The mediating role of green innovation. *Frontiers in psychology, 13*, 916723.
12. Mousa, S. K., Fernandez-Crehuet, J. M., & Thaher, Y. A. Y. (2025). Advancing sustainable performance in healthcare: mediating roles of green HRM and green innovation under green transformational leadership. *Business Strategy and the Environment*.
13. Nigatu, T., Degoma, A., & Tsegaye, A. (2024). Green practices and economic performance: Mediating role of green innovation in Ethiopian leather, textile, and garment industries—An integrated PLS-SEM analysis. *Heliyon, 10*(15).
14. Nunnally, J., & Bernstein, I. (1994). Psychometric Theory 3rd edition (MacGraw-Hill, New York).
15. Ribeiro, N., Gomes, D. R., Ortega, E., Gomes, G. P., & Semedo, A. S. (2022). The impact of green HRM on employees' eco-friendly behavior: The mediator role of organizational identification. *Sustainability, 14*(5), 2897.

16. Shah, N., & Soomro, B. A. (2023). Effects of green human resource management practices on green innovation and behavior. *Management Decision, 61*(1), 290-312.
17. Shah, S. M. A., Jiang, Y., Wu, H., Ahmed, Z., Ullah, I., & Adebayo, T. S. (2021). Linking green human resource practices and environmental economics performance: the role of green economic organizational culture and green psychological climate. *International journal of environmental research and public health, 18*(20), 10953.
18. Shahzad, M., Qu, Y., Zafar, A. U., Rehman, S. U., & Islam, T. (2020). Exploring the influence of knowledge management process on corporate sustainable performance through green innovation. *Journal of Knowledge Management, 24*(9), 2079-2106.
19. Shahzad, M. A., Jianguo, D., & Junaid, M. (2023). Impact of green HRM practices on sustainable performance: mediating role of green innovation, green culture, and green employees' behavior. *Environmental Science and Pollution Research, 30*(38), 88524-88547.
20. 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.
21. Soewarno, N., Tjahjadi, B., & Fithrianti, F. (2019). Green innovation strategy and green innovation: The roles of green organizational identity and environmental organizational legitimacy. *Management Decision, 57*(11), 3061-3078.
22. Tjahjadi, B., Soewarno, N., Hariyati, H., Nafidah, L. N., Kustiningsih, N., & Nadyaningrum, V. (2020). The role of green innovation between green market orientation and business performance: Its implication for open innovation. *Journal of Open Innovation: Technology, Market, and Complexity, 6*(4), 173.
23. Vasileiou, E., Georgantzis, N., Attanasi, G., & Llerena, P. (2022). Green innovation and financial performance: A study on Italian firms. *Research Policy, 51*(6), 104530.
24. Wang, H., Khan, M. A. S., Anwar, F., Shahzad, F., Adu, D., & Murad, M. (2021). Green innovation practices and its impacts on environmental and organizational performance. *Frontiers in psychology, 11*, 553625.
25. Zaidi, S. Y. A., Aslam, M. F., Mahmood, F., Ahmad, B., & Tasaddque, S. (2025). Accomplishing the SDGs Through Green HRM Practices: Insights From Industrial Sustainability Experts. *Global Business and Organizational Excellence*.