

Impact of Green Human Resource Management on Environmental Performance: A Mediated Analysis of Environmental Awareness in HEIs of Khyber Pakhtunkhwa

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Abstract

Green management is now a global phenomenon. All organizations, including Higher Education Institutions (HEIs) are called upon to promote green behavior. Green Human Resource Management (GHRM) is a strategic approach to integrating sustainability into organizational systems. But, as with empirical evidence from higher education institutions (HEIs) in developing economies. This research explores the impact of Green Human Resource Management practices (GHRM) on the environmental performance of public-sector higher education institutions (HEIs) in Khyber Pakhtunkhwa, Pakistan, with special focus on the mediating role of environmental awareness. We surveyed 240 faculty members from six universities using standardized instruments measuring GHRM, Environmental Awareness, and Environmental Performance using a stratified random sample. We conducted measurement and structural model assessments using SmartPLS 4. The results showed that all constructs were reliably and validly measured. The GHRM has significantly improved environmental awareness by $\beta = 0.516$ ($p < 0.001$) and environmental performance by the $\beta = 0.444$ ($p < 0.001$). Environmental awareness also has a significant positive influence on environmental performance ($\beta = 0.442$, $p < 0.001$). The relationship of GHRM and environmental performance has significant partial mediation effect of environmental awareness according to mediation analysis ($\beta = 0.228$, $p < 0.001$). The model showed a significant effect size of 26.6% on environmental awareness and 59.5% on environmental performance. The model was also found to be robust and predictive after considering effect sizes (f^2) and predictive relevance (Q^2).

In general, the study provides compelling evidence confirming that GHRM significantly drives environmental performance in HEIs, either directly or indirectly through enhanced environmental awareness. Understanding how colleges use sustainability can help policymakers and university leaders develop sustainability strategies driven by human resources.

Keywords: Green Human Resource Management (GHRM); Environmental Awareness; Environmental Performance; Higher Education Institutions; Sustainability; PLS-SEM; Pakistan; Mediation Analysis.

Introduction

Many organizations in the corporate social and environmental sectors are adopting environmental sustainability in order to allow businesses to organise. Higher Education Institutions (HEIs) play a key role in institutionalizing sustainable behaviours among their academic staff and students as well as environmental education. Green Human Resource Management (GHRM) is a strategic concept that aligns human resource functions with environmental objectives to nurture sustainable organizational cultures in the organization. This research looks at how GHRM impacts environmental performance in HEIs of Khyber Pakhtunkhwa and the mediating role of environmental awareness.

The raising of environmental degradation, pollution and institutional waste have warranted serious concerns scholarly, policy, and organizational circles globally to adopt green practices to reduce waste to carbon footprint and live sustainably (Adeel et al., 2022; Malik et al., 2021). As companies work to become more sustainable, commitment to GHRM practices such as green recruitment, environmental training, green performance appraisals, the development of green employees cannot be overlooked in embedding environmental awareness to organisational systems (Altassan, 2023; Gul et al., 2025). Earlier studies show that various GHRM practises enhance employees' green creativity, innovation and pro-environmental behaviour and performance, which improves performance on the environmental sustainability front (Malik et al, 2021; Hameed et al, 2023). GHRM helps organizations develop an environmentally-aware workforce that is useful in achieving sustainability targets (Pham et al., 2018; Jabeen et al., 2024). It does so by enhancing environmental awareness and developing a green culture in the organization.

Although academic planning efforts have intensified, significant research deficiencies persist. While Greening Human Resource Management (GHRM) has gained much popularity in the past twenty years, the existing literature mostly focuses on the corporate sector. The academic institutions are less researched in this area (Tairu, 2018; Rath & Schmitt, 2017; Dyer & Dyer, 2017). Research indicates that GHRM practices may motivate employees in Pakistani universities to enhance sustainability at the workplace (Gilal, Ashraf, Gilal, Gilal & Chaana, 2019). However, there is a lack of empirical research on GHRM shaping environmental outcomes in higher education institutions especially in developing countries. In addition, prior research has not adequately examined the mediating role of environmental awareness in the GHRM–environmental performance relationship, especially in a region like Khyber Pakhtunkhwa which is going through the motions of sustainability but has not been empirically evaluated systematically. The gaps reveal the need for studies that show how GHRM practices can strengthen the environmental awareness of the employee thus enhance performance.

This study contributes to the literature in several ways. First, it provides proof and evidence for the impact of GHRM practices on environmental performance amongst public sector HEIs of Khyber Pakhtunkhwa. Moreover, it contributes to theoretical development by analyzing whether environmental awareness serves as a mediating mechanism that explains GHRM's impact on environmental outcomes. Next, it adds to the limited context-specific literature from Pakistan to plan and formulate policies for sustainability in the higher education sector.

This study comes as an eye-opener to university administrators, policymakers, and sustainability practitioners on the strategic value of GHRM for promoting environmental sustainability. By comprehending how GHRM practices promote awareness of environment and strengthen environmental performance, HEIs can better align internal operations with national and global priorities. The expected findings will assist decision-makers to design HR-based sustainability interventions to build green competencies and further institutional sustainability agendas.

The paper is organized in the following manner: the next section presents literature review and hypotheses development. The third section contains the research design, population, sampling and data analysis procedures. The empirical results are detailed in section four and section five presents

the discussion. The last part ends with implications, limitations, and suggestions for future research.

Literature Review

In recent years, the literature on sustainable human resource practices has expanded dramatically to examine how Green Human Resource Management (GHRM) affects the behaviours of employees and organizations' environmental performance. This section summarises the main theoretical perspectives and empirical evidence that underlie the relationships among GHRM, environmental awareness and environmental performance. This also showcases relevant mediators and moderators that were previously studied in the field of sustainable HRM which helps in developing hypothesis and modelling.

Green Human Resource Management (GHRM)

Green human resource management has become an essential aspect of human resource management that tries to integrate environmental management within traditional human resource management functions. These functions include green recruitment, green training and development, green performance appraisal and green compensation systems. In addition to the above argument, other studies suggest that GHRM practices help in developing eco-friendly knowledge, skills and motivation among employees that contribute towards achieving organisational environmental objectives (Khawaja & Janjua, 2025; Adeel et al., 2024). According to a study, GHRM implementation provides organizations with improved employee engagement, effective knowledge-sharing mechanisms and better pro-environment behaviors. These findings are consistent with those of Xie and Lau (2023) indicating that GHRM dimensions (training, appraisal and reward) are vital to developing green human capital and achieving sustainability performance.

According to Malik et al. (2021), there are studies which stated that green training and development programs encourage green creativity, green innovation and they are important outcomes for sustainable growth of organizations. Green organizational culture plays a central role as sustainable norms and shared beliefs strengthen environmentally responsible practices thus employees in any organization (Pham et al., 2018). These initiatives enhance environmental competencies and build preparedness, suitability and institutional capacity for innovation and sustainability.

Environmental Awareness

Employees' understanding of environmental issues, ecological responsibilities, and sustainable behaviours are called Environmental Awareness. In the case of HEIs, environment consciousness inspires the academic corps to engage in waste reduction, energy conservation and sustainability (Maliha et al., 2024). According to Khan et al (2025), green training and organizational communication of GHRM practices significantly enhance environmental awareness by providing information, learning experience, and behavioural cues to increase employee sensitivity to environmental needs.

According to Social Cognitive Theory (SCT), environmental awareness is learned by observing other people, acquiring knowledge, and reinforcement mechanisms built into the green HR system. As institutions steadily promote sustainability messages and practices, employees are more likely to internalize environmental values and engage in green behaviours that benefit organizational sustainability outcomes.

Environmental Performance

An organization's environmental performance indicates whether they have achieved the sustainability-related outcomes that they set out, such as energy efficiency, reduced waste, saving resources, and going green. Environmental performance is shown in HEIs by the use of less electricity and paper, running of a sustainable campus, and participation of faculty in environment initiatives (Usman et al., 2024). We cannot only rely on structural intervention but need strong employees' commitment and environmental competencies which can be significantly impacted through GHRM practices to enhance these outcomes.

Relationship between GHRM and Environmental Performance

Many studies show a positive relationship between GHRM practices and environmental performance. As per the AMO (ability, motivation, and opportunity) framework, GHRM improves employees' environmental abilities (through training), motivation (through reward and recognition), and opportunities (through participation programs) to behave ecologically (Khawaja & Janjua, 2025). According to social exchange theory (SET), it is expected that when organizations invest in green practices and provide environmental support, employees will return the favor by exhibiting pro-environmental behaviors that contribute to the overall environmental performance of the institution.

Previous studies show that GHRM enhances green creativity, innovation, pro-environmental work behaviour which ultimately leads to improvement in organizational environmental performance (Malik et al., 2021; Jabeen et al., 2024). Research in various sectors like the food sector, manufacturing, etc. also shows that green transformational leadership and green innovation greatly moderate the GHRM–environmental performance relationship (Amjad et al., 2025; Weber & Kassab, 2024). HR-based sustainability strategies can take many different forms. Nevertheless, they lead to the achievement of environmental excellence in organizations. Thus, it is proposed that the following hypothesis is developed.

H1: Green Human Resource Management (GHRM) practices have a positive and significant effect on the environmental performance of Higher Education Institutions (HEIs).

Green Human Resource Management and Environmental Awareness

Green Human Resource Management (GHRM) refers to environmental practices and policies integrated into the traditional Human Resource Management (HRM) system to enhance the environmental performance of the organization and its overall functioning (Alketbi & Rice, 2024). Green Human Resource Management is a concept that can be defined as the processes that incorporate environmental management in the HRM processes of the organisation. The processes cover a wide range of processes like recruitment, training, performance management, compensation, etc. (Ghazi et al., 2024). GHRM aligned the prevailing HR practices with the environmental goals of an organization plays a key role environmental management and sustainability (Lashari et al., 2022).

GHRM not only promotes awareness amongst employees but encourages active participation in an organization's sustainability (Gazi et al., 2024). Although the importance of GHRM is becoming well-known, little is known in the literature regarding the impact of GHRM on employee behavior. (Malik et al., 2021) It is essential to explore this link because doing so will help us understand the ability of GHRM to shape employee mindsets and behavior as well as organizational behaviour at a level beyond what we label as 'green' (Malik et al., 2021) and consequently also organizational environmental performance.

This phenomenon is said to take place in higher education organizations as they face special issues related to their distinct organizational structure as well as a variety of stakeholders (Asfahani, 2023). The academics GHRM aims to reduce the significant institutional waste generated by the

institution (e.g. paper, plastics) and instil an environmental culture within the staff and students (Adeel et al., 2022). By creating a positive socio-psychological environment, GHRM encourages employees to feel that their engagement in environmental activities helps the company attain environmental goals. In another words, managers help company to take macro-level sustainability agenda to individual employee level (Ghazi et al., 2024; Malik et al., 2021).

In the end, successful implementation of GHRM can assist in the sustainable utilization of resources, practicing eco-friendly behaviour, as well as creating a culture of environmental awareness and competence among employees resulting in sustainability in the organization (Jamil et al., 2023). Hence, the following hypothesis is formulated from the above discussion:

H2: Green Human Resource Management (GHRM) practices positively and significantly influence environmental awareness among academic staff in higher education institutions (HEIs).

Environmental Awareness and Environmental Performance

The universities can improve their environmental performance by continuously learning about and using knowledge about green innovation processes (Zada et al., 2025). Using environmentally friendly knowledge management systems to share environmental intelligence, creating a knowledgeable workforce that enhances green innovation. Furthermore, specialists highlight that sustainable development should not only safeguard existing environmental conditions but also utilize them to improve future conditions in all aspects such as our economy, environment and social (Abubakar et al., 2016). The new perspective implies that sustainability must be a mission of the institutions of higher education. In this context, institutions must try to incorporate sustainability in their curricula, research and campus operations (Ospino et al., 2025). This includes contributing to sustainability and digitalization curricula and programs to motivate students in the same (Shen et al., 2025). This initiative is important in influencing the mindset of faculty, staff and students for the adoption of digital solutions to save the environment (Shen et al., 2025). This can be further reinforced through academic and social engagements along with seminars, workshops, and interactive sessions both within and outside the university to foster a green digital mindset (Shen et al., 2025). These activities play an important role in creating awareness in the students and personnel, as well as their participation, and the institution's goals with sustainability goals (Shange et al., 2025; Shen et al., 2025).

Based on the above discussion, the following hypothesis is proposed:

H3: Environmental awareness positively and significantly contributes to the environmental performance of HEIs.

Mediating Role of Environmental Awareness

GHRM influences environmental performance via environmental awareness which is important cognitive mechanism. According to Social Cognitive Theory, experiences, environmental signals and organizational communication shapes pro-environmental mindset and behaviour of employees. Research tells us that GHRM improves environmental awareness which encourages employees to engage in behaviours that enhance environmental performance (Khan et al., 2025; Usman et al., 2024). Recent studies have looked into other mediators such as green innovation, green creativity, pro-environmental behaviour, and psychological green climate (Faheem et al., 2023; Nhung et al., 2024). Green training, for example, activates green innovation when employees acquire the ability to develop new creative environmental solutions (Laradi et al., 2024). In a similar way, green transformational leadership reinforces how GHRM improves awareness and environmental performance (Wang & Makhbul, 2024). The results show that things which happen inside HRM processes have a significant impact on the results of GHRM.

In particular, Jerónimo et al. note that green behaviour at home and work can mediate the relationship of GHRM on environmental performance. This spillover effects points to a wider role

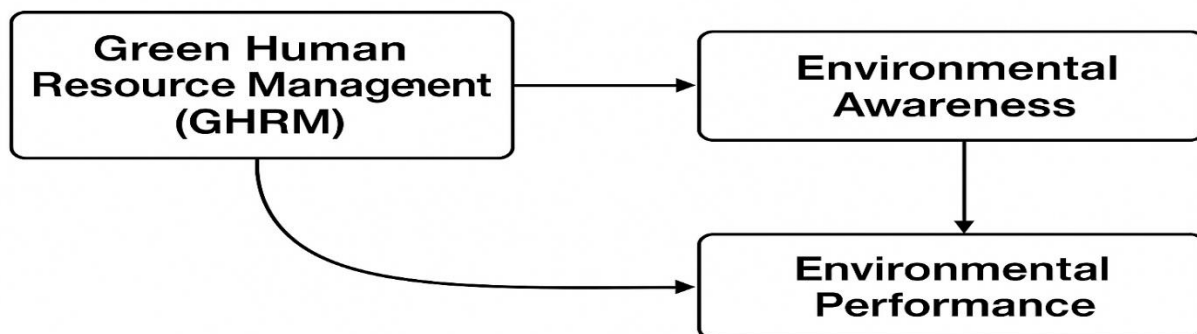
of behaviour. This multi-faceted perspective highlights the importance of further investigating the mediators that explain how GHRM enhances institutional environmental performance. Based on the above discussion, the following hypothesis is proposed:

H4: Environmental awareness mediates the relationship between Green Human Resource Management (GHRM) practices and environmental performance in HEIs.

Conceptual Framework

The study's conceptual framework identifies how a) Green Human Resource Management (GHRM) and environmental performance relate directly and how b) GHRM and environmental performance relate indirectly in Higher Education Institutions (HEIs). The model utilizes the theory of social exchange (SET), the ability-motivation-opportunity (AMO) framework, and the social cognitive theory (SCT). GHRM practices (green recruitment, green training, green performance appraisal and green rewards) enhance employees' ability, motivation, and opportunity to act eco-friendly. These practices would directly enhance environmental performance, as they will help facilitate sustainable work behaviours and efficient resource usage. According to the theorists, at the same time, GHRM may indirectly affecting environmental performance through creating environmental awareness. Thus, environmental awareness would be an essential cognitive mechanism that influence employee's pro-environment attitude and behavior. So, the framework proposes that environmental awareness acts as a mediator between GHRM and environmental performance, which indicates the importance of awareness in enhancing sustainability outcomes in HEIs.

Conceptual Framework



Conceptual framework illustrating the relationships between Green Human Resource Management (GHRM), Environmental Awareness, and Environmental Performance in HEIs of Khyber Pakhtunkhwa

Research Methodology

Participants and Procedure

The study's population was faculty members of six (6) public-sector universities of Khyber Pakhtunkhwa Pakistan. Relevant information regarding the faculty was obtained from HEC Faculty Database (2023-2024). A stratified random sampling technique was employed to ensure fair and representative participation across all institutions. Out of 300 questionnaires distributed, 270 were received back giving return of 90% response. After checking for missing or contradictory

answers, we retained 240 valid questionnaires for analysis, giving a final valid response rate of 80%. There were valid responses from 40 faculty members of the University of Peshawar, 40 faculty members of Islamia College University, 30 faculty members of University of Agriculture Peshawar, 30 faculty members of Shaheed Benazir Bhutto Women University, 60 faculty members of University of Engineering and Technology Peshawar, and 40 faculty members of the Khyber Medical University. This distribution allowed all partnering institutions' representation which is balanced and adequate for the study's analysis.

Measures

Green Human Resource Management (GHRM)

GHRM was measured using a 14-item scale developed by Ogbonnaya et al. (2020) with slight modifications involved changing the word 'company' to 'university.' An illustrative item is "The university focuses on recruiting and selecting employees who are environmentally conscious and have environmental knowledge and skills." All items were measured on a 5-point Likert scale (1 = strongly disagree; 5 = strongly agree).

Environmental Performance (EP)

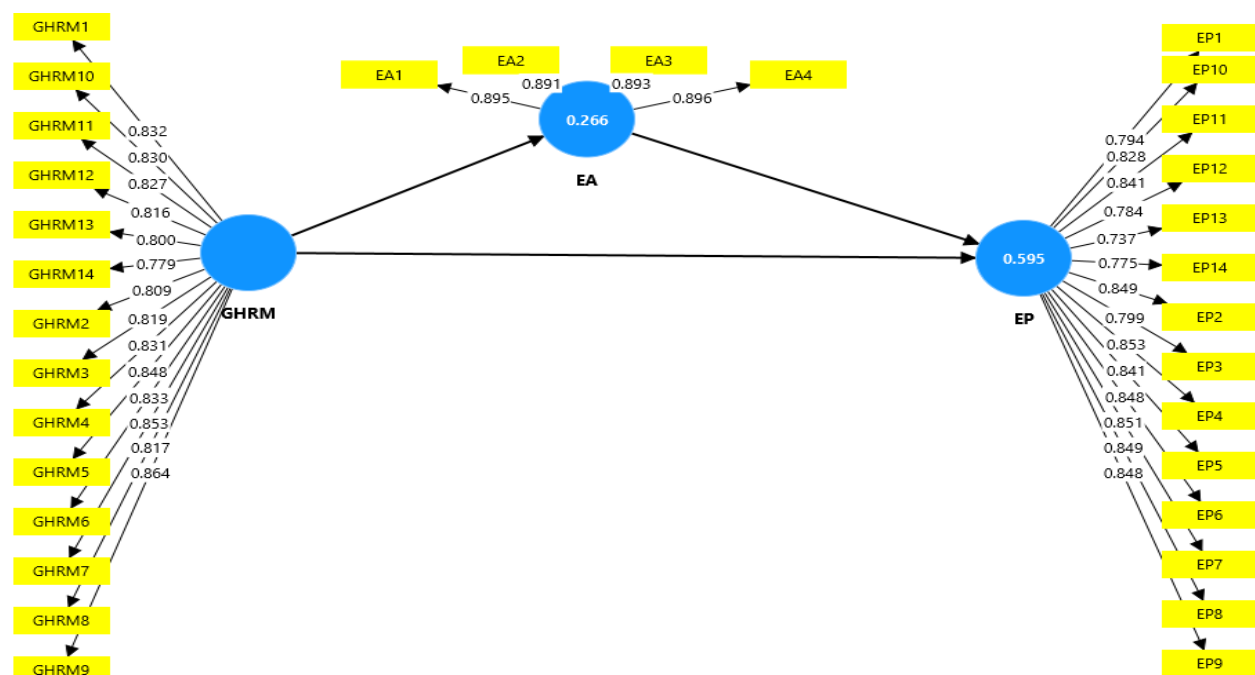
The environmental performance was assessed using a scale comprising 14 items (Larrán Jorge et al. 2016). A sample item is: "In my university, initiatives are taken to implement long-term environmental policies."

Environmental Awareness (EA)

The four-item scale derived from Han & Yoon (2015) was used to measure environmental awareness. A sample item is: "The effects of pollution on public health are worse than we realize."

Measurement Model Assessment

The constructs used in this study are reliable and valid as measured by the selected measurement model. The assessment included the checking of indicator loadings and internal consistency reliability. Additionally, it also checked for both convergent validity and discriminant validity.



	EA	EP	GHRM
EA1	0.895		
EA2	0.891		
EA3	0.893		
EA4	0.896		
EP1		0.794	
EP10		0.828	
EP11		0.841	
EP12		0.784	
EP13		0.737	
EP14		0.775	
EP2		0.849	
EP3		0.799	
EP4		0.853	
EP5		0.841	
EP6		0.848	
EP7		0.851	
EP8		0.849	
EP9		0.848	
GHRM1			0.832
GHRM10			0.830
GHRM11			0.827
GHRM12			0.816
GHRM13			0.800
GHRM14			0.779
GHRM2			0.809
GHRM3			0.819
GHRM4			0.831
GHRM5			0.848
GHRM6			0.833
GHRM7			0.853
GHRM8			0.817
GHRM9			0.864

Indicator Reliability

The reliability of indicators was strong with all indicator loadings higher than 0.7. The loadings for the Environmental Awareness (EA) items ranged from 0.891 to 0.896, the Environmental Performance (EP) indicator loaded between 0.737 and 0.853 while loadings for Green Human Resource Management (GHRM) loaded between 0.799 and 0.896. These figures reveal that every item was of great help in their constructs.

Internal Consistency Reliability and Convergent Validity

We checked for internal consistency using Cronbach's Alpha, rho_A, and CR. Every construct showed reliability that was above the threshold of 0.70. The EAs' Cronbach's Alpha score is 0.916, that of EP is 0.963 and GHRM is 0.964. The Composite Reliability values also remained high, between 0.941 and 0.968, indicating excellent reliability.

Validity was established by considering their Average Variance Extracted (AVE). All the Average Variance Extracted (AVE) values are above the recommended limit of 0.50. EA is at 0.799, EP at 0.676, and GHRM at 0.682. These results indicate that the constructs account for a large proportion of variance in their indicators.

Construct reliability and validity

	Cronbach's alpha	Composite reliability (rho_a)	Composite reliability (rho_c)	Average variance extracted (AVE)
EA	0.916	0.916	0.941	0.799
EP	0.963	0.964	0.967	0.676
GHRM	0.964	0.965	0.968	0.682

Discriminant Validity

We assessed discriminant validity with the Fornell–Larcker criterion. The AVE for each construct had a higher square root than the correlations between constructs which indicates satisfactory discriminant validity. For instance, the EA and EP were found to correlate by 0.714. Similarly, the GHRM showed inter-correlations with other constructs within 0.547 to 0.696. All values were below the square roots of their respective AVE values.

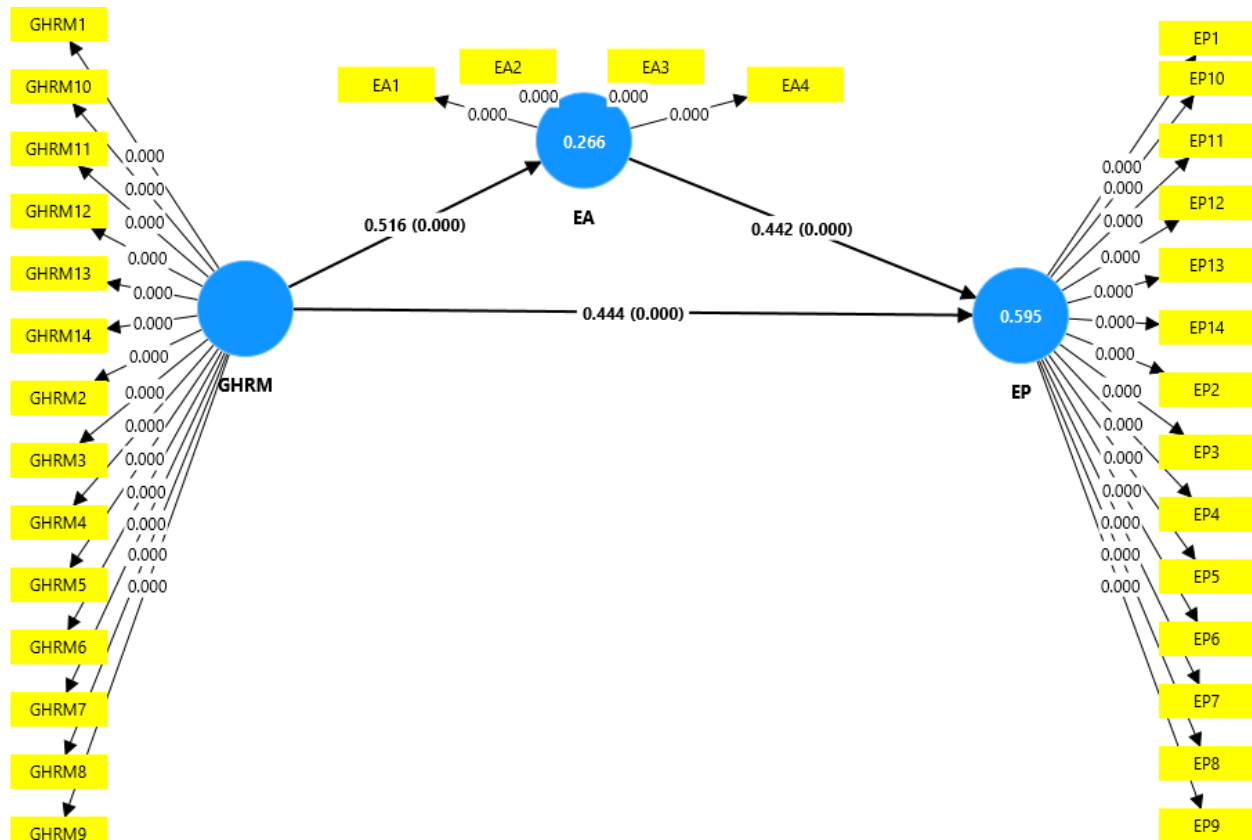
Discriminant validity (HTMT)

	EA	EP	GHRM
EA			
EP	0.714		
GHRM	0.547	0.696	

In general, the measurement model has reliability, convergent, and discriminant validity which suggests that the data is ready for structural modelling.

Structural Model Assessment

The structural model was analyzed to test the hypothesized relationships between GHRM, Environmental Awareness and Environmental Performance. We looked at path coefficients, t-values, p-values and other indicators.



Path Coefficients

The path analysis results showed that every relationship we forecasted was a positive and statistically significant one. The practice of green HRM significantly raises the environmental knowledge and sensitivity of employees. Environmental awareness, in turn, positively impacts environmental performance ($\beta = 0.442$, $t = 4.941$, $p < 0.001$). This finding implies that those employees who have more awareness of the environment will have better involvement in environmental initiatives within their universities. Also, GHRM had a direct positive influence on Environmental Performance ($\beta = 0.444$, $t = 5.227$, $p < 0.001$), meaning that environmentally focused HR practices directly improve environmental performance in educational institutions.

	Original sample (O)	Sample mean (M)	Standard deviation (STDEV)	T statistics ((O/STDEV))	P values
EA -> EP	0.442	0.441	0.089	4.941	0.000
GHRM -> EA	0.516	0.519	0.065	7.949	0.000
GHRM -> EP	0.444	0.446	0.085	5.227	0.000

Explanatory Power (R^2)

We assessed the explanatory ability of the structural model through the coefficient of determination (R^2). Environmental awareness or EA is the GHRM or Green Human Resource Management contributing factor. Environmental Performance ($R^2 = 0.595$) was similarly explained by GHRM and Environmental Awareness. The values are moderate to high and suggest the model explains the variation in the dependent constructs.

	R-square	R-square adjusted
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EA	0.266	0.263
EP	0.595	0.592

Effect Size (f^2)

	Original sample (O)	Sample mean (M)	Standard deviation (STDEV)	T statistics ((O-STDEV))	P values
GHRM -> EP	0.228	0.228	0.053	4.308	0.000

We also assessed the effect size of each independent variable on the dependent variable through their f^2 values. The impact of GHRM on Environmental Awareness is suggested to be moderate ($f^2 = 0.362$). Likewise, Environmental Awareness (EA) ($f^2 = 0.354$) and GHRM ($f^2 = 0.358$) also have moderate impact on Environmental Performance. The independent variables generally contribute to explaining the variation in the endogenous constructs.

F squared

	EA	EP	GHRM
EA		0.354	
EP			
GHRM	0.362	0.358	

Predictive Relevance (Q^2)

They used the blindfolding technique to check the predictive relevance with the help of Q^2 values. The model in question highly predicts the outcome since both of the endogenous constructs have a Q^2 value greater than zero. The Q^2 value of Environmental Awareness is 0.251, while that of Environmental Performance is 0.437. These results show that the model has enough predictive accuracy to predict the outcome of endogenous variables.

Q Squared

	Q^2predict	RMSE	MAE
EA	0.251	0.872	0.591
EP	0.437	0.756	0.527

Mediation Analysis

The bootstrapping procedure was used to examine the indirect effect, direct effect and total effect of Environmental Awareness on GHRM Environmental Performance. The impact of GHRM on EP through EA is found to be positive and significant as $\beta = 0.228$, $t = 4.308$, $p < 0.001$ suggesting that GHRM enhances environmental performance by enhancing EA. The impact of GHRM on EP was still significant at ($\beta = 0.228$, $t = 4.308$, $p < 0.001$) after including the mediator which shows GHRM impact on EP was direct in addition to indirect.

Total indirect effect

The GHRM had a significant total effect on EP ($\beta = 0.672$, $t = 11.512$, $p < 0.001$), hence establishing the strength of the connection. VAF was used to estimate the extent of mediation. The VAF score of 33.9% lies between 20-80% signifying partial mediation or influence. Thus, the connection between GHRM and Environmental Performance is partly mediated by Environmental Awareness. Thus, this result supports H4. The practices of the organization and employees' environmental consciousness will improve the environmental performance of the organization.

Total effect

	Original sample (O)	Sample mean (M)	Standard deviation (STDEV)	T statistics ((O/STDEV))	P values
EA -> EP	0.442	0.441	0.089	4.941	0.000
GHRM -> EA	0.516	0.519	0.065	7.949	0.000
GHRM -> EP	0.672	0.675	0.058	11.512	0.000

Hypothesis Testing

According to the structural model findings, the study's hypotheses were all supported. As the findings revealed, GHRM enhances Environmental Awareness (H1 supported), Environmental Awareness enhances Environmental Performance (H2 supported), and GHRM is positively and directly related to Environmental Performance (H3 supported). The study results also showed that Environmental Awareness mediates GHRM-Environmental Performance relationship (H4), in other words, green HRM practices do not only directly impact environmental performance but also indirectly as faculty members improve their Environmental Awareness. The study outcomes substantiate the conceptual framework and highlight the significant impact of GHRM on cultivating environmental consciousness and sustainability in higher educational institution.

To sum up, the analysis confirmed that the measurement model passes all reliability and validity tests. The results of the structural model supported the all hypothesized paths. GHRM significantly enhanced environmental awareness and environmental performance. In addition, environmental awareness was also a significant path through which GHRM influenced the environmental outcome.

Discussion

The study results robustly show that GHRM practices influence the environmental awareness and environmental performance of faculty members in HEIs (Higher Education Institutions) of Khyber Pakhtunkhwa, Pakistan. As was hypothesized, GHRM has a significant positive impact on environmental awareness ($\beta = 0.516$, $p < 0.001$). In other words, the implementation of green recruitment, green training/education, green performance appraisal, and green reward systems enhances employees' knowledge, sensitivity, and participation in environmental issues. As previous research (Malik et al., 2021; Adeel et al., 2024) indicates, GHRM practices increase the employee eco-consciousness and develop the competencies of the employees which serves to implement sustainability in the organization.

Further, environmental awareness was proved to be an important predictor of environmental performance ($\beta = 0.442$, $p < 0.001$), which shows that those employees who are more knowledgeable and conscious of environmental issues take part in energy conservation and waste reduction in HEIs. The mediation analysis also shows that environmental awareness partially mediates the GHRM and environmental performance link (VAF = 33.9%). Thus, GHRM enhances environmental performance directly and indirectly through increasing employees' cognitive awareness about the environment. This study supports the propositions of Social Cognitive Theory (SCT) that knowledge, observation, and reinforcement mechanisms contribute to pro-environmental behavior (Ghazi et al., 2024; Darvishmotevali & Altınay, 2021).

GHRM improves environmental performance directly ($\beta = 0.444$, $p < 0.001$). This suggests that green HR practices promote awareness among individuals and organizations. Moreover, green HR

practices have the ability to shape practices and behaviour to promote safeness. This is consistent with the Ability–Motivation–Opportunity (AMO) framework which states that giving employees environmental ability, motivating them through reward and recognition and providing opportunities for participation will encourage employees to perform eco-friendly behaviour that enhances institutional environmental performance. In the same way, Social Exchange Theory (SET) states that organizations investing in green initiatives will motivate employees to engage in responsible environmental behavior in return and ultimately enhance performance outcomes of sustainability (Usman et al., 2024).

Integrating GHRM strategies in higher education is valuable for many reasons. A practically implication from the study is that HEIs can promote sustainability outcomes by designing green HR programmes that integrate environmental training with performance management and participative initiatives. Such interventions do not only improve employees' environmental consciousness, they facilitate employees' participation in eco-friendly practices and inculcates a culture of sustainability. These findings also have theoretical contributions as they consolidate evidence on applicability of SET, AMO and SCT in the context of HEIs of Pakistan and fill a major gap in literature which has largely dealt with corporate sector.

Ultimately, the study shows that GHRM plays a significant part in enhancing environmental performance. However, the study had been limited to six public-sector universities in a specific region. Future studies may look at other mediators such as green innovation, green psychological climate, leadership styles and assess the relationships across different cultures and organizations to help with generalizability. In general, this study shows that GHRM practices, which can be implemented with purpose, increase awareness and performance on the environment. Overall, using human resource management can align organizations to their sustainability goals as well.

Implications of the Study

This research will make theoretical and practical contributions to understanding the role of Green Human Resource Management (GHRM) in higher education institutions. In theory, it supports the applicability of Social Exchange Theory (SET) and Social Cognitive Theory (SCT) as well as Ability–Motivation–Opportunity (AMO) framework as it indicates that GHRM practices can play a role in employees' pro-environmental behaviours through cognitive and motivational mechanisms. The findings also show that environmental awareness mediates SCT by showing how knowledge acquisition, observation, reinforcement in impacts environmental outcomes. The study also fills an important gap in the literature by looking at GHRM in the context of universities in Pakistan which is an under-researched area in past studies and providing a multi-theoretical view of the impact green HR practices have on environmental performance.

The study suggests that universities can enhance environmental performance by adopting systematic GHRM functional strategies such as green recruitment, training, performance appraisal and rewards. Engaging faculty in environmental awareness through workshops, campaigns and participative initiatives can help strengthen engagement further. When the human resource policies of an institution align with the sustainability goals of the university, it helps in supporting eco-friendly behaviour, enhancing the efficient use of resources, and finally, achieving its long-term environmental objectives. University administrators and policymakers can take actionable insights from these findings that strategically integrated offerings of GHRM are essential for the development of green employees and sustainability outcomes of organizations.

Conclusion

This research proves that the eco-friendly Human Resource system positively affects the environmental performance of higher education institutions directly and indirectly through green awareness. The results show that employee environmental knowledge and engagement help turn

human resource actions into sustainable human resource actions. The research further demonstrates that the SET, SCT, and AMO frameworks can promote eco-friendly behavior in academic contexts. By embedding GHRM strategies and awareness programs practically improve organizational environmental performance and organization sustainability in universities. HRs cannot do everything to ensure sustainability, but they can help inculcate and align values. Through strategically aligned HR practices, organisations can nurture environment-friendly employees and attain sustainability goals.

Limitations and Future Research Directions

Limitations of this study must be considered despite it being contributory. To begin with, the research was limited to six public-sector universities in Khyber Pakhtunkhwa, Pakistan. Therefore, people may not generalize the findings to other regions, private universities and/or sectors. Secondly, the study relied on self-reporting by faculty members. Thus, their responses could exhibit social desirability bias. For the third point, while examining environmental awareness as a mediating variable, other mediating and moderating variables like green innovation, green psychological climate of firms, and green leadership are ignored which may provide further insights on the relationship of GHRM–environmental performance.

In the future, the researchers may expand the sample to public schools or private schools or a cross-country sample with some other country. We could handle longitudinal designs in research in the future to get causal relations better. Also, examining other mediating and moderating variables may provide a better understanding of how GHRM affects environmental performance. In summary, qualitative research could provide deeper insight into faculty views, experiences, and organizational practices regarding sustainability, offering a different angle from other quantitative findings that would advance theoretical and practical understanding.

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