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KEYWORDS	ABSTRACT
Green Human Resource Management, Environmental Performance, Green Innovation, Employee Green Behavior, Manufacturing Sector, Pakistan	Organizations are under pressure to perform better concerning environmental performance, but they are unable to introduce effective Green Human Resource Management practices. This paper explores how Green Human Resource Management affects environmental performance through the mediating influence of green innovation and green employee behaviour. A cross-sectional survey was conducted on 193 HR professionals and industrial officers working in Lahore and Sheikhpura, Pakistan, manufacturing companies and analyzed via partial least squares structural equation modelling (PLS-SEM). The results reveal that GHRM practices enhance EP directly and indirectly, mainly through the strong intervening effect of green innovation and to a smaller extent through employee green behaviour. These results provide both theoretical and practical information on the way to attain sustainable performance and create a clear roadmap through which industries can play a role in SDGs 9 (Industry, Innovation, and Infrastructure), 12 (Responsible Consumption and Production), and 13 (Climate Action).
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Introduction

Green Human Resource Management (GHRM), the integration of environmental values into HR functions has gained considerable attention for its potential to enhance environmental performance, foster green innovation, and promote employee green behavior (Khan et al., 2025). Regulators, investors, and other stakeholders are putting more pressure on organizations to be environmentally friendly, which means that environmental goals are becoming more important. Recent evidence shows that integrating environmental, social, and governance (ESG) factors into

corporate strategy is quickly becoming the norm as companies make sustainability a regular part of their operations (Kumar, 2025). The EU Corporate Sustainability Reporting Directive (CSRD) and other similar frameworks now require businesses to be more environmentally responsible, even when the economy is unstable (Yang, 2025). In this context, GHRM becomes a strategic tool for integrating environmental awareness into everyday business practices. This study looks at how green innovation and employees' green behaviour work as two separate mediators in the GHRM environmental performance relationship.

It is well known that traditional HR practices like training employees, getting them involved, and giving them rewards based on their performance can help organizations do better (Delaney & Huselid, 1996). When framed with an environmental goal, these practices can give employees a mindset of sustainability. With the rise of technology-enhanced ESG tracking tools, this integration has become more strategic. Today, HR systems are more likely to link talent management directly to ESG goals, which shows how important GHRM is to corporate sustainability plans (Wilkinson et al., 2001).

Integrating sustainability into HRM is essential for addressing the varied demands of stakeholders (Colakoglu et al., 2006). GHRM facilitates the implementation of environmentally sustainable practices, encourages innovation, and promotes behaviours that are consistent with ecological objectives (Chen et al., 2020). Dumont et al. (2017) emphasize that HR-driven strategies can concurrently foster green creativity, enhance employee engagement, and yield improved environmental outcomes. Organizations that want to align their work with the United Nations Sustainable Development Goals (SDGs), especially SDG 9 (Industry, Innovation, and Infrastructure), SDG 12 (Responsible Consumption and Production), and SDG 13 (Climate Action), are increasingly seeing the adoption of Green Human Resource Management (GHRM) as an important strategic lever (Jabbour et al., 2016; Tang et al., 2018). Adverse economic conditions can influence individuals' and organizations' risk preferences, potentially affecting their willingness to undertake innovative and sustainability-oriented initiatives (Ahmed et al., 2025). Globally, the notion of parallel mediation has been widely accepted as scholars continue to attempt to comprehend the nature of the association that exists between HR practices and the results of sustainability. This method provides more information on whether innovation-based or behavior-based processes are greater contributors to environmental performance.

Research Gap and Novelty

The role of GHRM has been constantly acknowledged in sectors in Pakistan. Nevertheless, there is a dearth of empirical studies investigating the independent, but concomitant, impact of green innovation and employee green behavior on the GHRM-EP relationship within the manufacturing industry (Gul et al., 2025; Khan et al., 2025; Afzal et al., 2023). This paper fills this gap by presenting one crucial theoretical subtlety: the GI and EGB are parallel mediators. This method goes beyond looking at individual mediators separately, and by so doing, we are able to decouple and contrast the unique explanatory power of a capability-based, macro-level pathway (GI) vs. a motivation-based, micro-level pathway (EGB). In this way within the understudied setting of

Pakistani manufacturing a setting where regulatory pressures and cost competition are on the rise the research gives a more full-fledged and contextualized picture of the black box of GHRM to sustainability outcomes and puts into question the generalization of existing theories.

Research Questions

This study will respond to the following questions in light of the above mentioned facts:

RQ1. What is the Green HRM's influence on environmental performance?

RQ 2. How does green innovation mediate the relationship between Green HRM and environmental performance?

RQ 3. How does employee green behavior mediate the relationship between Green HRM and environmental performance?

RQ 4. What is the combined mediating effect of green innovation and employee green behavior on the relationship between GHRM and environmental performance?

Research Objectives:

Specifically, the research objectives will be:

- To identify the green HRM practices implemented in the manufacturing firms.
- To investigate how green HRM practices and environmental performance are related to each other.
- To investigate the mediating role of employee green behavior and green innovation in the relationship between GHRM and environmental performance.
- To suggest suitable recommendations to the firms on how to implement sustainable HR strategies to improve sustainability and environmental performance.

This research is relevant to the literature as it unravels the causal links between HR practices and environmental results in two mediating variables. It takes the Western-centric GHRM discourse and situates it in the context of an emerging economy, and it provides managers with insights useful in modelling HR systems that facilitate not only innovation but also green behavior to enhance environmental legitimacy and competitiveness. Thus, the study makes the organizational practice consistent with the United Nations Sustainable Development Goals (SDGs), specifically Goal 12 (Responsible Consumption and Production) and Goal 13 (Climate Action).

Literature Review and Hypothesis Development

The paper is grounded in four theoretical frameworks that are compliant with each other and explain the application and reasons of Green Human Resource Management (GHRM) practices on Environmental Performance (EP). Institutional Theory describes the external forces which

encourage firms to embrace GHRM. These practices are then framed through the Resource-Based View (RBV) as strategic investments which develop valuable human capital. Lastly, both the Ability-Motivation- Opportunity (AMO) theory and the Self-Determination Theory (SDT) offer the micro-level of how this human capital is converted into green results through employee capabilities, motivation and opportunities.

Theoretical Underpinnings

Resource-Based View (RBV):

The RBV (Barney, 1991) is an idea that states that companies can achieve a sustainable competitive advantage through the development of valuable, rare, inimitable and non-substitutable (VRIN) resources. GHRM practices are strategic investments that create a green human capital VRIN resource. Companies can develop a special internal capability by hiring green talent, training it green, and rewarding sustainable performance (Chen, 2008). It is this human capital that is the foundation of green innovation (a capacity to create new processes and products that are environmentally friendly) and consistent employee green behavior (a routine use of resources) that, in turn, improve environmental performance (Zahrani, 2024). Technological innovation can contribute to environmental sustainability by lessening the undesirable environmental externalities (Shahab and Mahmood, 2026).

Ability-Motivation-Opportunity (AMO) Theory:

AMO framework offers a micro-foundational perspective on the effects of GHRM practices on individual employees (Appelbaum et al., 2000). GHRM improves the Ability of employees to make contributions towards sustainability by training and developing them to be green. It enhances their Motivation through green compensation, rewards, and performance management which acknowledge environmental contributions. Lastly, it offers the Opportunity by green participation policies, suggestion schemes and facilitating psychological climate (Dumont et al., 2017). These augmented AMO dimensions are directly stimulating to EGB (the motivated action) and GI (the application of ability and opportunity to innovate), resulting in better EP.

Institutional Theory:

Institutional Theory explains why organizations embrace the same practices such as GHRM (DiMaggio & Powell, 1983). Firms are coerced into legitimizing their activities through sustainability, which is driven by coercive pressures (government regulations), normative pressures (industry standards, professionalization), and mimetic ones (imitating successful competitors). There are external institutional requirements of implementing GHRM. This theory describes the reason why the adoption of GHRM practices occurs, whereas RBV and AMO describe how the practices internally bring about performance results (Delmas & Toffel, 2004).

Self-Determination Theory (SDT):

SDT enhances the motivation aspect of AMO (Deci & Ryan, 1985). SDT deepens the motivation component of AMO. It assumes that GHRM leads to higher, intrinsic motivation, by fulfilling the human needs of autonomy (volitional action), competence (sense of effectiveness) and relatedness (feeling part of a cause), which is fundamental in maintaining voluntary green behavior and innovation (Robertson and Barling, 2013).

These theories in concert assume that firms use GHRM as a reaction to external demands, which in effect creates valuable human capital (RBV) by methodically adding value to employee ability, opportunity, and autonomous motivation (AMO and SDT) to meet environmental objectives.

Hypothesis Development

Green HRM Practices and Environmental Performance

GHRM practices align systematically the goals of employees to organizational environmental goals (Renwick et al., 2013). . Green recruitment means that the new employee is environmentally conscious, green training means that they develop the required skills, and green performance management means that they can track their achievements, and green rewards encourage the employees to act in the right direction. This strategic focus will ensure that the human resource initiatives are specifically geared towards waste reduction, increased energy use, and regulatory compliance, which will directly be able to improve EP (Yusoff et al., 2020; Gilal et al., 2019). Technological advancement and forestry conservation can contribute to environmental improvement by reducing long-term carbon emissions, demonstrating the importance of technology-oriented approaches to climate mitigation (Ahmad and Majeed, 2026).

Therefore, we hypothesize:

H1: Green HRM practices have a positive direct effect on Environmental Performance.

The Mediating Role of Green Innovation

Green innovation requires a critical antecedent GHRM practices. Training equips employees with the skills to be innovative sustainably. The system of performance management that incorporates green metrics and rewards on innovative ideas is what gives the impetus to innovate in rather risky activities (Malik et al., 2021). Moreover, the selection of people sharing the sustainability values enhances the possibility of coming up with new, sustainable ideas (Ali et al., 2019). This green innovation is in the form of new products, services or processes, which directly result in less environmental impact, conservation of resources and better EP (Chen et al., 2016; Rehman et al., 2021). Thus, we propose:

H2: Green HRM practices mediate the relationship between Green Innovation and Environmental Performance.

The Mediating Role of Employee Green Behavior

The behavior of employees is actually determined by GHRM practices. By demonstrating the significance of sustainability in an organization via its HR systems, an organization creates a green psychological climate that promotes pro-environmental behaviors (Dumont et al., 2017). Training raises awareness and capability, and rewards and recognition encourage employees to take part in both mandatory and optional green actions, including recycling, energy saving, and proposing changes (Pinzone et al., 2019; Chaudhary, 2020). The combination of these individual actions (EGB) results in organizational-level environmental performance that is significantly improved (Norton et al., 2015). Hence, we hypothesize:

H3: Green Behavior of employees mediates the relationship between Green HRM practices and Environmental Performance.

The Parallel Mediating Model

Crucially, Green innovation and employee green behavior are different but parallel versions of how GHRM influences the performance on the environmental front. Green innovation is a macro-oriented and capabilities-based route, which is change-oriented technologically and strategically (Khan et al., 2021). EGB is a motivation-based, micro-oriented, route that targets day-to-day actions and routines. They will be able to act concurrently and independently; innovation may take place without all employees altering their daily behavior, and higher-quality behaviors can lead to benefits even without radical innovation (Li et al., 2023; Naseer et al., 2023). Nevertheless, the combination of them is a more comprehensive explanation of the GHRM-EP relationship. When we test them concurrently, we are able to determine the distinct amount of variance each mediator accounts and provides detailed information about the mechanisms in action. This gives rise to our last hypothesis:

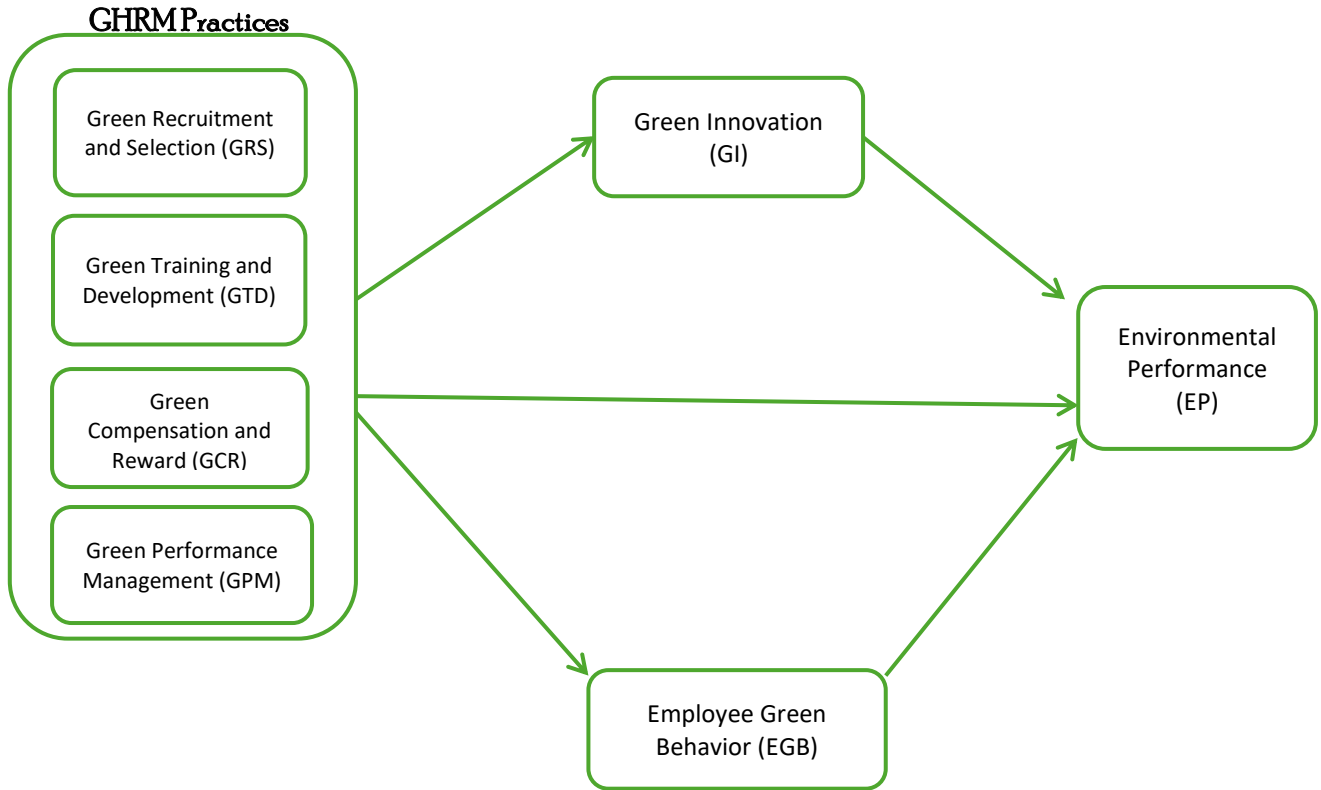
H4: Green Innovation and Employee Green Behavior are mediators in parallel relationship between Green HRM practices and Environmental Performance.

Research Methodology

Research Design and Data Collection

A quantitative, cross-sectional research design was used to test the hypothesized model (Harwell, 2011). The data was gathered through a structured questionnaire to the HR professionals, the plant and operations managers, middle management and general employees of manufacturing firms in the industrial hubs of Lahore and Sheikhpura, Pakistan. The reason behind the selection of this sector was its high environmental impact and the increased use of sustainable practices.

Figure 1: Conceptual Framework



The purposive sampling was employed to select people who are aware of the HR and environmental practices in their firm (Sekaran and Bougie, 2016). A minimum sample size of 160 was needed to have a medium effect size ($f^2 = 0.15$), power ($1 - \beta = 0.80$) and $\alpha = 0.05$, as a medium effect size, power and α would be needed respectively. A total of 345 sent questionnaires provided 193 complete and usable questionnaires, with a response rate of 55.9, which is strong enough to perform PLS-SEM analysis and far much above the minimum (Cohen, 1998; Hair et al., 2017).

The demographic and job characteristics of the participants ($N = 193$) are presented in Table 1. The sample was mainly male (64.8%) and the majority were aged 25-34 years old (54.5%). Most of the respondents had a Master Degree or above (89.1) and were in mid-level (53.9). Six main industries were used to draw the sample, of which Food & Beverage (21.2) and Animal Feed (18.1) were the most represented. Intensive job experience was also evident with 38.9% of the participants staying with their company over six years.

Table 1: Demographic Profile of Respondents (N=193)

Characteristic	Percentage (%)
Gender	
Male	64.8
Female	35.2
Age	
Below 25	24.4
25-34 years	54.5
35-44 years	13.5
Above 45 years	7.8
Education	
Diploma	8.8
Bachelor's Degree	21
Master/MBA/M.Phil/PhD	89.1
Job Position	
Entry-Level	11.9
Mid-Level	53.9
Senior/Executive Level	34.2
Industry	
Food & Beverage	21.2
Textile	17.1
Chemical	13.0
Glass	15.0
Automobile	15.5
Animal Feed	18.1
Job Tenure	
<1 year	13.0
1-3 years	21.8
4-6 years	26.4
More than 6 years	38.9

Measures

All constructs were measured using reflective scales adapted from established literature, with items rated on a five-point Likert scale (1 = Strongly Disagree to 5 = Strongly Agree).

The study employed a 31-item scale to measure four dimensions of **Green HRM Practices**: Green Recruitment & Selection (7 items, e.g., "We prioritize candidates with environmental awareness"), Green Training & Development (8 items), Green Compensation & Rewards (8 items), and Green Performance Management (8 items) (Renwick et al., 2013; Jabbour, 2011). These dimensions were modeled as a reflective, second-order construct. For **Green Innovation**, a 7-item scale was used to measure the development and implementation of eco-friendly innovations (e.g., "My organization

invests in environmentally friendly technologies") (Chen et al., 2006). **Employee Green Behavior** was assessed using a 7-item scale that measured voluntary and task-related eco-friendly behaviors (e.g., "I try to reduce waste in the workplace") (Robertson & Barling, 2013). **Environmental Performance** was evaluated using a 7-item scale, which focused on perceived environmental outcomes (e.g., "There has been a reduction in waste and emissions in recent years") (Daily & Huang, 2001). While firm characteristics such as size and age could potentially influence environmental performance, the core objective of this study was to test the theoretical relationships between the psychological and organizational constructs in the model. Based on power analysis and model complexity considerations, a focused approach was adopted for this study. Future research could incorporate these characteristics as control variables to account for additional variance.

Green HRM Practices:

A 31-item scale measured four dimensions: Green Recruitment & Selection (7 items, e.g., "We prioritize candidates with environmental awareness"), Green Training & Development (8 items), Green Compensation & Rewards (8 items), and Green Performance Management (8 items) (Renwick et al., 2013; Jabbour, 2011). The concept of GHRM was represented as a second-order reflective concept.

Green Innovation:

The development and implementation of eco-friendly innovations (e.g., "My organization invests in environmentally friendly technologies") was measured on a 7-item scale (Chen et al., 2006).

Employee Green Behavior:

Voluntary and task-related eco-friendly behaviors (e.g., "I try to reduce waste in the workplace") were measured on a 7-item scale (Robertson & Barling, 2013).

Environmental Performance:

The perceived environmental outcomes (e.g., "there has been a reduction in waste and emissions in recent years") were measured on a 7-item scale (Daily & Huang, 2001).

Control Variables:

Firm characteristics such as size and age may be relevant to the environmental performance, but the main aim of this study was to examine the theoretical connections of the psychological and organizational constructs of our model. The power analysis and complexity of the model that we did as a result of our considerations made us focus on a narrow model. They may be considered as control variables in future studies in order to explain more variance.

Data Analysis Strategy

Variance-based Partial Least Squares Structural Equation Modelling (PLS-SEM) with SmartPLS 4.0 was selected for three primary reasons, which align with the recommendations of Hair et al. (2019) and Ringle et al. (2022). To begin with, the purpose of the study is predictive, which is to explain the variance in the environmental performance, a strong advantage of PLS-SEM. Second, the model includes parallel mediators, creating a complex predictive model for which PLS is ideally suited. Third, the sample size (N=193), while sufficient for PLS, is below the threshold typically required for covariance-based SEM techniques, ensuring the robustness of the estimates. The analysis followed a two-step structural-equation-modeling (SEM) procedure (Hair et al., 2019): (1) Evaluated the measurement model by examining indicator loadings, Cronbach's α , composite reliability, and average variance extracted (AVE) to establish reliability and convergent validity; and (2) Tested the structural model, assessing direct effects and the mediating role of green innovation using a bootstrapping with 5,000 resamples (He & Wong, 2004).

Results

Measurement Model Assessment

The reflective measurement model was evaluated for internal consistency reliability, convergent validity, and discriminant validity (Hair et al., 2017). All constructs demonstrated good internal consistency, with Cronbach's Alpha and Composite Reliability (CR) values exceeding the recommended threshold of 0.70 (Nunnally & Bernstein, 1994). The Average Variance Extracted (AVE) for all constructs was above 0.50, confirming convergent validity (Fornell & Larcker, 1981). All indicator loadings were significant and above 0.60, with most above 0.70. Discriminant Validity was established using the Fornell-Larcker criterion and the Heterotrait-Monotrait Ratio (HTMT). The square root of the AVE for each construct was greater than its correlations with other constructs. Furthermore, all HTMT values were below the conservative threshold of 0.85, confirming discriminant validity (Henseler et al., 2015).

Table 2: Reliability and Validity of Constructs

Construct	Cronbach's Alpha	Composite Reliability (CR)	Average Variance Extracted (AVE)
GHRM	0.892	0.915	0.546
GI	0.862	0.881	0.593
EGB	0.802	0.812	0.502
EP	0.789	0.751	0.503

Structural Model and Hypothesis Testing

The structural model was assessed for collinearity, path coefficients (β), coefficient of determination (R^2). All Variance Inflation Factor (VIF) values were below 3.3, indicating no multicollinearity issues. The results of the hypothesis testing are summarized in Table 3 and Figure 2.

- **Direct Effect (H1):** The results show a significant positive direct effect of GHRM on Environmental Performance ($\beta = 0.135$, $t = 1.78$, $p < 0.05$), supporting H1. It is interesting to note that this direct effect, however, significant statistically, is rather small.
- **Mediating Effects (H2 & H3):** The analysis of the bootstrapping results has verified the strong mediating effect of Green Innovation (H2 = 0.179, $t = 2.950$, $p = 0.002$). The Employee Green Behavior (0.113, 1.888, $p = 0.059$) which offers less strong support to the relationship between GHRM and EP. Thus, H2 is supported and H3 is marginally supported.
- **Parallel Mediation (H4):** The model confirms that GI and EGB act as significant parallel mediators. The specific indirect effects through each path are significant, demonstrating that both mechanisms operate independently and simultaneously to transmit the influence of GHRM on EP. H4 is supported.

Figure 2: Structural Model Results

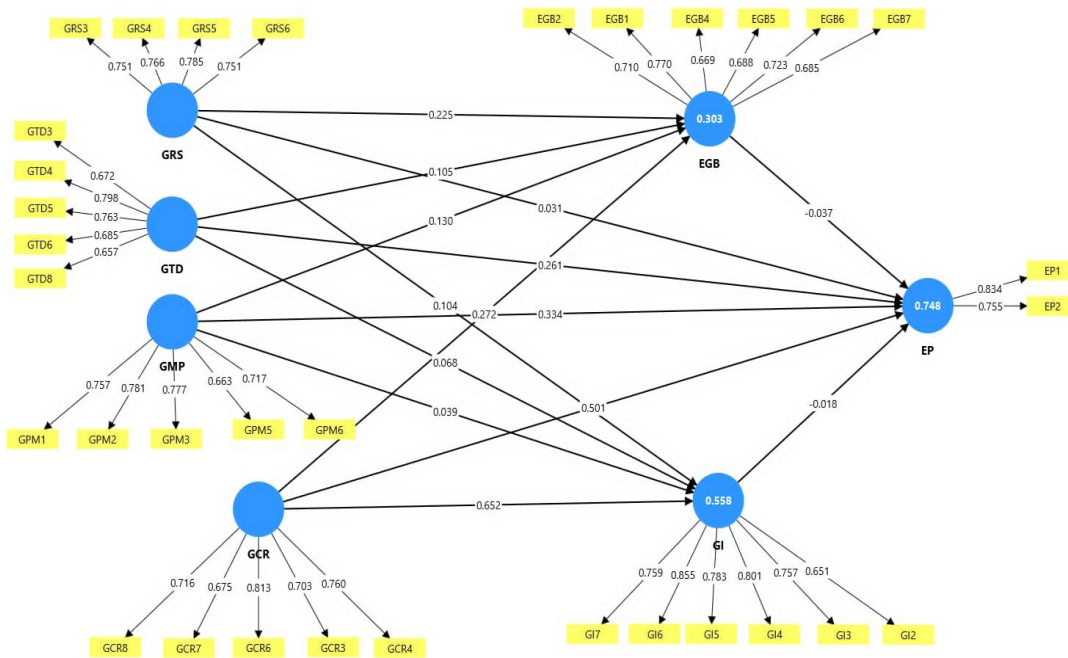


Table 3: Hypothesis Results

Hypothesis and Path	β	t-value	p-value	Decision	(f ²) Effect Size
H1: GHRM → EP	0.135	1.780	0.038	Supported	0.042
H2: GHRM → GI → EP	0.179	2.950	0.002	Supported	~
H3: GHRM → EGB → EP	0.113	1.888	0.059	Marginally Supported	~
H4: Parallel Mediation	~	~	~	Supported	~

Model Explanatory Power: The model's explanatory power, assessed by R^2 , was substantial for Environmental Performance (0.748), moderate for Green Innovation (0.558), and modest for Employee Green Behavior (0.303). All Q^2 values were greater than zero, confirming the model's predictive relevance (Hair et al., 2022). The effect sizes (f^2) for the direct paths were assessed, with the effect of GHRM on EP showing a small effect size (0.042).

Table 4: Measurement of Variables Coefficient of Determination (R^2)

Construct	R-square	R-square adjusted	Decision
EGB	0.303	0.289	Small effect
EP	0.748	0.740	Substantial
GI	0.558	0.549	Substantial

Post-Hoc Analysis:

Exploring GHRM Dimensions while the primary analysis treated GHRM as a holistic, second-order construct, we conducted a post-hoc analysis to explore the distinct effects of its four first-order dimensions on the outcome variables. This preliminary investigation painted a complex picture.

Green Recruitment & Selection ($\beta = 0.257, p < 0.01$), Green Training & Development ($\beta = 0.243, p < 0.05$), and Green Compensation & Rewards ($\beta = 0.135, p < 0.05$) were found to have significant positive direct effects on Environmental Performance. The relationship between environmental performance and green performance management, however, was not significant ($\beta = 0.104, p > 0.05$). This implies that even though the GHRM system as a whole is successful, the process of formally assessing and controlling performance in relation to green metrics could not be directly influencing environmental results in this particular situation.

Discussion

Key Findings

The goal of this study was to "unpack" the mystery surrounding GHRM and environmental performance by examining the concurrent mediating functions of employee green behaviour (EGB) and green innovation (GI).

The results fill a crucial gap in the literature by offering solid empirical proof that GHRM practices are a powerful driver of EP in Pakistan's manufacturing sector. This relationship is substantially explained by two different, concurrent pathways (Aftab et al., 2023; Khan, M.A. et al., 2021). First, the fundamental tenet of GHRM is strengthened by the proof of a direct influence (H1) (Ahmad, 2015; Jabbour & De-Sousa Jabbour, 2016). Despite being substantial, this direct effect is quite small ($\beta = 0.135$), indicating that GHRM's effects is primarily transmitted through the mediators (GI and EGB). This result supports the increasing body of evidence suggesting that GHRM's benefits are frequently realised through its impact on intermediary systems rather than

through direct impacts (Dumont, Shen & Deng, 2017; Renwick et al., 2008). The majority of GHRM's influence comes from its capacity to empower and inspire employees rather than from its structured, systematic impact. Second, the substantial indirect benefit through Green Innovation (H2) emphasises that GHRM is about developing capability as well as behaviour control. This bolsters the AMO framework's "Ability" dimension by implying that green training and development improve workers' capacity for innovation (Xie et al., 2019; Tang et al., 2018). Organizations can unleash their employees' potential to develop innovative solutions, such as more efficient processes or greener products that significantly improve environmental performance, by investing in green training and rewarding creative ideas. This connection has been demonstrated in other contexts (Chen & Chang, 2013; Chang, 2011).

Third, although this association is not as strong as the innovation pathway in our sample, the marginally significant mediating role of Employee Green Behaviour (H3) indicates that GHRM is probably effective at translating policy into everyday action. According to Paň et al. (2014) and Norton et al. (2015), this conclusion is consistent with the micro-foundations of GHRM, showing how organizational-level practices can influence individual-level behaviors. GHRM guarantees that sustainability concepts are implemented on the shop floor through numerous tiny, cumulative activities like waste reduction and energy saving by influencing the organizational atmosphere and inspiring workers. A fruitful avenue for future research is presented by the modest R^2 value for EGB (0.303) and the marginal significance of the mediation, which indicate that although GHRM is an important driver, a significant portion of variance in individual green behaviour is explained by other factors not in our model, such as peer influence or personal values (Zacher, Rudolph & Katz, 2023; Kim et al., 2017).

Post-Hoc Analysis of GHRM Dimensions

The post-hoc analysis is essential. The insignificant finding of Green Performance Management (GPM) is ironical, but informative. It recommends that in this regard, a formal assessment of green performance can be viewed as a punitive or fake compliance practice that can breed opposition. This is different to Green Compensation & Rewards which was significant. The main distinction could be that rewards can be seen as positive reinforcement (fulfilling the competence need of SDT), and performance management can be seen as punitive control (which can destroy autonomy) (Deci & Ryan, 1985). This suggests that the power of the carrots (rewards) can be stronger than sticks (appraisal-based accountability) in this particular cultural and organizational context as to why building capability (training) and providing motivation (rewards) are more immediately a potent force than formal evaluation (Rael, 2018). This result can also contribute to the explanation of the slightly significant mediation effect of Employee Green Behavior (H3). When the formal performance management aspect of GHRM is viewed in bad light, then it may undermine the overall impact of GHRM on the motivation of day-to-day green actions and this mediation channel is less strong compared to the pathway of Green Innovation. This indicates that formal performance evaluation systems may not be fully entrusted or incorporated in the sustainability objectives in the

Pakistani manufacturing environment. They can be taken as a sort of control instead of support by employees, which is not as effective as positive ones.

Lastly, the main theoretical contribution is the viability of parallel mediation (H4). It shows that the relationship between GHRM and EP is propelled by a two engine system one engine of innovation and change (GI) and another engine of implementation and routine (EGB). This observation resonates with the exploration-exploitation paradigm which argues that in order to have a long-term environmental performance, it is not only that firms should explore new green solutions, but also exploit current green routines (He & Wong, 2004). This shows that the best sustainability strategies are those which are able to pursue both macro-level innovation and micro-level behaviors.

Combined Insights: Theoretical Advances, Managerial Recommendations, and SDG Impact

This work adds to the body of literature in GHRM by introducing a two-pathway model that conceptualizes green innovation (GI) and employee green behavior (EGB) as parallel mediators, which have independent effects on environmental performance and responds to the call to develop more complex, mediated frameworks (Ren et al., 2018; Yuzliza et al., 2020). It applies the GHRM theory to an emerging-economy situation by presenting strong evidence that is based in the manufacturing sector of Pakistan, enhancing generalizability (Shah, 2019; Kodua et al., 2022). The study also incorporates the Resource-Based View, Ability-Motivation-Opportunity and Institutional Theory to provide a multi level explanation of how GHRM promotes sustainability and a post hoc analysis shows that not all GHRM dimensions are equally effective that calls out on finer grained models (Tang et al., 2018). In practice, HR chiefs are supposed to design a Green Talent Value Proposition that instills sustainability in the employee lifecycle; line managers are supposed to change their approach of supervision based on tasks towards facilitation and recognition of green behavior; sustainability officers are supposed to consult HR in designing fair, measurable green metrics, and incentives of firms applying advanced GHRM practices are supposed to be developed by policymakers. On the whole, these contributions connect GHRM to SDG 9 (innovation), SDG 12 (responsible consumption) and SDG 13 (climate action), placing GHRM in the role of translating the global sustainability perspectives into organizational performance.

Limitations and Future Research Directions

This study has limitations that present avenues for future research. The cross-sectional design makes it impossible to make definite causal conclusions; longitudinal research would be more successful in proving causality. The data, a self-reporting, single country, single-sector data, is prone to common method bias and restricts generalization. The study can be extended to other areas and other sectors using multi-source data in the future (Paillé et al., 2014). Also, it might be important to explore the moderating variables (e.g., leadership style, organizational culture) to identify the boundary conditions of the suggested relationships (Gilal et al., 2019). Moreover, the mediating role of employee green behavior is almost significant, implying that further studies should find the factors that might enhance this relationship, including personal green principles or climate of

organizational support. Lastly, the interesting observation about Green Performance Management needs additional research to comprehend its application within the context of various cultures and organizations.

Conclusion

This study confirms that Green HRM is an effective driving force to environmental performance. Although there is a direct effect, the relationship can be mostly attributed to a dual-mechanism model. The results indicate that the greatest impact of GHRM is through its potent ability to develop green innovation. Another, albeit less significant, channel is via its capability to inspire employee green behavior. This shows that the real power of GHRM is its ability to mobilize two key engines of organizational performance: a primary engine of green innovation which is a transformative engine and a secondary engine of green behavior in workers that ensure operational excellence in daily operations. To organizations and policymakers interested in making a contribution to the larger Sustainable Development Goals (SDGs), this study provides an evidence-based roadmap: invest in holistic GHRM systems especially those oriented to the development of innovation capabilities and positive reinforcement in order to successfully direct human capital towards meeting the global sustainability objectives.

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