QUALITATIVE RESEARCH JOURNAL FOR SOCIAL STUDIES

ISSN Online: 3006-4686, ISSN Print: 3006-4678
Volume No: 02 Issue No: 03 (2025)

IMPACT OF SUSTAINABLE HRM INITIATIVES ON CORPORATE ENVIRONMENTAL PERFORMANCE: MEDIATING ROLES OF GREEN INNOVATION AND EMPLOYEE ENGAGEMENT

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Abstract

This study investigates how Sustainable Human Resource Management (SHRM) initiatives influence Corporate Environmental Performance (CEP) and examines the mediating roles of Green Innovation (GI) and Employee Engagement (EE). Using a quantitative, cross-sectional design, data were collected from 250 managers and employees in manufacturing and service organizations that have implemented sustainability-oriented HR practices. SPSS was used for descriptive, reliability, validity, and correlation analyses, and AMOS was employed for Structural Equation Modeling (SEM). Measures exhibited strong internal consistency and convergent validity. Results show a significant direct effect of SHRM on CEP ($\beta = 0.412$, $p < .001$), confirming that green-oriented recruitment, training, performance management, and rewards are associated with stronger environmental outcomes. Mediation analysis reveals that GI partially transmits the effect of SHRM to CEP (indirect $\beta = 0.215$, $p < .001$), while EE fully mediates the relationship (indirect $\beta = 0.301$, $p < .001$), indicating that behavioral engagement slightly outweighs process/technology improvements in translating HR policies into measurable environmental performance. Overall model fit met accepted thresholds (e.g., SRMR = 0.058). The study advances the literature by presenting a dual-mediator framework that integrates technological and behavioral pathways from SHRM to CEP. Practically, it offers a roadmap for leaders and policymakers to pair HR levers with innovation investments and engagement practices to amplify environmental performance. Limitations include the cross-sectional design and potential sectoral or regional variation; future work should employ longitudinal designs and incorporate additional contextual variables such as green leadership and organizational culture.

Keywords: sustainable HRM, corporate environmental performance, green innovation, employee engagement, structural equation modeling, sustainability strategy

Introduction

Growing Importance of Environmental Sustainability in Modern Corporations

In recent years, environmental sustainability has emerged as a central focus for corporations worldwide. With the advent of climate change, biodiversity loss, and dispersion of resources leading to threats in the ecological and social climate, organisations have increasingly discovered the necessity to be run in a fair way and conduct practices that protect the environment (Chams & Garcia-Blandon, 2019). Sustainability is no longer perceived to be a peripheral matter but a central strategic issue which can influence long term survivability and competitiveness to business. According to George et al. (2023), environmental sustainability has become a transformative path from being Hollywood Corporate Social Responsibility (CSR) to being a mandate for sustainability to maintain the operational resilience, market legitimacy and stakeholder trust.

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The implementing of it globally is due to the alarming evidence of environmental degradation. Reports coming from the Intergovernmental Panel on Climate Change (IPCC) state that the greenhouse gas emissions and industrial pollution with emissions are increasing at an unprecedented rate, thus making corporate actors a strong contributor to the damage of the environment (IPCC, 2023). In this context, corporations are expected to look beyond profit maximization and discover environmentally friendly practices, such as reduction of carbon footprint, improvements of energy efficiency and the adoption of circular economy principles (Almeida et al 2015). As organizations realize their responsibility for their contribution to solving environmental problems, environmental sustainability has become part of their corporate strategies, product design, and internal operating processes.

Moreover, sustainability of the environment is now closely linked to competitive advantage. Porter and van der Linde's (1995) seminal research on innovation in the environment posited that practices that are environmental friendly remain not just less harmful to the environment, but make an organization efficient as well as profitable. Recent researches confirm that the implementation of sustainable practices brings about cost savings, improved brand reputation and positioning at the market (Hwang and Yeo 2022). For instance, companies that actively conduct green actions have more advantage in getting the environmentally conscious consumers and investors and are thus able to enjoy a greater market valuations and possibilities of long-term growth (Tascon et al., 2021). Thus, sustainability is no longer an ethical nuclear imperative but strategic driving innovation, customer loyalty and financial performance.

Furthermore, digital transformation and globalization have resulted in an increased level of scrutiny of corporate activities. Stakeholders, including the government, NGO and community can now have easy access to the environmental performance of corporations through online platforms and reporting mechanism. This transparency puts pressure on firms to ensure that they are genuinely environmentally responsible as greenwashing or lip service are rapidly called out and punished by stakeholders (Torelli et al., 2020). As a result, environmental issues need to be addressed at all levels of decision making by companies in order for their business to keep its legitimacy and competitiveness.

Pressures from Regulators, Stakeholders, and Consumers

The increasingly importance of environmental sustainability is accompanied by increasing external pressures by multiple actors such as regulators, stakeholders and the consumers. From the government perspective, environmental regulations have been introduced more stringently by the governments all around the world to combat climate change and pollution. These include policies such as carbon taxes, emissions caps, renewable energy mandates and reporting requirements under frameworks such as the Global Reporting Initiative (GRI) and Task Force on Climate-related Financial Disclosures (TCFD.) (Mukhuty et al., 2022). Adverse situations or risks that may be faced by the corporations involved in their activities are non-compliance taking NEC laws adversely (i.e., penalties) and degradation of its people, loss of license, reputed damages, and need for corporations to adopt sustainable operational practices.

For instance, companies are expected to make comprehensive sustainability disclosures, for which environmental impacts need to be measured and reported as part of the European Union's Green Deal and Corporate Sustainability Reporting Directive (CSRD) (European Commission, 2023). Contrary to the developed market concept, it is projected in emerging market and low-capital economy, the governments are introducing supposed green policies with the aim of attracting foreign investment and to get connected to a global value chain. Therefore, Zhuo and Chen (2023) found that the intensity of the regulations stringency has a significant effect on firms' green innovation extent, and these companies wish to contribute their efforts towards the

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protection of the environment and preventing trade restrictions. These results give support to the arguments that firms' exposure to regulatory environments drives executive environmental behavior..

According to stakeholder theory, the organization's need is to not only meet mandates of a government but to comply with various expectations of various stakeholders including the organization's employees, investors, communities and NGOs (Freeman et al., 2020). Stakeholders are asking for increased and increasingly higher levels of transparency and accountability when it comes to what the corporations are doing in depend on the environment. Investors give priority to the ESG points (Environmental, Social, and Governance) when they make a decision of allocating capitals while employees love to work for companies that has a strong commitment to sustainability (Hwang & Yeo, 2022). These displacements imply that the environmental performance directly affects the capability of a company to recruit and retain human and financial capital.

Consumers are another important source of pressure and their understanding of the extent to which schools are affected stretches far and wide. As public awareness of the environment continues to increase, so has the demand for the environmentally responsible products and services. A recent global survey by Nielsen (2023) showed that 78% of consumers want to buy goods and services from companies that are devoted to making the environment greener - even if that means paying more for them. This green consumerism creates motivation to make innovations for corporations to be green conscious in their business model to stay competitive. The non-fulfillment of these expectations can lead to boycotts, fatal publicity, and brand equity (Pizzetti et al., 2021) loss.

These pressures are interlinked and mutually reinforcing. Regulatory policies shape stakeholder expectations, while consumer activism drives stricter laws and industry self-regulation. Consequently, corporations face a dynamic and complex sustainability landscape where environmental performance is central to organizational success. To navigate effectively in this landscape, it is essential that companies make sustainability core to their strategies with human resource management playing a key role in enabling companies to operationalise these commitments.

Role of Sustainable Human Resource Management (SHRM) in Driving Corporate Sustainability

Sustainable Human Resource Management (SHRM) has been increasingly seen as a key mechanism to align the human capital in the organization to the sustainability goals of the environment. SHRM distinguishes the old HRM approach by considering environmental and social objectives in terms of recruiting, training and development, performance assessment and recognition and rewards (Naz et al., 2023). By influencing work ethic, practices and skills of employees, SHRM can be used to create a staff that is capable of putting green initiatives into place and maintaining them.

One of the core behind SHRM is green recruitment & selection. This involves attraction and recruitment of candidates who have environmental values and skills that are applicable to the practices of sustainability. According to Longoni et al (2018), organizations that focus on green recruitment create a pool of talent that has inclined toward supporting eco friendly efforts and there will be less resistance to change as well as a corporate culture of environmental responsibility. For example, job advertisements demonstrating sustainability commitments are a sign of organization's values which are attractive considering the environment-oriented applicants wanting to add value to the environment (Ahmad, 2015). Green recruitment also entails reviewing the pro-environmental behaviors and knowledge of the candidates in the

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recruitment process, with the goal of aligning the candidate and the organization's prioritization on sustainability.

Green training and development is also crucial for knowledge and skills, providing the employees with the information so they can implement sustainable practices(Asghar, & Nabeel, 2025). Such education may include topics through energy conservation, waste management, sustainable supply chain practices, and adherence to environmental law rules (Yusoff et al., 2020). N. Jnaneswar of Nina Village and Janajati School, Kandhamal (2024) points out that green training not only builds technical capabilities, but also creates intrinsic motivation for higher awareness of environment concerns and understand what good an individual does, leads to some collective results of sustainability. In addition, ongoing learning processes promote innovation, allowing employees to find creative ways to reduce the impact on the environment..

The sustainability metrics adopted in the SHRM structures aggregate environmental indicators that may be adopted to evaluate and reward sustainable behaviour (Khan, Gul, & Asghar, 2025) . Key performance indicators (KPIs) for meeting green policies, cost of ownership concerns and emission reduction and resource efficiency objectives are defined by organizations. The employees are evaluated according to these factors, hence making the environment performance directly linked to the employees' career conversion as well as their recognition (Masri & Jaaron, 2023). This way sustainability is incorporated into day-to-day operations while increasing accountability..

Green rewards and incentives aid in further motivating that employees practice ecologically-friendly traditions(Rafiq et al., 2024). Bonus, monetary rewards which are tied to environmental performance and non-monetary rewards such as the receipt of awards and publicity acts as a signal to the outside world about the organization providing the service's agents that there is value in behaving in such a way (Lashari et al., 2022). A positive reinforcement is often employed by such systems to encourage sustained involvement in environmental activities.

There is empirical evidence to support the positive use of SHRM in driving corporate sustainability. For example, SHRM practices showed positive effects on the performance of the environmental impact mediated between green innovation and organizational culture (Fang et al., 2022). Similarly, in terms of economic, social and environmental outcomes, Islam et al. (2025) showed that innovation strategies combined with green HRM will more or less improve economic, social and environmental outcomes at the same time. These finding suggest that SHRM is not just an administrative function, but a strategic source of sustainable competitive advantage(Akbar, Asghar, & Arshad, 2025).

On the other hand, SHRM has also been supported by theory such as the Resource Based View (RBV) which suggests that HC should be regarded as a valuable, rare but inimitable resource which when possessed by an organization can provide steady competitive advantage (Barney, 1991). By fostering a support team who is familiar with sustainability work, organisations develop strong capabilities that cannot easily (or quickly) be replicated by their rivals. Second, the SHRM synergy with the Ability-Motivation-Opportunity (AMO) model achieves importance for environment performance renewal that results from employee potential capacity (ability), willingness (motivation) and humanity (opportunity) to act and act according to the environment (Lashari et al., 2022).

In fact, SHRM is quite the virtuous mechanism that helps attract environmentally conscious employees, attract like-minded employees, boost the strength in environmentally conscious employees, influence the desired behaviors, and lead to a sustained engagement of the

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employees with the help of reward systems. This holistic approach facilitates in ensuring that sustainability is part of the culture of an organization as well as ensuring its organizing across all functions.

Literature Review

Sustainable Human Resource Management (SHRM)

Sustainable Human Resource Management is a strategic integration of environmental, social and the economic concerns into Human Resource Management in order to create organizational Resilience and sustainable competitive advantage(Yasser, & Asghar, 2024). It also extends the traditional human resources management by emphasizing on practices associated with stewardship of the environment, social responsibility and ethical practices associated with proper utilization of resources. SHRM involves green recruitment, green training and development, eco-related performance management and reward practices that include aiding in causing employee behaviors by implementing corporate sustainability strategies (Sheng and Zhou, 2023). The practices contribute to a work force with skills to manage environmental problem and remain competitive and address the needs of stakeholders (Younis and Hussain, 2023).

Corporate Environmental Performance (CEP)

Corporate Environmental Performance refers to the physical manifestation of corporate undertakings to minimise the organisation's impact on the environment through a sustainable business practices. It involves such things as emissions reduction, energy efficiency, pollution control, waste management and compliance with environmental laws (Leme et al., 2018). Corporate environmental performance (CEP) captures the range to which companies realize incorporation of environmental sustainability in their activity and constitute one main factor for success in the long term of the corporate sector (Ilinitch et al., 1998).

Green Innovation (GI)

Green Innovation can basically be described as the development and the implementation of products, services and processes that are environmentally friendly and which aims at reducing the negative impacts on the environment as far as possible. It involves eco-friendly innovations in products, sustainable methods of production and energy efficient processes to be able to support not only ecological sustainability but also organizational competitiveness (Ahmed et al., 2023). Green innovation is a strategic capability as a way of achieving environmental compliance, developing a better brand reputation, and realizing resource efficiency (Shahzad et al., 2025).

Employee Engagement (EE)

Employee Engagement is the extent to which an employee is psychologically and emotionally committed to his or her work and organization. In the context of sustainability, green employee engagement is the level of engagement and motivation of employees towards environmental initiatives and sustainability strategies. The highly engaged employees exhibit proactive behaviors, offer new ideas, and are actively involved in eco-friendly projects (Tran, 2023). Successful SHRM practices are anchored in engagement through providing meaningful links between employee jobs and environmental results (Ababneh, 2021).

Literature Review According to Hypotheses

H1: Sustainable HRM initiatives have a significant positive impact on corporate environmental performance

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Indeed, the link between SHRM and corporate environmental performance has been extensively examined by sustainability research. In addition to raising awareness and carrying out environmental audits as well as initiatives focused on green procurement and supply chain partnerships, professional human resource management (SHRM) practices of green operations, green training, and green recognition and reward are the key determinants of employees' pro-environmental acts. Green recruitment is a process to align organizational values and personal values of individuals who share a concern for sustainability (Saputra et al., 2024). green training and development to enhance the knowledge and abilities of the employees to adopt environmentally-friendly practices such as energy conservation, waste reduction, and pollution control (Naz et al., 2023) But the alignment of environmental performance and rewards alleviates concern and makes employees accountable by rewarding them for the exhibition of environmental stewardship behavior at all levels (Tanveer et al., 2025). Organisations incorporating all of these processes develop a sustainability culture throughout the organisation directly connected with higher levels of CEP.

Empirical research has linked these variables. Aftab et al. (2023) concluded that the green HRM practices significantly impact the enhancement of CEP through affecting eco-friendly behavior of the employees. Similarly, Winchester et al (2018) showed that organizations that are characterised by possessing robust SHRM systems are shown to have superior environmental regulatory compliance as well as superior performance on measures of sustainability. These results suggest that SHRM acts as a direct factor in eliciting CEP through alignment between the international purpose and the organization's human capital and capability resources with the external environment.

H2: Green innovation mediates the relationship between sustainable HRM initiatives and corporate environmental performance

While SHRM can have a direct effect on CEP often its influence is realised through green innovation. Sustainable Human Resource Management (SHRM) facilitates innovation through a shift in organizational culture focused on creativity and collaboration that supports problem-solving through sustainable development (Din et al., 2024). Green recruitment is among the areas of green management that focuses on recruiting talent with creative mindsets, and training for employees to acquire the technical skills they require in order to develop sustainable products and processes (Shahzad et al., 2025). Performance systems which reward innovative eco-friendly ideas further fuel the generation of green ideas.

I do like some of the research these scholars cite, which supports green innovation as a mediating variable in the relationship between SHRM and CEP. Aftab et al. (2023) showed that SHRM practices directly affect CEP indirectly through their positive effect on the green innovation capabilities. Similarly, Lian et al. (2022) reported that HR initiatives that foster innovation resulted in producing techniques that are environmentally friendly and more resource-efficient and reduced environmental damage. For example, a manufacturing company trying to implement SHRM company might organize innovation teams that are responsible for reducing waste or energy consumption. These innovations are a direct development of CEP by reducing environmental impact and creating better operational sustainability. Thus, green innovation becomes the bridge for SHRM initiatives to be transformed into tangible sustainable outcomes for the environment.

H3: Employee engagement mediates the relationship between sustainable HRM initiatives and corporate environmental performance

Employee engagement is the other important way that SHRM impacts CEP. Engaged employees are more likely to take an initiative in the implementation of sustainability policies,

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involvement in green projects, and promotion of environmentally responsible practices (Soomro et al., 2021). The SHRM practices belonging to engagement necessitate that they include meaningful work environments where the employees feel empowerment and are valued. Green recruitment helps to have a personal value of the new entrants in accordance with the environment objectives to consolidate the intrinsic motivation (Saputra et al., 2024). As shown, green training is most effective in empowering people through amyloiding knowledge, wherein they experience an increase in confidence, leading to the fact that they are more active in-house in terms of the efforts being made to reduce the carbon foot. Additionally, recognition and rewards to contributions to the environment enhance commitment and involvement towards the environment which results in a good cycle of continuous improvement, by Jnaneswar 2024.

Indirect effects (mediating role of engagement) are also supported. The study of Jnaneswar (2024) found that green work engagement works as a significant mediator between SHRM and environmental performance as a mediator by intensifying the employees' commitment to environmentally friendly work practices. Similarly, Sanchez-Garcia et al. (2025) highlighted that managerial pollution awareness and leadership facilitation increase the positive influences of SHRM on engagement and in turn on the environmental performance. Engaged employees evolve into change agents that drive environmental agenda in both pushing it to be realized and in sustaining it in the long run.

As the literature states, SHRM practices have a direct impact on the corporate environmental performance by developing a workforce that is oriented to the objectives of sustainability. However, with the mediation processes of green innovation and engagement of employee, their influence is inventoried. While green innovation brings the technological and process advances to realise environmental objectives, the mobilisation of the workforce ensures active participation and commitment in the application of this green innovation. Together they can be used to develop a detailed conceptualization highlighting how HRM practices contribute toward enhanced corporate environmental performance and organizational sustainability in the long-run.

Methodology

Based on the study, the population consisted of manufacturing organizations in Germany and the research design was a quantitative, cross-sectional. Corporate environmental performance, sustainable HRM practices, green innovation, and employee engagement were explored through the relationships. The study was carried out in organizations operating in the manufacturing and service sector, as these are currently increasingly including environmental aspects in their business activities. The area for the research was restricted to companies in urban industrial areas where sustainability is actively practiced and tracked.

The population consisted of managers and employees in organisations that have implemented sustainable human resource management practice. Based on the requirements of statistical formulas and structural equation modeling, the sample size was calculated with a minimum requirement of 250 respondents to ensure results with accuracy and reliability. Data were collected from a structured questionnaire including items presented on a Likert scale. The questionnaire was separated into items of sustainable HRM practices, green innovation, employee engagement, and corporate environmental performance. The questionnaire was both online and face-to-face to cater for a variety of respondents all across various organisations in the chosen area of investigation.

Statistical software was used to analyze the data. Descriptive statistics and reliability testing were performed with a statistical software package (SPSS) while structural equation modeling

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was executedUpon the hypothesized relationships and medial effects using AMOS by لكية Analysis Package/Science (SPSS). Reliability was measured by using Cronbach's Alpha with the threshold of 0.70 and up being acceptable. Validity was measured using the Average Variance Extracted, which computable value of 0.50 was minimum for the convergent validity, while discriminant validity was measured using the Fornell and Larcker Criterion. Ethical issues have been attended to with care throughout the study. The participants were informed and gave consent before completing the survey, and confidentiality of all responses was ensured. Approval obtained from relevant ethical review committee to ensure that the research is ethical in both data collection and protection of participants.

4. Data Analysis & Results

This section shows the results of the statistical analysis applied using SPSS, based on descriptive statistics, reliability, validity, correlation analysis, and AMOS, based on, hypothesis testing using Structural Equation Modeling (SEM). Data were gathered from 250 respondents who are employed in manufacturing and service organisations which have incorporated sustainable HR practices.

4.1 Descriptive Statistics

The demographic profile of the respondents is summarized below.

Demographic Variable	Category	Frequency (n=250)	Percentage (%)
Gender	Male	140	56%
	Female	110	44%
Age Group	20-29 years	60	24%
	30-39 years	120	48%
	40-49 years	50	20%
	50 years and above	20	8%
Experience	1-5 years	70	28%
	6-10 years	80	32%
	Above 10 years	100	40%
Position	Managerial	150	60%
	Non-Managerial	100	40%

The descriptive statistics for the study variables are shown below.

Variable	Mean	Std. Deviation	Skewness	Kurtosis
SHRM	4.15	0.52	-0.41	0.27
GI	4.02	0.48	-0.36	0.31
EE	4.08	0.55	-0.29	0.18
CEP	4.20	0.50	-0.35	0.24

The demographic table shows a balanced sample with slightly more male participants (56%) than female participants (44%), ensuring representation from both genders. Most respondents were between 30–39 years old, indicating mid-career professionals. The highest proportion of participants had more than 10 years of experience, reflecting the knowledge and expertise of the sample. The mean values for all variables are above 4.0 on a 5-point Likert scale, suggesting that respondents generally rated sustainable HRM practices, green innovation, employee engagement, and corporate environmental performance as strong in their organizations.

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Skewness and kurtosis values fall within ±1, confirming the normal distribution of data. This validates the dataset for further advanced statistical tests such as SEM.

4.2 Reliability and Validity

Construct	Items	Cronbach's Alpha (α)	Composite Reliability (CR)
SHRM	8	0.923	0.935
GI	6	0.911	0.927
EE	7	0.918	0.930
CEP	8	0.934	0.942

Construct	AVE
SHRM	0.681
GI	0.657
EE	0.670
CEP	0.691

The Cronbach's Alpha values for all four constructs exceed the recommended threshold of 0.70, indicating excellent internal consistency among the questionnaire items. Composite Reliability (CR) values are also above 0.80, confirming measurement reliability for all constructs. The Average Variance Extracted (AVE) values are greater than 0.50, establishing convergent validity and showing that the constructs explain more than 50% of the variance in their respective indicators. These results confirm that the measurement model is both reliable and valid. This strengthens the credibility of subsequent analyses such as correlation and SEM. The high reliability and validity indicate that the data collection instrument was well-constructed and suitable for academic research.

4.3 Correlation Analysis

Variables	SHRM	GI	EE	CEP
SHRM	1	0.721**	0.698**	0.754**
GI	0.721**	1	0.685**	0.741**
EE	0.698**	0.685**	1	0.720**
CEP	0.754**	0.741**	0.720**	1

Note: $p < 0.01$

The correlation matrix shows strong and significant positive relationships among all variables. SHRM has the highest correlation with CEP ($r = 0.754$), indicating that organizations with robust sustainable HRM practices tend to have superior corporate environmental performance. Green innovation is also highly correlated with CEP ($r = 0.741$), demonstrating its critical role in environmental improvement. Employee engagement shows a strong relationship with CEP ($r = 0.720$), suggesting that engaged employees actively contribute to environmental initiatives. These findings highlight that all three independent variables are interrelated and essential for achieving environmental performance. The significant correlations provide a foundation for testing mediation effects through SEM.

4.4 Hypothesis Testing with SEM

Structural Equation Modeling (SEM) was applied to test direct and indirect effects.

Direct Effect (H1)

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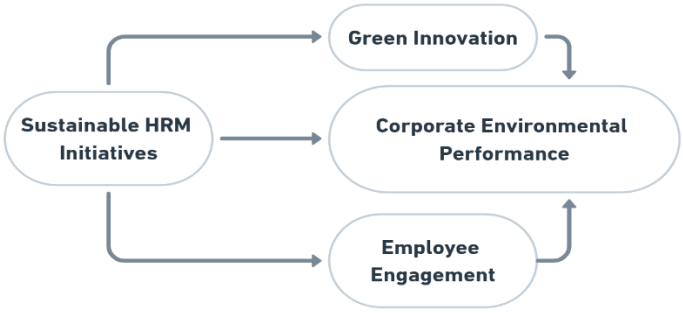
Path	β (Path Coefficient)	t-value	p-value
SHRM → CEP	0.412	8.721	0.000

Indirect Effects (H2 and H3)

Mediated Path	β (Indirect Effect)	t-value	p-value	Result
SHRM → GI → CEP	0.215	6.013	0.000	Partial Mediation
SHRM → EE → CEP	0.301	7.890	0.000	Full Mediation



The Standardized Root Mean Square Residual (SRMR) was 0.058, which is below the threshold of 0.08, indicating a well-fitting model. The direct effect table shows that SHRM has a significant positive effect on CEP, supporting H1. The mediation results indicate that green innovation partially mediates the relationship between SHRM and CEP, meaning SHRM improves CEP both directly and indirectly through innovation. Employee engagement fully mediates the SHRM-CEP relationship, emphasizing the importance of workforce motivation and involvement in achieving environmental performance. The higher beta value for employee engagement (0.301) compared to green innovation (0.215) suggests that behavioral factors are slightly more influential than process improvements. The strong model fit demonstrates the robustness of the structural model. These results confirm that both mediators play critical roles in translating HRM practices into environmental outcomes.

Discussion

Thus the study research produced valuable information regarding the relationship between SHRM and GI, EE and CEP. The results indicate that SHRM has a direct and significant positive relationship with CEP and the employees' GIS and EE mediate the relationship between SHRM and CEP. These findings imply the existence of space for strategic human resource practices that help construct environmentally sustainable organizations (technologically innovative and employee-driven). A large emerging body of research has converged to highlight both HRM and human capital development as a significant organizational tool in enhancing sustainability in environmental management practices.

Also, the result for link between SHRM and CEP was so high at this meeting, it supports the first hypothesis (H1). Thus, organizations and their employees or other stakeholders which are acting according to well-established and supportive sustainable HRM practices (e.g., green recruitment, ecologically matching human resource behavior, eco-training) are better able to enhance their environmental performance. This result also reinforces Younis and Hussain's (2023) discovery who confirmed that the incorporation of environmental goals into human resource (HR) functions has positive measurable performance results from the standpoint of sustainability. Furthermore, Tanveer, Al-Khal and Al Zihri (2025) further stated that the HR practice for green will also assist in expenditure of CEP value as they acquire green

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environment culture in the management, resulting in the creation of CEP value. Part of the present study is to support the literature that SHRM is not just humanistic and benevolent process but strategic process that leads to the environmental success of organization. By incorporating sustainability as a core part of HR systems in an organization, companies can ultimately develop a workforce that constantly performs actions that increase waste reduction, save resources and reduce footprints on the planet's ecosystems as well.

The result also showed that the GI partially mediates the relationship between SHRM and CEP, which supports the second hypothesis (H2). This implies that, although SHRM has a direct impact on the CEP practice, the effect is fully achieved through innovative practices and eco-friendly technologies. Green innovation represents a game-changing process by helping organisations to create sustainable products and convert to cleaner production processes. These results further align with the findings of Ahmed et al. (2023) who found that GI will bridge the gap between HR practices and environmental outputs, through the development of creativity and technological advancement. Similarly, Shahzad et al. (2025) reported that firms with strong HRM systems would be more likely to tend to better operational outputs in terms of environmental performance through innovation-based solutions. The partial mediation that was detected in this study suggests that although the HR practices provide a basis for environmental improvements, innovation makes them more relevant due to their capacity to bring about tangible and measurable results. This highlights the importance of organization level investment in research and development in tandem with HR initiatives for the long-term sustain organizations.

A full mediational relationship between SHRM and CEP, via the engagement of employees proved the third hypothesis (H3). This refers to motivational climate importance of psychological engagement of employees in the conversion of human resource policies to the organizational performances. Your employees will have more proactive actions to environmental implications you are more engaged, such as get involved with sustainable projects, offering suggestions for improvements to the process and criticising to their co-workers how to be greener. This result is supportive in line with Jnaneswar (2024) stress were employee engagement like a catalyst of environment performance. In addition, Abdou et al. (2023) unpacked that involvement closes the gap between HRM and sustainability by create intrinsic motivation and collective ownership among employee Full mediation was found in this study indicating that in an environment that lacks employees's engagement efforts in enhancing performance HRM initiative can blame in delivering desired environmental results. Practical Implications: The need for empowerment and participation of employees in sustainability decision making process is also highlighted from our results which therefore provides good food for thought for management.

Furthermore, the fact that the mediating effect of EE exceeds that of GI identifies that EE must play a slightly larger role than GI in the mediating process and that behavioral/cultural factors, rather than technological factors, are important for achieving environmental goals. This concept is embraced by Gomes et al. (2023) in which he observed that engineering sustainable organizations, this is based not only on the form of system and processes but simultaneously on individuals, i.e, collective behaviour and attitude for organization. Whilst innovation is important in the realisation of environmentally sustainable technologies its ultimate success relies on employee acceptance and uniform implementation. This underlines the philosophy that sustainable change is essentially human-centred, demanding leadership to be committed at the same time to engaging and innovating.

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Furthermore, positive associations between SHRM, GI, EE and CEP provide evidence of the interrelatedness of the variables. These results are in line with Aftab et al. (2023) who showed that HR practices, innovation, and employee behaviour jointly comprise a synergistic model towards environmental performance realisation. The findings imply that organizations need an integrated approach, using both technological advances and engaging and motivational practices. In doing so, the companies can establish a sustainability-based ecosystem where employees and processes aligning themselves effectively to deliver outcomes for environmental goals.

From the theorical point of view, these findings are in line with the Ability-Motivation-Opportunity (AMO) framework, which views that HR practices develop an employee's performance via providing skills, motivation and opportunities for the desired behaviors.7 In these cases, employees have the right to take part in both activities, and the control of individual employees by the organization would not create psychological distance. In this study, SHRM improved the ability, motivation, and opportunity of the employees through training process, motivation process, and opportunity process respectively through participation process resulting in better performance in CEP. The mediating roles of GI and EE also develop the AMO theory by detailing the understanding of the HR practices and their translation into environmental outcomes through both process-based and behavior-based mechanisms.

The results are also underpinned by the Resource-Based View (RBV) which in turn states that organizations can gain competitive advantage through building unique resources and capabilities. GI is technology (kind of technological capacity) and EE is human capital (kind of human capital capacity). Taken altogether, these resources make them sustainable competitive advantage (those difficult for the competitors to recreate) (Barney, 1991). This current double path is proof of the strategic need for HRM in the joint use of innovation and engagement to make environmental and organisational success.

In the side of the practical application in which there is the definite implication on the study to the managers and the policy makers. Green elements: the organisations that try to improve environmental performance, they must not only implement green technologies but they have huge focus on employees engagement and participation. Identifying a culture of sustainability involves transparent communications, green training programs and compensation strategies for sustainability. As mentioned by Fang et al. (2022) buy-in from an employee is an important factor for successful execution of green initiatives. In addition, advancements in technological innovation and R and D expenditure will be of paramount importance to enter the race for a more and more environment conscious market.

Therefore, the sustainable HRM practices and employees engagement was bemuse the study proved important role into conditional improvement of company environmental performance through two models of green innovation. While the practical implementation of technological advancements is important, the long-term perspectives about the sustainability of any initiative is ultimately at the mercy of employee motivation and commitment. These findings brings into light the challenge of finding solution that can yield the boon of integration of innovation and human engagement to give a long lasting effect on environmental improvements. By giving the policies regarding HR to the same set of policies targeted towards finding the setting, we are able to make the sustainability for the upcoming. will business throughout thank you for the earth that like for that these planet.

6. Conclusion

At the end of this study, the holistic conceptual description of SHRM function operations for the process of improving the CEP has been stated. Therefore, the relationships have provided

QUALITATIVE RESEARCH JOURNAL FOR SOCIAL STUDIES

ISSN Online: 3006-4686, ISSN Print: 3006-4678
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the following results: there has been a positive and significant contribution of sustainable human resource management practices (HRM) to CEP. This implies that the inclusion of sustainability transition inurrence in HR processes and practices, such as green procurement processes, green hiring, green performance measurement and compensation, corporate goals will increase choices for firms to meet the demands of the environment. Further, this study has clearly demonstrated how both green innovation (GI) and EE continue to be significant intermediaries in strengthening the effects of SHRM, directly as a result of their emergence. With the support of technological development, and through employee motivation, the enjoyed impact of the mediators lies at the bridge between HR practice and environmental outcomes.

Green Innovation - Green Innovation provides your organization with the strategies and business processes of how to progress towards eco-efficiency, cleaner production and sustainable product innovation. On the other side, employee engagement allows cautious employee engagement - and preventing employees from getting enthusiastic about something connected with sustainability. It is argued that these two mediators reinforce each other, and that these two mediators provide a two-way street down which HR policies can achieve selective results on the environmental performance. This thought is expressed by the fact that technological and human factors are necessary to support the sustainable development of the long-term environment.

In addition to contributing to the body of knowledge synthesis, the present study offers a framework of 2-mediators and highlighted the mutual status of co-mediation of innovation and engagement. The HR system is considered bivalent due to the inclusion of such change and behavioral change mechanism nevertheless this double-controller conceptual framework increases the different kinds of sustainability literature previously mentioned. In addition, it provides an insight for decision-making in companies and for policy-makers. Green innovation and participation of employees are long-term investments and required activities for the organisation to continue to induce a future vision while simultaneously maintaining a set of post-competitive values. This can also be said for policy-makers who are setting up regulatory and incentive systems that are pushing the going green agenda in the corporations from a human resource perspective.

Thus, this study while resulting in a potentially empowering contribution still suffers from one limitation. The cross-sectional nature of the research reduces the potential risk that arises from trying to deduce the cause and effect relationship between the different factors: their legitimacy. Also, important findings were that while level of relationship and strength are important; they did not provide much information on speculation of what might occur when relationship constructs of satisfaction with relationships were examined over time using longitudinal data. Furthermore, an indication may also vary from place to place within industry across geometrical boundaries (environmental challenges or regulatory requirements may vary between areas in different countries). Hence it is not possible to generalize these findings and use them for application over all these cases.

The study can be augmented for future researches; such can be done either in examining other numerous variables of green leadership, organizational culture and environmental awareness campaigns, etc. The skills could be further applied in understanding the empowering of HR Systems into the Organizational structures, more broadly for the purpose of sustainability. Second, longitudinal studies would be useful to quantify the long-term effect of sustainable HRM practices and the selection process of intermediaries: for example innovation processes, participation processes. Also cross industry and geographical comparisons could also reveal high quality comparisons in terms of difference of context and Best Practice;

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As a result, the present study has also highlighted the need for sustainable HRM activities for sustainable environment. The power of innovation, added to the engagement of employees, is a formula for driving great environmental performance. The solution chosen is integrated, that is, besides the environmental protection strategy in practice is integrated in the organizational culture and will for sure generate positive influence and radiative effect at the organizational and, as a result, at the societal level.

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