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Green Human Resource Management Practices and the Digital World

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This study investigates the impact of Green Human Resource Management (GHRM) practices on environmental performance in the Information Technology (IT) sector of Karachi, Pakistan. It specifically explores how green competence-building practices, green motivation-enhancing practices, and green employee involvement practices contribute to achieving sustainability goals. A quantitative research design was employed using a cross-sectional survey approach. Data were collected from 398 IT professionals working in Karachi through a structured questionnaire based on a 5-point Likert scale. The data were analyzed using Partial Least Squares Structural Equation Modeling (PLS-SEM) via Smart PLS 4. The results reveal that green competence-building practices and green motivation-enhancing practices have a statistically significant positive impact on environmental performance. However, green employee involvement practices did not demonstrate a significant direct effect. The findings suggest that investing in skill development and motivational strategies is more impactful in driving sustainable outcomes than involvement strategies in the local context. The study highlights the importance for IT firms in Karachi to implement structured green training and motivational reward systems to enhance environmental performance. It also suggests the need for organizational cultural change to make employee involvement more effective in sustainability efforts. This research contributes to the limited literature on GHRM practices in the context of developing countries, particularly within the rapidly evolving IT sector of Karachi. It addresses a critical research gap by examining specific GHRM dimensions and their differential effects on environmental outcomes.

1. Introduction

Today the integration of green practices inside organizational operations stands as an unquestionably vital necessity because of rising environmental conditions. GHRM has evolved to become a core part of human resource management which transforms classic HR operations into environmentally-focused methods. Jabbour et al. (2013) created foundational research to demonstrate how human resources organizations could incorporate green elements into their operational framework thus showing the essential role of GHRM in managing environmental impact alongside cultural development of employee green practices. The Quick-Growing Information Technology industry of Karachi understands environmentally conscious practices as both moral and strategic business approaches (Nizam et al., 2020a). Karachi's unique socio-economic and environmental landscape offers a compelling context for examining how corporate activities align with broader environmental performance objectives. This research evaluates essential green methods that sustain the industry while offering relevant analytical findings that relate to Karachi and worldwide sustainability benchmarks.

Recent research reveals the environmental sustainability importance that exists in Karachi's IT sector because corporate approaches increasingly adopt green initiatives (Ali et al., 2019; Nizam et al., 2020b). The study investigates the systematic development methods that empower IT organizations to become environmentally competent. The study examines methods for boosting green motivation within IT professional groups as Yafi et al. (2021) have studied which motivational approaches lead IT professionals to participate in environmental projects. The implemented approach generates dual benefits for both organizational sustainability and the IT sector’s dedication to environmental stewardship.

The adoption of green practices provides organizations with both market competitiveness along better innovation capabilities and opportunities to attract employees concerned with environmental values (Smith & Turner, 2021). The deployment of GHRM practices such as green competence building, motivation-enhancing practices, and employee involvement have been linked to improved environmental performance across various sectors (Lee et al., 2022; Khan & Qianli, 2020). The practices help embed sustainable values into corporate culture and fuel green behaviors as well as practices across all organizational units.

The literature emphasizes how GHRM systems play an essential part in developing environmental conservation practices within emerging markets. Zhang et al. (2022) underscore the importance of sustainable development goal alignment with Human Resource management practices specifically for technology-oriented businesses. The ecological footprints of IT companies decrease and their competitiveness improves when organizations implement green HR practices according to Martins and Martins (2023). Thompson and Gullone (2022) establish through research that organizational culture serves as an essential element for sustainability ethos development by demonstrating cultural practices' dual capability to speed up or slow down green initiative adoption.

1.1 Problem Statement

The UN launched SDGs in 2015 to ensure productive harmony between global economic development and community development along with environmental sustainability (Barbier & Burgess, 2017; Fonseca & Carvalho, 2019). The United Nations (UN) has prioritized multiple regional as well as international technology applications because these technologies play an essential role in achieving their goals. Society exists in a direct connection with environmental sustainability and technology according to the findings reported by Salam and Khan (2018). Sustainability receives special attention within the information technology (IT) sector while discussions continue about sustainability in engineering, manufacturing, and sciences of the situation according to Aleixo et al. (2018) and Saunila et al. (2018).

The economy of Karachi Pakistan advances through the power of its Information Technology industry. But at the moment, it's dealing with sustainability issues that are affecting its ability to achieve environmental performance (Nizam et al., 2020a). The IT industry's fast growth produces both higher resource consumption and increased electronic waste production together with higher expenses and standard compliance difficulties because of insufficient comprehensive green strategies. The immediate performance capabilities of Karachi's economy are negatively affected by the people's lack of environmental concern in the city. Lack of environmental awareness spreads across society creating an obstacle that hinders the integration of the sector with SDGs according to Ikram et al. (2021). The present study aims to enhance environmental performance by investigating green competency, motivation, and employee involvement within the IT industry of Karachi.

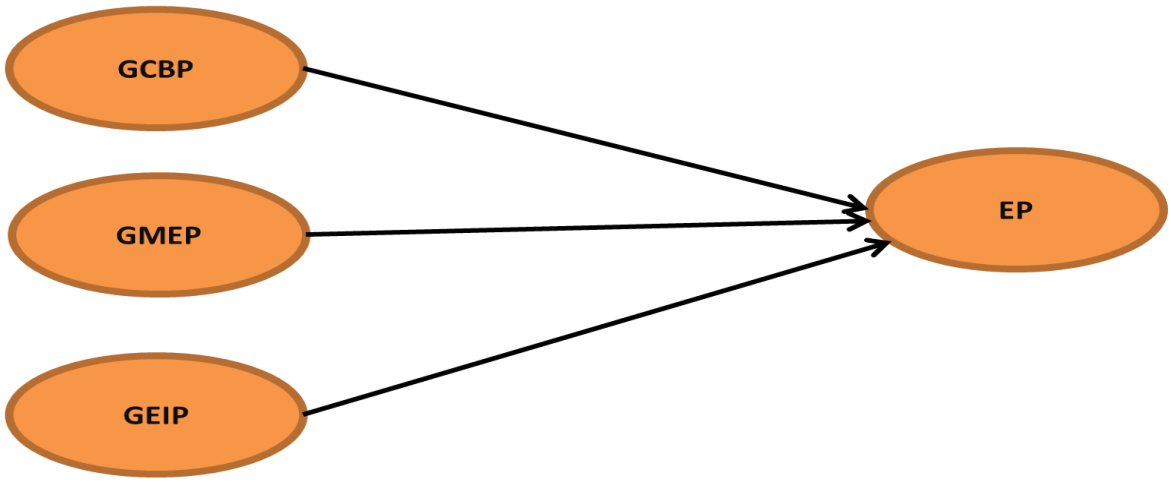
1.2 Research Gap

Research on GHRM practices in Pakistan's IT sector has received significant attention (Salam & Khan, 2018, Waheed et al., 2020, Jamal et al., 2021), yet there is a recognized lack of study about specific structures (GCBP, GMEP, GEIP and EP) specifically in Karachi. Research previously conducted has given limited insights about specific characteristics of GHRM practices in the IT industry thus creating space to explore construct details in this study. This study explores unknown GHRM practices in the IT field to fill knowledge gaps in the literature database with new findings.

Studies on GHRM practices in IT sectors mainly analyzed separate green behaviors and values in correlation with various GHRM practices (Ahmad et al., 2022; Ribeiro et al., 2022). The Pakistan Information Technology (IT) industry in Karachi requires advanced unified implementation of all components. To better understand Green Human Resource Management (GHRM) methods in this setting, this research focuses on how they impact environmental performance in Karachi's IT sector. By consistent with the gaps the study aims to achieve these objectives, To investigate the influence of green competence-building practices on environmental performance. To investigate the influence of green motivation-enhancing practices on environmental performance. To investigate the influence of green employee involvement practices on environmental performance. Followed by questions such as What’s the impact of green

competence-building practices on environmental performance? What's the impact of green motivation-enhancing practices on environmental performance? What's the impact of green employee involvement practices on environmental performance?

Figure No 1: Conceptual Framework



2. Literature Review

2.1 The Ability Motivation and Opportunities Theory (AMO)

Meyer and Allen (1991) developed the AMO paradigm which describes employee engagement behaviors as well as workplace performance in detail. This research incorporates this model for its framework. Men and women need opportunity and motivation combined with ability to perform appropriately throughout structured organizational arrangements. This study rests on (AMO) model theory which demonstrates how HR policies enable workers to improve environmental performance and obtain environmental competencies and drive (Yu et al., 2020). The application of AMO theory to Pakistani GHRM environments enables researchers to better understand how workers' abilities together with their motivational aspects and environmental circumstances impact their adoption of green values which leads to better environmental outcomes.

Environmental sustainability education applications in Pakistan must analyze student training practices jointly with background expertise to build their competencies (Khan & Inam, 2018). Working employees demonstrate environmental initiative commitment when they both take part in environmental projects and show motivation towards sustainable behavior. Didactic values from

a social system combine elements from extrinsic and intrinsic elements to determine employee interest in green events (Renwick et al., 2013).

The environmental identity support of Pakistani organizations manifests through leaders who endorse such initiatives along with developing green policies that reach employees through designated communication channels (Iqbal et al., 2019). Cultural values and social norms together with environmental training and performance review methods used during employee recruitment enhance employee participation in environmentally friendly activities. Research needs to explore how Pakistani cultural elements impact employee motivation as well as how specific cultural dimensions affect sustainability initiatives in GHRM. The AMO theory serves Pakistani GHRM through an organized framework that clarifies the structures linking workforce capabilities with motivational factors to environmental sustainability opportunities. The theoretical framework serves as a basis for creating research guidelines that lead to initiative designs that aim to facilitate environmental practices matching Pakistani cultural values.

2.2 Hypothesis Development

2.3 Green Competence Building Practices and Environmental Performance

Evidence collected by Adeel et al. (2022c) demonstrates that green human resource techniques particularly component-building programs including green training effectively boost business environmental outcomes. The initiatives define both ability levels and competency standards needed by Workers to deliver effective sustainable initiatives. Structured green training programs as examples of green competence development led to improved environmental performance in organizations according to Sakharina et al. (2020). The research proves that workers with appropriate information can both identify environmental risks and successfully implement appropriate green solutions. Yafi et al. (2021) explain through their paper the sequential influence of green training on environmental outcomes. A research project demonstrates that employee capabilities and motivational levels improve after green training because both factors function as means to link training initiatives to better environmental outcomes. Organizations using green operational practices achieve superior environmental outcomes while employees demonstrate higher involvement in sustainable corporate goals.

Patil et al. (2022) revealed complete green HRM practices starting with sustainable recruitment and candidate selection before employee development and instruction teaches corporate sustainability values to organizations and builds professional teams. Multiple sustainability practices bring organizational benefits by creating superior market positioning that links corporate strategy to environmental sustainability targets. The data presented by Preksha Yadav (2023) establishes that sustainable training holds essential value for developing organizational performance that ensures sustainability. An effective green training program leads to superior environmental citizenship behavior from organizational members which improves total organizational environmental performance.

Collectively, this literature demonstrates that Green Competence Building Practices are pivotal in fostering an organizational environment conducive to sustainable growth. By investing in employee training and developing a workforce skilled in green practices, organizations can significantly enhance their environmental performance. The research evidence provides substantial backing to validate the proposed hypothesis.

(H1): Green competence-building practices have a positive impact on environmental performance.

2.4 Green Motivation-Enhancing Practices and Environmental Performance

Green Motivation-Enhancing Practices (GMEP) play a pivotal part in the development of an organizational culture that supports and advances environmental performance. Lawmakers currently deploy many distinct strategies through GMEP to promote employee participation in environmentally sustainable conduct including the implementation of green reward systems and direct factual collaboration with environmental programs. Recent research by Kuo et al. (2022) emphasizes the effectiveness of GMEP in enhancing employee satisfaction with green rewards, which in turn contributes positively to environmental performance. Mehrajunnisa et al. (2022) agree with this finding that green HRM practices along with GMEP enable sustainability-focused organizations to boost their business performance by enhancing employee green behavior. Ukrainian organizations choose to use intangible rewards instead of tangible benefits to motivate employees toward environmental initiatives as per Tsymbaliuk et al. (2022). Organizations should understand cultural and regional differences as a fundamental factor that determines the success of motivating green behaviors through strategic approaches. Research shows that GMEP drives the development of green maturity along with internal and external drives in various business sectors such as hospitality.

Hotel managers recognize according to Ahmed et al. (2021b) that GMEP initiatives create significant positive results for environmental management practices in hotel establishments. The research conducted by Chen and Wu (2022) demonstrated the relationship between green HRM practices and their positive impact on employee green mindfulness resulting in active green behaviors. The relationship between green transformational leadership and green self-efficacy exhibits a complex dynamic with employee behavior and leadership which assists environmental goal achievement. Research by Zaki and Norazman (2019) demonstrates that GMEP contributes substantially to worker engagement in green work principles by enabling green employee empowerment as a mediator between these relationships. The research of Bashirun and Noranee (2020) investigated environmental knowledge and green behavioral attitudes as critical concepts in which motivation-based employee practices can effectively educate and involve workers. Building on this, Peng, Hou, and Pang (2019) sum up that employees' green behavior, influenced by motivation-enhancing practices, can directly impact the environmental performance of organizations, contributing to their sustainable development. This body of evidence strongly supports the hypothesis:

(H2): Green motivation-enhancing practices have a positive impact on environmental performance

2.5 Green Employee Involvement Practices and Environmental Performance

Green Employee Involvement Practices (GEIP) are crucial for fostering sustainable business operations. Adeel et al. (2022d) and Opatha and Arulrajah (2020) show how ethical human resources practices such as GEIP increase job satisfaction as well as serve as a communication channel between the practices and better environmental results. This shows that complete green HRM approaches have direct positive impacts on employee satisfaction. Kuo et al. (2022b) discuss the transformative role of green HRM practices in promoting green innovation, which is essential for improving environmental performance. According to Berrone et al. (2019), innovative sustainability measures consist of creating new processes together with products that minimize environmental impacts to directly boost firm sustainability. Ahmad et al. (2023) climax the position of information exchange and green HRM practices in attractive environmental performance by fostering employee environmental commitment. According to Vasconcelos (2021), organizations that clearly communicate sustainability targets generate increased employee engagement and stronger commitment towards these targets. Green Human Resource Management practices generate positive effects on psychological green climate and employee green commitment according to Zaki and Norazman (2019).

The implementation of sustainable Human Resource Management practices creates improved workplace green climates that results in better organizational sustainability performance according to Renwick et al. (2016). The integration of green HRM practices with green transformational leadership allows sustainable staff conduct according to Chen and Wu (2022). Environmental performance receives additional reinforcement from green leadership because Osadchy et al. (2020) demonstrate its crucial role in supporting employee green behavior development and the creation of green working environments. Luu (2019) has studied the impact of effective environmental domestic management together with group green craftsmanship on strengthening organizational citizenship behavior (OCBE) through green HR practices. Barth et al. (2021) establish that sustainable leadership strengthens team relationships which produce environmental citizenship actions leading to enhanced performance outcomes. Environmental knowledge management enables employees to safeguard the environment through information distribution before they develop behavioral intention which improves organizational green aspects as shown by Zhang et al. (2021) along with Chuang et al. (2020). Liu et al. (2023) prove that employee green practice advocacy strengthens through the combination of supervisory environment backing and green passion as critical components.

The research by Wang et al. (2019) demonstrates that supportive leadership together with proper organizational culture functions as essential elements which drive employees towards sustainable practice usage and advocacy. Begum (2020) explains how green HRM practices within higher education institutions boost employee understanding and acceptance of environmental operations which lead to better organizational environmental results. Tariq et al. (2019) discovered

results that align with those researchers who study how green HRM practices develop a sustainability culture in academia. Research by Rabbani (2021) confirms employees practice environment-friendly behavior in their personal lives because of green practices from the organization. Both levels of environmental effects ranging from societal to community would be impacted by outside work sustainability commitments according to Simões and Vos (2020). Kavgacı and Erkmen (2021) explore the role of green human resource management practices in supporting corporate social responsibility through environmental responsibility project enhancement. The creation of corporate reputations that meet international sustainability standards requires green Human Resource Management practices according to Malik et al. (2020).

(H3): Green employee involvement practices have a positive impact on environmental performance.

3. Methodology

3.1 Research Design

Research training collects quantitative data about employee views regarding GHRM implementation and its effect on green values through standardized Likert scales distributed via questionnaires.

3.2 Research Approach

A deductive approach in the study investigates the connections between GHRM methods and environmentally motivated employee attitudes and conduct.

3.3 Philosophes and Time Horizon

The research approach takes empirical evidence along with statistical data as highly significant while analyzing GHRM's influence on environmental consciousness. The study traces the HRM applications at a distinct historical point through a cross-sectional approach to display current HRM methods together with their employee effects.

3.4 Instruments

The research used five-response Likert scales as its main method to gather data. The research distributes questionnaires to IT personnel working within Karachi in order to get feedback from a wide range of business sectors. Multiple investigated constructs for analyzing the relationship between environmental performance and green practices come directly from established studies in green literature. Six operationalized items originate from Tang et al. (2017) to evaluate this construct. The selected items derived from Tang et al. (2017) analyze various training approaches and staff development elements that enable employees to succeed in sustainable activities. The items applied demonstrate their effectiveness at identifying how extensively organizations should develop environmental stewardship competencies to achieve sustainability success. Six operationalized items originate from Tang et al. (2017) to evaluate this construct. The selected items derived from Tang et al. (2017) analyze various training approaches and staff development elements that enable employees to succeed at sustainable activities. The

items applied demonstrate their effectiveness at identifying how extensively organizations should develop environmental stewardship competencies to achieve sustainability success. The measurement tool consists of five items established by Anwar et al. (2020) that assess employee green practice participation including sustainable resource management and waste recycling and energy preservation activities. Employees who actively participate in green initiative execution reflect in these measurement items due to their ability to build sustainable organizational cultures. 7 items from Elshaer et al. (2021), this dependent variable targets the effectiveness of the organization's environmental strategies. These items are designed to measure nmerous outcomes such as reduced carbon footprint, improved waste management, and enhanced energy efficiency, providing a holistic view of the organization's environmental impact.

3.5 Population and Data Collection

Workers from different IT organizations in Karachi Pakistan consisting of 398 employees served as the selected study participants. The active workforce division demonstrates itself as a working unit that manages an advancing industrial field while actively shaping environmental sustainability approaches. Data collection through a Likert scale questionnaire utilized a 5-point selection ranging from "Strongly Disagree" to "Strongly Agree." The research method includes tools to examine how Pakistani IT personnel evaluate their organizational environmental responsible practices and their corresponding behavioral responses toward them.

A representative sampling system was designed using strata distribution to include the full population range. The researchers used stratified random sampling to organize the total population by organization size and type and effectively retrieved participants from all groups. The worker sample contains balanced gender demographics together with participants from diverse age ranges and educational levels and income bands that describe the entire IT sector employee population in Karachi.

4. Results

4.1 Measurement Analysis

The measurement analysis for the study involved evaluating the reliability and validity of constructs related to green HRM practices and their impact on environmental performance. The analysis started by examining item loadings which showed sufficient results in line with Hair et al. (2017; Mubashir & Siddiqui, 2023) for checking adequate convergent validity in structural equation modeling since each construct exceeded the recommended threshold of 0.7. Each set of items demonstrates substantial correlation with its core construct because the threshold confirms they measure identical constructs.

The analysis included additional tests that used Composite Reliability (CR) and Cronbach’s Alpha (Rho A) evaluations to examine each construct. The CR values exceeded the accepted threshold of 0.7 as recommended by Hair et al. (2017) for establishing high internal consistency among construct items thus ensuring reliability. The constructs demonstrated reliable

behavior due to Cronbach's Alpha results which surpassed the 0.7 benchmark according to Goldberg's (1972) recommendations.

The measures achieved valid convergent validity according to Fornell and Larcker (1981) since their Average Variance Extracted (AVE) values exceeded 0.5. More than fifty percent of the observable items' variance is explained by their construct variables thus demonstrating that the construct effectively measures significant aspects of latent variable assessment.

Proper measurement adherence to established criteria results in strong and reliable findings during the study. The constructs of Green Competence Building Practices, Green Motivation Enhancing Practices, Green Employee Involvement Practices, and Environmental Performance are thus well-supported by their respective item loadings and reliability statistics, providing a solid foundation for the subsequent analysis of their interrelationships and their collective impact on environmental performance in the context of green human resource management practices. The rigorous analytical approach applied to measurements proves essential because it confirms both theoretical compatibility with research frameworks and demonstrates superior empirical qualities to generate dependable findings regarding green HRM practice effects on sustainable organizational achievements. The Heterotrait-Monotrait (HTMT) ratio evaluation serves as a fundamental assessment to confirm the distinct nature of research measures in the study. The HTMT ratios calculated for the constructs in this research—Green Competence Building Practices, Green Motivation Enhancing Practices, Green Employee Involvement Practices, Green Value, Green Behavior, and Environmental Performance—substantiate their distinctiveness and justify the model's construct validity. According to Henseler, Ringle, and Sarstedt's (2015) suggested criteria, the discriminant validity is strong since all HTMT ratios remain below 0.90 in the presented table.

Table No 1: Construct Reliability and Validity

Construct	Item	Item Loading	Composite Reliability (CR)	Cronbach's Alpha (Rho A)	Average Variance Extracted (AVE)
Green Competence-Building Practices	GC1	0.702	0.980	0.988	0.655
	GC2	0.710			
	GC3	0.723			
	GC4	0.799			
	GC5	0.722			
	GC6	0.834			
Green Motivation Enhancing Practices	GM1	0.745	0.899	0.980	0.630
	GM2	0.727			
	GM3	0.708			
	GM4	0.710			
	GM5	0.709			
	GM6	0.755			

Green Employee Involvement Practices	GE1	0.712	0.840	0.941	0.646
	GE2	0.755			
	GE3	0.767			
	GE4	0.787			
	GE5	0.809			
	GB12	0.823			
Environmental Performance	EP1	0.704	0.913	0.934	0.650
	EP2	0.734			
	EP3	0.702			
	EP4	0.793			
	EP5	0.903			
	EP6	0.750			
	EP7	0.870			

Table No 2:HTMT

Construct	GCBP	GMEP	GEIP	GV	GB	EP
GBP						
GMEP	0.982					
GEIP	0.850	0.800				
EP	0.655	0.554	0.560	0.678	0.703	

4.2 Structural Analysis

The structural analysis conducted for this study focused on the relationships between various green human resource management (HRM) practices and environmental performance, with specific attention to the mediating roles of green values and behaviors. These research findings deliver essential information about the sustainability outcome effects of the IT sector's practices in Karachi's market.

H1 proposed that green competence-building practices positively influence environmental performance. The statistical evaluation demonstrated this association with a beta value of 0.320 while showing a t-value of 3.850 together with a p-value below 0.05. H2 examined the effect of green motivation-enhancing practices on environmental performance. The beta value reached 0.180 and the t-value achieved 5.890 indicating a significant positive relation (p-value of 0.002). H3 which explored the impact of green employee involvement practices on environmental performance, showed a beta value of 0.212 and a t-value of 1.979. The p-value of 0.006 exceeds the standard significance threshold by the slightest margin therefore leading researchers to reject this hypothesis. The research findings demonstrate a positive relationship but the relationship lacks enough statistical significance at traditional levels.

Table 4 presents the R^2 and Q^2 values for each endogenous construct within our structural model. R^2 values measure the proportion of variance in the dependent variable which is predictable from the independent variables, indicating the explanatory power of the model. Q^2 values, obtained via the Stone-Geisser test criterion through a blindfolding procedure, assess the model's predictive relevance. Environmental Performance: The R^2 value of 0.680 suggests that 68% of the variance in environmental performance can be explained by the predictors included in the model, such as green competence-building practices, and motivation-enhancing practices, (Hair et al., 2017). This assessment of R^2 and Q^2 values is crucial in confirming that the theoretical model is not only conceptually robust but also empirically valid, providing significant insights into the interdependencies and effects within green HRM practices.

Table No 3: Results of Hypotheses

Hypothesis	Path Description	β Value	t Value	p Value	f Square	Decision
H1	Green Competence Building Practices → Environmental Performance	0.320	3.850	0.004	0.100	Accept
H2	Green Motivation Enhancing Practices → Environmental Performance	0.180	5.890	0.002	0.080	Accept
H3	Green Employee Involvement Practices → Environmental Performance	0.212	1.979	0.051	0.009	Reject

Table No 4: R Square and Q Saquare

Construct	R^2 Value	Q^2 Value
Environmental Performance	0.680	0.450

5. Discussion & Conclusion

Results showed support for this hypothesis which proves that green competence-building practices create a substantial impact on environmental performance. Current research establishes that green competence initiatives support the findings of Tang et al. (2017) by working in any industry sector. The IT sector in Karachi demonstrates how rising sustainability-related market and regulatory interest leads to higher significance of green practices. These initiatives increase due to global business competition because organizations implement sustainable operations to lower their operating costs and develop better brand images.

Research by Renwick et al. (2013) received verification through our study because motivational strategies generate substantial environmental outcomes in technology-oriented businesses. The attributes of IT growth in Karachi coupled with its environmentally conscious young workforce suggest that these measures might boost environmental performance. Traditional communal values along with collective responsibility create new potential for motivation-based environmental initiatives to succeed.

The study disproved this hypothesis in contradiction to results observed across Europe and North America (Jackson et al., 2011). The business environment in Karachi creates obstacles that limit how extensively employee participatory actions help organization achieve their objectives. Karachi business entities opt for short-term survival over sustainable development when they confront political turmoil and financial crises which divert their attention from green development practices.

5.1 Practical Implication

This research into green human resource management (HRM) practices and their impact on environmental performance in Karachi's IT sector offers several practical implications for industry stakeholders. The results demonstrate that human resource management functions as a critical instrument to develop sustainable organizational practices since businesses achieve better environmental results when they integrate green competencies and motivation and employee involvement approaches. Firstly, the positive influence of green competence-building practices on environmental performance underscores the importance of investing in employee training and development focused on sustainability. IT organizations operating in Karachi must introduce specific development programs to train workers about environmentally friendly management as well as sustainable operational methods. The dual benefit arises as the company conserves environmental resources while holding onto motivated staff who prioritize sustainable business practices. This appeal to corporate responsibility ideology attracts employees and strengthens company sustainability. The positive results from green motivational programs support IT firms to adopt incentives that recognize sustainable workplace activities. When employees actively participate in environmental goals the company achieves they should receive recognition programs or monetary bonuses and career advancement opportunities.

Through these practices organizations successfully encourage their staff members to uphold behaviors that achieve sustainability goals. However, the study also indicates that green employee involvement practices did not show a significant direct impact on environmental performance, which could be reflective of the hierarchical and possibly rigid corporate cultures prevalent in some Karachi IT companies. Organizations require developing cultures that genuinely empower workers to engage in sustainability initiatives because these employees will actively participate in sustainable efforts. The organization must develop open channels for workforce communication and collaboration which enable staff to present their environmental solutions. Organizations that execute green HRM protocols gain environmental compliance with local regulations while establishing themselves as sustainability champions to boost their image draw superior staff members and develop fresh green market prospects. The study reveals that IT companies operating in Karachi should integrate green HRM practices strategically into their organizational operational systems as well as cultural frameworks. Doing so not only drives environmental performance but also aligns with broader corporate objectives of innovation, competitiveness, and compliance. The research findings enable leaders from the IT sector to create decisions that enhance business outcomes and environmental sustainability simultaneously.

5.2 Limitations

This study, focused on assessing the impact of green HRM practices on environmental performance within Karachi's IT sector, encounters several limitations that could influence the interpretations and applicability of its findings. The cross-sectional design angle provides instant data points yet hinders our ability to show cause-effect relationships and track practice developments as well as their related impact dynamics across time. The regional and specific industry boundaries make it difficult to extend the research findings to additional industries beyond the Karachi Information Technology sector or across different geographical areas. Standardized Likert scale questionnaires with self-reported measures can produce reaction biases because respondents tend to provide answers they consider socially acceptable instead of genuine behavioral or attitudinal reflections. Additionally, while the study includes a robust set of constructs, it does not account for all possible variables that could influence environmental performance, such as specific organizational policies, leadership styles, external economic conditions, or technological advancements that are particularly pertinent in the IT sector. These factors would play major roles in altering or linking the detected relationships thus creating a missing piece within the study's current boundaries.

5.3 Future Studies

Additional future research in green HRM practices should investigate broader geographical locations and various industrial sectors to enhance both the applicability and robustness of research findings. The investigation of causal relationships along with the tracking of green HRM practices throughout time would become possible by using longitudinal research designs. Research on these matters would reveal the permanent characteristics of sustainability along with the effectiveness metrics of these approaches. Studies should examine new potential factors influencing green practices such as organizational culture alongside leader commitment and macroeconomic elements and digital transformation effects to reveal more comprehensive results. Various organizational factors influence the reception and usage of green initiatives throughout different business environments. Qualitative methods which include focus groups and interviews will enhance quantitative findings by revealing deeper contextual perspectives on human responses toward sustainability within different organizations. These approaches would offer a more comprehensive understanding of the complex dynamics at play, thereby providing a more detailed roadmap for organizations aiming to enhance their environmental performance through strategic HR initiatives. Research exploring how technology impacts both green HRM practice adoption and effectiveness would advance understanding of human resource-sustainability alignment within digital business environments.

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