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Research Article

Green HRM And Sustainability Orientation in Relation to Carbon-Reduction Performance: The Moderating Role of Perceived Vision 2030 Alignment

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Abstract:

Introduction: This research examined the relationship between green human resource management (Green HRM), sustainability orientation, and the carbon-reduction performance in Saudi-based sustainability-focused firms with perceived Vision 2030 alignment as a moderator. The study utilized Natural Resource-Based View (NRBV), Stakeholder Theory, and Institutional Theory to examine the association between internal environmental capabilities, institutional alignment, and carbon outcomes.

Methods: A cross-sectional survey design was used, where 250 valid responses were collected from environmental and operations staff were taken. The data were analyzed by Partial Least Squares Structural Equation Modeling (PLS-SEM) to evaluate reliability, validity, direct relationship, and moderation.

Results: A significant positive association of Green HRM with carbon-reduction performance ($\beta = 0.524$, $p < 0.01$) and significant positive relationship ($\beta = 0.230$, $p < 0.01$) was also observed between sustainability orientation and the carbon reduction performance. The moderation effect of perceived Vision 2030 alignment was small but statistically and meaningfully significant on the relationship between GHRM and carbon-reduction performance ($\beta = 0.058$, $p < 0.01$) and between the sustainability orientation and carbon-reduction performance ($\beta = 0.032$, $p < 0.05$).

Conclusion: Alignment with national decarbonization strategies (Vision 2030) in Green HRM practices and Organization's vision, decision-making, and operational processes is positively associated with carbon-reduction performance.

Keywords: Green HRM, sustainability orientation, vision 2030 alignment, carbon-reduction performance, and Saudi Arabia.

1. INTRODUCTION

Global issues like climate change and increased carbon emissions have put pressure on governments and various organizations to embrace sustainable operational practices. Economic diversification and environmental responsibility are big issues for resource-dependent economies. One of the largest hydrocarbon economies in the world, the Kingdom of Saudi Arabia (KSA) is experiencing growing urgency to mitigate carbon emissions and maintain economic growth in the context of its national transformation agenda, Vision 2030 (Al-Barakati, 2024). The need to achieve organizational-level carbon-reduction performance has thus become critical to national net-zero commitments.

Empirical evidence indicates that energy use is a major factor contributing to CO_2 emissions in Saudi Arabia, which underscores the need to incorporate technological innovation and environmental management practices across the sectors (Alajmi, 2024). National environmental analysis also shows

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that economic growth and industrial activity still place pressure on greenhouse gas (GHG) emission, especially in power and heat generation systems (Altouma *et al.,* 2024). Such environmental pressures have driven the Saudi government to initiate structural sustainability reforms via Vision 2030 and the Saudi Green Initiative.

Saudi Arabia, under Vision 2030, has committed to reaching net-zero emissions by 2060, aiming to reduce by an estimated 278 million tons of CO_2 each year by 2030, doubling renewable energy capacity, and increasing energy efficiency in industries (Islam & Ali, 2024). These policy efforts focus on organizational change, technological advancement, and sustainable workforce engagement as critical tools to facilitate national decarbonization strategies. The carbon capture project, which can store 9 million metric tons of carbon dioxide annually, in which Aramco, SLB, and Lindse are major shareholders, provides additional example of how the Kingdom is shifting to a low-carbon economy in line with global climate pledges (Reuters, 2024).

Though national sustainability policies offer a strategic guide, organizational capabilities and workforce engagement, to a large extent, determine environmental performance outcomes. Green Human Resource Management (Green HRM) and sustainability orientation have become key internal forces bringing environmental change in this context. In a recent study on Saudi organizations, it was observed that Green HRM practices contribute to environmental performance significantly by boosting both environmental commitment and innovation behavior of employees (Altassan, 2025). But it also indicated the importance of aligning leadership values in order to incorporate sustainability in their culture meaningfully. Likewise, a study indicated that sustainability-oriented organizational cultures strengthen sustainable development performance using the green engagement and operational innovation processes (Putra *et al.,* 2025).

Theoretical perspectives that support this facet are the Stakeholder Theory, Natural Resource-Based View (NRBV), and Institutional Theory. According to (McDougall *et al.,* 2019), NRBV proposes that firms gain a competitive advantage by having environmentally sustainable capabilities. Conversely, (Ribeiro & Gavronski, 2021) pointed out that Stakeholder Theory focuses on the responsibility of an organization to fulfill the environmental expectations of the stakeholders that affect the sustainability performance outcomes. Also, Institutional Theory describes the external pressures produced by laws, norms and expectations of the industry and the formation of organizational behavior in relation to the adoption of sustainable practices (Kauppi, 2022).

Although scholarly attention has increased on the topic, the current body of literature focuses mainly on direct associations between Green HRM practices and sustainability outcomes. Current literature often disregards the institutional and policy processes by which organizational sustainability efforts are translated into concrete carbon-reduction performance. Corporate environmental strategies in transitional economies like Saudi Arabia are highly determined by the national sustainability programs. Nevertheless, there is little empirical evidence on how organizational sustainability orientation and Green HRM practices are impacted by national programs like the Vision 2030.

To fill this gap, this research aimed to examine the impact of Green Human Resource Management and sustainability orientation on carbon-reduction performance in Saudi Arabian organizations, and explore the moderating effects of the perceived Vision 2030 alignment. This research makes an empirical contribution by offering organization-level findings to determine how internal sustainability practices culminate in environmental performance outputs through policy-based mechanisms. In concept, it adds a new dimension to the literature on sustainability management by incorporating human resource practices, strategic sustainability orientation, and national climate policy into a single approach to analysis. Contextually, the research provides the insights peculiar to the KSA and proves the role of Vision 2030 as an institutional driver that aligns the organizational behavior with the national net-zero goals in an energy-reliant developing economy.

2. LITERATURE REVIEW

2.1. Key Constructs

Green HRM is defined as the incorporation of environmental sustainability goals into the human resource practices, including green recruitment and selection, environmental training and development, sustainability-based performance appraisal, green compensation, and involvement of employees in environmental programs (Ahmad *et al.,* 2025). Such practices build ecologically responsible employee behavior and ecological competence of the organization. Green HRM in this study involves green recruitment, environmental training, performance evaluation based on sustainability, and participation of employees in carbon-reduction programs.

Sustainability orientation is the strategic dedication of an organization to incorporate environmental and social responsibility in the corporate vision, decision-making, operational processes, and long-term strategic planning to create sustainable values (Silva *et al.,* 2025). Companies that are highly sustainability-oriented make alignment between the business objectives, environmental conservation, and the needs of the stakeholders.

Perceived Vision 2030 Alignment is the perception of employees about the degree to which the organization sustainability strategies, policies, and operational practices comply with the environmental and decarbonization priorities in the Saudi Arabia agenda of the Vision 2030. Instead of gauging national policies programs or carbon performance on the macro-level, this construct reflects the perceived organizational alignment, strategic commitment, and compliance orientation to Vision 2030 sustainability goal. Notably, the items are not a direct measure of carbon reduction performance, but how much organizations are bringing their sustainability strategies and internal practices in line with the national policy framework of Vision 2030. The construct therefore, reflects how employees perceive organizational alignment and not the national policy itself.

Carbon-reduction performance is an organizational capacity to reduce GHG emission levels by improving energy efficiency, emission control strategies, optimization of resources, and a low-carbon operational strategy. Although carbon reduction can be measured using audited emission inventories, this study measures it using perceptual assessment of professionals who have a sound understanding of sustainability and operations, and are involved in the evaluation of environmental activities of organizations. Previous sustainability studies often quantify environmental performance based on perceptual judgments of employees where objective data on emissions are lacking, because organizational actors have credible knowledge of environmental programs and operational strategies that affect carbon performance (Fang *et al.,* 2023; Ibrahim & Mahmood, 2022).

Therefore, the construct represents perceived organizational effectiveness in carrying out emission-reduction programs, energy-efficient operations, and carbon-management practices that could help in reducing the operational carbon footprint of the organization.

2.2. Theoretical Framework

The Natural Resource-Based View (NRBV) is a continuation of the Resource-Based View (RBV), where it is suggested that the organization can gain a lasting competitive advantage based on the environmentally oriented capabilities, including pollution prevention, eco-efficiency, and sustainable management of resources (McDougall *et al.,* 2019). According to NRBV, environmental competencies are integrated into organizational systems, especially human capital and managerial practices, which become strategic resources that are difficult to imitate and valuable, and are the key to their sustainability performance in the long term (Legese *et al.,* 2026). Green HRM in this research serves as an internal capability that builds environmental knowledge and behaviors of employees to help companies enhance carbon-reduction performance.

Stakeholder Theory, on the other hand, postulates that the success of organizations is based on their capacity to address the demands of their stakeholders, such as employees, regulators, communities, and society, especially in terms of environmental responsibility and sustainability performance (Freeman, 1984, cited in Mahajan *et al.,* 2023). Stakeholder Theory supports sustainability orientation construct as stakeholder theory emphasizes the external pressure (decarbonization demands of stakeholders under the Saudi Arabian agenda of Vision 2030) compelling firms to incorporate sustainability in corporate vision and objectives.

In order to support this explanation further, the Institutional Theory sheds light on how organizational behavior is influenced by the formal policy structures. Firms are urged to adhere to national sustainability agendas by institutional pressures such as coercive regulations, normative expectations, and legitimacy-seeking behavior (DiMaggio & Powell, 1983; Kauppi, 2022). A recent article applied Institutional Theory and revealed that institutional forces have a strong impact on low-carbon innovation policy in organizations, indicating its usefulness in environmental strategy study (Yuning *et al.,* 2024). Vision 2030 in the Saudi Arabian context is an institutional mechanism that is policy-based to encourage organizations to correspond their internal strengths and strategic orientations to national climate objectives. A combination of these theories offers a multi-layered account: NRBV shows how Green HRM creates the internal environment capabilities, Stakeholder Theory explains the reason why companies form the sustainability orientation to be able to match the expectations of stakeholders, and Institutional Theory explains how policy environments like Vision 2030 precondition the efficacy of the given capabilities.

Beside theories, many pioneering empirical studies have provided evidence regarding the linkages between HR practices and environmental sustainability. In their pioneering study, (Daily & Huang, 2001) stated that the success of environmental management is dependent upon the participation of employees, leadership support, and environmental training programs. Following their study, (Renwick *et al.,* 2013) developed Green HRM as an approach to strategic sustainability that includes green recruitment, green training, green performance management, and green rewards. Likewise, (Jackson *et al.,* 2011) also conceptualized Green HRM in the context of strategic sustainability where environmentally focused HR systems enable sustainability transformation.

2.3. Hypotheses Development

It has been observed that sustainability-related business approaches enhance the competitiveness of the Saudi Arabian energy industry, which supports the strategic significance of sustainability management systems (AlKhars *et al.,* 2024). Another study by (Kumar *et al.,* 2025) studied a large state-owned steel manufacturing firm and applied PLS-SEM analysis with the data of 236 workers to explore how Green HRM can impact environmental performance via the proactive behavior of employees. The researchers concluded that Green HRM significantly and positively impacted environmental performance through employee engagement in environmentally friendly practices, which eventually leads to emission reduction performance. Nevertheless, its results are constrained by a single industry setting and cross-sectional survey design, thus limiting the generalizability to other sectors and national policy settings.

Likewise, (Mishra & Rath, 2024) identified the effects of Green Recruitment and Training (GRT) and Green Performance and Reward (GPR) on environmental performance by surveying employees in the Indian banking industry. Their findings were that such practices improve environmental outcomes in organizations through the intermediary of Organizational Citizenship Behavior for Environment (OCBE). However, the service-sector orientation and regional concentration in India restrict the applicability to the carbon-intensive industries with more significant pressure for emission reduction.

Continuing NRBV arguments, (Ahmad *et al.,* 2023) conducted research among 155 academic employees of

environmentally ranked institutions, with structural modeling used to test Green HRM (competence, motivation, and involvement) and environmental performance relations. The results showed that Green HRM improves environmental results indirectly via employee environmental commitment and the indirect impact of green knowledge sharing. Nevertheless, the university context is a low-emission institutional setting, which forms a theoretical limitation in explaining the performance of direct carbon reduction in industrial organizations.

On the other hand, there are also indications of conditional effects. A study based on NRBV within the banking sector and involving 310 employees in the survey indicated that Green HRM did not have a direct positive effect on environmental performance unless moderators like green corporate social responsibility and innovation process were included (Niazi *et al.,* 2023). This implies that organizational systems might be expected to encode HR practices into the quantifiable emission results. The limitation of the study is that it is sectorial, which makes the direct effect of the environment inconclusive. Collectively, the existing literature shows that Green HRM builds environmental competencies and responsiveness of the stakeholders that facilitate sustainability performance, but there are gaps in how it specifically affects the carbon-reduction performance outcomes in diverse settings. Thus, H1 is proposed:

H1: Green HRM has a positive and significant impact on carbon-reduction performance.

(Agyapong *et al.,* 2023) conducted a survey among 202 Ghanaian manufacturing SMEs based on survey data and structural equation modelling, which explored the impact of environmental orientation on sustainability performance via green supply chain management (GSCM). It concluded that environmental orientation has a strong positive correlation with environmental performance, which is consistent with the reduction of emissions, but the research revealed that GSCM is a primary means of this relationship. Nevertheless, it is a regionally targeted study focusing on Ghana and manufacturing SMEs, which makes it less directly applicable to different environments and sectors with high carbon emission rates.

(Zehir & Ozgul, 2020) evaluated the impact of the green innovation functions in a different empirical context by calculating the results of the 315 ISO-certified industrial firms in Turkey on the performance of firms depending on internal and external environmental orientation. Findings showed that internal environmental orientation had a direct positive impact on firm performance through innovation results, which proved that organizational commitment to sustainability can be translated into performance gains. However, this study did not directly relate carbon emissions or reduction indicators, and its Turkish industrial sample limits its use in industry with different emission profiles.

Other evidence in support is (Nurulasiah *et al.,* 2022) in an emerging economy, where PLS-SEM analysis showed that sustainability orientation was a key determinant of sustainable performance outcomes, thus indicating that the firm's sustainability commitment contributed to improved corporate sustainability outcomes in line with environmental goals. Nevertheless, the emphasis on micro-enterprises and generalized sustainability performance instead of carbon-specific performance is a methodology shortcoming.

Moreover, (Mah *et al.,* 2023) carried out another study on 219 Malaysian MSMEs in which PLS-SEM was applied in an effort to determine the effect of corporate sustainability orientation and environmental practices on the performance of the firm. It was determined that sustainability orientation positively influenced firm performance *via* environmental practices, proving that strategic environmental commitment positively affects the sustainability performance of the firm. But it did not segment carbon-specific performance and focused on MSMEs in Malaysia, so it cannot be directly applied to carbon reduction in general terms. Taken together, these works imply that the organization sustainability orientation facilitates the improvements of the environmental performance, which are conceptually connected to the results of carbon-reduction, but the gaps in geographic coverage, industry orientation, and relation with carbon-reduction remain. Thus, H2 is proposed:

H2: Sustainability orientation has a positive and significant impact on carbon-reduction performance.

(Khuntia, 2025) studied the integration of a Green HRM policy and the change in employee behavior in Malaysian organizations and found that structured HRM policies enhance pro-environmental behaviors that affect sustainability results. Despite this not being targeted at Saudi Vision 2030, the study mentions that organizational policy frameworks can enhance the correlation between HRM and environmental performance, which means that the governance frameworks can play the role of moderator.

Furthermore, (Liu *et al.,* 2025) relied on panel data of A-share listed companies in China to determine the impacts of institutional interventions of green policies on corporate environmental performance. They reported high levels of improvement in firm environmental performance after the implementation of the policies, implying that national policies reinforce the role played by internal management practices in emission reductions. Importantly, HRM was not directly measured in the study, but evidence was provided that policy contexts moderate the effects of organizational practice.

(Soussi *et al.,* 2025) have examined 188 firm-years of listed firms in Saudi Arabia to test the relationship between sustainable governance and environmental performance. They discovered that the mechanism of sustainability governance, which is informed by the expectations of the national policy, has a positive influence on the environmental performance. Although the study does not directly test the moderation effect, it depicts how robust sustainability frameworks that are associated with the priorities of the national policy improve outcomes of organizational environmental. Taken together, these studies indicate that policy and strategy frameworks moderate organizational practices in terms of sustainability and

environmental performance. Even though none of them directly consider the perceived Vision 2030 alignment as a moderator, the evidence shows that the national policy settings can enhance the internal HRM agency on the environmental outcomes. Thus, H3 is proposed:

H3: Perceived Vision 2030 alignment is a positive and significant moderator between Green HRM and carbon-reduction performance.

(Basali & Alshahrani, 2025) studied ESG disclosure reform under the Vision 2030 and the sustainability reporting practices of listed Saudi companies in response to the national policy priorities. According to their analysis, disclosure reforms under the Vision 2030 have an impact on the manner in which firms organize sustainability orientation within the organization, promoting transparency and accountability. Nevertheless, the research concentrates on financial performance, rather than direct carbon-reduction indicators, which prevents the generalization of the research to the areas of environmental performance.

Moreover, (Altassan, 2025) discussed sustainable leadership and green leadership in Saudi companies, with the possibility of establishing the sustainability orientation in organizational practice through strategic leadership and internal systems. However, the study did not directly relate the carbon-reduction performance or moderation effect of the policies. Still, its focus on matching the internal orientation with the external values implies that wider policy frameworks, such as Vision 2030, enhance the operationalization of sustainability orientation to deliver quantifiable results.

Another study by (Elfakharani, 2024) focused on the legislative effect of Vision 2030 on multinational corporations in Saudi Arabia, showing that Vision 2030 created regulatory changes that force firms to modify compliance and corporate approaches. This implies that organizational responses to sustainability orientation are determined by national policy under the Vision 2030, which forms institutional expectations that have the capacity to moderate orientation-performance associations. Its qualitative method and compliance constrain a quantitative evaluation of Green HRM and carbon-reduction performance.

Moreover, (Syeda *et al.,* 2023) on the CSR and sustainability roles of Aramco in the context of vision 2030 demonstrated that the corporation addresses CSR principles consistent with the sustainability agenda of Saudi Vision 2030. It encompasses climate, energy transition, and environmental impact areas. This signifies the influence of national policy priorities on strategic orientations for environmental responsibility in large corporations and suggests a moderating effect on the connection between sustainability orientation and outcomes (including carbon metrics) *via* Vision 2030 frameworks. Nevertheless, the single-corporate emphasis does not provide wider generalizability across industries. Collectively, these research works highlight that Vision 2030 policy frameworks, in turn, reinforce and channel the organizational sustainability orientation, allowing the sustainability commitment to translate into performance results. Thus, H4 is proposed.

H4: Perceived Vision 2030 alignment is a positive and significant moderator between sustainability orientation and carbon-reduction performance.

2.4. Conceptual Framework

Below presented conceptual framework in Fig. (**1**) includes independent Variables (IVs) are Green HRM and sustainability orientation, the dependent variable (DV) is carbon-reduction performance, whereas the perceived Vision 2030 alignment acts as a moderating variable (MV) between IVs and DV.

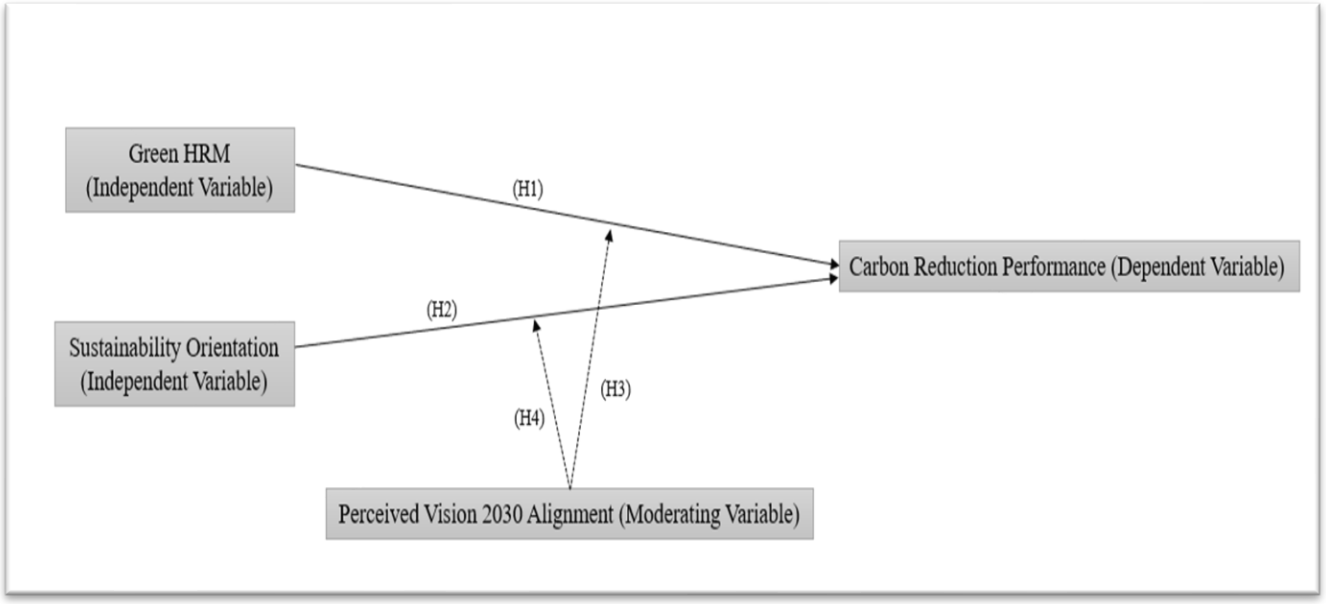

Fig. (1). Conceptual framework.

2.5. Literature Gap

It is a common agreement in existing research that Green HRM and sustainability orientation can be used to enhance environmental and organizational performance. Nevertheless, the majority of the studies focus mainly on the direct correlations of these internal sustainability capabilities with the broad environmental or financial performance indicators, but do not investigate how this internal sustainability capabilities can transfer into certain carbon-reduction outcomes (Altassan, 2025; Putra *et al.,* 2025). Research in the Saudi context draws attention to the fact that corporate sustainability practices and ESG reporting are increasingly consistent with the national agenda of Vision 2030 (Basali & Alshahrani, 2025; Elfakharani, 2024), but they seldom investigate whether such consistency can enhance the connection between internal sustainability practices and quantifiable environmental results. Equally, the international literature recognizes that policy environments affect sustainability initiatives (Khuntia, 2025), yet, there is little empirical research on how national policy alignment predisposes the relationship between internal sustainability capabilities and carbon-reduction performance. As such a major gap in knowledge on how organizational sustainability capabilities can be converted to carbon-reduction performance exists under the conditioning effect of national agenda. The novelty of this study is that it investigated Vision 2030 as a moderator to develop an understanding about national agenda impact on the association between organizational sustainability capabilities and carbon-reduction performance in Saudi Arabia companies.

3. METHODOLOGY

The research design used in this study was a quantitative research design, which is a systematic empirical study involving numerical data to measure relationships between constructs (Taherdoost, 2022). The quantitative research was appropriate in this study for testing the hypothesized relationships between Green HRM, the sustainability orientation, and the perceived Vision 2030 alignment and carbon-reduction performance, with moderating effects. The research is explanatory in nature and thus concentrates on the interplay between internal organizational practices and policy frameworks in shaping environmental outcomes, and not describing trends.

The target group was the environmental and operations staff employed in the sustainability-based businesses in Saudi Arabia. The choice of these participants was based on their direct participation in the sustainability initiatives implementation. In the research, sustainability-based businesses are defined as those organizations with official sustainability programs, environmental management processes, or sustainability functions that are in tandem with the national environmental policies like Vision 2030. These companies were mainly selected in industries where active environmental management is practiced such as energy, manufacturing, construction, and service industries. A purposive method of sampling was used, which (Obilor, 2023) defined as a form of non-probability sampling that entails the selection of a participant based on specified criteria that are applicable to the study aim. Moreover, the respondents were required to be working in an organization that publicly report sustainability activities, have environmental management activities, or be in a sector where sustainability and environmental compliance activities are actively taking place.

An online questionnaire on Google Forms was used to collect data. The invitations were sent through LinkedIn groups related to environmental and sustainability-related practices, namely, 'Saudi Green Initiative' and 'Sustainability Professionals in Saudi Arabia', which guaranteed the inclusion of professionals who are highly engaged in sustainability projects. Invitations were dispatched to 500 people, with 280 responding (response rate of 56%). The final analysis involved 250 responses that were filtered after thorough screening of completeness, consistency, and elimination of statistical outliers. This sample is deemed sufficient since it was sufficient to provide sound and strong results in structural modeling studies.

G*Power analysis was performed to approximate the minimum number of participants needed to reliably identify the proposed moderating effect. (Kang, 2021) claimed that it would require over 100 respondents for a significance level (0.05), statistical power (0.80) (probability of finding an effect that is true) and an effect size of 0.5. As the research had already 250 valid responses, the sample size is greater than the heuristic and statistical suggestions, and it increases the reliability of parameter estimates and the validity of the moderation analysis.

The questionnaire was divided into two parts (Appendix **A**), where the initial section included demographic data: gender, age, education, job position, and years of work experience. Past studies suggest that education level, professional experience, among other factors may have effects on sustainability awareness and engagement (El Khatib & Alsereidi, 2025). The second part examined the primary constructs, Green HRM, sustainability orientation, perceived Vision 2030 alignment, and carbon-reduction performance, on a five-point Likert scale (1 = strongly disagree to 5 = strongly agree). The validated scales used in previous research (Jin *et al.,* 2019; Martusewicz *et al.,* 2025; Tang *et al.,* 2018) served as the foundation of items, which were modified to be content-valid and contextually appropriate to Saudi organizations.

PLS-SEM was used to analyze the collected data, which (Hair *et al.,* 2021) defined as a variance-based structural modelling method employed in prediction-focused and exploratory theory testing. It would be appropriate in cases where the study is aimed at explaining a variance, moderation analysis, and complex latent constructs as opposed to rigid theory confirmation. PLS-SEM was selected due to a number of reasons. First, the research examines moderating impact of perceived Vision 2030 alignment and it is served better with predictive modelling methods. Second, the model has several latent variables, which are reflected indicators. Third, PLS-SEM does not assume multivariate normal data distribution and works well with non-probability samples. All constructs in this study were defined as reflective measurement models since indicators are manifestations of the latent variable and are supposed to be correlated.

Furthermore, the discriminant validity was estimated by the Heterotrait-monotrait ratio (HTMT), which was reported as the higher reliability and sensitivity than traditional Fornell-Larcker criteria used to determine the lack of discriminant validity (Afthanorhan *et al.,* 2021). Measurement model was used prior to testing structural relationships to determine the reliability and validity of measurement models. Cronbach's alpha and composite reliability were used to determine construct reliability, whereas average variance extracted (AVE) was used to determine convergent validity.

Harman single-factor test was done to measure the common method bias. The initial unrotated factor contributed 34.2% of total variance, which is less than 50% that (Howard *et al.,* 2024) recommend, indicating that common method bias is unlikely to have a significant impact on the results. Further, the variance inflation factor (VIF) was considered to identify possible collinearity and bias of the method with the suggested value ranging between 3 and 5 (Hair *et al.,* 2006; Jeng, 2023). The inner VIFs were all between 1.32 and 2.41, which is far below the recommended value, thus indicating that no serious issues of common method bias exist. Moreover, non-response bias was determined using early and late respondents and independent sample t-tests showed no statistically significant differences, which implied that there was little non-response bias in the dataset.

The research was conducted with high ethical standards. The respondents were informed of the purpose of the research, and participation was voluntary and anonymous. The consent was provided through electronic means, and participants were free to withdraw at any point without any penalty. No personal identifiable information was gathered, and data were kept in a safe place to be used in an academic sense only.

4. RESULTS

4.1. Descriptive Analysis

Table **1** shows descriptive analysis and note that the sample mainly comprised male professionals (62%), with the highest age bracket of 25-34 years (43.2%), which implies a youthful workforce. The sample was highly educated, with most of the respondents having a Bachelor's (43.6%) or Master's degree (40.8%). The roles in the organization differed, but the technical and sustainability specialist jobs were prevalent. The experience was mixed; almost half (48%) of respondents had 3-10 years of experience, which boosted the validity of the information relating to the sustainability practices. There was a sound representation of energy, industrial and service industries, and more than three-quarters indicated moderate to direct participation in sustainability initiatives, which highlights the informed opinion on environmental management.

4.2. Measurement Model

Table **2** shows the results of the measurement model in PLS-SEM. The construct reliability and validity, followed by structural testing and suggested thresholds are: factor loadings = 0.70, Cronbach's alpha = 0.70, composite reliability (CR) = 0.70 and average variance extracted (AVE) = 0.50 (Hair *et al.,* 2021; Mia *et al.,* 2022). The factor loadings of all indicators vary between 0.824-0.909, which is above the 0.70 mark of indicator reliability. The values of Cronbach's alpha (0.918-0.933) and composite reliability (0.939-0.949) exceed the recommended value at 0.70, which means that there is internal consistency. The values of the AVE (0.755-0.788) are much higher than 0.50, which means that the convergent validity is satisfactory. In general, constructs are sufficiently reliable and valid, indicating their appropriateness towards structural analysis.

4.3. Discriminatory Analysis

Table **3** shows the discriminant validity with the help of the Heterotrait Monotrait ratio (HTMT), which evaluates the presence of empirical differences between constructs. The standard recommended level is less than 0.90 or less conservatively, 0.85 (Afthanorhan *et al.,* 2021; Cheung *et al.,* 2023). All HTMT values are between 0.392 and 0.842 which is less than 0.85. Although the largest figure (0.842) between Green HRM and Carbon Reduction Performance is close to the threshold, it is still within reasonable range. These findings confirm that each construct reflects a different concept and there is no issue of multicollinearity and conceptual overlap. Consequently, there is an adequate level of discriminant validity.

4.4. Model Explanatory Power and Predictive Relevance

Table **4** provides the coefficient of determination (R^2), which measures the explanatory power of the model (Hair *et al.,* 2021). Generally, values of R^2 of 0.25, 0.5, and 0.75 are termed as weak, moderate, and substantial, respectively. The R^2 of Carbon Reduction Performance is 0.669 (adjusted R^2 = 0.662) which has a moderate to substantial explanatory power. This implies that its predictors explain about 66% of carbon-reduction performance. Q^2 value indicates the predictive relevance of the model, which is obtained during the blindfolding process, with values above the zero implying sufficient predictive power. The Q^2 of 0.652 in this research indicates strong predictor relevance meaning that the model is effective in predicting carbon-reduction performance in organizations that are sustainability-oriented. In general, the model has a significant explanatory and predictive strength.

4.5. Path Coefficient

The outcomes of the path coefficient in Table **5** reveal that the largest positive impact on carbon-reduction performance belongs to the Green HRM ($\beta = 0.524$, $p < 0.01$), which implies that use of green recruitment, training, and sustainability-based performance systems is positively associated with carbon-reduction performance. A significant positive relationship ($\beta = 0.230$, $p < 0.01$) is also observed between sustainability orientation and the carbon reduction performance, which implies that organizations that incorporate sustainability into their strategic goals and decision-making tendencies are more effective in achieving the aim of eliminating emissions. Although the moderating coefficients ($\beta = 0.058$ and $p = 0.032$) are small, they are statistically and meaningfully significant. It suggests that the perceived Vision 2030 alignment has a small, but significant strengthening impact on the connection between organizational sustainability practices and carbon-reduction performance.

Table 1. Descriptive analysis of 250 respondents.

Demographic Variable	Category	Frequency (n)	Percentage (%)
Gender	Male	155	62.0
	Female	92	37.0
	Prefer not to say	3	1.00
Age Group	Below 25	38	15.2
	25–34	108	43.2
	35–44	68	27.2
	45–54	26	10.4
	55 and above	10	4.00
Education	Diploma / Technical	12	4.80
	Bachelor's Degree	109	43.6
	Master's Degree	102	40.8
	Doctorate / PhD	25	10.0
	Other	2	0.80
Organizational Role	Env./Sustainability Specialist	67	26.8
	Operations / Technical	82	32.8
	Supervisor/Team Leader	38	15.2
	Middle Management	40	16.0
	Senior Management / Executive	23	9.20
Experience (Years)	Less than 3	46	18.4
	3–5	74	29.6
	6–10	63	25.2
	11–15	38	15.2
	More than 15	29	11.6
Industry Sector	Energy / Oil & Gas	68	27.2
	Manufacturing / Industrial	59	23.6
	Construction / Infrastructure	42	16.8
	Services	63	25.2
	Other	18	7.20
Sustainability Involvement	Not directly involved	21	8.40
	Occasionally involved	37	14.8
	Moderately involved	78	31.2
	Highly involved	66	26.4
	Directly responsible	48	19.2

Table 2. Measurement model.

Latent Construct	Indicator	Factors Loading	Cronbach's Alpha	Composite Reliability	Average Variance Extracted
Carbon Reduction Performance	CRP1	0.856	0.933	0.949	0.788
	CRP2	0.888			
	CRP3	0.904			
	CRP4	0.906			
	CRP5	0.883			
Green HRM	GHRM1	0.895	0.921	0.941	0.761
	GHRM2	0.859			
	GHRM3	0.892			
	GHRM4	0.879			
	GHRM5	0.834			
Sustainability Orientation	SO1	0.879	0.918	0.939	0.755
	SO2	0.878			
	SO3	0.906			
	SO4	0.824			
	SO5	0.856			
Perceived Vision 2030 Alignment	PVA1	0.845	0.920	0.940	0.758
	PVA2	0.869			
	PVA3	0.909			
	PVA4	0.870			
	PVA5	0.860			

Note: *Factor Loadings ≥ 0.70; Cronbach's alpha ≥ 0.70; CR ≥ 0.70; AVE ≥ 0.50*

Table 3. Discriminant validity through HTMT.

-	Carbon Reduction Performance	Green HRM	Sustainability Orientation	Perceived Vision 2030 Alignment	Perceived Vision 2030 Alignment x Sustainability Orientation
Green HRM	0.842	-	-	-	-
Sustainability Orientation	0.776	0.770	-	-	--
Perceived Vision 2030 alignment	0.767	0.783	0.768	-	
Perceived Vision 2030 alignment x Sustainability Orientation	0.392	0.387	0.493	0.498	-
Perceived Vision 2030 alignment x GHRM	0.423	0.407	0.518	0.524	0.840

Note: *HTMT threshold < 0.85*

Table 4. Explanatory power and predictive relevance.

-	R-Square	R-Square Adjusted	Q-Square
Carbon Reduction Performance	0.669	0.662	0.652

Table 5. Path coefficient.

-	Path Coefficient	T-Statistics	*P*-Values
Green HRM -> Carbon Reduction Performance	0.524***	8.482	0.001
Sustainability Orientation -> Carbon Reduction Performance	0.230***	2.972	0.003
Perceived Vision 2030 alignment -> Carbon Reduction Performance	0.113***	2.630	0.007
Perceived Vision 2030 alignment x Green HRM -> Carbon Reduction Performance	0.058***	2.652	0.008
Perceived Vision 2030 alignment x Sustainability Orientation -> Carbon Reduction Performance	0.032**	2.576	0.010

Note: *Asterisks show significant paths: ** = 0.05 (5%), and *** = 0.01 (1%)*

5. DISCUSSION

The study found a positive relationship between Green HRM and carbon-reduction performance, confirming the H1 ($\beta = 0.524$, $p < 0.01$). It means that the sustainability-related HR practices are closely linked to the organizational carbon-reduction results among Saudi sustainability-oriented companies. Notably, in this case, it indicates association and not causality because of the cross-sectional design. This result correlates with the previous literature that proposes Green HRM enhances the environmental abilities and employee involvement, which are associated with environmental performance (Ahmad *et al.,* 2023; Kumar *et al.,* 2025). With approval to H1 it can be suggested that to achieve stronger emission-control outcomes, Saudi firms need to embed environmental responsibilities their day-to-day workplace and employee management practices.

The findings supported H2 as sustainability orientation had a positive and significant effect on carbon-reduction performance ($\beta = 0.230$, $p < 0.01$). This indicates that those organizations that exhibit greater strategic dedication to environmental responsibility are more apt to focus on carbon-reduction efforts in their business operations. Sustainability orientation in Saudi sustainability-oriented firms is associated with managerial focus on environmental performance, whereby firms can incorporate targeting of emissions reduction to larger organizational objectives. Nevertheless, the relatively moderate scale of the connection suggests that strategic sustainability commitment can not necessarily be transformed into robust carbon-reduction results in the absence of well-organized implementation instruments. The results also align with the earlier research demonstrating that sustainability orientation is associated with better environmental results through the influence on the organizational strategies and decision-making processes in a way that leads to environmental responsibility (Agyapong *et al.,* 2023; Nurulasiah *et al.,* 2022; Mah *et al.,* 2023). Therefore, organizations should make efforts to reflect their sustainability commitments into their operations so that intentions for strategic environment can give measurable improvements in environmental context.

The greater impact of Green HRM over the sustainability orientation can be accounted by the operational character of the HR practices that directly influence the behavior of the employees and the implementation of the environmental programs (*e.g.,* green recruitment, sustainability-driven performance appraisals, and environmental training). By comparison, sustainability orientation tends to be more indicative of larger-scale strategic purposes or corporate values, long-term environmental ambitions, or organizational vision, which are less directly concerned with the actual performance of operations on a daily basis. This difference underscores the fact that strategic orientation defines the path but the HR-led practices are real tools that transform these intentions into quantifiable carbon-reduction results. It can be suggested that more benefits can be gained from having sustainability systems that are actionable rather than having mere general commitments for environment. Thus, Saudi firms need sustainable mechanisms that can be executed operationally.

The difference in effect size (0.524 and 0.230) also indicates that operationally embedded practices are more likely to generate a stronger measurable environmental result as compared to strategic intents in general. Green HRM directly influences the competencies of employees, accountability infrastructure, and daily environmental practices that are more directly related to carbon-management efforts. Sustainability orientation on the other hand, represents more general organizational values and strategic commitment that might need more implementation mechanisms before being translated into measurable operational results. This can also be indicative of the transitional phase of sustainability implementation in the Saudi Arabian environment under the Vision 2030 whereby most companies are yet to translate strategic sustainability commitments into operational systems that are fully institutionalized.

The findings indicated that Perceived Vision 2030 alignment enhances relationship between Green HRM and carbon-reduction performance ($\beta = 0.058$, $p = 0.01$), which validates its moderating role and support H3. It means that HR-related environmental practices are more closely linked to carbon-reduction results in circumstances when employees perceived that their organizations are guided by the national decarbonization agenda in the institutional direction. In the case of Saudi companies, this underlines the need to make the internal sustainability practices (green recruitment, hiring, and

training, and appraisals) consistent with the policy priorities of Vision 2030. These results are consistent with the literature on the subject that proposed sustainability policies and regulatory frameworks enhance the effectiveness of internal environmental practices by promoting the alignment of managerial systems with institutional expectations (Khuntia, 2025; Liu *et al.,* 2025; Soussi *et al.,* 2025). From these findings it can be gathered that to have strong organizational environment outcomes, policymakers need to encourage firms to make visible connection between their internal sustainability systems and Vision 2030 agenda.

The findings supported H4 as Perceived Vision 2030 alignment moderated the connection between sustainability orientation and carbon-reduction performance ($\beta = 0.032$, $p < 0.05$). This implies that the sustainability-related organizational values are positively associated with the carbon-reduction results when employees perceive that the firms match their environmental priorities with the national decarbonization course established within the frames of Vision 2030. To organizations, this means that aligning the corporate sustainability strategies to national climate priorities can contribute to changing the general environmental commitment in more systematic carbon management activities. Such results are in line with other prior studies that show that national sustainability agendas, climate policies steer organizations in the alignment of internal environmental strategies with the overall policy goals, enhancing environmental performance results (Basali & Alshahrani, 2025; Elfakharani, 2024). Importantly, the results of this study are consistent with what (Altassan, 2025) who conducted a study in the UAE regarding the impact of national visions on sustainability, but differ in the strength of the effect, which may reflect the difference in the degree of maturity of green infrastructure between the two countries. These results point to an implication that when firms align their sustainability approaches with national goals, they may have better organizational coordination and consistent environmental performance improvements.

In this regard, one can find that Vision 2030 may be seen as an institutional setting that influences the operationalization of sustainability-oriented approaches by firms. However, the moderating coefficients (0.058 and 0.032) are small, meaning that although policy alignment has a positive influence, other aspects may also moderate the effect of internal capabilities and strategic orientation on carbon-reduction performance (organizational culture, resource constraints, or implementation fidelity). This implies that Vision 2030 offers guidance and validity but not the sole factor that defines organizational efficiency.

The institutional and sustainability-governance literature implies that relatively small moderation effects are prevalent since policy and institutional variables tend to affect organizational outcomes indirectly and not as the driving operational factors. To illustrate, institutional sustainability research by (Gauthier, 2013) established that institutional pressures primarily work in interactive and reinforcing ways rather than having significant direct operational impacts. Moreover, the research on corporate sustainability governance has demonstrated that institutional context tends to reinforce the already-established sustainability systems at an incremental level, not in terms of transforming operational outcomes itself (Pasamar *et al.,* 2026; Ortiz-de-Mandojana *et al.,* 2016). Thus, the moderation coefficients are relatively small in the context of this study, which is consistent with the institutional theory and the study on sustainability governance, where policy alignment tends to strengthen, legitimize, and sustain organizational sustainability capabilities, instead of supplanting the internal drivers of operations.

Demographic controls (education, job position, and work experience) were added since an individual may feel more or less engaged in sustainability depending on the level of professional seniority and expertise. The large proportion of managerial and experienced respondents in the sample reinforces the belief that the observed associations are not based on peripheral perceptions but rather on informed organizational opinions. Notably, the results do not merely substantiate the essence of sustainability practices being advantageous; they help to understand that organized HR-based competencies and institutional correspondence seem to be more strongly correlated with the carbon-cutting results in comparison with sustainability orientation in general.

THEORETICAL CONTRIBUTION

This research expands three theoretical approaches, NRBV, Stakeholder Theory, and Institutional Theory, and reveals the interplay of internal capabilities with national policy frameworks in yielding a quantifiable carbon-reduction effect. NRBV is conventionally concerned about the competitive advantage created by the environmentally oriented internal capabilities. This study shows that Green HRM as an internal strategic resource does not only positively associate with the performance in carbon-reduction, but more effectively in policy-conditioned mechanism that NRBV literature lacked. The Stakeholder Theory is extended by demonstrating that sustainability orientation in itself is not enough; responsiveness of the organization to environmental demands is only turned into concrete performance when it is systematically coordinated with institutional policy.

Institutional Theory is furthered by recognizing perceived Vision 2030 alignment as a moderator, to demonstrate the influential effect of the coercive and normative pressures on operational effects of HR and strategic sustainability practices. The synthesis of these perspectives enables the study to bridge a major gap: previous studies have analyzed Green HRM, sustainability orientation, or policy alone, but there is little research on how internal environmental capabilities are used in the explicit contexts of decarbonization on the national level. All in all, the contribution is that the efficacy of internal capabilities depends on policy alignment, which is a new mechanism in which national climate policy influences the mapping of organizational sustainability endeavors to concrete carbon-reduction impacts.

CONCLUSION

The study identifies structured Green HRM practices to be strongly associated with the carbon-reduction performance. The results imply that internal environmental capabilities are more strongly associated to carbon outcomes when they are congruent with the Perceived Vision 2030 alignment. On the whole, the findings support the significance of capability-based deployment and institutional fit in decarbonization initiatives at an organizational level under a national policy agenda.

However, there are various methodological limitations of this study. The cross-sectional design does not allow for monitoring dynamic changes in sustainability practices over time and due to this design, causal relationships cannot be drawn, and therefore the results are interpreted as correlational relationships only. Longitudinal analysis may be more useful in the investigation of the changes in policy congruency and its impact on carbon achievements. Second, the use of self-reports by the environmental and operations personnel could create common method bias. Future studies can link employees' perceptions of green HRM practices with actual published data on carbon emissions (such as ESG reports or annual sustainability reports).

Third, the research generalizability is limited because it targets sustainability-oriented enterprises in Saudi Arabia. Comparative analysis across sectors or other countries with distinct national climate policies would assist in assessing the strength of the identified moderating mechanism. Moreover, data was collected from 5 different sectors (Energy, Manufacturing, Services, and Construction), but the study did not investigate whether the relationships differ between these sectors or not. Results for service or financial firms may differ radically from manufacturing or construction company results, this presents an area for future research.

The results can be used by policymakers and organizational leaders working on advancing the net-zero goals of Saudi Arabia, according to the Vision 2030. To begin with, the high relevance of Green HRM implies that the environmental skills must be integrated into HR systems on a formal basis. This may be operationalized through asking firms to put the sustainability-related criteria in job descriptions, carbon-reduction KPIs in annual performance appraisals, and certified environmental training hours in high-impact jobs. Government bodies may release standardized Green HRM implementation toolkits based on priority areas, including energy, manufacturing, and construction. Second, regulators may enhance alignment of policies by directly associating ESG or sustainability reporting policies with HR metrics, including the intensity of green training, environmental leadership development, and incentives tied to sustainability, in national reporting templates. Lastly, executive training programs that are structured through industry associations may help translate national carbon targets into departmental action plans that would guarantee that policy objectives are formally integrated into day-to-day operations and decision-making within the enterprises.

LIST OF ABBREVIATIONS

AVE	=	Average Variance Extracted
DV	=	Dependent Variable
GHG	=	Greenhouse Gas
GPR	=	Green Performance and Reward
GRT	=	Green Recruitment and Training
GSCM	=	Green Supply Chain Management
HTMT	=	Heterotrait-Monotrait Ratio
IVs	=	Independent Variables
KSA	=	Kingdom of Saudi Arabia
MV	=	Moderating Variable
NRBV	=	Natural Resource-Based View
OCBE	=	Organizational Citizenship Behavior for Environment
PLS-SEM	=	Partial Least Squares Structural Equation Modeling
RBV	=	Resource-Based View

AUTHOR'S CONTRIBUTION

M.A.A.A.Q. contributed to the design and implementation of the study. B.H.S.A., N.S.A.A. contributed to the analysis of the results and the writing of the manuscript.

ETHICAL APPROVAL & INFORMED CONSENT

All procedures were carried out in accordance with institutional research ethics committee guidelines and Declaration of Helsinki. Informed consent was obtained from all participants. To ensure participant protection, all data were fully anonymized at the point of collection, and no personal or identifiable data was recorded.

AVAILABILITY OF DATA AND MATERIALS

The data will be made available on reasonable request by contacting the corresponding author [M.A.A.A.Q.].

FUNDING

None.

CONFLICT OF INTEREST

The author declares that there is no conflict of interest regarding the publication of this article.

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DECLARATION OF AI

During the preparation of this work the authors used ChatGPT for editing purposes. After using this tool, the authors reviewed and edited the content as needed and take full responsibility for the content of the published article.

APPENDIX A

Study Title: Green HRM and Sustainability Orientation on Carbon-Reduction Performance: Perceived Vision 2030 Alignment as a Moderator

Research Team: Group of Students (Research Team)

Introduction

Thank you for considering participation in this research study. We, a group of students, are conducting a study on the relationship between Green Human Resource Management (HRM) practices, sustainability orientation, and carbon-reduction performance, with a specific focus on the moderating role of perceived Vision 2030 alignment. Your participation is valuable and will significantly contribute to the completion of this research.

Purpose of the Study

The aim of this study is to explore how Green HRM practices and sustainability orientation influence carbon-reduction performance, and how perceived Vision 2030 alignment moderate these relationships. By participating, you will help us gain insights into the role of green HRM and sustainability practices in achieving carbon-reduction targets. Your responses will assist in understanding how alignment with national sustainability objectives can enhance organizational carbon-reduction efforts.

What will I be asked to do?

You will be asked to complete a questionnaire that will take approximately 5-15 minutes to complete. The questions will focus on your experiences and views regarding Green HRM practices, sustainability orientation, and the role of perceived Vision 2030 alignment in supporting carbon-reduction performance. Your participation will help us collect essential data to support our research findings.

Confidentiality

Your responses will be kept strictly confidential. The information you provide will only be used for research purposes. No personally identifiable information will be collected. Your participation will remain anonymous.

Voluntary Participation

Participation in this study is entirely voluntary. You can choose not to participate, or withdraw from the study at any time without any consequences. If you decide to withdraw, your responses will be excluded from the final analysis.

Potential Risks

There are no anticipated risks involved in participating in this study. The questions are non-invasive and do not require sensitive personal information. If you feel uncomfortable at any point, you are free to skip any questions or withdraw.

Section A: Respondent Profile

1. **Gender**
   - Male
   - Female
   - Prefer not to say
2. **Age Group**
   - Below 25
   - 25–34
   - 35–44
   - 45–54
   - 55 and above
3. **Highest Educational Qualification**
   - Diploma / Technical Certification
   - Bachelor's Degree
   - Master's Degree
   - Doctorate / PhD
   - Other
4. **Current Organizational Role**
   - Environmental / Sustainability Specialist
   - Operations / Technical Staff
   - Supervisor / Team Leader
   - Middle Management
   - Senior Management / Executive
5. **Years of Professional Experience**
   - Less than 3 years
   - 3–5 years
   - 6–10 years
   - 11–15 years
   - More than 15 years
6. **Industry Sector of Your Organization**
   - Energy / Oil & Gas
   - Manufacturing / Industrial
   - Construction / Infrastructure
   - Services
   - Other

7. **Extent of Involvement in Sustainability Initiatives**
   - Not directly involved
   - Occasionally involved
   - Moderately involved
   - Highly involved
   - Directly responsible for sustainability initiatives

Section 2: Survey Questions

Construct	Indicator	Question Statement	1	2	3	4	5
Green Human Resource Management	GHRM1	Recruitment considers candidates' environmental awareness.	☐	☐	☐	☐	☐
	GHRM2	Employees receive environmental sustainability training.	☐	☐	☐	☐	☐
	GHRM3	Sustainability included in employee performance evaluations.	☐	☐	☐	☐	☐
	GHRM4	Employees participate in organizational environmental programs.	☐	☐	☐	☐	☐
	GHRM5	Employees rewarded for supporting environmental initiatives.	☐	☐	☐	☐	☐
Sustainability Orientation	SO1	Sustainability integrated into organizational strategic vision.	☐	☐	☐	☐	☐
	SO2	Environmental responsibility guides organizational decision making.	☐	☐	☐	☐	☐
	SO3	Management prioritizes sustainability in business operations.	☐	☐	☐	☐	☐
	SO4	Organization balances business goals with environmental protection.	☐	☐	☐	☐	☐
	SO5	Long-term strategies emphasize environmental sustainability.	☐	☐	☐	☐	☐
Perceived Vision 2030 Alignment	PVA1	Our organization aligns its sustainability strategy with the environmental objectives of Saudi Arabia's Vision 2030.	☐	☐	☐	☐	☐
	PVA2	Our organization considers Vision 2030 priorities when developing environmental and sustainability initiatives.	☐	☐	☐	☐	☐
	PVA3	Employees in this organization are aware of the relevance of Vision 2030 sustainability goals for organizational operations.	☐	☐	☐	☐	☐
	PVA4	Vision 2030 provides a strategic reference point for our organization's sustainability planning.	☐	☐	☐	☐	☐
	PVA5	Our organization seeks to ensure that its environmental policies are consistent with the sustainability direction of Vision 2030.	☐	☐	☐	☐	☐
Carbon-Reduction Performance	CRP1	Organization implements programs to reduce carbon emissions.	☐	☐	☐	☐	☐
	CRP2	Energy efficiency initiatives lower operational carbon emissions.	☐	☐	☐	☐	☐
	CRP3	Organization monitors and evaluates carbon reduction progress.	☐	☐	☐	☐	☐
	CRP4	Operational processes improved to support low-carbon practices.	☐	☐	☐	☐	☐
	CRP5	Organization achieves progress toward carbon reduction targets.	☐	☐	☐	☐	☐

Contact Information

If you have any questions or need more information about the study, please feel free to contact the research team.

Thank you for taking the time to consider participating in this study. Your involvement is greatly appreciated.

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