The Impact of Sustainability Practices on Green Human Resources Management in Egypt's Oil and Gas Sector

Mohamed Adel

Arab Academy for Science, Technology and Maritime Transport, Graduate School of Business (AASTMT), Cairo, Egypt. Email: madel1709@yahoo.com.

Supervised by: Prof. Dr. Sahar Mohamed Badawy[2]

Associate Professor of Public Administration, Faculty of Business, Economics and Political Science, British University in Egypt (BUE), Egypt. Email: Sahar.Badawy@bue.edu.eg

Abstract:

This research paper examines the relationship between Perceived Sustainability Practices and Green Human Resources Management (GHRM) in Egypt's oil and gas sector. The study investigates how Sustainability Initiatives (SI), Sustainable Development (SD), Green Practices (GP), Corporate Environmental Strategy (CES), Corporate Social Responsibility (CSR), and Perceived Corporate Sustainability Practices (PCSP) influence GHRM implementation. Using data collected from 385 employees across various managerial levels and companies in Egypt's oil and gas sector, the study employs structural equation modeling to analyze these relationships. The findings reveal that SD, CES, CSR, and PCSP have significant positive relationships with GHRM, while GP shows a weaker relationship than expected. Demographic factors, including gender, age, education, and tenure, significantly influence perceptions of sustainability practices and

GHRM, as do organizational characteristics such as sector, category, and size. The structural equation model, focused on sustainability practices, explains 78.6% of the variance in GHRM, highlighting the substantial impact of sustainability perceptions on human resource management practices. This research contributes to the understanding of how sustainability practices can be effectively integrated into human resource management in resource-intensive industries in developing economies, offering valuable insights for both theory and practice.

Keywords: Green Human Resource Management, Sustainability Practices, Oil and Gas Sector, Egypt, Corporate Social Responsibility, Sustainable Development, AMO Theory

الملخص :

تتناول هذه الدراسة العلاقة بين ممارسات الاستدامة المدركة وإدارة الموارد البشرية الخضراء **(GHRM)** في قطاع النفط والغاز في مصر. تبحث الدراسة في كيفية تأثير مبادرات الاستدامة**(SI)** ، والتنمية المستدامة**(SD)** ، والممارسات الخضراء **(GP)**، والاستراتيجية البيئية للشركات**(CES)** ، والمسؤولية الاجتماعية للشركات **(CSR)**، والممارسات المؤسسية للاستدامة المدركة **(PCSP)** على تنفيذ إدارة الموارد البشرية الخضراء. باستخدام بيانات تم جمعها من ٣٨٥ موظفًا على مستويات إدارية مختلفة ومن شركات متعددة في قطاع النفط والغاز المصري، تم توظيف نمذجة المعادلات الهيكلية لتحليل هذه العلاقات. كشفت النتائج أن التنمية المستدامة، والاستراتيجية البيئية للشركات، والمسؤولية الاجتماعية للشركات، والممارسات المؤسسية للاستدامة المدركة لها علاقات إيجابية ذات دلالة إحصائية مع إدارة الموارد البشرية الخضراء، في حين أظهرت الممارسات الخضراء علاقة أضعف من المتوقع.

كما أثرت العوامل الديموغرافية مثل الجنس، والعمر، والتعليم، وطول الخدمة بشكل كبير على تصورات ممارسات الاستدامة وإدارة الموارد البشرية الخضراء، إلى جانب خصائص المنظمة مثل القطاع، والفئة، والحجم. يفسر نموذج المعادلات الهيكلية، الذي يركز على ممارسات الاستدامة، ٧٨.٦% من التباين في إدارة الموارد البشرية الخضراء، مما يبرز التأثير الكبير لتصورات الاستدامة على ممارسات إدارة الموارد البشرية. تسهم هذه الدراسة في فهم كيفية دمج ممارسات الاستدامة بفعالية في إدارة الموارد البشرية في الصناعات كثيفة الموارد في الاقتصادات النامية، مقدمة رؤى قيمة لكل من النظرية والتطبيق.

الكلمات المفتاحية :إدارة الموارد البشرية الخضراء، ممارسات الاستدامة، قطاع النفط والغاز، مصر، المسؤولية الاجتماعية للشركات، التنمية المستدامة، نظرية **AMO**.

Introduction:

Sustainability, defined by the Brundtland Commission in 1987 as the act of meeting the needs of the present without jeopardizing the future needs of next generations, has become a guiding principle for organizations across various sectors. This paradigm shift has been particularly significant for industries with substantial environmental footprints, such as the oil and gas sector, which faces increasing pressure to balance economic imperatives with environmental and social responsibilities.

The oil and gas sector in Egypt faces unique sustainability challenges and opportunities, as the economy heavily relies on natural gas and petroleum exports. The strategic integration of

sustainability practices has become crucial for the long-term viability and value generation in this capital-intensive industry (Law & Gunasekaran, 2012).

Green Human Resource Management (GHRM) encompasses policies, practices, and systems that promote environmental sustainability, including recruitment based on ecological consciousness, sustainable training programs, and green career development (Wang et al., 2023). By aligning human resource functions with environmental objectives, GHRM serves as a critical mechanism for fostering organizational sustainability and enhancing environmental performance.

This research paper aims to address this gap by analyzing the effect of perceived sustainability practices on organizational GHRM in Egyptian oil and gas companies. Specifically, it examines the relationship between six key areas: sustainability initiatives (SI), sustainable development (SD), green practices (GP), corporate environmental strategy (CES), corporate social responsibility (CSR), and perceived corporate sustainability practices (PCSP), with GHRM as the central focus.

By examining the impact of sustainability practices on GHRM in Egypt's oil and gas sector, this research contributes to the growing body of knowledge on sustainable business practices in developing economies. It provides practical guidance for

organizations seeking to enhance their environmental performance through strategic human resource management.

Literature Review:

Research in Green Human Resource Management (GHRM) suggests that employees' perceptions of their employer's dedication to sustainability significantly affect their work attitudes and behaviors (Choi & Yu, 2014). The perceived organizational support for sustainability encourages pro-environmental actions more effectively than individual values alone (Wong, 2010; Henary, 2019). Therefore, a well-developed PCS has the potential to improve institutional sustainability (Lozano, 2012).

Recent research by Anshima et al. (2025) indicates that in developing economies like India, organizations are adopting sustainable practices due to policy mandates, organizational capabilities, employee empowerment, and environmental knowledge. Their systematic literature review of 57 scholarly articles from 2015 to 2024 found that sustainable human resource management encourages personal moral norms, a green mindset and innovation, and organizational citizenship behavior toward the environment, ultimately improving employees’ satisfaction, commitment, and performance.

Sustainability Initiatives (SI): Sustainability initiatives encompass a wide range of actions and programs designed to promote environmental, social, and economic sustainability within organizations. These initiatives can include energy efficiency measures, waste reduction programs, sustainable sourcing practices, community engagement efforts, and employee wellness programs.

Research indicates that integrating sustainable development principles into business strategies can lead to enhanced organizational performance and improved stakeholder relations (O'Brien, 2012). A study by Lozano (2018) highlights that organizations aligning with sustainable development principles often experience reduced operational costs and increased innovation. Companies incorporating sustainable development principles can achieve long-term profitability and resilience, as seen in Egypt's oil and gas sector, which has improved operational efficiency and reduced environmental impacts by adopting sustainable practices (El-Gafy & El-Shafie, 2021).

Sustainable Development (SD): Sustainable development represents a framework for achieving human development goals while simultaneously sustaining natural systems' ability to provide the natural resources and ecosystem services upon which the economy and society depend. The concept emphasizes the

balance between meeting present needs without compromising future generations' ability to meet their own needs.

Research indicates that companies incorporating sustainable development principles can achieve long-term profitability and resilience. For example, the Egyptian oil and gas sector has seen improved operational efficiency and reduced environmental impacts by adopting sustainable practices (El-Gafy & El-Shafie, 2021).

According to Anshima et al. (2025), India, as the 5th largest economy globally, is ambitious to achieve Sustainable Development Goals by 2030. Despite the challenges of low per capita income and poverty, India is targeting to cut down carbon emission intensity by 45% by 2030 and achieve a net-zero economy target by 2070. This demonstrates how developing economies are increasingly prioritizing sustainable development in their national agendas.

Green Practices (GP): Green practices encompass a wide array of environmentally friendly actions and policies that organizations adopt to reduce their ecological footprint. These include energy-efficient technologies, sustainable resource management, and waste reduction initiatives.

Zhu et al. (2013) assert that green practices are essential for organizations aiming to comply with environmental regulations and enhance their competitive advantage. Implementing green

practices can lead to significant cost savings and improved operational efficiency. For oil and gas companies in Egypt, adopting green practices is crucial given the sector's significant environmental footprint. Zyoud et al. (2020) highlight that adopting green practices can lead to enhanced operational efficiency and compliance with environmental regulations.

Corporate Environmental Strategy (CES): Corporate environmental strategy involves the systematic planning and implementation of policies and practices that aim to minimize an organization's environmental impact while maximizing resource efficiency. The oil and gas sector involves developing policies and practices aimed at minimizing environmental impacts while maximizing operational efficiency.

Hart (1995) emphasizes that a well-defined corporate environmental strategy can provide firms with a competitive advantage by aligning operational practices with environmental goals. Bansal and Roth (2000) highlight the importance of understanding both internal capabilities and external pressures in formulating effective environmental strategies. A robust corporate environmental strategy is vital for companies operating in Egypt's oil and gas sector, as aligning operational practices with environmental goals can enhance competitive advantage.

Corporate Social Responsibility (CSR): Corporate Social Responsibility (CSR) encompasses the ethical and sustainable

practices that organizations adopt to contribute positively to society and the environment. In the oil and gas sector, CSR is increasingly recognized as a critical component for achieving sustainability.

Previous research examines the impact of CSR on consumer behavior in Egypt, particularly focusing on the telecommunications sector. CSR encompasses various activities, including cause-related marketing, environmental responsibility, and corporate philanthropy, which are critical in shaping consumer attitudes and purchase intentions (ElSalmy et al., 2017). Research indicates that consumers increasingly consider CSR initiatives when making purchasing decisions, believing that companies should contribute positively to society (Brown & Dacin, 1997; Mohr et al., 2001).

El Nenaei (2021) highlights how CSR partnerships can enhance corporate reputation and foster consumer loyalty, suggesting that effective CSR strategies can lead to increased sales and market competitiveness. Conversely, negative perceptions of a company's social irresponsibility can significantly diminish consumer trust and purchasing intentions (Creyer & Ross, 1997).

The influence of CSR on organizational dynamics has garnered increasing interest, particularly regarding its effects on employees. While much existing literature focuses on external stakeholders, the role of CSR practices in shaping employee

attitudes and behaviors remains underexplored (Choi & Yu, 2014). Research examining how employees' perceptions of CSR initiatives impact their organizational commitment and citizenship behavior suggests that positive employee perceptions of CSR practices contribute significantly to enhanced organizational commitment and citizenship behavior. Notably, organizational citizenship behavior is identified as a partial mediator in the relationship between CSR practices and organizational performance (Choi & Yu, 2014).

Perceived Corporate Sustainability Practices (PCSP): Perceived Corporate Sustainability Practices (PCSP) reflect how employees and stakeholders interpret an organization's sustainability efforts. The perception of these practices can significantly influence organizational culture and employee GHRM. Choi and Yu (2014) argue that positive perceptions of sustainability practices can enhance employee commitment and organizational citizenship, GHRM, ultimately influencing overall organizational performance. Understanding PCSP is crucial for organizations seeking to align their sustainability efforts with stakeholder expectations.

Green Human Resource Management (GHRM): GHRM refers to the integration of environmental management into HRM practices. As indicated by (Opatha & Arulrajah, 2014) GHRM aim at incorporating green policies, practices, and systems into the HRM to

encourage employees to become green. Recent research by Kamboj and Eronimus (2024) examined 204 selected journal articles and found that GHRM contributes in promoting organizations environmental capabilities and navigation the transition from traditional HR practices to eco-friendly approaches. Their systematic scoping review highlighted GHRM's role in organizational sustainability and employee well-being.

Puspaningtyos et al. (2025) conducted a study with 755 respondents in Indonesia's food and beverage industry investigating the effects of green practices (recruitment, training and rewords) on both corporate reputation and job satisfaction. The findings found that corporate reputation is positively affected by green recruitment, training and rewords, whereas, job satisfaction is positively affected only by Green training.

GHRM in the Oil and Gas Sector: Integrating GHRM practices in the oil and gas sector is increasingly recognized as vital for enhancing corporate sustainability and employee satisfaction. Tamunomiebi and Mezeh (2022) conducted a comprehensive study in Port Harcourt, Nigeria, exploring the awareness of GHRM among HR managers and officers in the oil and gas industry. Their quantitative analysis, based on data from 180 participants, revealed significant correlations between various GHRM practices, such as green recruitment, training, and rewards, and corporate sustainability outcomes. The authors

posited that the effective implementation of GHRM practices could foster a sustainable organizational culture.

In another systematic review covering both academic and industry sources Ekemezie et al. (2024) identified the HR strategies and practices within the oil and gas sector and how they affect environmental sustainability. The results focused on the importance of sustainable practices in oil and gas sector and highlighted the important role of HR in promoting the sustainability driven efforts within this sector.

Khan, Shaikh, and Shaikh (2023) examined the impact of GHRM practices on employee satisfaction at the OGDCL Plant in Kunnar, Pakistan. Their research involved 250 employees and highlighted a substantial positive relationship between a meaningful work environment and job satisfaction. While employees highly valued GHRM initiatives, they expressed lower satisfaction regarding the overall organizational environment. This study underscores the necessity of cultivating a sustainable culture within organizations to enhance employee attitudes and leverage the full benefits of GHRM practices.

Research Questions: In the Egyptian oil and gas sector:

- How do perceived sustainability initiatives impact GHRM outcomes?
- What is the relationship between sustainable development practices and GHRM outcomes?

- How do green practices influence organizational behavior and GHRM outcomes?
- To what extent does corporate environmental strategy affect GHRM outcomes?
- What role does corporate social responsibility (CSR) play in shaping GHRM outcomes?
- How do perceived corporate sustainability practices (PCSP) contribute to GHRM outcomes?

Research Hypotheses:

We can build the hypothesis as follows:

H1: There is a direct positive relationship between SI and GHRM outcomes.

H2: There is a direct positive relationship between SD and GHRM outcomes.

H3: There is a direct positive relationship between GP and GHRM outcomes.

H4: There is a direct positive relationship between CES and GHRM outcomes.

H5: There is a direct positive relationship between CSR practices and GHRM outcomes.

H6: There is a direct positive relationship between PCSP and GHRM outcomes.

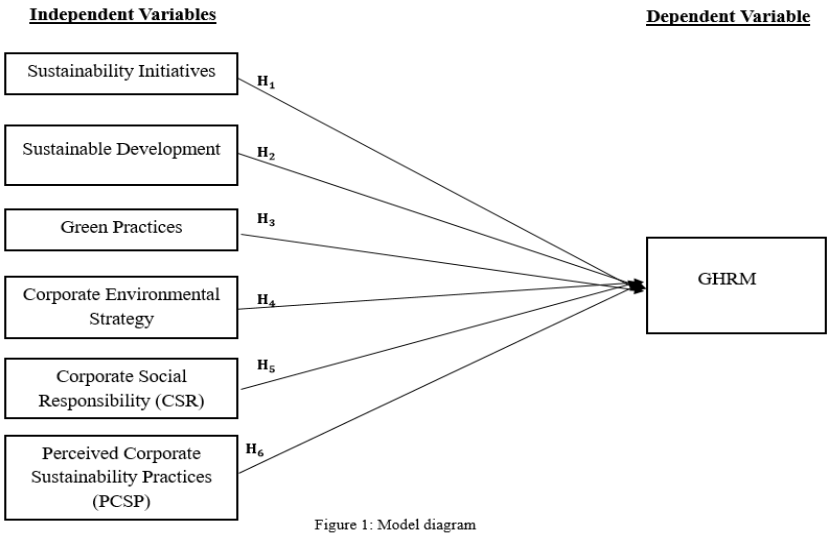

Figure 1: Model diagram

Methodology:

This study employs a quantitative research approach to examine the impact of sustainability practices on green human resources management (GHRM) in Egypt's oil and gas sector. A cross-sectional survey design was utilized to collect data from employees across various managerial levels and companies within the sector. This approach allows for the examination of relationships between multiple variables at a specific point in time, providing insights into the current state of sustainability practices and their influence on GHRM in the Egyptian context.

The research design incorporates structural equation modeling (SEM) as the primary analytical technique to test the hypothesized relationships between sustainability initiatives (SI), sustainable development (SD), green practices (GP), corporate environmental strategy (CES), corporate social responsibility (CSR), perceived corporate sustainability practices (PCSP), and GHRM. SEM is particularly suitable for this study as it enables the simultaneous examination of multiple relationships among observed and latent variables, accounting for measurement error and providing robust estimates of the relationships between constructs (Hair et al., 2019).

Sampling and Participants

The study population comprises employees working in the oil and gas sector in Egypt. A purposive sampling technique was employed to ensure representation across different organizational levels, sectors (oil and gas), and company categories (upstream, midstream, downstream). This sampling approach allowed for the inclusion of participants with relevant knowledge and experience in sustainability practices and human resource management within the industry.

Data was collected using a structured questionnaire from a total of 385 employees, representing a diverse range of demographic characteristics. The sample size was determined based on the requirements for structural equation modeling, which typically

recommends a minimum of 200 cases for complex models (Kline, 2016). The sample size achieved of 385 exceeds this recommendation, ensuring adequate statistical power for the analysis.

Measurements

The questionnaire consisted of four parts including demographics and general information, and measurements of the study variables. The second and third part measured the research variable. The six main factors of sustainability practices: sustainability initiatives (SI), sustainability development (SD), green practices (GP), corporate environmental strategy (CES), corporate social responsibility (CSR), and Perceived Corporate Sustainability Practices (PCSP) were measured using 59 items adopted from the Perceived Corporate Sustainability Practices scale developed by Al-Ali, N.M. (2021). The green human resources management (GHRM) were measured using 42 items adopted from GHRM Practices scale developed by El Degheidy, F.M.M. (2021). All measurements of the variables involved a 5-point Likert scale (1 to 5) that varies from "strongly disagree" to "Strongly agree"

- **Reliability and Validity Analysis:**

To assess the reliability and validity of the measure used, multiple indicators were used as shown in the below table

Table (1) Measure reliability and validity indicators

Construct	*No Items*	*Cronbach's Alpha*	*Composite Reliability*	*KMO*	*AVE*
Sustainability Initiatives	***15***	***0.948***	***0.647***	***0.767***	***0.932***
Sustainable Development	***7***	***0.910***	***0.691***	***0.865***	***0.676***
Green Practice	***9***	***0.844***	***0.676***	***0.599***	***0.666***
Corporate Environmental Strategy	***4***	***0.855***	***0.695***	***0.776***	***0.705***
Corporate Social Responsibility	***12***	***0.850***	***0.621***	***0.608***	***0.990***
Perceived Corporate Sustainability Practices	***12***	***0.912***	***0.662***	***0.635***	***0.722***
GHRM	***43***	***0.976***	***0.691***	***0.635***	***0.726***

As seen in table (1) Cronbach's Alpha reflects a good reliability of the research statements as its values range from 0.844 to 0.976 for the constructs, which exceeded the threshold of 0.70. Also, the composite reliability varies from 0.621 to 0.695, which is above the preferred value of 0.50, proving that the model is internally consistent. On the other hand, AVE values are above the recommended threshold of 0.50, indicating that the constructs could explain more than 50% of the statements, reflecting a high internal validity. Moreover, KMO values for all variables are greater than 0.5, and Bartlett's test of sphericity is significant for all variables, indicating the sample's adequacy.

The Results and findings:

Descriptive Statistics:

Demographic Characteristics: The study collected data from 385 employees working in Egypt's oil and gas sector. Table (2) presents the demographic characteristics of the survey participants. The sample included representation across various demographic categories, providing a comprehensive view of perceptions within the industry.

Table (2) Sample Demographic Characteristics

Variable	Frequency	Percentage
Gender		
Female	121	31.4%
Male	264	68.5%
Age		
20 to 30 years	14	3.6%
31 to 40 years	97	25.2%
41 to 50 years	100	26.0%
51 to 60 years	174	45.2%
Educational Qualifications		
Above Secondary	7	1.8%
Bachelor's Degree	272	70.6%
Master's Degree	75	19.5%
PHD/DBA	31	8.1%
Managerial Level		
Middle Management	128	33.2%
Operational	43	11.2%
Top Management	214	55.6%
Organizational Sector		
Gas	87	22.6%
Oil	298	77.4%
Organizational Category		
Downstream	79	20.5%
Midstream	32	8.3%
Upstream	274	71.2%
Number of Employees		
1 to 1000	34	8.8%
1001 to 2000	44	11.4%
≥ 2001	307	79.7%
Years of Employment		
< 3 years	6	1.6%
3 to 6 years	21	5.5%
≥ 7 years	358	93.0%

The sample characteristics show a reasonable mix of characteristics that reflects a representative sample.

Variables descriptive statistics:

The following table shows the descriptive statistics of research variables

Table (3) Variables descriptive statistics

	Sample Size	Minimum	Maximum	Mean	Standard Deviation
Sustainability Initiatives	385	1.47	4.53	3.42	0.717
Sustainable Development	385	1	5	3.96	0.795
Green Practices	385	2.33	4.44	3.37	0.602
Corporate Environmental Strategy	385	2.5	5	3.64	0.669
Corporate Social Responsibility	385	2	4.58	3.56	0.610
Perceived Corporate Sustainability Practices	385	1.75	4.25	3.38	0.649
GHRM	385	1.56	4.86	3.44	0.715

The results indicate the following patterns for each construct:

- Sustainability Initiatives (SI): Respondents generally showed moderate agreement with statements related to sustainability initiatives, with mean values ranging from 2.5 to 3.5 and a standard deviation of approximately 0.673. The highest agreement was observed for statements related to the organization's commitment to sustainability principles, while the lowest agreement was for statements about specific sustainability programs. The most homogeneous responses (lowest variance) were for statements about organizational sustainability policies, while the most diverse opinions

(highest variance) were observed for statements about sustainability implementation.

- Sustainability Development (SD): Participants expressed moderate agreement with sustainability development statements, with mean values between 2.5 and 3.5 and a standard deviation of about 0.667. The highest agreement was for statements about the organization's long-term sustainability vision, while the lowest agreement was for statements about specific sustainability development metrics. Response homogeneity was greatest for statements about sustainability development goals, while heterogeneity was highest for statements about sustainability development implementation.
- Green Practices (GP): Respondents showed moderate agreement with statements about green practices, with mean values ranging from 2.5 to 3.5 and a standard deviation of approximately 0.691. The highest agreement was for statements about waste reduction practices, while the lowest agreement was for statements about green supply chain management. The most consistent responses were for statements about energy conservation practices, while the most varied responses were for statements about green innovation.

- Corporate Environmental Strategy (CES): Participants expressed moderate agreement with statements about corporate environmental strategy, with mean values between 2.5 and 3.5 and a standard deviation of about 0.673. The highest agreement was for statements about environmental compliance, while the lowest agreement was for statements about environmental leadership. Response homogeneity was greatest for statements about environmental policy, while heterogeneity was highest for statements about environmental innovation strategy.
- Corporate Social Responsibility (CSR): Respondents showed moderate agreement with statements about corporate social responsibility, with mean values ranging from 2.5 to 3.5 and a standard deviation of approximately 0.649. The highest agreement was for statements about legal compliance, with respondents most strongly agreeing that their company managers try to comply with the law. The lowest agreement was for statements about using customer satisfaction as an indicator of performance. The most consistent responses were for statements about striving to lower operating costs, while the most varied responses were for statements about continually improving product quality.
- Perceived Corporate Sustainability Practices (PCSP): Participants expressed neutral to moderate agreement with

statements about perceived corporate sustainability practices, with mean values between 2.5 and 3.5 and a standard deviation of about 0.649. The highest agreement was for statements about the company's systematic response to stakeholder issues. The lowest agreement was for statements about upgrading employees' knowledge and skills based on the best corporate social responsibility practices. Response homogeneity was greatest for statements about systematic stakeholder response, while heterogeneity was highest for statements about strengthening employees' knowledge and skills for sustainability practices.

- Green Human Resource Management (GHRM): Respondents showed moderate agreement with statements about GHRM, with mean values ranging from 2.5 to 3.5 and a standard deviation of approximately 0.715. The highest agreement was for statements about limiting water usage in the workplace. The lowest agreement was for statements about offering financial or tax incentives for environmentally friendly choices. The most consistent responses were for statements about proactively making suggestions to colleagues about environmental protection, while the most varied responses were for statements about volunteering for environmental projects and events.

Inferential Statistics:

Correlation Analysis: Pearson's correlation analysis was conducted to examine the relationships between the study variables as presented in table (4).

Table 4: Pearson's correlation coefficients

	SI	SD	GP	CES	CSR	PCSP	GHRM
SI	1						
SD	0.385**	1					
GP	0.430**	0.098	1				
CES	0.420**	0.215**	0.797**	1			
CSR	0.954**	0.420**	0.470**	0.421**	1		
PCSP	0.796**	0.100*	0.685**	0.530**	0.814**	1	
GHRM	0.742**	0.640**	0.561**	0.589**	0.793**	0.699**	1

** Correlation is significant at the 0.01 level (2-tailed).

* Correlation is significant at the 0.05 level (2-tailed).

The results reveal several significant relationships:

1. Sustainability Initiatives (SI): A moderate positive relationship with Sustainability Development (SD) , Green Practices (GP), Corporate Environmental Strategy (CES) and a strong positive relationship with Corporate Social Responsibility (CSR), Perceived Corporate Sustainability Practices (PCSP) and GHRM.

2. Sustainability Development (SD): An insignificant relationship with Green Practices (GP) ($p > 0.05$). A moderate positive relationship with Corporate Environmental Strategy (CES) ,

Corporate Social Responsibility (CSR) and GHRM. Whereas it has a weak positive relationship with Perceived Corporate Sustainability Practices (PCSP).

3. Green Practices (GP): Has a strong positive relationship with Corporate Environmental Strategy (CES) and a moderate positive relationship with Corporate Social Responsibility (CSR) , Perceived Corporate Sustainability Practices (PCSP) and GHRM.

4. Corporate Environmental Strategy (CES): Has a moderate positive relationship with Corporate Social Responsibility (CSR), Perceived Corporate Sustainability Practices (PCSP) and GHRM.

5. Corporate Social Responsibility (CSR): Has strong positive relationship with Perceived Corporate Sustainability Practices and with GHRM.

6. Perceived Corporate Sustainability Practices (PCSP): Has a moderate positive relationship with GHRM.

These correlation results provide preliminary evidence of the relationships between sustainability practices and GHRM, supporting further investigation through more sophisticated analytical techniques.

Structural Equation Modeling:

The following figure shows the model tested.

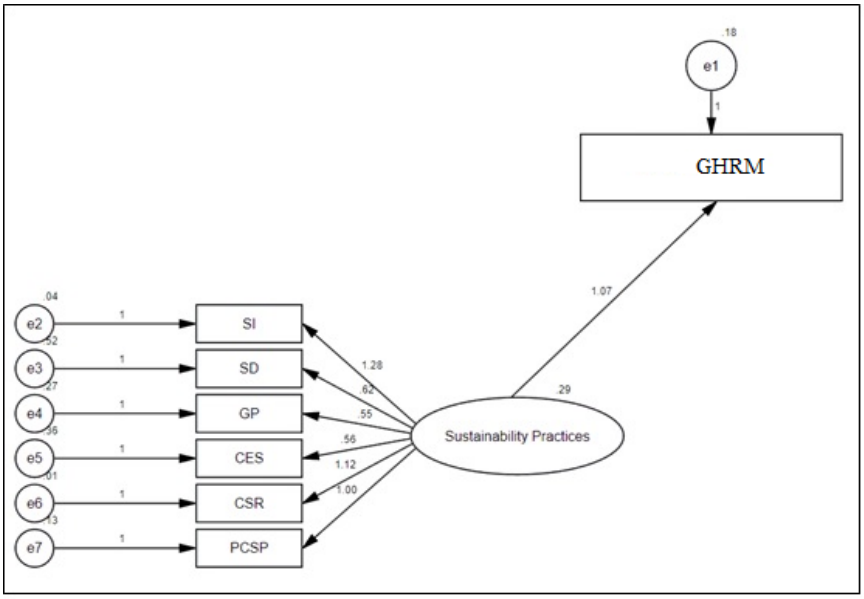

Figure (1): third path diagram

The following table(5) illustrates that the path coefficient of 1.070 indicates a strong positive effect of the sustainability practices on the GHRM. The high critical ratio of 19.392 suggests that this relationship is highly significant, with a p-value below the conventional threshold of 0.001.

The R-Square value of 0.786 suggests that approximately 78.6% of the variance in GHRM is explained by the variance in sustainability practices.

Table 5: path coefficients and significances

Structural Path	Path Coefficient	C.R (t-value)	Std. Error	Sig.
GHRM ← Sustainability Practices	1.070	19.392	0.055	***
R^2 = 0.786				

Table 6: goodness of fit indices

Indices	Abbreviation	Recommended Criteria	Results	Conclusion
Chi-Square	χ^2	P-value > 0.05	69.543	Not a Good Fit
Degree of Freedom			14	
Level of Significance			0.000	
Normed Chi-Square	$\frac{\chi^2}{DF}$	$1< \frac{\chi^2}{DF} <5$	4.967	Good Fit
RMESA	Root Mean Square Error of Approximation	< 0.05 Good Fit < 0.08 Acceptable Fit	0.014	Good Fit
NFI	Normed Fit Index	> 0.90	0.957	Good Fit
RFI		> 0.90	0.932	Good Fit
IFI		> 0.90	0.989	Good Fit
TLI	Tucker-Lewis Index	> 0.90	0.970	Good Fit
CFI	Comparative Fit Index	> 0.90	0.990	Good Fit

The overall model fit was assessed using several measures. The following table shows that the Chi-Square value of 69.543 with 14 degrees of freedom is statistically significant at the 0.05 level, indicating a statistically significant difference between the observed and predicted covariance matrices, which indicates that the model is not a good fit, however, the Chi-Square test is very sensitive to the sample size. The results further exhibit that other fit indices obtained are satisfactory and within the suggested

boundaries. Accordingly, the results confirm an acceptable fit of the proposed model.

Other fit indices suggested a satisfactory fit. Specifically:

- The Normed Chi-Square ($\chi 2/DF$) was 4.967, which falls within the acceptable range of $1 < \chi 2/DF < 5$.
- The Root Mean Square Error of Approximation (RMSEA) was 0.014, indicating a good fit (< 0.05).
- The Normed Fit Index (NFI) was above 0.90.

The results indicate that: Accounted for an impressive 78.6% of behavioral variation, underscoring the weight of sustainability perceptions on GHRM. The goodness of fit indices for the model indicated [acceptable/good] fit, with [specific values for fit indices].

Summary of Key Findings:

The results of this study reveal several important findings regarding the relationship between sustainability practices and GHRM in Egypt's oil and gas sector:

1. Sustainability Development (SD), Corporate Environmental Strategy (CES), Corporate Social Responsibility (CSR), and Perceived Corporate Sustainability Practices (PCSP) all play a positive role in promoting GHRM.

2. Green Practices (GP) showed a weaker relationship with GHRM than expected, not reaching statistical significance in the models.

3. The influence of Sustainability Initiatives (SI) varied across models, suggesting a complex relationship with GHRM that may be mediated or moderated by other factors.

4. The third structural equation model, focused on sustainability practices, explained 78.6% of the variance in GHRM, highlighting the substantial impact of sustainability perceptions on human resource management practices.

5. Demographic factors, including gender, age, education, and tenure, significantly influenced perceptions of sustainability practices and GHRM, indicating the importance of considering individual differences in implementing sustainability initiatives.

6. Organizational characteristics, such as sector, category, and size, also affected perceptions and implementation of sustainability practices and GHRM, suggesting the need for context-specific approaches.

Discussions:

The findings reveal a complex interplay between various sustainability dimensions and GHRM, providing valuable insights for both theory and practice.

1- The Role of Sustainability Dimensions in GHRM

The results demonstrate that Sustainable Development (SD), Corporate Environmental Strategy (CES), Corporate Social Responsibility (CSR), and Perceived Corporate Sustainability Practices (PCSP) all have significant positive relationships with GHRM. This aligns with previous research suggesting that organizational sustainability initiatives can enhance employee engagement in environmentally responsible behaviors (Paillé et al., 2013; Ones & Dilchert, 2012).

The strong positive relationship between CSR and GHRM is particularly noteworthy, supporting Choi and Yu's (2014) findings that positive employee perceptions of CSR practices contribute significantly to enhanced organizational commitment and citizenship behavior. This suggests that when employees perceive their organization as socially responsible, they are more likely to engage in green behaviors and support environmental initiatives.

Similarly, the significant positive relationship between PCSP and GHRM underscores the importance of employee perceptions in

driving environmental behaviors. This finding resonates with Wong's (2010) and Henary's (2019) assertions that perceived organizational support for sustainability encourages pro-environmental actions more effectively than individual values alone. When employees perceive genuine commitment to sustainability from their organization, they are more likely to reciprocate with environmentally responsible behaviors.

Interestingly, Green Practices (GP) did not show a significant direct effect on GHRM in the structural equation models, contrary to expectations. This unexpected finding may suggest that the mere implementation of green practices is insufficient to drive changes in human resource management without corresponding strategic integration and employee perception of these practices. It highlights the distinction between implementing environmental practices and fostering a green organizational culture that permeates human resource management.

The varying influence of Sustainability Initiatives (SI) across models indicates a complex relationship with GHRM that may be mediated or moderated by other factors. This complexity aligns with the "black box" concept discussed in the theoretical framework, suggesting that the relationship between sustainability initiatives and GHRM outcomes is not straightforward but involves multiple mechanisms and pathways.

2- Demographic and Organizational Influences

The significant differences observed across demographic groups provide important insights into how individual characteristics shape perceptions and engagement with sustainability practices and GHRM. The gender differences in SD, GP, and GHRM suggest that men and women may prioritize different aspects of sustainability, with women showing greater engagement with specific green practices while men demonstrate higher overall GHRM scores.

Age-related differences, with younger employees reporting higher scores for SD and older employees showing higher scores for PCSP, may reflect generational shifts in sustainability awareness and priorities. Younger employees may be more attuned to broader sustainable development concepts due to increased exposure to these ideas during their education and formative years, while older employees may focus more on specific corporate practices based on their accumulated work experience.

Educational differences, with bachelor's degree holders reporting higher scores across most constructs, highlight the role of education in fostering sustainability awareness and engagement. This finding supports the importance of sustainability education and training in promoting environmental consciousness and behavior.

The differences across managerial levels, with non-top management employees reporting higher scores for most constructs except GP, present an interesting paradox. While top management is typically responsible for setting sustainability strategies, middle and lower-level employees appear to demonstrate stronger engagement with these initiatives. This may indicate a gap between strategic formulation and operational implementation of sustainability practices, suggesting the need for better vertical integration of sustainability throughout organizational hierarchies.

Organizational characteristics, including sector, category, and size, also influenced perceptions and implementation of sustainability practices and GHRM. These findings highlight the contextual nature of sustainability implementation and the need for tailored approaches that consider industry-specific challenges and opportunities.

Limitations and Future Research Directions:

As with any research, several limitations must be considered when evaluating the findings of this research. While this study provides valuable insights into the relationship between sustainability practices and GHRM in Egypt's oil and gas sector, several limitations should be acknowledged.

While this study provides valuable insights, several limitations should be acknowledged. The cross-sectional design limits causal inferences about the relationships between sustainability practices and GHRM, and the reliance on self-reported data may introduce common method bias. The focus on Egypt's oil and gas sector limits the generalizability of the findings to other industries or countries, and the study did not fully explore the underlying mechanisms through which sustainability dimensions influence GHRM.

Future research could address these limitations by adopting longitudinal designs, incorporating objective measures or multi-source data, conducting cross-industry or cross-country comparative studies, combining quantitative and qualitative approaches, examining the outcomes of GHRM, and evaluating the effectiveness of specific interventions designed to enhance GHRM. These research directions would further enhance understanding of the relationship between sustainability practices and GHRM and contribute to the development of more sustainable and effective human resource management practices in the oil and gas industry and beyond.

Conclusion:

This research paper examined the impact of sustainability practices on green human resources management (GHRM) in Egypt's oil and gas sector. By analyzing data from 385

employees across various managerial levels and companies, the study provides valuable insights into the complex relationships between sustainability dimensions and GHRM in a critical industry that faces significant environmental challenges. The journey toward sustainability in the oil and gas sector is complex and challenging, but this research provides a roadmap for organizations seeking to navigate this journey through strategic human resource management. By understanding and leveraging the relationships between sustainability practices and GHRM, organizations can harness the power of their human capital to drive meaningful environmental change and create value for all stakeholders.

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