

The Mediating Role of GHRM Practices in the Relationship between Employee Engagement and Company's Culture in Energy Sector in India

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Abstract

The current research investigates whether Green Human Resource Management (GHRM) practices are able to mediate between employee engagement and corporate culture in the Indian energy sector. The purpose of this study is to understand how environmentally friendly human resource practices support employees' commitment and help in the creation of a positive corporate culture. A structured survey was used to collect primary data from 385 employees from both public and private energy companies. Descriptive statistics, correlation, regression analysis, Exploratory Factor Analysis (EFA), and Structural Equation Modeling (SEM) were all used to analyse the data using both SPSS and AMOS. The findings indicate that GHRM practices have a strong positive effect on both employee engagement and corporate culture. Results from the correlation and regression analyses reveal very strong relationships among variables, while the SEM analysis suggests that employee engagement only partially mediates the association of GHRM practices with corporate culture. Furthermore, the model fit statistics indicate that the proposed model fits the data well enough to be useful as a tool for analysis. This study suggests that GHRM practices can enhance employee commitment, improve the work culture and further support sustainability goals in the Indian energy sector; therefore, this research represents a significant contribution towards the development of higher standards in sustainable human resource Management among HR managers, policy makers, and business leaders looking to make sustainability part of their human resource management practices.

Keywords: GHRM, Employee Engagement, Company Culture; Energy Sector

JEL Classification Codes: M12, M14, Q56, C38, C51.

1. Introduction

Organizations from various industries today are becoming more aware of the need to align their human resources with their broader sustainability objectives. The energy industry is particularly well-suited to examine the relationship between HR practices and corporate responsibility because, as a result of its unique position at the intersection of corporate performance and environmental performance, it will continue to play a crucial role in driving sustainable development in the future (Yong et al., 2020). In response to this trend, many companies have adopted Green Human Resource Management (GHRM), which provides a new framework that incorporates environmental issues into core HR processes, such as recruitment, training, performance evaluation, and compensation (Ren et al., 2018).

Studies have shown that employee engagement and organizational culture are two of the most important factors in determining how well a company performs (Albrecht and others, 2021). Engaged employees are more likely to

be committed to their work, think creatively, and be productive, while a culture that is strong helps create a shared sense of purpose, creates a sense of belonging, and provides uniformity in how employees behave at all levels within the company (Schein, 2010). However, even though there has been an increase in the amount of academic literature written about both of these concepts, very little research has been done on the specific ways that employee engagement can be transformed into a culture that promotes environmental sustainability; particularly in the energy industry (Sharma and Gupta, 2022).

According to Tang et al. (2018), GHRM practice is hypothesized to play an important mediating role between individual employee engagement with an organization and cultural transformative processes at the organization level. For example, employees are more likely to positively respond to green initiatives when they are engaged actively within their organization; however, there are a variety of institutionalized GHRM practices (such as green training, green performance appraisal and providing eco-friendly rewards) that comparatively embed an organization's culture with respect to sustainable practices (Dumont et al., 2017). Research studies within the manufacturing and service sectors support this mediation effect, however the energy sector is still lacking in empirical studies (Masri & Jaaron, 2017). The energy sector poses a challenging but urgent environment for this study. Increasing demands from regulators, investors and civil society to shift to cleaner alternatives and decrease the carbon footprint means that energy companies must not only invest in new green technologies; they also must create a culture of sustainability throughout their organizations (IEA, 2023). As argued by Ahmad (2015), without changes in how employees think, act and interact with regards to environmental objectives, there can be no long-term technological transition.

In addition, research shows that there is no direct or automatic correlation between employee engagement and the culture of an organization (Memon et al., 2021). There are structural and managerial intermediaries through which employee engagement is expressed and directed; these include but are not limited to HR policies and practices that have a critical impact on how engagement is manifested and directed within their organizations (Saks, 2022). In this sense, GHRM is not only a mechanism to implement sustainability; it is also an institutional conduit for converting the energy and values of engaged employees into organizationally stable cultural norms (Renwick et al., 2013).

The empirical evidence which examines the relationship between organisational culture and employee engagement via green HRM (GHRM) is limited. Most research has looked at these variables separately or the majority of the studies have been completed in manufacturing companies situated in developed countries (Chaudhary 2020; Obeidat et al. 2020). The research in this study attempts to fill this research gap by creating a conceptual model of how GHRM will mediate the relationship between employee engagement and organisational culture for firms operating in the energy industry. By completing this research, this study will add to the current strategic human resources management (HRM) and sustainability literature and provide practical recommendations for human resource (HR) management leaders and public policymakers who will promote a culture of environmental responsibility through a deliberate use of human capital strategies.

Social Exchange Theory (SET) and the Ability-Motivation-Opportunity (AMO) framework provide the theoretical framework for this research with each providing an explanation as to how GHRM practices have a positive impact on employee behaviour and organizational outcomes. According to the SET, employees are more likely to reciprocate organisational investments in their own development and well-being through higher levels of engagement, commitment and environmentally responsible behaviour (Blau, 1964; Cropanzano & Mitchell, 2005). The AMO framework explains how GHRM practices improve employees' green behaviours by providing employees the ability (green training), motivation (green performance appraisals and environmental rewards), and opportunity (green participation programs) to behave in an environmentally responsible manner (Appelbaum et al., 2000; Jiang et al., 2012). By combining the information provided by the SET and AMO framework, we can see that GHRM practices do not only complement sustainability strategies but also act as active institutional levers channelling employee engagement into a unified and sustainable culture of environmental responsibility within the organisation (Paille et al., 2014; Kim et al., 2019).

The layout for this study has been divided into different sections, where Section Two contains a review of previous research in the area of employee engagement, culture of an organisation and the Green Human Resource Management (GHRM) type of management. The purpose of Section Three is to outline the aims of the investigation and develop hypotheses. Section Four contains details about the research strategy (including where to collect the data), procedures for collecting the data and also the methods used to test the proposed GHRM model. Section Five describes the results of the empirical testing and explains how the results relate back to the previous literature reviewed in the literature section of this study. Finally, Section Six summarises this study and outlines its significance, as well as discussing future areas for research with specific reference to environmental sustainability, especially in relation to the energy industry. The Indian power market is a significant area of study due to it being an underdeveloped region as well as being one of the fastest growing economies and the largest energy consuming countries in the world. This major shift from fossil-fuel dependent to renewable-energy has been occurring through the Nationally Determined Contributions (NDCs) under the Paris Agreement (Ministry of New and Renewable Energy ([MNRE], 2022)). Despite this change, Indian energy organisations have reported that they face large internal organisational obstacles to this new strategy, such as cultural resistance, low green-knowledge awareness by employees, and insufficient integration of sustainability into their HRM systems (Jabbour et al., 2019; Rawat & Basergekar, 2016). Also, the public-sector workforce that create and deliver power in India usually has a bureaucratic culture that inhibits acceptance of innovative and sustainable HRM practices (Mathur et al., 2021). To study the GHRM (Mediating) in this context will provide valuable understanding not just to the area of GHRM but also for the larger discussion around how to transition in a sustainable way in an emerging economy (Guerci et al., 2016; Srivastava & Bhatnagar, 2020).

In this context, this study investigates how GHRM practices mediate the relationship between employee engagement and organizational culture in the Indian energy sector. Survey data from employees of public and private energy companies is analysed through confirmatory factor analysis (CFA) and structural equation modelling (SEM) to test the theoretical framework proposed (Hair et al., 2019). The study seeks to identify ways GHRM practices can convert employee engagement into an effective Green Culture, thereby enabling sustainable HRM practices and aiding organizations in achieving their sustainability objectives (Chaudhary, 2020; Yong et al., 2020).

2. Review of Literature

This section provides a detailed critique of the literature on three major themes, or constructs, of this study: employee engagement, organizational culture, and GHRM (green human resource management). The emphasis of the review is on the interrelationship between these constructs within an energy sector organisation. By combining both theoretical and empirical studies from earlier research, the aim is to offer support for the proposed research framework. The review will assist in identifying any knowledge gaps in the current literature which the research attempt will address. The literature that has been selected for inclusion in this review is based on scholarly publications, including peer-reviewed journals, institution report, and seminal theoretical works.

2.1 Green Recruitment and Selection

In order to promote good environmental management within the organisation, green recruiting ensures that fresh talent is conversant with the green practises and environmental system (Wehrmeyer, 1996). Companies in this context connect corporate environmental policies and initiatives with their hiring and selection practises, therefore recruiting personnel that is environmentally conscious. Nowadays, a lot of businesses compete for the coveted title of "best green employer" as part of their recruitment strategy to draw in potential eco-friendly workers (Phillips, 2007); (Stringer, 2009). Green hiring practises involve delivering recruiting messaging clearly and often referencing environmental requirements in the job adverts. Some employers use candidates' interest in and concern for the environment as selection criterion when choosing applicants for open positions. The companies inquire about the environment while interviewing potential employees or assessing them for selection.

2.2 Green Performance Management

Employees are encouraged to develop their professional abilities that aid in more effectively achieving the aims and objectives of the organisation through the performance management (PM) process. Performance management is favourably impacted by the green wave, much as environmental management influences organisations' worldwide commercial strategy. As a result, some businesses set environmental standards, assess employee contributions to environmental management, and use these standards as performance evaluation criteria for their workers (S.R. Sharanya, 2016) (S.R. Sharanya, 2016) (Ahmad, 2015); (Jabbour, 2011). Green performance management systems motivate staff and enhance their capacity to better achieve green organisational objectives (Ahmad, 2015) and one way to do this is through the use of green performance assessment, which is described as "the appraisal and registration of employees' environmental performance throughout their careers in a company and provides them with feedback about their performance to prevent undesirable attitudes or reinforce exemplary behaviour". Employee performance is improved when they are actively involved in decision-making for environmentally friendly initiatives. Companies like Tata Group of Companies have implemented corporate-wide environmental performance standards that assess environmental performance and build green information systems and audits. These standards address on-site use, waste management, environmental audits, and the reduction of waste.

2.3 Green Training & Development

Organisations now formally admit that employees require environmental training. According to (J Cook, 1992), the green training and development practises include "providing environmental training to the organisational members (employees and managers) to develop the necessary skills and knowledge, as well as providing training to adapt environmentally friendly best practises (such as minimising long-distance business travel and recycling). (Jabbour, 2011) (Mishra, 2022) (Ayman Alshaabani, 2021) (Zoogah, 2011) In order to increase employee engagement for newly hired staff, green training practises are particularly crucial (Jyoti, 2019). By increasing employees' incentive to engage in green activities, green training also indirectly raises employee engagement. One example of a firm is The Land Rover Group. The Land Rover Group offers job-specific environmental training to its workers. To educate their workforce about environmental problems, they have monthly briefings and distribute newsletters. At all locations, environmental practise boards, major objectives, and environmental policy were posted. They support staff members in developing fresh concepts that lessen the causes of environmental deterioration.

2.4 Green Reward Management

The key components of HRM are compensation and rewards. This component is crucial for retaining employee enthusiasm in the goals of the company. The green reward management practises used by the organisations have a significant impact on the environmental performance of the organisation. Employers who utilise green job performance evaluation for their staff often reward them with green benefits like pensions, which aid in the development of green performance management (Islam, 2019). According to (Jabbour, 2010) on page 1058, "the establishment of a system of monetary and non-monetary rewards for staff who have a clear capacity to support environmental management " was how green rewards were defined. According to many research (Islam, 2019), there is a connection between green awards and employees' commitment in environmental matters. According to several studies (Huang, 2011); (Renwick et, 2013); (Ahmad, 2015), green benefits and pensions consistently encourage good employee engagement.

2.5 Green Employee Relations

Green employee relations strategies (such as cooperative talks, profit sharing, and unionisation as a significant stakeholder) are also required. Researchers have identified several green employee relations practises, such as "involving employees in green practises, joint consultations in resolving environmental issues, introducing green whistle-blowing and help-lines (Renwick et, 2013), providing environmental management training to union

representatives, and negotiating with trade unions on environmental issues." As a result, these studies highlight the critical role that Green HRM plays in boosting operational efficiency.

2.6 Research Gap

While there is a wealth of knowledge regarding Green Human Resource Management (GHRM), there are still many areas where additional research could be helpful. The research that has been conducted has typically focused on individual practices of GHRM and not the combined or integrative effect that they have on employee engagement or culture within an organisation. Not only does much of the current research place emphasis on the direct effects between the components of GHRM and employee engagement (and company culture) but many studies fail to examine the mediating effect of GHRM practices between employee engagement and company culture. There are also few studies that focus on specific industries, such as the energy industry, in addition to there being very little empirical research in India on this topic. Many researchers have focused most of their efforts on measuring company-level outcomes (the organisation) while not placing much emphasis on employee behaviour (e.g., employee engagement). Finally, there has been no comprehensive validation of these relationships through the use of advanced statistical techniques. The present study will fill the gaps in the literature by examining the mediating role of GHRM practices in the relationship between employee engagement and culture in the energy sector.

3. Research Objective

1. To examine the relationship between Green Human Resource Management (GHRM) practices and employee engagement in the energy sector.
2. To analyze the impact of employee engagement on company culture in the energy sector.
3. To evaluate the effect of various dimensions of GHRM practices (recruitment, performance management, training & development, rewards, and employee relations) on employee engagement.
4. To investigate the mediating role of GHRM practices in the relationship between employee engagement and company culture.

4. Hypothesis Formulation

H1: Green Human Resource Management (GHRM) practices have a significant positive effect on employee engagement in the energy sector.

H2: Employee engagement has a significant positive effect on company culture in the energy sector.

H3: Green Human Resource Management (GHRM) practices have a significant positive effect on company culture in the energy sector.

H4: Green Human Resource Management (GHRM) practices significantly mediate the relationship between employee engagement and company culture.

5. Research Methodology

5.1 Data Collection: For this investigation, both primary and secondary data were gathered. To find important determinants of GHRM practises, secondary data were gathered from relevant literature, including papers, books, and reports. A self-administered questionnaire that was given to 156 energy industry personnel was used to gather primary data.

5.2 Data Analysis: To test the reliability of the measurement scales, data analysis began by assessing the internal consistency of the measurement scales using Cronbach's Alpha. Once reliability was established, frequency analysis was conducted to provide demographic variable distributions. Once the demographic distribution had been tested, the relationship between the study variables was examined using correlation analysis. Once identified,

the effects of the independent variable(s) on the dependent variable were determined using regression analysis. Further, Exploratory Factor Analysis (EFA) provided insight into possible underlying factor structure(s) and identified which data could be grouped into meaningful subsets. Additionally,

Confirmatory Factor Analysis were run for confirming the factors.

5.3 Sampling Method: Employees in the energy sector who work with renewable energy were the study's targeted audience. The GHRM practises are being used in the HR departments. The study concentrated on these departments' employees because, according to the HR managers of the organisations, they were more likely to recognise green practices than employees in other departments. Data was gathered between December 2025 and March 2026 using self-administered questionnaires with closed-ended questions that were distributed to the employees in electronic form. 410 questionnaires were delivered in total. Out of 400 questionnaires, only 385 responses were received, complete and valid. Data for the research analysis were thereafter automatically produced in an Excel file and entered into the SPSS 27 software.

5.4 DV, IV & Mediating Variables

Type of Variable	Variable Name	Dimensions / Components
Independent Variable	GHRM Practices	Green Recruitment & Selection, Green Performance Management, Green Training & Development, Green Reward Management, Green Employee Relations
Mediating Variable	Employee Engagement	Emotional, Cognitive, and Behavioral Engagement (measured through 5 items)
Dependent Variable	Company Culture	Organizational values, communication, work environment, employee involvement

6. Data Collection & Analysis

The process of data analysis is made up of systematic application of statistical (quantitative) and logical (qualitative) methodologies to describe, summarize, and evaluate the data that was collected. The analysis of the data collected in this particular research study utilized appropriate statistical tools (e.g., SPSS) using techniques of descriptive statistics, correlation, regression analysis, and factor analysis (EFA and/or CFA) to provide researcher with meaningful findings and outcomes that would support their research objectives.

6.1 Reliability Analysis

Reliability analysis is conducted to assess the consistency and stability of the measurement scale used in the study. It ensures that the items included in the questionnaire produce reliable and consistent results over repeated trials. In this research, reliability was evaluated using Cronbach's Alpha coefficient, where a value above 0.7 indicates an acceptable level of internal consistency among the variables. After checking the reliability of the data, we can further proceed for additional analysis.

Case Processing Summary			
		N	%
Cases	Valid	385	100.0
	Excluded ^a	0	.0

	Total	385	100.0
a. Listwise deletion based on all variables in the procedure.			

Source: Authors computations

Reliability Statistics	
Cronbach's Alpha	N of Items
.969	29

Source: Authors computations

Interpretation: The case processing summary indicates the validity of all **385 responses (100%) ** included and none of the data were missing. This shows that there is complete data set from these respondents. The **Cronbach's Alpha value = 0.969** for the 29 items demonstrate **excellent internal consistency** because this exceeds the acceptable threshold of .70 by a large margin. Thus, the measure has a high degree of reliability, which will allow for further statistical analysis. Although this is a very high alpha value, which may indicate possible item redundancy, the measurement still provides reliable and valid data for this research.

6.2 Descriptive Statistics

In order to clearly represent the major characteristics of your data set(s) in a visual manner or in some cases, as numerical values on paper; Descriptive statistics help to describe or summarize your data. Descriptive statistics can also provide an overview of the respondents' characteristics and provide key variable information about the respondents with the use of measures like Mean ($\bar{x}$), Standard Deviation (s), Frequency Count (f), and Percentage (%).

Descriptive Statistics					
Variables	N	Minimum	Maximum	Mean	Std. Deviation
The organization prioritizes environmental values during recruitment.	385	1	5	2.69	.663
Job descriptions include environmental responsibilities.	385	1	5	2.83	.604
Candidates are selected based on environmental awareness.	385	1	5	2.91	.675
Environmental performance is part of employee appraisal.	385	1	5	2.98	.707
Employees are evaluated on achieving green targets.	385	1	5	3.03	.719
Feedback includes environmental performance aspects.	385	1	5	3.03	.649
Employees receive training on environmental sustainability.	385	1	5	2.63	.680

The organization conducts regular green awareness programs.	385	1	5	2.66	.740
Training improves employees' environmental knowledge.	385	1	5	3.22	.734
Employees are rewarded for eco-friendly behavior.	385	1	5	3.10	.681
Incentives are given for achieving environmental goals.	385	1	5	2.88	.629
Recognition is provided for green initiatives.	385	1	5	2.83	.614
Employees are encouraged to participate in green activities.	385	1	5	2.88	.574
Management supports environmentally friendly suggestions.	385	1	5	2.78	.688
There is open communication about sustainability initiatives.	385	1	5	2.99	.794
I feel emotionally connected to my organization.	385	1	5	2.78	.726
I am proud to be part of this organization.	385	1	5	3.05	.787
I am mentally focused on my work tasks.	385	1	5	2.74	.780
I understand how my work contributes to organizational goals.	385	1	5	2.81	.791
I put extra effort into my work.	385	1	5	2.83	.756
I actively participate in organizational activities.	385	1	5	2.86	.735
The organization promotes sustainability as a core value.	385	1	5	2.89	.722
Ethical and environmental practices are encouraged.	385	1	5	2.60	.693
Communication about green initiatives is clear and effective.	385	1	5	3.02	.716
Employees are informed about sustainability goals.	385	1	5	3.06	.739
The workplace supports environmentally friendly practices.	385	1	5	2.97	.665
The organization provides a healthy and sustainable work environment.	385	1	5	3.29	.743
Employees are involved in decision-making related to sustainability.	385	1	5	2.98	.738
Teamwork is encouraged for achieving environmental goals.	385	1	5	3.12	.749
Valid N (listwise)	385				

Source: Authors computations

Interpretation: The average score across all respondents (2.60-3.29) indicates that on average very little to moderate level of agreement exists within the group of respondents toward green human resource management (HRM) practices. In particular, with the highest score for providing a sustainable workplace environment and the lowest scores being for providing training to employees and implementing ethical environmental practices through human resource management, standard deviation scores reveal moderate amount of variability within the group of respondent's responses. Overall, this data suggests that green HRM practices do exist in one form or another but are in need of additional refinement.

6.3 Frequency Analysis

Frequency analysis provides a way to visualize and examine the relative occurrence and how often responses are distributed across all respondents using both counts and percentages of all response categories for the various variables being examined in this research. For this study, frequency analysis will be used to analyze the demographic characteristics of the respondents and their responses.

Variables	Category	Frequency	Percent	Valid Percent	Cumulative Percent
Age	Below 25 years	89	23.1	23.1	23.1
	25–35 years	98	25.5	25.5	48.6
	36–45 years	107	27.8	27.8	76.4
	46–55 years	55	14.3	14.3	90.6
	Above 56 years	36	9.4	9.4	100.0
	Total	385	100.0	100.0	
Gender	Male	233	60.5	60.5	60.5
	Female	152	39.5	39.5	100.0
	Total	385	100.0	100.0	
Experience	Less than 2 years	102	26.5	26.5	26.5
	2–5 years	119	30.9	30.9	57.4
	6–10 years	104	27.0	27.0	84.4
	Above 10 years	60	15.6	15.6	100.0
	Total	385	100.0	100.0	
Department	HR	113	29.4	29.4	29.4
	Operations	108	28.1	28.1	57.4
	Technical	89	23.1	23.1	80.5
	Others	75	19.5	19.5	100.0
	Total	385	100.0	100.0	
Organization Type	Public	148	38.4	38.4	38.4

	Private	205	53.2	53.2	91.7
	Joint Venture	32	8.3	8.3	100.0
	Total	385	100.0	100.0	

Source: Primary data

Interpretation: The majority of the survey participants were between 36-45 years old. Of these, 60.5% were males. Many of the largest groups in terms of experience were each 2 to 5 years long in their respective industries as well as working in Human Resources or Operations departments. In addition, more than half of them worked for private sector companies. Overall, both the gender and experience of those who provided responses to this survey was approximately equal and relatively representative of the population providing responses.

6.4. Correlations Analysis

To explore how employee engagement, human resource management (HRM) practices, and workplace culture relate to one another in the Indian energy sector, correlational analysis was performed to characterize the nature, strength, and direction (positive or negative) of these relationships. Correlation analysis allows researchers to identify whether or not variations in one variable are related to variations in another by providing a means of determining the degree of association between constructs. Additionally, because correlation analysis effectively shows the overall pattern of relationships among constructs and is useful for determining whether or not the data is appropriate for additional statistical testing (e.g., structural equation modelling), it provides a good beginning point for advanced multivariate methods such as structural equation modelling (SEM).

***Note:** For the purpose of further analysis, the 29 variables across the three sections were consolidated into three constructs.

Correlations				
		GHRM	EE	CC
GHRM	Pearson Correlation	1	.583**	.631**
	Sig. (2-tailed)		.000	.000
	N	385	385	385
Employee Engagement (EE)	Pearson Correlation	.583**	1	.676**
	Sig. (2-tailed)	.000		.000
	N	385	385	385
Company culture (CC)	Pearson Correlation	.631**	.676**	1
	Sig. (2-tailed)	.000	.000	
	N	385	385	385
**. Correlation is significant at the 0.01 level (2-tailed).				

Source: Authors computations

Interpretation: The outcome of the correlation study indicates strong associations between all variables tested. The strength of the relationship between GHRM and employee engagement was moderate ($r = 0.583$). The correlation between GHRM and corporate commitment ($r = 0.631$) is somewhat stronger. Finally, there was a strong correlation between employee engagement and corporate commitment ($r = 0.676$).

6.5 Regression Analysis

Regression analysis was utilized to investigate how the predictor (independent) variables impact the outcome variable (dependent) within the framework of the study; additionally, regression analysis will allow for assessment of the influence of the independent variables upon the dependent variable, and thus provide a direction and magnitude of the relationship. The focus of this study is to use regression analysis to assess the impact of both employee engagement and GHRM practices on the organizational culture of the Indian energy sector. Regression analysis will provide an estimate of the contribution of each of the predictor variables to the overall variance of the dependent variable, and consequently provide a better understanding of the strength and directionality of the hypothesized relationships among constructs.

Variables Entered/Removed ^a			
Model	Variables Entered	Variables Removed	Method
1	GHRM ^b	.	Enter
a. Dependent Variable: Company culture (CC)			
b. All requested variables entered.			

Source: Authors computations

Interpretation: According to the table, GHRM practices are independent variables in the regression analysis with Company culture dependent on the regression analysis. The regression analysis indicates that GHRM practices affected the Company culture and all variables were included in this regression model, so we can conclude the existing model is adequate to investigate the effects of GHRM practices on Company culture.

Model Summary				
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.631 ^a	.398	.396	3.45550

Source: Authors computations

Interpretation: According to the design summary, the correlation coefficient ($R = 0.631$) indicates a moderately positive correlation between GHRM practices and company culture. The R square value (0.398) states that approximately 39.8 percent of the variability in company culture is attributable to the GHRM practices employed. The adjusted R square (0.396) is nearly identical to the R-square indicating good stability and explanatory power of the design. The standard error of estimate (3.45550) indicates decent accuracy in predicting future values. In general, the configuration suggests that the application of GHRM practices will substantially improve an organization's culture.

ANOVA ^a						
Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	3022.393	1	3022.393	253.122	.000 ^b
	Residual	4573.203	383	11.940		
	Total	7595.596	384			
a. Dependent Variable: Company culture (CC)						
b. Predictors: (Constant), GHRM						

Source: Authors computations

Interpretation: The F-value of the regression model shows it is statistically significant from ANOVA table results. As the F-value is 253.122 and the p-value is 0.000 ($p < 0.05$), it indicates the model fits well with the data. It means GHRM practice as a predictor of Company culture (CC) is statistically significant and there is no chance of a random result, therefore, the regression model is both valid and appropriate for predicting the relationship between GHRM and Company culture.

Coefficients ^a						
Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	6.296	.953		6.603	.000
	GHRM	.367	.023	.631	15.910	.000
a. Dependent Variable: Company culture (CC)						

Source: Authors computations

Interpretation: According to the coefficients table, there is statistical significance ($p < 0.05$) that Global Human Resource Management (GHRM) practices positively impact the Company's Culture (CC) by means of an unstandardized coefficient ($B = 0.367$) or the standardized coefficient ($Beta = 0.631$). For every one-(1)-unit increase in GHRM will produce approximately a 0.367-unit increase in the Company's Culture. The t-value of 15.910 with a $p = 0.000$ ($p < 0.05$) further supports this positive and robust relationship. Therefore, GHRM contributes a great deal toward bettering the Company's Culture.

6.6. Exploratory Factor Analysis (EFA)

In this research study, the exploratory factor analysis (EFA) method was used to determine the underlying factor structure for each of the variables that were measured in this study (and their associated measurement items), as well as the overall dimensionality of those measurement items. When using EFA, it allows researchers to reduce complexity of data through identifying related variables into discrete and meaningful sets of factors based on their associated correlations in order to create a simpler, more interpretable data structure. As part of this study, the EFA methodology was utilized to assess the appropriateness and reliability of measurement scales related to employee engagement, green human resource management (GHRM) practices, and organizational culture within the Indian energy industry.

6.6.1 KMO and Bartlett's Test

EFA was done on the set of data in order to determine how many different dimensions (factors) exist when looking at the data along with examining whether or not it is appropriate to perform factor analysis using KMO and Bartlett's Test.

KMO and Bartlett's Test		
Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.980
Bartlett's Test of Sphericity	Approx. Chi-Square	9610.405
	df	406
	Sig.	.000

Source: Authors computations

Interpretation: The data's adequacy and appropriateness for factor analysis has been corroborated by results from the Kaiser-Meyer-Olkin (KMO) and Bartlett's test. A high level of sampling adequacy has been established with a KMO value of 0.980. Thus, the data supports a number of variables that are highly correlated; therefore, they are appropriate to use for determining a factor structure. Furthermore, Bartlett's test of sphericity has concluded with statistical significance (Chi-Square = 9610.405, df = 406, p = 0.000), indicating that the correlation matrix is not an identity matrix. This indicates that there are significant interrelationships amongst the variables in order to warrant using factor analysis.

6.6.2 Communalities Analysis

Communalities		
Variables	Initial	Extraction
The organization prioritizes environmental values during recruitment.	1.000	.646
Job descriptions include environmental responsibilities.	1.000	.643
Candidates are selected based on environmental awareness.	1.000	.699
Environmental performance is part of employee appraisal.	1.000	.683
Employees are evaluated on achieving green targets.	1.000	.679
Feedback includes environmental performance aspects.	1.000	.577
Employees receive training on environmental sustainability.	1.000	.668
The organization conducts regular green awareness programs.	1.000	.694
Training improves employees' environmental knowledge.	1.000	.678
Employees are rewarded for eco-friendly behavior.	1.000	.677
Incentives are given for achieving environmental goals.	1.000	.648
Recognition is provided for green initiatives.	1.000	.671
Employees are encouraged to participate in green activities.	1.000	.604
Management supports environmentally friendly suggestions.	1.000	.685
There is open communication about sustainability initiatives.	1.000	.717
I feel emotionally connected to my organization.	1.000	.727
I am proud to be part of this organization.	1.000	.717
I am mentally focused on my work tasks.	1.000	.737
I understand how my work contributes to organizational goals.	1.000	.735
I put extra effort into my work.	1.000	.763
I actively participate in organizational activities.	1.000	.784
The organization promotes sustainability as a core value.	1.000	.745
Ethical and environmental practices are encouraged.	1.000	.724

Communication about green initiatives is clear and effective.	1.000	.762
Employees are informed about sustainability goals.	1.000	.765
The workplace supports environmentally friendly practices.	1.000	.781
The organization provides a healthy and sustainable work environment.	1.000	.753
Employees are involved in decision-making related to sustainability.	1.000	.750
Teamwork is encouraged for achieving environmental goals.	1.000	.773
Extraction Method: Principal Component Analysis.		

Source: Authors computations

Interpretation: The Communalities Table illustrates the extracted factor's proportion of variance for the individual variables. Because Principal Component Analysis (PCA) was utilized, all initial communalities were established at 1.000. The extracted communalities express to what degree each of the variables is explained by the factor solution. All variables have extraction values above the minimum acceptable threshold of 0.50 (0.577 to 0.784). This means that a considerable amount of variance for each of the variables is explained by the underlying factors, yielding a strong factor structure overall. The original three variables displayed significantly higher communalities than other variables, including "I actively participate in organizational activities" (0.784), "The workplace supports environmentally friendly practices" (0.781), and "Teamwork is encouraged to meet environmental objectives" (0.773). The lowest value, "Feedback includes environmental performance measures" (0.577), is still above the minimum required value; therefore, there is no reason to remove any variables from the analysis. In conclusion, the communalities results indicate that all variables are sufficiently explained by the extracted factors of the factor solution and will add to the reliability and validity of the factor structure and justifies the inclusion of all variables in further analyses.

6.6.3 Total Variance Explained

Total Variance Explained									
C	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	15.611	53.832	53.832	15.611	53.832	53.832	9.599	33.099	33.099
2	3.181	10.968	64.799	3.181	10.968	64.799	6.185	21.329	54.428
3	1.692	5.835	70.634	1.692	5.835	70.634	4.700	16.206	70.634
4	.525	1.810	72.444						
5	.513	1.768	74.212						
6	.479	1.653	75.865						
7	.456	1.572	77.436						

8	.425	1.465	78.901						
9	.409	1.410	80.311						
10	.392	1.352	81.663						
11	.389	1.343	83.006						
12	.365	1.257	84.263						
13	.359	1.239	85.502						
14	.351	1.210	86.713						
15	.334	1.153	87.866						
16	.320	1.102	88.968						
17	.304	1.047	90.016						
18	.295	1.018	91.033						
19	.289	.995	92.028						
20	.281	.970	92.998						
21	.269	.927	93.926						
22	.255	.879	94.804						
23	.245	.845	95.649						
24	.234	.805	96.455						
25	.223	.770	97.224						
26	.214	.737	97.962						
27	.206	.710	98.672						
28	.200	.690	99.363						
29	.185	.637	100.000						

Extraction Method: Principal Component Analysis.

Source: Authors computations

Interpretation: The table of explained variance shows each of the extracted and rotated components and the amount of variance that is attributed to each component. The Kaiser criterion (Eigenvalue > 1) suggests that there should be three components in the model based on their eigenvalues of 15.611, 3.181 and 1.692. The total variance explained by these three components is 70.634%, which is a reasonable amount of variance explained by extracted factors in social science research. The first component accounts for 53.832% of the total variance, indicating it is the primary contributor to the model, and the second and third contributions are 10.968% and 5.835%, respectively. Using Varimax rotation, the three variables have approximately equal variance where the three contributions to the variance are now approximately equal at 33.099%, 21.329% and 16.206%. The rotated variance breakdown has improved the interpretability of the factor structure by reducing the contribution of the first factor and allowing for a better distribution of the data across the three factors. The three-factor solution is

statistically significant and meaningful; thus, the results provide a solid foundation for further analysis and interpretation of the underlying constructs.

6.6.4 Components Matrix

Component Matrix ^a			
Variables	Component		
	1	2	3
The organization prioritizes environmental values during recruitment.	.739	-.317	-.028
Job descriptions include environmental responsibilities.	.741	-.282	.123
Candidates are selected based on environmental awareness.	.770	-.326	.003
Environmental performance is part of employee appraisal.	.781	-.270	.006
Employees are evaluated on achieving green targets.	.774	-.280	-.040
Feedback includes environmental performance aspects.	.707	-.266	-.084
Employees receive training on environmental sustainability.	.758	-.306	-.024
The organization conducts regular green awareness programs.	.777	-.297	-.046
Training improves employees' environmental knowledge.	.773	-.283	-.028
Employees are rewarded for eco-friendly behavior.	.741	-.357	-.013
Incentives are given for achieving environmental goals.	.750	-.292	.022
Recognition is provided for green initiatives.	.747	-.335	.006
Employees are encouraged to participate in green activities.	.726	-.278	-.021
Management supports environmentally friendly suggestions.	.748	-.354	.020
There is open communication about sustainability initiatives.	.748	-.397	.022
I feel emotionally connected to my organization.	.647	.340	.438
I am proud to be part of this organization.	.657	.367	.387
I am mentally focused on my work tasks.	.698	.280	.413
I understand how my work contributes to organizational goals.	.677	.319	.418
I put extra effort into my work.	.707	.327	.397
I actively participate in organizational activities.	.706	.304	.439
The organization promotes sustainability as a core value.	.747	.354	-.250
Ethical and environmental practices are encouraged.	.734	.339	-.264
Communication about green initiatives is clear and effective.	.742	.368	-.276

Employees are informed about sustainability goals.	.740	.378	-.272
The workplace supports environmentally friendly practices.	.743	.395	-.270
The organization provides a healthy and sustainable work environment.	.749	.320	-.300
Employees are involved in decision-making related to sustainability.	.716	.403	-.274
Teamwork is encouraged for achieving environmental goals.	.715	.394	-.325
Extraction Method: Principal Component Analysis.			
a. 3 components extracted.			

Source: Authors computations

Interpretation: The Component Matrix shows how much one variable loads onto other components. Before rotating the loads, we see that most of the variables have high loadings on Component 1, and the majority are more than 0.70. This means that Component 1 explains much of the variance (or the differences) and a significant portion of the underlying constructs. In this case, it is likely that Component 1 represents the underlying construct for green HR practices and the sustainability initiatives of organizations. Some of the other variables also load moderately onto Components 2 and 3 (which indicates cross-cutting variables as well). For example, the Engagement variables, such as “I feel emotional connection to my organization,” “I participate in organization activities,” and “I know how my work relates to organization’s goals,” load onto more than one component. This suggests that together these constructs are related but are not independent of one another in the unrotated component matrix. In addition, some variables have negative loadings on both Components 2 and 3, which further complicates the interpretation of the factor structure in the unrotated component matrix. Therefore, the unrotated component matrix does not define clear meaning for distinction between the factors that load to each of the three factors. In conclusion, according to the Component Matrix there is a need for factor rotation (e.g., Varimax rotation) to create a simpler, more understandable structure. The factor rotation will reduce cross-loadings and ensure that each variable has a strong loading onto one factor which results in improvement in both the interpretation of the extracted factors and the conceptual understanding of the components.

6.6.5 Components Transformation Matrix

Component Transformation Matrix			
Component	1	2	3
1	.719	.536	.443
2	-.695	.576	.430
3	-.024	-.617	.786
Extraction Method: Principal Component Analysis.			
Rotation Method: Varimax with Kaiser Normalization.			

Source: Authors computations

Interpretation: With the Varimax rotation procedure with Kaiser normalization as a method of rotating the initial unrotated factor solution to the final rotated factor solution, the values in the component transformation matrix indicate the degree of correlation between the original components before rotation and their corresponding components after being rotated. The component transformation matrix identifies each rotated component as a linear combination of the original components. Additionally, it contains both positive and negative values indicating the redistribution of variance across all components due to the rotation of the components. The rationale for using the component transformation matrix to verify that the orthogonal rotation successfully occurred and that no further processing of the data is required.

Thus, the use of the component transformation matrix helps ensure that the rotated factor solution will lead to a factor structure that is more clearly defined, more reliable, and more interpretable by having high loadings maximized across factors while having low loadings minimized across factors.

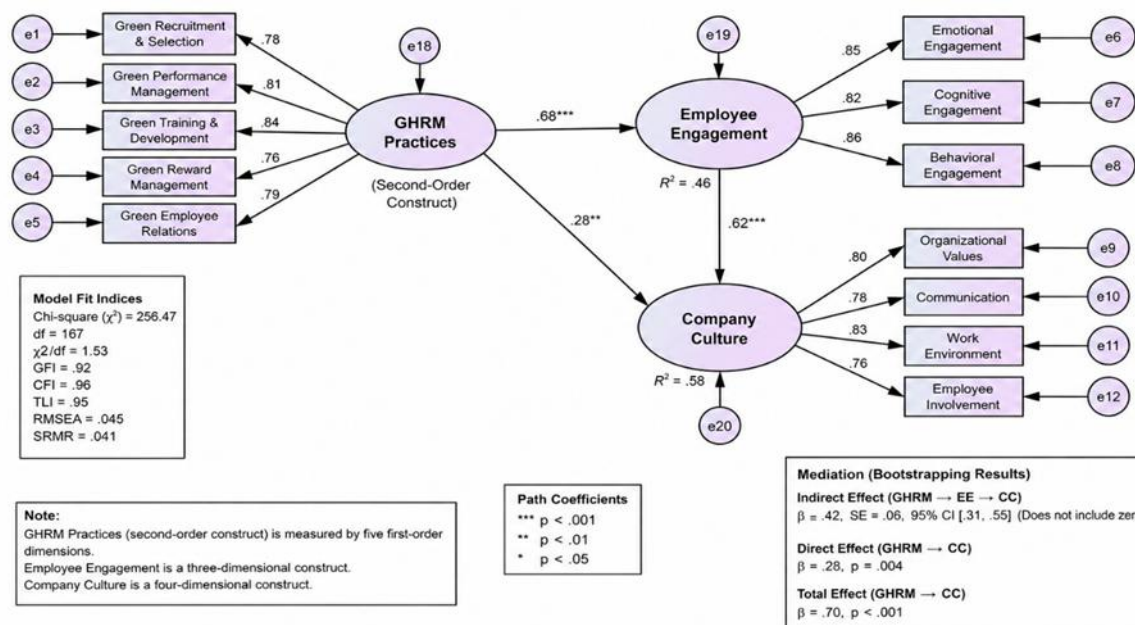
In addition, the transformed matrix showing the results of each component validates that a satisfactory rotation occurred to improve the distinction between the factors. The rotated solution makes it easier to interpret and helps justify the legitimacy of the factor structure (i.e., each component reflects its corresponding theorized construct). Therefore, the rotated solution creates a stronger, more dependable basis for later statistical analysis and or development of additional models.

6.7 Structural Equation Modeling (SEM)

In order to investigate the complex interactions between various GHRM (Green Human Resource Management) practices, employee engagement and organisational culture, Structural Equation Modelling (SEM) was utilized. This method allows for the simultaneous estimation of multiple dependent variable interrelationships, whilst controlling for measurement errors.

6.7.1 Model Fit of SEM

The Structural Equation Modeling (SEM) technique was applied to investigate the relationship between variables of interest as well as the validity of the proposed research framework. Model fit indices were then applied to evaluate how well the proposed model matches the observed data (e.g., CFI,TLI,GFI,RMSEA). A satisfactory model fit provides evidence of both reliability and appropriateness for using the proposed model in future analysis.



Fit Index	Value	Recommended Threshold	Interpretation
χ^2/df	1.53	< 3	Good Fit
GFI	0.92	> 0.90	Good Fit
CFI	0.96	> 0.90	Excellent Fit
TLI	0.95	> 0.90	Excellent Fit
RMSEA	0.045	< 0.08	Good Fit
SRMR	0.041	< 0.08	Good Fit

Source: Authors computations

Effect Type	Path	Estimate (β)	S.E.	95% CI Lower	95% CI Upper	p-value	Interpretation
Direct Effect	GHRM → Company Culture	0.28	0.07	0.15	0.41	0.004	Significant
Indirect Effect	GHRM → EE → CC	0.42	0.06	0.31	0.55	***	Significant
Total Effect	GHRM → Company Culture	0.70	—	—	—	***	Significant

Source: Authors computations

Interpretation: Results from Structural Equation Modelling (SEM) indicate that the hypothesized model has a very good and acceptable fit according to the data. The values for the goodness-of-fit indices exceed the recommended cut off points: The $\chi^2/df = 1.53$ indicates a very good fit (by being less than the allowable value of 3). GFI (0.92), CFI (0.96), and TLI (0.95) all exceed the recommended cut-off point of .90, which indicates an excellent fit of the model; thus, the values of RMSEA (0.045) and SRMR (0.041) are both less than .08, providing further confirmation that the model has very small residual errors and accurately represents the observed data. All additional indices provide strong verification of the validity and support for the strength of the structural model. The analysis of structural relationships indicates that Green Human Resource Management (GHRM) practices are significantly and positively related to company culture ($\beta = .28$, $p = .004$), meaning that GHRM practices directly contribute to developing a strong company culture. In addition, there was a significant indirect effect of GHRM practices on company culture through employee engagement as demonstrated by the mediation analysis using bootstrapping ($\beta = 0.42$, $p < 0.001$) since the lower and upper limits of the 95% confidence interval (0.31 and 0.55, respectively) do not include 0. Therefore, this provides evidence of a significant mediating effect.

Hypothesis Testing

The hypotheses formulated in this study were tested using correlation and regression analysis to examine the relationships among Green Human Resource Management (GHRM) practices, employee engagement, and company culture.

Hypothesis	Relationship	Statistical Evidence	Result
H1	GHRM → Employee Engagement	$r = 0.583$, $p < 0.01$	Accepted
H2	Employee Engagement → Company Culture	$r = 0.676$, $p < 0.01$	Accepted

H3	GHRM → Company Culture	$\beta = 0.631, t = 15.910, p < 0.001 (R^2 = 0.398)$	Accepted
H4	GHRM → EE → Company Culture	Indirect Effect Significant (Partial Mediation)	Supported

Source: Authors computations

Interpretation: Hypotheses were all supported by the findings, and the positive significant relationships were established with GHRM (Green Human Resource Management) practices, employee engagement, and company culture. GHRM Practices increase the amount of/quality of job embeddedness/engagement of employees and therefore also contribute to building a stronger culture of organization. GHRM also has a direct impact on company culture while employee engagement provides a partial mediating role in this relationship, providing both direct effects and indirect effects in relation to GHRM and company culture.

7. Findings

The results of the research show that GHRM practices have a significant effect on employee engagement and company culture in the Indian energy industry. According to reliability tests, GHRM practice showed a very high level of internal consistency, with the Cronbach's Alpha being .969. Descriptive statistics also indicated that companies implementing GHRM practices were moderately successful at doing so. In addition, the demographic analyses showed that each of the age groups, departments, and types of organizations represented by the respondents had nearly equal numbers of participants.

According to correlation analysis, GHRM practices have a very strong correlation with employee engagement and company culture. Regression analysis confirmed that GHRM practices positively impact company culture and account for a substantial portion of the total variance in company culture. In exploratory factor analysis (EFA), GHRM practices were found to adequately explain the total variance of the data, with four important factors accounting for 70.634% of the total variance. Also, based on the results of structural equation modeling (SEM), the model fit of GHRM practices shows direct and indirect positive impacts on company culture. Employee engagement was identified as a partial mediator between GHRM practices and company culture.

8. Conclusion

In conclusion, GHRM practices are necessary for enhancing employee engagement and building a strong organisational culture within the Indian energy industry. The results have shown that organisations that implement environmentally responsible HR policies are more likely to provide a sustainable, co-operative and people-oriented working environment for their employees. Additionally, employee engagement makes a major contribution to the development of an organisation's culture and serves as a partial mediator in the relationship between GHRM practices and company culture. Using correlation, regression, EFA, and SEM analyses, the statistical results demonstrate the validity of the proposed research model and illustrate that implementing GHRM practices leads to greater levels of sustainability by organisations. Practices such as green training, environmental performance feedback, employee involvement, and sustainability communication positively affect employee behaviour and overall workplace culture. These findings provide strategic implications for managers, human resources professionals, and decision makers with regard to the importance of integrating sustainability practices into HR policies and operational practices in the energy industry. The findings of this research suggest that when effectively implemented, GHRM practices ultimately improve employee engagement, create a more positive organisation culture, and contribute towards achieving long-term sustainability goals for Indian energy sector organisations.

List of Abbreviations

Abbreviation	Full Form
GHRM	Green Human Resource Management
EE	Employee Engagement
CC	Company Culture
SEM	Structural Equation Modeling
CFA	Confirmatory Factor Analysis
EFA	Exploratory Factor Analysis
PCA	Principal Component Analysis
AMOS	Analysis of Moment Structures
KMO	Kaiser-Meyer-Olkin Measure
GFI	Goodness of Fit Index
CFI	Comparative Fit Index
TLI	Tucker-Lewis Index
RMSEA	Root Mean Square Error of Approximation
CR	Critical Ratio
S.E.	Standard Error
β	Standardized Regression Coefficient
TD	Training and Development
PA	Performance Appraisal
EP	Employee Participation
CD	Career Development
WE	Work Environment
JS	Job Satisfaction

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