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EXPLORING THE ROLE OF SAUDI LEADERS IN INCREASING THEIR EMPLOYEES' AWARENESS OF GREEN MANAGEMENT PRACTICES AND THE CHALLENGES THEY FACE: A CASE STUDY OF SAUDI PUBLIC UNIVERSITIES

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ABSTRACT: This study seeks to investigate the role of Saudi leaders in promoting their employees' understanding of green management techniques in Saudi public universities, as well as the problems they encounter in doing so. This text explores the techniques and initiatives employed by these leaders to advance environmental sustainability, as well as the organisational and cultural obstacles that may hinder these endeavours. This study used a structured questionnaire consisting of closed-ended questions, which may be rated on a Likert scale to assess the level of agreement with specific claims. The findings of this study demonstrate that regression models applied to female, male, and general datasets show substantial impacts of employee awareness, engagement, and organisational factors in green management on leadership initiatives, with varying degrees of influence depending on gender. The findings of this study can be advantageous to decision-makers in Saudi institutions, researchers, and academics. Moreover, this work has the potential to serve as a novel point of reference in the realm of green management for future applications.

KEYWORDS: Saudi leaders, employees' awareness, green management, Saudi Public Universities

Introduction

Recently, there has been a noticeable increase in worldwide awareness regarding the importance of environmental sustainability. This has led to a sense of urgency for businesses and organisations to implement green management techniques. Saudi Arabia, as a prominent global producer of oil, encounters distinct obstacles in its journey towards achieving sustainability. This study explores the crucial role of Saudi leaders in promoting awareness of environmentally friendly management practices among their employees, specifically within the framework of Saudi public universities. It also examines the problems faced in this regard.

Saudi Arabia, possessing huge oil reserves, has traditionally heavily depended on oil production for economic development. Nevertheless, this reliance has led to the deterioration of the environment and increased susceptibility to changes in oil prices. In response to the urgent demand for sustainability, the Saudi government has undertaken steps to expand the economy and encourage environmental stewardship.

Green management methods involve a variety of strategies that focus on reducing environmental harm and increasing organisational effectiveness. These practices may encompass energy conservation, waste reduction, sustainable sourcing, and initiatives related to corporate social responsibility. Implementing such methods necessitates a fundamental change in the culture of the organization and a strong commitment from its executives.

Leadership is crucial in pushing organisational change towards sustainability. Within the framework of Saudi public universities, leaders, encompassing administrators and department heads, have substantial authority in moulding institutional policies and procedures. Their dedication to sustainability can accelerate endeavours to incorporate environmentally-friendly principles into university operations and curricula.

The awareness and engagement of employees are crucial for the success of green projects. Saudi leaders should give priority to activities aimed at educating and empowering their staff on the significance of sustainability and the individual's role in accomplishing organisational objectives. This may encompass educational initiatives, awareness drives, and providing incentives for adopting environmentally friendly practices.

Although there is a strong need for sustainability, Saudi authorities face numerous obstacles in their efforts to promote environmentally-friendly management methods. These challenges may encompass: Firstly, cultural factors can impede the implementation of green techniques due to traditional attitudes towards environmental conservation. Furthermore, the presence of limited resources and conflicting agendas can create obstacles when it comes to implementing sustainable programs. Furthermore, the intricate regulatory environment and bureaucratic procedures can hinder advancements in achieving sustainability objectives. Furthermore, technological barriers such as obsolete infrastructure and limited availability of state-of-the-art technology can impede the practicality of green solutions. Resistance to Change can be a significant obstacle when trying to execute revolutionary changes since it may be fueled by entrenched interests and organisational inertia.

Saudi public colleges act as small-scale representations of the wider socioeconomic environment, showcasing both the obstacles and possibilities in advancing sustainability. Through analysing the experiences of these organisations, valuable insights can be obtained regarding the techniques utilised by Saudi leaders to overcome obstacles and promote a culture of environmental accountability.

The involvement of Saudi elites in advocating for green management techniques in public institutions is essential for the advancement of sustainability objectives in the Kingdom. Saudi Arabia can achieve a more ecologically conscious and resilient future by effectively tackling obstacles and utilising leadership influence. This study seeks to enhance the discussion on sustainability leadership within the Saudi context and offer practical ideas for organisational leaders who are committed to achieving a more environmentally friendly future.

The implementation of environmentally sustainable management methods in Saudi public universities encounters several obstacles that impede its advancement. The hurdles arise from a range of reasons such as cultural norms, resource constraints, legislative intricacies, and technological obstacles. Gaining a comprehensive understanding of these difficulties is crucial for developing efficient solutions to enhance sustainability within these organisations. Furthermore, it is essential to

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investigate the involvement of Saudi leaders in tackling these difficulties and promoting employee consciousness in order to facilitate significant transformation.

The importance of this study lies in its examination of the impact of Saudi leaders on promoting green management practices and employee awareness in public institutions. This research is essential for the progress of sustainability, the enhancement of organisational effectiveness, and the provision of valuable insights for policy-making. It provides globally applicable knowledge, promoting environmental responsibility and innovation in education and other areas.

The study seeks to examine the influence of Saudi leaders in advancing environmentally sustainable management practices and enhancing employee consciousness inside public universities. The objective is to identify the difficulties encountered by leaders and evaluate their consequences, offering valuable knowledge to improve sustainability initiatives, organisational efficiency, and policy development.

The content of this article is organised into five primary sections: The first is the introduction. Furthermore, the text discusses the literature review and the development of hypotheses. Furthermore, the Methodology. Furthermore, the subsequent section will present results, discuss the outcomes and engage in a comprehensive analysis. Finally, the conclusion.

Literature review and hypotheses development

Literature Review

Leadership is crucial in implementing and promoting environmentally sustainable management practices. The study conducted by Ali and Hassan (2023) showed that ethical leadership enhances the association between trust and the propensity to engage in environmentally friendly behaviour among firms operating in the tourism industry. By using green human resource management (GHRM) practices and becoming ethical leaders, firms can promote sustainability. This can be achieved by creating a work environment that encourages people to engage in sustainable activities (Chreif & Farmanesh, 2022). The practices of GHRM (Green Human Resource Management), responsible leadership, and green innovation are positively correlated with sustainable firm performance. Pro-environmental conduct partially mediates this association (Liu et al., 2023). Effective implementation of sustainable management and leadership techniques is essential for improving corporate performance since they have a significant impact on an organisation's processes, activities, and functions (Sarfraz & Ivascu, 2023). Green human resource practices, green innovation practices, and green transformational leadership are factors that enhance environmental performance in enterprises, especially in emerging nations (Wiredu et al., 2023).

Administrative leadership is crucial in fostering environmentally sustainable management practices within firms. Research has indicated that both leadership and management assistance have a beneficial impact on the development of environmentally friendly innovations (Idrees et al., 2023). Research conducted by Ali and Hassan (2023) has revealed that ethical leadership plays a crucial role in enhancing the connection between trust and the intention to engage in environmentally friendly behaviour within the tourism industry. Moreover, research conducted by Javaid et al. (2023) has revealed that leader-green behaviour is favourably influenced by followership qualities such as active involvement and autonomous critical thinking. Moreover, research conducted by Zhang et al. (2023) has revealed that the implementation of green human resource management systems and the adoption of pro-environmental attitudes by leaders have a beneficial impact on employees' voluntary engagement in environmentally friendly actions. Recent research by Priyadarshini et al. (2023) has demonstrated that green transformational leadership is effective in encouraging corporate environmental citizenship behaviour. This is achieved through variables such as green empowerment, resource dedication, and environmental enthusiasm, which play significant roles in promoting such behaviour.

Public colleges in Saudi Arabia play a vital role in enhancing employees' understanding of green management techniques and tackling the issues they encounter. According to the viewpoint of faculty members, Saudi universities have achieved sustainability to different extents. They have received high to moderate ratings in areas such as academic sustainability, community partnership, resource management, planning and administration, and innovation and leadership (Katsamakas, 2024). Nev-

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ertheless, there is a requirement for additional enhancement and advocacy of sustainability in these colleges. The study highlights the significance of prominent and forward-thinking leaders who can effectively oversee and enable the implementation of sustainable practices in higher education institutions, hence assuring the attainment of targeted objectives and outcomes (Sharabi et al., 2023). Furthermore, the research emphasises the importance of implementing regulatory measures, fostering collaborations between the public and private sectors, and enhancing the technological capabilities of firms to promote the wider acceptance and implementation of sustainable practices (Asfahani, 2023). The findings of the Alenezi et al. (2024) study demonstrate that administrative leadership at Northern Border University has a significant influence on green management. The impact of gender on leadership differs, as male leaders tend to struggle with adopting strategic management, while female leaders could benefit from enhancing their skills in effective communication. Furthermore, the Leader's academic credentials have a beneficial impact on the implementation of environmentally friendly management methods.

Hypotheses Development

In this section, we explore the theories on how Saudi leaders influence the adoption of green management practices in universities, which will be studied empirically.

Theory 1. Cultural factors play a role in implementing green management practices in Saudi public universities.

- The null hypothesis (H0) suggests that there is no link between cultural aspects and the use of green management strategies.
- The alternative hypothesis (H1) argues that cultural influences play a role in embracing green management approaches.

Theory 2. Limitations in resources pose a challenge to executing initiatives in Saudi public universities.

- The null hypothesis (H0) proposes that resource constraints do not have an impact on project implementation.
- The alternative hypothesis (H1) contends that resource limitations present a barrier to carrying out programs.

Theory 3. The complexity of frameworks hinders the progress of green management practices at public universities in Saudi Arabia.

- The null hypothesis (H0) states that regulatory complexity does not significantly affect the progress of green management methods.
- Alternative theory (H1) suggests that the complexity of the environment significantly hinders the implementation of management practices.

Hypothesis 4. The feasibility of solutions in public universities faces challenges due to technological obstacles.

- The null hypothesis (H0) argues that technological limitations do not greatly affect the feasibility of solutions.
- On the hand, the alternative hypothesis (H1) suggests that technological barriers play a role in limiting green solution practicality.

Hypothesis 5. A positive relationship exists between leadership dedication and employee understanding of green management strategies in universities.

- The null hypothesis (H0) posits no correlation between leadership commitment and employee awareness.
- Contrarily the alternative hypothesis (H1) proposes a link between leadership dedication and staff knowledge of green management strategies.

These hypotheses form assertions guiding research on challenges faced by leaders in promoting green-friendly management practices and their impact on employee awareness in Saudi public universities.

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Methodology

Model and Variables

The objective of this statistical model is to evaluate the relationship between leadership initiatives and employees' awareness and engagement with green management practices in Saudi public universities.

Variables

Independent Variable: Leadership Initiatives

Measured through survey questions about various initiatives implemented by university leaders (e.g., sustainability programs, training, partnerships, etc.).

Dependent Variables: Employee Awareness and Employee Engagement

Awareness can be measured through survey questions assessing employees' knowledge of green practices.

Engagement can be measured by surveying participation in green initiatives, behaviour changes, or involvement in sustainability-related activities.

Control Variables: Organizational Factors

Include factors such as university size, available resources, cultural attitudes, etc.

In all this article The Dependent Variable: Leadership Initiatives (LI). And independent Variables: Employee Awareness (EA), Employee Engagement (EE) and Organizational Factors (OF).

MODEL

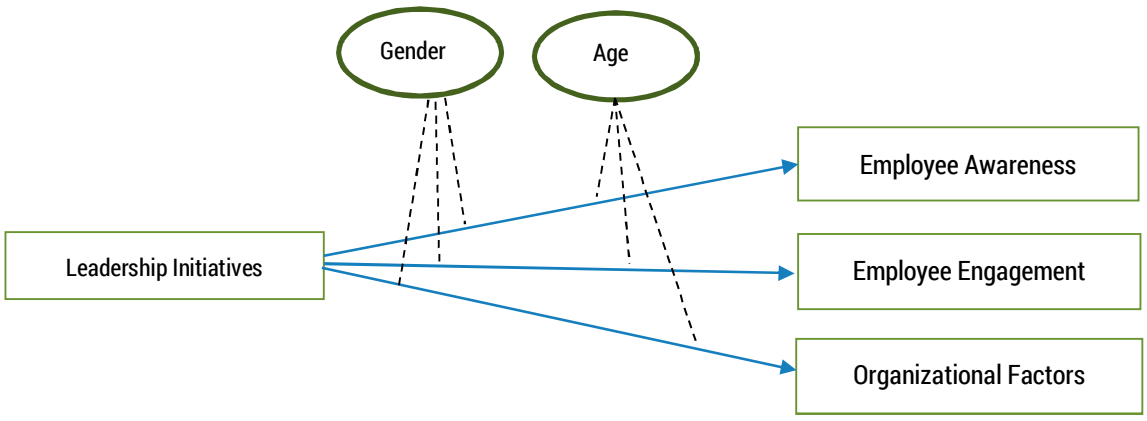

Figure 1. Model of Study

Data Collection

Sample: Faculty members, administrative staff, and university leaders from Saudi public universities. The survey was disseminated to a cohort of Saudi University administrators occupying managerial roles. Data was gathered from a sample of 150 individuals in leadership positions. The outcomes are presented in Table 1.

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Table 1. Data Sample

Characteristic	Number	Percentage
Gender		
Male	82	54.67
Female	68	45.33
Age		
25-30	7	4,67
31-35	15	10
36-40	29	19.33
41-45	57	38
46-50	27	18
< 50	15	10
Qualification		
Doctorate	114	76
Magister	23	15.33
Bachelor	9	6
Other	4	2,67
Administrative Position		
Vice president of University	11	7.33
Dean	20	13,33
Vice Dean	30	20
Head of the Department	64	42.67
Other	25	16.67

The sample in Table 1 exhibits a slight bias towards males, who make up 54.67% of the total. The age distribution is heterogeneous, with the majority falling between the age range of 41-45, followed by 36-40. The majority of the sample have a PhD level educational status (76%). Regarding administrative roles, the most prevalent position is "Head of the Department," accounting for 42.67% of the sample. This is followed by "Vice Dean" and "Dean."

This data offers a comprehensive summary of the demographics and attributes of the sample population. Comprehending the makeup of the sample is vital for understanding study findings and formulating conclusions. Researchers must acknowledge any biases or limits that exist within the sample and carefully evaluate how these factors may affect the capacity to apply their findings to a broader population.

Method: Use a structured questionnaire with both closed-ended and open-ended questions. Closed-ended questions can be on a Likert scale to measure agreement with specific statements, while open-ended questions can explore perceptions and experiences in more detail.

Statistical Analysis

Descriptive Statistics: Provide an overview of the data, including means, standard deviations, and frequency distributions.

Table 2 indicates that the Leader Gender variable is distributed evenly, suggesting a nearly equal presence of the two groups. The indicators for Employee Awareness, Employee Engagement, Organizational Factors, and Leadership Initiatives all fall near or above the midpoint (3) on the scale, suggesting a general inclination towards higher values. This implies that there may be favourable results or patterns associated with the variables in question. The variable "Organizational Factors" exhibits the highest standard deviation, suggesting a greater degree of diversity or dispersion in the values.

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Conversely, the variable "Leadership Initiatives" displays the lowest standard deviation, indicating a more uniform distribution.

Table 2. Descriptive Statistics

	Minimum	Maximum	Mean	Std. Deviation
Leader gender	0.00	1.00	0.5467	0.49949
EA	1.00	5.00	3.9400	0.99650
EE	1.00	5.00	3.9767	1.06868
OF	1.00	5.00	3.8567	1.08890
LI	1.00	5.00	3.8600	0.95383
N	150			

Source: authors' work based on IBM SPSS Statistics.

Table 3. Reliability Statistics

	Value
Cronbach's Alpha	0.737
N of Items	5
N of Sample	150

Items: Gender, Leadership Initiatives (LI), Employee Awareness (EA), Employee Engagement (EE) and Organizational Factors (OF).
Source: authors' work based on IBM SPSS Statistics.

In Table 3 the Cronbach's Alpha coefficient of 0.737 suggests that the items on the scale (Gender, LI, EA, EE, OF) exhibit a moderate to high level of internal consistency. These findings indicate that these items effectively assess interconnected components of the same fundamental concept.

Based on a sample size of 150 and 5 items, the reliability estimate seems to be quite consistent and dependable. The high level of reliability suggests that the scale is appropriate for assessing the intended concept among the individuals in the sample population. However, it is crucial to interpret the findings in light of the specific study goals and characteristics of the population.

The reliability data indicate that the scale utilised to assess Gender, Leadership Initiatives, Employee Awareness, Employee Engagement, and Organizational Factors demonstrates satisfactory internal consistency. This is evidenced by Cronbach's Alpha surpassing the usual criterion of 0.7. This suggests that the items in the scale have a strong correlation with each other and can be considered dependable for evaluating the desired characteristics among the sample population of 150 individuals. Researchers can rely on this scale to assess the specific concept in future studies, although they should also take into account supplementary evidence of validity and use caution when interpreting results, particularly when generalising findings to other populations or contexts.

Correlation Analysis: Determine relationships between leadership initiatives and both employee awareness and engagement.

The correlations matrix in Table 4 demonstrates robust positive associations between certain pairs of variables, particularly between Employee Awareness and Employee Engagement, suggesting a tendency for these two variables to co-vary. The correlations between the gender of the leader and other factors are relatively weak and negative, indicating minor or inconsequential associations. It is important to bear in mind that correlation does not necessarily indicate causality. Therefore, these findings must be understood in the wider context of the dataset and its underlying hypotheses or research inquiries.

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Table 4. Correlations Matrix

	Leader gender	EA	EE	OF	LI
Leader gender	1				
EA	-0.122	1			
EE	-0.139	0.890**	1		
OF	-0.058	0.297**	0.232**	1	
LI	-0.028	0.688**	0.678**	0.493**	1

** Correlation is significant at the 0.01 level.
Source: authors' work based on IBM SPSS Statistics.

Results and discussion

Regression Analysis

Analyse the impact of leadership initiatives on employee awareness and engagement, controlling for other variables like university size and available resources.

Table 5. Summary of Models

Model	Model 01 (Global)	Model 02 (Female)	Model 03 (Male)
R	0.770 *	0.802 *	0.774 *
R Square	0.593	0.644	0.599
Adjusted R Square	0.584	0.627	0.583
Std. Error of the Estimate	0.614	0.516	0.671

* Predictors: (Constant), OF, EE, EA.
Source: authors' work based on IBM SPSS Statistics.

Table 5 is used to analyse the regression, which is divided into three parts. Firstly, let's discuss the topic in a broad sense. Secondly, the focus of the analysis will be on the regression of female administrative leadership. Finally, a regression analysis was conducted to examine the relationship between male gender and administrative leadership.

Regression analysis is a statistical method used to examine the relationship between variables

The elevated R and R^2 values indicate a robust linear correlation between the predictors (OF, EE, EA) and the dependent variable. The predictors account for approximately 59.3% of the variance in the dependent variable. The Adjusted R^2, which is somewhat lower than R^2, demonstrates the model's resilience even after considering the number of predictors, hence strengthening the notion of a well-fitting model. The Standard Error of the Estimate is within a satisfactory range, suggesting forecasts that are reasonably precise. In general, the model appears to be strong and has a high level of explanatory capacity, indicating that the chosen predictors (OF, EE, EA) have significant relevance in explaining the fluctuations in the dependent variable. Nevertheless, it is important to note that these metrics do not establish a cause-and-effect relationship. To gain a more thorough knowledge of the model's performance, it is advisable to conduct additional analysis, such as reviewing residuals and performing validation tests.

Regression analysis conducted on female leaders

The model summary indicates that the predictors (OF, EE, EA) account for a substantial amount of the variability in the dependent variable when the leader is female. This suggests that these predictors hold significance and relevance within this particular environment. The model's strong Adjusted

R^2 and low Standard Error of the Estimate indicate its robustness and accuracy, suggesting that the predictions are reliable and exact. Nevertheless, like any statistical analysis, it is crucial to take into account the wider context, verify that the fundamental assumptions of the regression model are satisfied, and do further validation or diagnostic checks to verify the findings. Moreover, it is essential to bear in mind that correlation does not indicate causation and additional investigation may be necessary to establish causal connections.

Regression analysis was conducted on male leaders

Revealing a robust association between the predictors (OF, EE, EA) and the dependent variable. The high R^2 value indicates that the model effectively explains a significant amount of the variance. However, when comparing to female leaders, the marginally reduced R^2 and Adjusted R^2, coupled with an elevated Standard Error of the Estimate, indicate a model that is somewhat less robust and accurate. These disparities may indicate fundamental discrepancies in how the predictors influence the dependent variable depending on gender. It is important to exercise caution when interpreting these data. To make more meaningful conclusions, additional analysis, validation, and context are required. The presence of correlation does not necessarily indicate causation and a comprehensive understanding of the relationships under investigation may necessitate the utilisation of supplementary statistical or qualitative methodologies.

Table 6. Regression of Models

Model 01: Global					
Variables		**C**	**EA**	**EE**	**OF**
Unstandardized Coefficients	B	0.450	0.253	0.327	0.288
	Std. Error	0.243	0.113	0.104	0.049
Standardized Coefficients	Beta	-	0.265	0.366	0.329
t		1.857	2.234	3.145	5.935
Sig.		0.065	0.027	0.002	0.000
Model 02: Female					
Variables		**C**	**EA**	**EE**	**OF**
Unstandardized Coefficients	B	0.592	-0.117	0.623	0.304
	Std. Error	0.319	0.178	0.151	0.075
Standardized Coefficients	Beta		-0.120	0.682	0.380
t		0.573	1.854	-0.656	4.118
Sig.		0.568	0.068	0.514	0.000
Model 03: Male					
Variables		**C**	**EA**	**EE**	**OF**
Unstandardized Coefficients	B	0.203	0.441	0.183	0.326
	Std. Error	0.354	0.151	0.141	0.067
Standardized Coefficients	Beta	-	0.460	0.205	0.351
t		0.573	2.924	1.305	4.854
Sig.		0.568	0.005	0.196	0.000

Dependent Variable: Leadership Initiatives (LI). Independent Variables: Employee Awareness (EA), Employee Engagement (EE) and Organizational Factors (OF).

Source: authors' work based on IBM SPSS Statistics.

Model 01 in global: The intercept corresponds to the predicted value of LI when all predictor variables (EA, EE, OF) are equal to zero. This scenario indicates that even without EA, EE, and OF, LI is anticipated to possess a value of 0.45.

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$$LI_i = 0.45 + 0.253 \cdot EA_i + 0.327 \cdot EE_i + 0.288 \cdot OF_i \quad (1)$$
$$(0.065) \quad (0.027) \quad (0.002) \quad (0.000)$$

Each additional unit of EA is associated with a predicted increase of 0.253 units in LI, while keeping all other predictors constant. With each incremental rise of one unit in EE, LI is anticipated to grow by 0.327 units while keeping all other predictors the same. With each incremental rise of one unit in OF, there is an anticipated increase of 0.288 units in LI, while keeping all other predictors constant.

The equation indicates that there is a positive correlation between all three predictors (EA, EE, OF) and LI. This indicates that greater values of EA, EE, and OF are correlated with higher values of LI. The coefficients indicate the magnitude and orientation of these associations. The coefficient of EE is the biggest, indicating that it has the most significant impact on LI compared to the other two predictors. The standard errors are relatively low, suggesting a high degree of precision in the coefficient estimations. This enhances confidence in the trustworthiness of the regression model.

The regression equation offers valuable insights into the correlation between employee awareness, engagement, organisational characteristics, and leadership activities within the specific environment examined. It can be utilised to forecast leadership initiatives by analysing the values of the predictor factors. Nevertheless, it is crucial to bear in mind that correlation does not establish causation, and additional investigation and examination are required to validate the connections proposed by the regression model. Furthermore, it is important to evaluate the assumptions of the model in order to verify its validity and reliability.

Model 02 for Female: The intercept denotes the anticipated value of Leadership Initiatives (LI) when all predictor variables (EA, EE, OF) have a value of zero. This scenario indicates that even without the presence of EA, EE, and OF, LI is anticipated to have a value of 0.592.

$$LI_i = 0.592 - 0.117 \cdot EA_i + 0.623 \cdot EE_i + 0.304 \cdot OF_i \quad (2)$$
$$(0.568) \quad (0.068) \quad (0.514) \quad (0.000)$$

Each time EA increases by one unit, LI is predicted to drop by 0.117 units while keeping all other predictors constant. Each additional unit rise in EE is associated with a 0.623 – unit increase in LI, while keeping other predictors constant. With each incremental rise of one unit in OF, LI is anticipated to grow by 0.304 units while keeping all other predictors the same.

The equation indicates that Employee Engagement (EE) has the highest level of influence on Leadership Initiatives (LI) compared to the other two predictors. The coefficient for this influence is 0.623, which is positive. This indicates that increased levels of energy expenditure are linked to increased levels of metabolic activity. The coefficient for Employee Awareness (EA) is -0.117, indicating that as EA increases, there is a corresponding decrease in levels of LI, while keeping other variables constant. Organisational Factors (OF) have a favourable impact on LI, as indicated by a coefficient of 0.304.

This regression equation offers valuable insights into the correlation between employee awareness, engagement, organisational factors, and leadership initiatives within the specific setting under study. The coefficients provide a quantitative measure of the magnitude and direction of these associations, assisting in the comprehension of how variations in predictor factors affect LI. Nevertheless, like any regression study, it is essential to take into account the constraints, such as the possibility of omitted variable bias, multicollinearity, and the assumption of linearity. Additional investigation and verification are required to establish the strength and applicability of the results obtained from this regression model.

Model 03 for Male: The intercept denotes the anticipated value of Leadership Initiatives (LI) when all predictor variables (EA, EE, OF) have a value of zero. This scenario indicates that even without the presence of EA, EE, and OF, LI is anticipated to have a value of 0.203.

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$$LI_i = 0.203 + 0.441 \cdot EA_i + 0.183 \cdot EE_i + 0.326 \cdot OF_i \quad (3)$$
$$(0.568) \quad (0.005) \quad (0.196) \quad (0.000)$$

Each time EA increases by one unit, LI is anticipated to grow by 0.441 units while keeping all other predictors constant.

Each additional unit increase in EE is associated with a 0.183 unit rise in LI, while keeping all other predictors constant. With each incremental rise of one unit in OF, LI is anticipated to grow by 0.326 units while keeping all other predictors constant.

The equation indicates that the three predictors (EA, EE, OF) have a favourable impact on Leadership Initiatives (LI). The predictor variable "Employee Awareness (EA)" has the highest coefficient of 0.441, indicating that it has the most substantial influence on the dependent variable "LI" compared to the other two predictors. The coefficient for Employee Engagement (EE) is 0.183, indicating a comparatively weaker impact on LI when compared to EA. Organizational Factors (OF) have a favorable impact on LI, with a coefficient of 0.326, which is consistent with Zam et al. (2021).

This regression equation offers valuable insights into the correlation between employee awareness, engagement, organisational factors, and leadership initiatives within the specific setting under study. The coefficients serve to quantify the magnitude and orientation of these associations, offering useful insights into the impact of changes in predictor factors on LI. The small standard errors indicate a high degree of accuracy in the coefficient estimations, which enhances trust in the dependability of the regression model. Nevertheless, like in any regression analysis, it is crucial to take into account possible limits and assumptions, including multicollinearity and the assumption of linearity. Additional investigation and verification are required to establish the strength and applicability of the results obtained from this regression model.

Analysis of Variance (ANOVA Test): Assess differences in awareness and engagement across different groups or conditions.

Table 7. Analysis of Variance: ANOVA Test

Model 01 (Global)	Regression	Residual	Total
Sum of Squares	80.344	55.216	135.560
df	3	146	149
Mean Square	26.781	0.378	-
F	70.815	-	-
Sig.	0.000b	-	-
Model 02 (Female)	**Regression**	**Residual**	**Total**
Sum of Squares	30.842	17.081	47.923
df	3	64	67
Mean Square	10.281	0.267	-
F	38.521	-	-
Sig.	0.000c	-	-
Model 3 (Male)	**Regression**	**Residual**	**Total**
Sum of Squares	52.403	35.125	87.527
df	3	78	81
Mean Square	17.468	0.450	-
F	38.789	-	-
Sig.	0.000c	-	-

Source: authors' work based on IBM SPSS Statistics.

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Table 7 displays the results of the Analysis of Variance (ANOVA) tests for three distinct models: Model 01 (Global), Model 02 (Female), and Model 03 (Male). Below is a comprehensive study of each model.

Global Model 01

Regression: The regression model has a sum of squares of 80.344, which represents the amount of variability that is accounted for by the regression model. The residual sum of squares, which represents the unexplained variability, is 55.216. The entire: The entire sum of squares is 135.560, which signifies the complete range of variability observed in the dependent variable. The regression model has 3 degrees of freedom, while the residuals have 146 degrees of freedom. The mean square is obtained by dividing the sum of squares by the degrees of freedom. The regression has a mean square of 26.781, while the residuals have a mean square of 0.378. F-value: The F-value, calculated as the ratio of the mean square of regression to the mean square of residuals, is 70.815. The p-value of the regression model is 0.000, which indicates that the model is statistically significant at the chosen significance level of 0.05.

Female Model 02:

This model is designed primarily to target female participants.

The ANOVA findings for regression, residuals, total sum of squares, degrees of freedom, mean square, F-value, and significance level are presented in a similar manner. The regression model demonstrates statistical significance for female participants (Sig. = 0.000), indicating that the predictors effectively account for the variability in the dependent variable among females.

Model 03 (Male):

This model is designed exclusively for male participants.

The ANOVA findings for regression, residuals, total sum of squares, degrees of freedom, mean square, F-value, and significance level are presented in a similar manner. The regression model is statistically significant for male participants (Sig. = 0.000), suggesting that the predictors effectively account for the variation in the dependent variable among males.

The ANOVA tests demonstrate that all three models include statistically significant regression models, suggesting that the predictors (variables) incorporated in the models account for a substantial proportion of the variability in the dependent variable. The F-values exhibit a considerable magnitude across all models, suggesting a robust association between the predictors and the dependent variable.

Conclusions

This case study highlights the crucial role of Saudi executives in Public Universities in promoting knowledge of green management practices among employees. The data analysis uncovers numerous significant discoveries that provide vital insights into the present situation and difficulties encountered by leaders in this environment. The study highlights the importance of Saudi leaders in spearheading efforts to increase employees' understanding of environmentally friendly management practices. Their guidance and strategic guidance are crucial in building the culture of the firm and advancing sustainability initiatives (Ejibe et al., 2024).

Although leadership is crucial, the report highlights various obstacles faced by Saudi leaders in their pursuit. These challenges encompass, Firstly, the prevalence of male leaders in Saudi Public Universities, which underscores the possibility of gender imbalances in leadership positions. Additionally, it is important to note that many leaders own doctoral degrees. However, it is crucial to prioritise varied representation and utilise the knowledge and skills from various educational backgrounds. Finally, the presence of leaders in administrative roles, such as the Head of the Department, highlights the necessity for wider leadership involvement and the distribution of tasks (Bryant & Walker, 2024).

Recognising the crucial role of leaders, it is essential for Saudi Public Universities to offer specific assistance and resources to empower leaders in spearheading sustainability initiatives. Efforts

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should be prioritised to encourage gender diversity in leadership roles and offer leadership development opportunities across different educational backgrounds and administrative positions. Collaborative platforms and knowledge-sharing networks can enhance the sharing of best practices and lessons learned among leaders, promoting a culture of ongoing development and innovation.

In particular, future studies should focus on investigating the unique tactics utilised by Saudi leaders to advance green management practices and overcome obstacles. Longitudinal studies have the potential to monitor the development of leadership practices and their influence on the long-term sustainability performance of an organisation (Boeve-de Pauw et al., 2022). Comparative analyses conducted across various industries and geographies can offer important insights into the contextual elements that influence leadership approaches and sustainability outcomes.

To summarise, this study emphasises the crucial role of Saudi leaders in promoting sustainability initiatives in Public Universities and emphasizes the need to overcome hurdles in order to cultivate a culture of environmental responsibility and organisational excellence.

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The contribution of the authors

Conceptual framework development, H.A. and S.E.; the comprehensive review of pertinent literature, H.A.; the methodological approach, H.A.; formal analytical procedures, H.A. and S.E.; the writing of the manuscript, H.A. and S.E.; the conclusions and discussion, H.A. and S.E.

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