

Green HRM Practices and Sustainable Work Environment among Higher Educational Institutions of Saudi Arabia. Role of Knowledge Sharing and Life-long Learning

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In Saudi Arabia's educational institutions, concern for the environment has grown. To this end, the government and regulatory authorities of Saudi Arabia are exerting constant efforts to achieve sustainable development objectives in the country's academic sectors. KS and LLE have been included as significant mediators in this study. Using a quantitative research design, the present study investigates the developed hypothesis and its degree of significance. After data cleansing and screening, 350 response papers were finalized for data analysis and distributed to the target audience. Various tests have been conducted using SPSS and AMOS to corroborate data normality, sample sufficiency, validity, and model fitness. Using structural equation modeling, the hypothesis was evaluated. A significant correlation was discovered between Green HRM practices and a sustainable work environment. The mediation of LLE between GHRM and SOE has proven significant, whereas the mediation of KS has proven insignificant. The study provides theoretical and practical insights, as it is a valuable contribution to the growing body of literature and helps education institutes in Saudi Arabia integrate green HRM practices to become SOE.

Key words: Sustainable work environment, Lifelong learning, knowledge sharing, green HRM practice.

1. INTRODUCTION

In terms of operations, processes, manufacturing, supply chain, etc., organizations are increasingly adopting sustainable practices to ensure a sustainable future for themselves (Ahmad et al., 2019; Buallay, 2020; Alnien & Pereira, 2021). Higher education institutions have also shifted their attention to promoting sustainable work environments that incorporate green human resource management practices into daily activities (Mehling & Kolleck, 2019; Mian et al., 2020). The trend of sustainable practices in higher education institutions focuses primarily on promoting SOEs and green HRM practices (Aboramadan, 2022; Anwar et al., 2020; Gilal et al., 2019; Anwar et al., 2022). Incorporating these concepts remains limited in Saudi Arabia's higher education institutions (Alkhayyal et al., 2019; Almulhim & Cobbinah, 2022; Singh et al., 2022; Alkhayyal et al., 2019).

These institutions face numerous obstacles in adopting sustainability practices and GHRM. One of the greatest obstacles is the absence of knowledge sharing. KS is essential for promoting sustainable practices in organizations (Ahmad & Karim, 2019; Quarchioni et al., 2022). Moreover, the active promotion of GHRM and sustainability practices are also supported by activities that develop lifelong learning skills in the teaching staff (Anthony et al., 2020; Cropley & Knapper, 2021; Tchamyu, 2020). As the pandemic has made clear, the future will require instructors and students who can adapt to dynamic challenges. Therefore, these skills must be developed immediately. However, Saudi Arabian organizations lack KS and continuous learning processes,

a significant barrier to adopting GHRM and sustainable practices within these organizations.

Saudi Arabian organizations lack the technological resources required for the efficient and effective implementation of sustainable practices (AlMamary et al., 2022; Alasmari & Zhang, 2019; Allmnakrah & Evers, 2020). Consequently, despite the research emphasis on GHRM practices, there is a paucity of implementation and investment for expanding SOEs in higher education institutions across the nation. These obstacles undermine the practical and theoretical requirements for GHRM in education uncovered by recent research. GHRM is essential for the advancement of an SOE because it promotes the incorporation of environmental considerations into HR functions (Benevene & Buonomo, 2020; Muhammad Ali & Nisar, 202). In Saudi Arabia, the government is committed to achieving sustainability goals (Bataeineh & Aga, 2022; Mitchell & Alfuraih, 2018; Yusuf, 2017), and the adoption of GHRM is the first step that can assist higher education institutions in enhancing KS and lifelong learning, which are significant factors in the improvement of an SOE (Mahdy et al., 2023; Prodanova & Kocarev, 2022). The purpose of the current study is to investigate the influence of knowledge-sharing and lifelong learning practices on the impact of GHRM on an SOE. This objective is translated into the subsequent objectives.

- lackTo explore the impact of GHRM on an SOE in higher education institutes in Saudi Arabia

- To examine the mediation effect of KS between GHRM and SOE in higher education institutes in Saudi Arabia
- To examine the mediation effect of Lifelong learning practices between GHRM and SOE in higher education institutes in Saudi Arabia

The research conducted and presented in this article sheds light on how GHRM can facilitate an SOE. In addition, researchers, industrialists, academics, and managerial stakeholders will be better equipped to use green human resource management practices to enhance KS and continuous learning in higher education institutions. This paper will make significant contributions and explain the significance of sustainability practices in Saudi Arabian higher education institutions. The remainder of this paper will include a literature review, an explanation of the methodology for data analysis, the presentation and discussion of findings, and the study's implications, limitations, and recommendations for future research.

2. REVIEW OF LITERATURE

2.1 Theoretical Background

(Gilal et al., 2019) Climate change is a severe issue facing humanity today and is responsible for increasing the environmental pressure on employees during their working hours in all industries. In addition, ecological stakeholders are emphasizing GHRM practices (Guerci et al., 2016; VázquezBrust et al., 2022; Yong et al., 2022). Many academic researchers (Saeed et al., 2019) have emphasized the significance of HRM green practices in educational institutions and industrial sectors, stating that the environmental performance industry sector is contingent upon the HRM sector's policies.

(Ma et al., 2021) Human Resource Management (HRM)'s green environmental practices have a significant impact on employees' adaptability to them for environmental improvement. This is supported by the theory of organizational citizenship behavior toward the environment (OCBE), which states that employees' voluntary actions are aimed at environmental enhancement. OCBE contributes to environmental sustainability by reducing organizational resource consumption and encouraging employees to preserve the organizational environment. Additionally, it contributes to the willingness of employees at a particular institution or organization to implement environmentally friendly human resource management practices to promote a sustainable environment. to research (Pham et al., 2019), when employees participate in green practices such as GHRM, they become more environmentally conscious and go above and beyond their responsibilities to maintain the work environment. However, extensive research is required to comprehend the green practices of HRM in higher education institutions and their impact on environmental sustainability.

2.2 Impact of Green HRM Practices on the Work Environment

In the modern world, organizations are shifting toward green practices to maintain a sustainable and healthy work environment, and human resource management sectors are attempting to promote a green environment for their employees so that they can work with greater zeal and enthusiasm. Recent research (Aboramadan, 2022) has demonstrated that the human resource management department is responsible for sustaining employees' behaviors, responsiveness, and enthusiasm about their job responsibilities. In addition, it has been observed that human resource management impacts the ecological environment of any organization.

Additionally, higher education institutions require a green and supportive environment for their employees to work in a green environment and ardently carry out their job responsibilities. In the past, many higher education institutions have attempted to promote a green environment for their employees by integrating green practices into their services (Roos & Guenther, 2020) because this is necessary for the employees to be able to work and promote positivity at their workplaces. It has been observed that green human resource practices have a significant impact on the work environment not only in the higher education sector but also in the industrial sector of a number of countries, fostering a more tranquil and sustainable workplace for employees.

GHRM practices positively impact environmental sustainability in higher education institutions (Muhammad Ali & Nisar, 2022) because GHRM practices contribute to changes in employee behavior, which will increase green and SOE initiatives in higher education institutions. In addition, this study emphasizes the significance of GHRM practices. It explains how the green practices of human resource management not only affect the level of employee commitment but also improve the environmental performance of higher education institutions.

H1: Hence, it can be proposed that green practices of HRM significantly impact the work environment.

2.3 Role of Knowledge Sharing as a Mediator

Knowledge sharing is a significant means of acquiring information in the workplace. KS functions as a mediator to promote an SOE in diverse global sectors. Recent research has demonstrated that KS positively mediates the sustainability of the work environment in higher education institutions (Rubel et al., 2021), indicating that green KS significantly influences the mediating effect between green human resource management practices and green employee behaviors toward the work environment. Globally, the higher education sectors are being affected to change their way of working by focusing on knowledge-sharing practices to maintain a supportive work environment (SOE) for employees, and are under pressure from external sectors to become more efficient and effective green practices of HRM and green KS to mediate

a supportive work environment for employees (Al-Husseini et al., 2021).

In addition, knowledge and KS are essential elements for significantly enhancing workplace innovations. Knowledge and KS management are necessary for organizations because it facilitates the transformation of tacit knowledge into explicit knowledge (He et al., 2022). To promote KS in higher educational institutions, transformational leadership can act as a determinant because it can innovate the ways to share knowledge, bring innovation, and result in the enhancement of the green behavior of employees toward their goals, which will ultimately promote organizational performance by sustaining the work environment and also bring innovation to higher educational institutions (Al Ahmad et al., 2019).

HEIs are promoting the concept of KS among their employees because the economy is dependent on knowledge today (Akram et al., 2020). Therefore, HEIs are promoting the concept of KS among their employees.

H2: Knowledge sharing significantly mediates the association between GHRM practices and work environment sustainability.

2.4 Role of Life-long Learning as a Mediator

In this technologically advanced and interconnected world, there should be an innovation in the learning strategies of higher education departments to improve the work environment's sustainability. LLE should mediate between green human resource management practices and SOE in various organizations and the higher education sector.

(Parisi et al., 2019) LLE is the ability to continuously acquire, transfer, and modify knowledge and skills throughout an employee's career so that they can foster a supportive work environment for themselves. Higher education institutions could expedite this by enabling the digital learning process.

Moreover, digital learning could be promoted in the form of blended learning, where knowledge can be delivered through a combination of face-to-face and digital learning strategies, where learning instructions can be passed on online or offline, and this will promote a greener and SOE for higher education employees (Prachagool et al., 2022). In this swiftly digitalizing era, both the academic and business sectors are contributing to innovation to improve the SOE for their employees. In this digitalized era, the significance of lifelong learning has increased because personnel in higher education institutions must innovate their knowledge, skills, and training methods. Ultimately, this is the key to their competitiveness and the preservation of their employment environments (Terzi et al., 2022).

With the assistance of KS and LLE as mediators, it can be concluded that GHRM practices significantly impact the work environment of HEIs and are responsible for enhancing the sustainability of the environment for employees.

H3: LLE significantly mediates the association between GHRM practices and SOE.

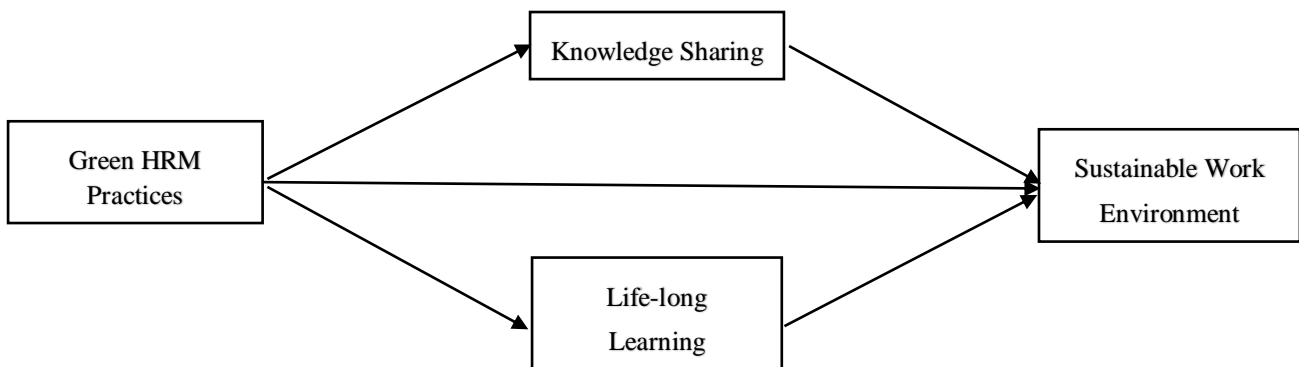


Figure 1: Conceptual Framework

3. METHODS

3.1 Target Population and Sampling Procedure

The focus of the present investigation is the Saudi Arabian higher education sector. The study employed a non-probability convenience sampling method to acquire data from 350 employees of various Saudi Arabian higher education institutions. According to Scholtz (2021), convenience sampling is a method in which the researcher includes specific units in the study's sample due to their simple accessibility. This may be due to the respondent's willingness to partake in the study, their availability at the given time, or their geographical proximity (Krupnikov et al., 2021). Consequently, the researcher has selected this

sampling method due to its practicability.

The summary of the demographic characteristics of the study's respondents is provided in Table 1.

3.2 Data Collection Tool

The survey research method has been utilized for data acquisition in this study. As this is a quantitative study, the researcher collected the numerical data using a closed-ended questionnaire. According to Surucu and Maslakci (2020), surveys are extensively utilized and advantageous data collection tools in quantitative research (Bloomfield & Fisher, 2019). This is a very useful research strategy while investigating in a natural environment. Also, the current study is objective. According to Bhat (2020), in

objective research, surveys emphasize the target audience's general opinions and document existing conditions. The study has therefore implemented a survey for data

collection and organization. The researcher ensured that all questions were written in English and were readily understood by the target audience.

Table 1: Demographics

Particulars	Description	Value	%
Gender	Male	193	55.1
	Female	157	44.9
	Total	350	100
Education	Intermediate	76	21.7
	Bachelors	172	49.1
	Masters	88	25.1
	Other	14	4.0
	Total	350	100
Age	Less than 25 years old	115	32.9
	25 to 30 years old	138	39.4
	31 to 35 years old	82	23.4
	More than 35 years old	15	4.3
	Total	350	100

3.3 Measurement Scales

In this investigation, the researcher has adopted measurement scales from prior research. For this purpose, the researcher has conducted an exhaustive literature review. The scales were initially adopted and then modified considering the present study's context. GHRM was measured using a 6-item scale developed by Dumont et al. (2017); a sustainable workplace environment was measured using five items adapted from Saifulina and Carballo Penela (2017); 6-items for knowledge sharing was adapted from Yu et al. (2022); and 11 items for life-long learning were adapted from Barros et al. (2013).

Table 2: Descriptive of studied variables

	N Statistic	Minimum Statistic	Maximum Statistic	Mean Statistic	Std. Deviation Statistic	Kurtosis Statistic	Std. Error
GHR	350	1.00	5.00	3.2481	1.05942	-.843	.260
LLR	350	1.00	5.00	3.3079	1.19599	-1.021	.260
SOE	350	1.00	5.00	3.2560	1.21153	-.909	.260
KS	350	1.00	5.00	3.2876	1.02716	-.959	.260
Valid N (listwise)	350						

GHR=Green HRM practices, LLR= Life-long learning, SOE=Sustainable work environment, KS= Knowledge sharing

4.2 Factor Loadings

After verifying data normality, outliers, or missing value analysis, the factor loading of each item included in the current study was assessed. The KMO & Bartlett test has

Table 3: KMO & Bartlett test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.967
Bartlett's Test of Sphericity	Approx. Chi-Square	15071.056
	df	300
	Sig.	.000

Table 4 illustrates no formulation of any identity matrix or duplication, or cross-loading issues. Each item appears in its respective column indicating the significant results of factor loading for the given set of items against each variable.

4.3. Validity Results

Through convergent and discriminant validity, the validity of quantitative research mechanisms is confirmed. Convergent validity is evaluated using two indicators: composite reliability and extracted average variance. Table

4. RESULTS

4.1 Descriptive Summary

Table 2 describes the variables studied. In the descriptive analysis, summary statistics are provided for the research variables useful for ensuring response orientation, data normality, missing values, and outliers. The findings indicate that there were no outliers in the data. As responses were obtained using a five-point Likert scale, the number of cases for each variable is 350, indicating no aberration in the data. The resulting minimum and maximum statistics are 1 and 5, respectively. In addition, the skewness values correspond to the cutoff threshold values between -1 and 1.

evaluated sample sufficiency for this purpose. The resultant value of .967 in Table 3 ensures sufficient data. In addition, the significance of Bartlett's test ($p=.000$) indicates a correlation between the items.

5 demonstrates that the CR and AVE values exceed the criterion thresholds of 0.70 and 0.50, respectively. Therefore, construct validity for the measurement model has been established. The discriminant validity results are also statistically significant, indicating that values are theoretically unrelated and unrelated. The bolded diagonal values represent the significant results of discriminant validity. The discriminant validity of values is written in bold when the initial values are lesser than those wr. Therefore, both validity conditions are met for the measurement model.

Table 4: Rotated Component Matrix

	1	2	Component 3	4
GHR1		.780		
GHR2		.783		
GHR3		.768		
GHR4		.738		
GHR5		.718		
GHR6		.737		
LL1	.843			
LL2	.848			
LL3	.853			
LL4	.848			
LL5	.853			
LL6	.849			
LL7	.849			
LL8	.852			
SOE1				.751
SOE2				.777
SOE3				.773
SOE4				.766
SOE5				.744
KS1			.858	
KS2			.857	
KS3			.861	
KS4			.873	
KS5			.844	

GHR=Green HRM practices, LLR= Life-long learning, SOE=Sustainable work environment, KS= Knowledge sharing

Table 5: Convergent and Discriminant Validity

	CR	AVE	MSV	MaxR(H)	LLR	GHRM	KSH	SWE
LLR	0.996	0.971	0.618	0.998	0.985			
GHRM	0.939	0.721	0.625	0.958	0.772***	0.849		
KSH	0.930	0.726	0.196	0.931	0.442***	0.370***	0.852	
SWE	0.967	0.853	0.625	0.968	0.786***	0.791***	0.351***	0.923

GHR=Green HRM practices, LLR= Life-long learning, SOE=Sustainable work environment, KS= Knowledge sharing

4.3 Confirmatory Factor Analysis

To corroborate the goodness of fit, confirmatory factor analysis has been considered. CFA utilizes various indicators to assess model adequacy. The CFA results are significant since [table 6](#) demonstrates that each indicator

threshold value corresponds to the reported/result values. As the sample size is sufficient, the validity is established, and the model's suitability is confirmed, it can be concluded that structural equation modeling would produce significant results, as depicted in [Figure 2](#).

Table 6: Model Fitness

	CMIN/df	GFI	CFI	IFI	RMSEA
Baseline	≤3	≥0.8	≥0.9	≥0.9	≤0.08
Reported	2.202	0.866	0.980	0.980	0.059

4.4 Structural Equation Modeling

The hypothesized model's results and the relationships between variables were evaluated using structural equation modeling. GHR has a significant and positive effect on SOE.

With a p-value of .016, a one-unit increase in GHR affects SOE by .408 units. The hypothesis has been significantly accepted since the p-value is less than the criterion value, i. e. 0.05.

Table 7: SEM Direct Effect

Parameter	Estimate	Lower	Upper	P
SOE ← GHR	.408	.239	.531	.016

GHR=Green HRM practices, LLR= Life-long learning, SOE=Sustainable work environment, KS= Knowledge sharing

Table 8: SEM Indirect effects

Indirect Path	Standardized Estimate	Lower	Upper	P-Value
GHR --> LLR --> SOE	0.343***	0.268	0.536	0.001
GHR --> KS --> SOE	0.006	-0.015	0.032	0.621

GHR=Green HRM practices, LLR= Life-long learning, SOE=Sustainable work environment, KS= Knowledge sharing

The results of the mediation hypothesis formulated in section 2 of this investigation are presented in [Table 8](#). The initial LLR mediation occurs between GHR and SOE. LLR significantly mediates the relationship between GHR and

SOE, as indicated by a p-value of 0.001. Between GHR and SOE, the next KS mediation is evaluated. As the p-value of 0.621 is greater than the significance threshold of 0.05, the mediation is insignificant, and the hypothesis has been

rejected. Figure 3 depicts the outcomes of SEM with a co-efficient effect magnitude.

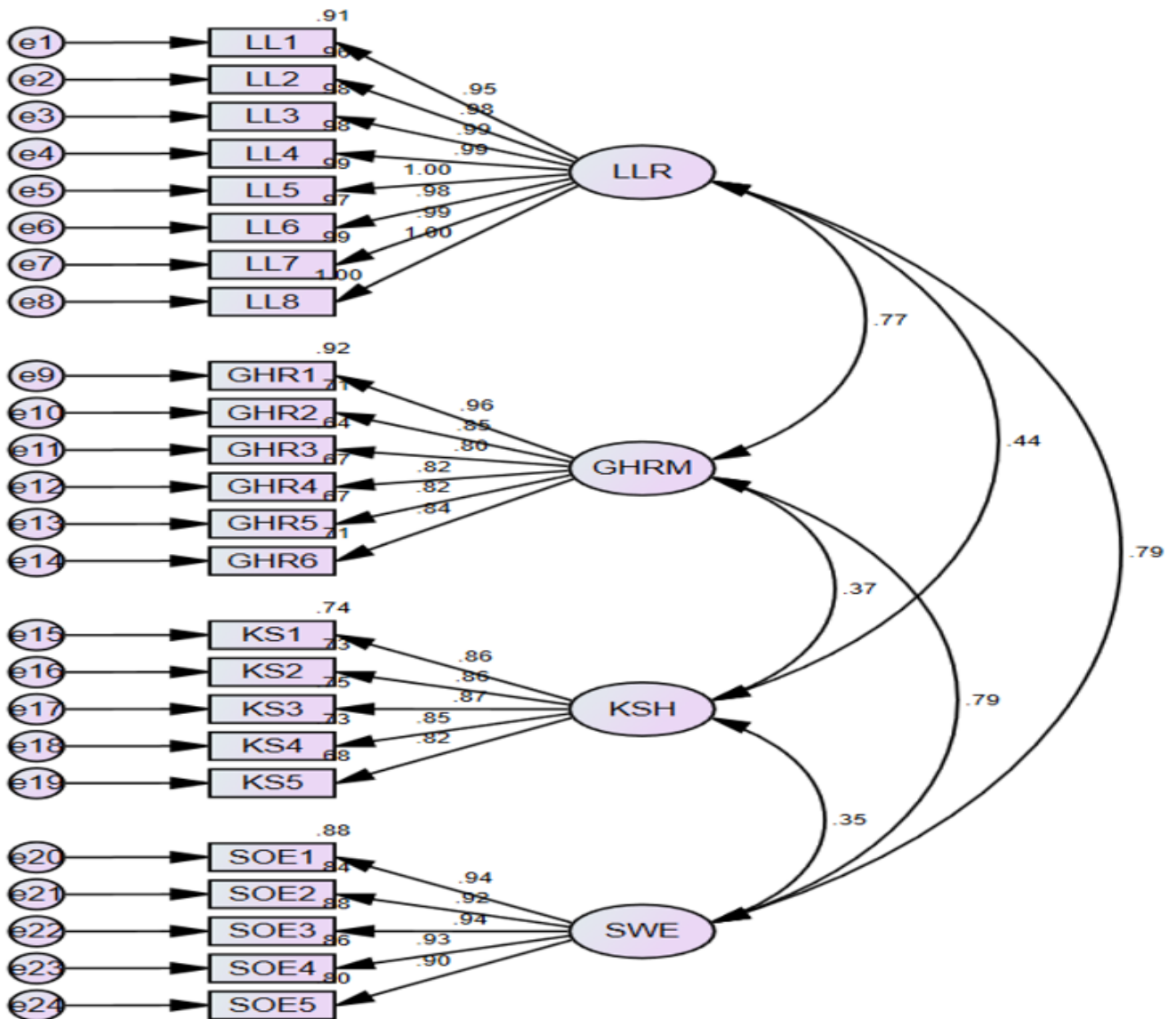


Figure 2: CFA

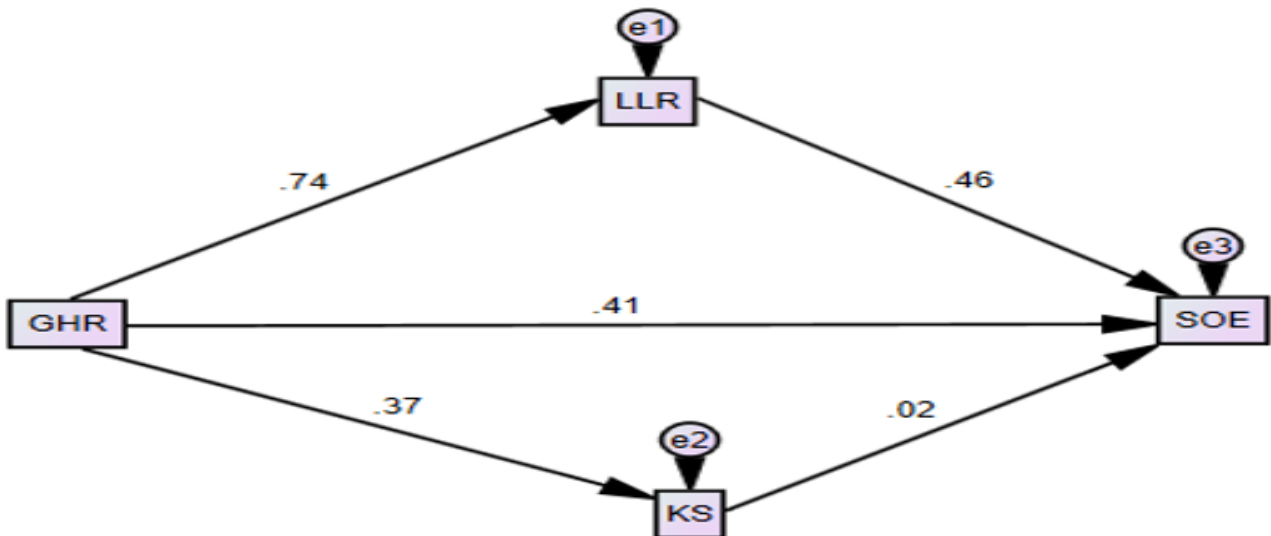


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5. DISCUSSION

In recent years, interest has increased in implementing green human resource management (HRM) techniques and developing SOEs in various industries, including higher education institutions. Saudi Arabia, a rapidly growing nation, recognizes the utility of these strategies and is moving to implement them in its higher education institutions. In this scenario, KS and LLE may greatly assist in promoting the adoption and utilization of sustainable business. This study investigates the roles that KS and continuous learning play in promoting GHRM practices and fostering a sustainable workplace environment in the higher education institutions of Saudi Arabia. This investigation produces results by analyzing the hypothesis. The findings support the first hypothesis (H1) that GHRM practices positively impact the work environment. Consistent with prior research, this finding suggests that instituting GHRM practices can improve environmental performance and employee engagement, resulting in a more SOE. Recent research (Aboramadan, 2022) has demonstrated that the human resource management department is responsible for sustaining employees' behaviors, responsiveness, and enthusiasm about their job responsibilities. GHRM practices positively impact environmental sustainability in higher education institutions because they lead to changes in employee behavior that increase the green and SOE in higher education institutions (Muhammad Ali & Nisar, 2021). The study discovered that KS mediates the relationship between GHRM practices and the workplace. The study found no evidence to support the second hypothesis (H2) that KS mediates the association between GHRM practices and the work environment. It suggests that KS may not substantially affect the relationship between GHRM practices and the workplace.

According to prior research, KS positively mediates the sustainability of the work environment in higher education institutions (Rubel et al., 2021), demonstrating that green KS significantly influences the mediating effect between green human resource management practices and green employee behaviors toward the work environment. Al-Husseini et al. (2021) also argued that the higher education industry should implement knowledge-sharing practices to facilitate employee SOE. In addition, external constraints are compelling the industry to implement more efficient and effective green HRM and knowledge-sharing practices to foster a positive work environment for employees. In addition, the study discovered that LLE mediates the connection between GHRM practices and the work environment. The result supports the third hypothesis (H3) and suggests that LLE can augment the effect of GHRM practices on the workplace. Anthony et al. (2020) provide evidence that LLE is a mediator between green

human resource management practices and SOE in various industries. In addition, research (Parisi et al., 2019; Prachagool et al., 2022) indicates that LLE enables employees to continuously acquire and modify their knowledge and skills, resulting in more SOE. By combining online and offline learning strategies, digital learning, specifically blended learning, can further promote a greener and more sustainable SOE.

6. IMPLICATIONS FOR THE STUDY

6.1 Practical Implications

In Saudi Arabia, the study's relevance is particularly crucial. The study proves that implementing GHRM practices and sustainable working environments can result in positive outcomes in Saudi Arabian higher education institutions. The current research suggests that management education institutions can effectively implement sustainable development by emphasizing the study's identified main factors, providing implications for their actions. For instance, the study indicates that KS and continuous learning may significantly promote SOEs and adopt GHRM practices.

6.2 Theoretical Implications

The study's findings also have some theoretical ramifications. The study sheds light on the factors that promote and inhibit the adoption of SOEs and GHRM practices in Saudi Arabian higher education institutions. These findings are essential for the development of concepts and constructs concerning the application of sustainability in higher education institutions. Additionally, the study broadened the context of GHRM and linked it to sustainability within educational institutions; therefore, it can serve as a reference for policymakers and HR managers in Saudi Arabia devising strategies to promote sustainability in higher education institutions.

7. CONCLUSION

This study investigated the effect of GHRM practices on an SOE in Saudi Arabian higher education institutions. This research also revealed that KS and LLE mediated the relationship between GHRM practices and an SOE. Based on the results of the hypothesis, it can be concluded that GHRM practices significantly affect the SOE in Saudi Arabian higher education institutions. This finding is consistent with the region's increasing emphasis on sustainability and environmental stewardship. Whereas LLE mediates significantly between GHRM practice and SOE, KS has a negligible effect on the relationship between GHRM practice and SOE. To achieve an SOE, higher education institutions in Saudi Arabia should adopt GHRM practices and prioritize KS and lifelong learning. This can have long-term benefits, such as increasing representative satisfaction and commitment, reducing

environmental impacts, and enhancing the institution's reputation in the community.

8. RESEARCH LIMITATIONS AND FUTURE RESEARCH DIRECTIONS

This study did not examine the anticipated costs or challenges of implementing GHRM practices and sustainable workplaces. In addition, this study does not investigate the long-term effects of SOEs and GHRM practices on organizational outcomes, such as employee retention or financial performance. In addition, the sample size of this cross-sectional study was relatively modest. Future research may enhance the sample size for longitudinal studies. The study employed a theoretical framework that included knowledge exchange and lifelong learning as significant variables influencing the relationship between sustainable work environments and green HRM practices.

Nevertheless, the framework may not have accounted for all variables or factors that could have influenced this relationship. Future research could expand the framework to include additional elements and provide a more comprehensive understanding of the topic. Future research could examine the relationships between green HRM practices, sustainable workplaces, knowledge exchange, and lifelong learning in various non-academic organizations and industries. This would aid in validating the findings and expanding knowledge of the topic.

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Appendix

Variable name	Items	Source
Green Human Resource Management	<ul style="list-style-type: none"> • My company sets green goals for its employees. • My company provides employees with green training to promote green values. • My company provides employees with green training to develop employees' employees' e and skills required for green management. • My company considers employees' employees' e green behavior in performance appraisals. • My company relates employees' employees' e green behaviours to rewards and compensation. • My company considers employees' employees' e green behaviours in promotion. 	(Dumont et al., 2017)
Sustainable Workplace Environment	<ul style="list-style-type: none"> • My organization has many programs and policies designed to promote environmentally friendly behavior. • My organization makes an active effort to help employees be environmentally proactive. • My organization puts money and effort into showing its support of ecology. • It is easy to find out about environmental support programs within my organization. • My organization provides its employees with useful information they need to behave environmentally friendly. 	(Saifulina et al., 2017)
Knowledge Sharing	<ul style="list-style-type: none"> • People within our organization regularly interact with each other to discuss different environmental developments and share knowledge. • We have a well-organized system through which we can share knowledge and learn from each other. • We are provided with the latest equipment and technology to obtain and share the knowledge. • My organization recognizes and rewards the employees sharing innovative ideas and information to improve the process for the protection of the natural environment. • My organization regularly share the latest environmental knowledge and market trends with its employees through e-mail, training sessions, and workshops. • We regularly share information and knowledge related to the natural environment with our customers, suppliers, and other stakeholders.* 	(Yu et al., 2022)
Life-long Learning	<ul style="list-style-type: none"> • I love learning for its own sake. • When I learn something new, I try to focus on the details rather than on the "big picture". • I am able to impose meaning upon what others see as disorder. • When I approach new material, I try to relate it to what I already know. • I feel others are in a better position than I am to evaluate my success as a student. • It is my responsibility to make sense of what I learn at school. • I try to relate academic learning to practical issues. • I often find it difficult to locate information when I need it.* • I can deal with the unexpected and solve problems as they arise.* • I feel uncomfortable under conditions of uncertainty.* 	(Barros et al., 2013)