International Journal of Instruction *October 2025 ● Vol.18, No.4*
e-ISSN: 1308-1470 ● www.e-iji.net *p-ISSN: 1694-609X*
pp. 131-152

Article submission code: 20241222221614
Received: 22/12/2025 Revision: 20/04/2025
Accepted: 01/05/2025 OnlineFirst: 01/07/2025

The Role of Knowledge Management in Achieving the Sustainability of Universities: A Comparative Study

Nada Zwayyid Almutairi
Assoc. Prof., Educational Leadership, College of Education, Ha'il University, Saudi Arabia, *nadoo.2010@hotmail.com*

The objective of this research is to examine the role that knowledge management plays in optimizing the sustainability of Saudi universities. A questionnaire containing 57 sentences was created to accomplish the research purpose, and it was distributed over two axes of establishing university sustainability. A sample consisting of 214 academic and leadership staff members from Saudi Universities was asked to answer the questionnaire. The study employed descriptive and differential approaches to meet its goals, and data was gathered using a survey. The study has two axes; the first axis is knowledge management, which includes thirty-eight phrases covering four different dimensions. The second axis includes nineteen phrases covering the sustainable development domain. The total role of knowledge management received an average score of 2.6, which reflects its great impact on achieving sustainability in Saudi universities.

Keywords: knowledge management, university sustainability, leadership, faculty members, sustainability

INTRODUCTION

Economic development will ultimately fail to achieve its objectives if it cannot find an appropriate and sustainable environment. Balance between different aspects of development is the key to success. Sustainable development is a framework for planning the future that considers social, economic, environmental, and technical factors to raise people's standard of living (UNESCO, 2012). Furthermore, sustainable development seeks to enhance people's quality of life, increase their consciousness of contemporary social and environmental challenges, and utilize resources rationally to achieve the aspired economic growth and ongoing change that corresponds to societal priorities and needs (Hegazy, 2017). With the increasing global awareness of sustainability, more attention has to be paid to universities. To develop qualified human capital that can coexist and adapt to modern challenges, managers must now be aware of their general and comprehensive responsibilities toward the development of their universities. This is achieved by improving their prospects for knowledge acquisition (Nejati et al., 2010; Staddon, 2023). The Educational institutions realize, as Al-Kubaisi (2005) explains, that they must benefit from what they know and learn to be

Citation: Almutairi, N. Z. (2025). The role of knowledge management in achieving the sustainability of universities: A comparative study. *International Journal of Instruction*, *18*(4), 131-152.

competitive. The current challenge contemporary educational institutions face is not in generating knowledge, but in how to apply it, to add value to the role it plays in the organization's transformation to a knowledge-based economy. Likewise, Al-Rashidi (2020) highlights the need to embrace the idea of knowledge management as the difficulty today lies in the overwhelming amount of knowledge, information, and science, which makes it challenging to organize and manage them. Therefore, the term "knowledge management" appeared as a solution to overcome these problems. Knowledge management is crucial for organizational success in today's era, as it supports innovations, enhances creativity, improves performance, and continuously modifies organizational structures. It strengthens interconnections between knowledge, science, and technology, and aids in developing production processes, improving services, and making decisions to create a competitive advantage at national and global levels (Ibrahim et al., 2019).

Universities are seen as tiny communities that, through carrying out their primary goals of teaching, research, and community service, significantly contribute to the development and well-being of their societies in all domains. From this vantage point, the significance of sustainability emerges, expressing green organizations that do not negatively affect the environment, society, or economy. They also have a huge obligation to conserve societies' resources and maintain their natural environment (Mathaisel et al., 2009; Yusuf, 2023), as defined by Selvanathan (2013). The study of Kidwell et al. (2000)demonstrated that implementing knowledge management in higher education has numerous advantages, including raising individual and institutional performance, enhancing efficiency and effectiveness, and fostering creativity by giving faculty members the chance to create, develop, transfer, apply, and use their knowledge in the areas of teaching, community service, and scientific research.

Literature Review

Abualoush et al. (2018) proposed assessing the relationships between infrastructure, knowledge management techniques, intellectual capital, and organizational performance. Despite businesses' widespread use of knowledge management capabilities, little study has been done on how to maximize their financial and non-financial success. Business performance must be optimized by leveraging knowledge management capabilities through the creation of intellectual capital, as the new competitiveness shifts from tangible to intangible resources. To achieve its primary objective, this study used a logical methodology and positivist ideology. A convenience sample of 134 employees in Jordan's food industry was used to develop a questionnaire that was used to evaluate the study methodology. Techniques from structural equation modeling were used to examine data collected from the questionnaire. This study emphasized the possible advantages of employing organizational performance, intellectual capital, and knowledge management skills in Jordan's food industry. The findings showed that the knowledge management process benefited from the knowledge management infrastructure.

Alkhayyal et al. (2019) investigated the Saudi Arabian higher education faculty's comprehension of sustainability. The main objective of this research is to find out how

one of Riyadh's biggest private non-profit institutions integrates sustainability into its curricula. The research demonstrated that faculty members were surveyed to determine their level of expertise in this area. The findings were compared across departments to see how faculty members may support sustainable education by expanding their expertise through relevant training and workshops. This research demonstrated how the comparative analysis made it possible to establish the rules for creating a powerful organization that presents itself as the Gulf's leader and change agent. Using the top-down technique, the survey was administered to the benchmark university's small number of faculty members to gather responses on sustainability. The survey achieved its initial goal of creating a database of faculty members' current knowledge, background, and enthusiasm for sustainability. In addition to being a crucial step in integrating sustainability into the benchmark institution, Participants had the opportunity in the survey to think about and make suggestions regarding what constitutes having sustainability for a strategic objective and core value. This study demonstrated that Saudi authorities recommend businesses to be more socially and economically responsible in accordance with the unique value of the Saudi Vision 2030, which was created based on the UN standards. Given the environmental, social, and economic ramifications, this study found that enhancing faculty members' knowledge and comprehension of sustainability helps young people launch their careers in sustainable settings.

Mutayem & Al-Makhzanji (2020) demonstrated how knowledge has emerged as a novel source of social and economic growth, the primary engine for national development and advancement, and how knowledge has grown more and more important to the global economy. Likewise, it demonstrated how industrialized nations tend to establish strong economic foundations for this kind of economy, allowing them to make investments in it. To attain sustainable development, it was determined that education, the creation of a knowledge society founded on technical advancement, and the encouragement of an innovative and creative culture were all necessary. Egypt has acknowledged that developing the knowledge economy is essential to boosting its competitiveness and that it is a key demand imposed by the globalization era. Despite its interest in the transition to a knowledge economy, Egypt has not had the same advantages as many other countries. According to this research, Egypt has set up specialized government agencies to collect different types of data and has websites specifically for each government ministry. At the beginning of 2017, there were approximately 33.7 million Internet users in Egypt, and from 2013 to 2017, the average annual growth rate of the capacity of the international Internet per person was 50.38%. This research examines Egypt's knowledge economy and how it contributes to sustainable development.

Russ (2021)demonstrated that this conceptual, multidisciplinary study would begin by introducing the Post Accelerating Data and Knowledge Online Society, a new era in which human society is confronted with constantly accelerating technological revolutions. In this context, a conceptual framework for sustainable development that prioritizes knowledge management and communication will be presented. This study will deconstruct the idea of knowledge management into a new three-layer model that emphasizes the data-machine and knowledge-human domains. Each of these spheres

will then be examined with an emphasis on the aspects of human actors, digital supporting systems, and learning and decision-making processes. Likewise, this study demonstrated that it would be suggested to combine modern knowledge management and fresh knowledge production into a single combined design. It stated that the holistic conceptual model of knowledge management for sustainable development is composed of time, cyber security, and two alternative humanistic viewpoints (Homo Technologicus and Homo Sustainabiliticus). Based on the models discussed and the concepts taken into consideration during the examination, this study reached several conclusions and future implications.

Ochoa-Jiménez et al. (2021)demonstrated that turning information into creative applications with a lasting impact is a crucial component of modern businesses; as a result, this study concentrated on establishing the connections between the three aforementioned structures. To confirm this, a survey was given to 492 tourism-related businesses in southern Sonora, Mexico. The data was recorded in SPSS and examined using structural equations in the Smart PLS program. The study's key conclusions confirmed that knowledge management, sustainability, and innovation have a direct, substantial, and positive link and that innovation and sustainability have a direct, positive association. According to the study's findings, businesses may concentrate on knowledge management that will lead to innovation, which would then set them apart by attaining sustainability and perhaps creating a competitive edge.

Al-Olayani et al. (2021)demonstrated how King Abdul-Aziz University, which is regarded as one of Saudi Arabia's local universities and is focused on innovation and development, aims to accomplish several objectives, including helping to realize Saudi Arabia 2030 and improving its competitiveness with foreign universities. Considering Saudi Arabia's 2030 vision and the contemporary university system, this study sought to determine the true contribution of knowledge management methods at King Abdul-Aziz University to establishing a sustainable competitive edge. The questionnaire served as the study instrument in this investigation, which included a descriptive quantitative and qualitative methodology. 726 members of the university's academic and administrative body made up the study sample. According to the study's findings, the participants in the study sample agreed with the requirements for establishing knowledge management practices at King Abdul-Aziz University with a very high degree and agreed with the barriers to doing so.

Al-Sayed (2021)outlined how environmental sustainability, which is the primary force behind community development across all domains, has become a crucial objective for universities to consider the escalating environmental issues. The university must balance its obligations to preserve the ecosystem and avoid adversely impacting its assets. This research sought to ascertain the views of Saudi university administrators regarding the most crucial tasks assigned to Saudi universities to attain environmental sustainability, expose the actual state of work being done by Saudi universities in this regard, and then develop a suggested plan to strengthen the educational duties of Saudi universities in this regard. To identify the most significant duties assigned to Saudi universities to carry out to attain environmental sustainability, this descriptive survey study used the Delphi method on a sample of 26 senior professors. A survey was then

administered to a random sample of 181 leaders to uncover the realities of practicing universities for those duties, and the suggested strategy was constructed using the SOAR approach. The study produced a list of 29 duties that academic institutions must fulfill to attain environmental sustainability. Additionally, the survey found that Saudi universities frequently perform inadequately when it comes to their duties regarding environmental sustainability. This study suggested an approach whose implementation would reinforce Saudi universities' commitment to making the transition to environmental sustainability.

Weina & Yanling (2022)demonstrated how environmental sustainability has become crucial and has received a lot of attention as a result of growing environmental consciousness and the issues that emerge from carelessness. The goal of this investigation was to ascertain how knowledge management (KM) practices contribute to the creation of a sustainable environment, with environmental consciousness and the usage of green technologies acting as mediators. The moderating effect of green innovative culture on the link between knowledge management techniques and a sustainable environment was investigated in this study.378 management-level employees in the Chinese construction sector provided the data via questionnaires, and the study's hypothesis was established using the structural equation modeling (SEM) approach in Smart-PLS 3.3.3. According to this study, green technology utilization, environmental consciousness, and a sustainable environment are all significantly correlated with knowledge management practices. Additionally, it demonstrated that environmental consciousness has a major impact on a sustainable environment; it was discovered that environmental consciousness significantly mediated the correlation between knowledge management procedures and a sustainable environment, but green technology use had no mediating effect. This research illustrated the association between knowledge management methods and a sustainable environment was significantly regulated by the green innovative culture.

Tajpour et al. (2022) demonstrated that a key tenet of human resource management globally is sustainability. This research looked at how knowledge management affected the long-term sustainability of tech-driven companies in emerging economies using social media. This descriptive correlational study was conducted in April 2022 and employed a 25-item questionnaire with a 5-point Likert scale to collect data. 537 companies made up the statistical population, while 224 research and development staff made up the sample size (determined by applying Cochran's formula). The data were then analyzed using Smart PLS 3. The study's findings showed that for technology-driven businesses to function sustainably, knowledge management components need to be applied across the entire organization. According to the results of this study, using knowledge management creates value and a sustained competitive edge in a dynamic environment. Moreover, It was found that effective participation in the corporate social network can activate knowledge management and generate value. According to the study's findings, social media knowledge acquisition maximizes learning and ideation, and for tech-driven businesses with limited resources, it permits growth and sustainability in a changing environment.

Mohiuddin et al. (2023)demonstrated that to help higher education growth in accomplishing the Vision, Saudi higher education institutions (HEIs) must reassess their goals, restructure their educational system, and reassess their capabilities. Additionally, it demonstrated that several educational innovation initiatives had been implemented to achieve the strategic goals for higher education development outlined in the vision. For the first review cycle of the Vision (2016–2020), this research examined the practices of HEIs, analyzed their accomplishments, and assessed the degree to which the Vision's higher education development goals were being met. Participants from the top ten Saudi universities participated in academic expert interviews and surveys for this project to learn how these institutions use innovative approaches to further the Vision. This study demonstrated how to assess development progress by comparing the higher education objectives of the Vision with the potential and priorities of HEIs. According to the study's findings, the most sought-after priorities are high-caliber graduates, industry-based academic learning outcomes, faculty development, innovative research, collaborations with foreign institutions, accreditations, and ongoing education that prioritizes future skills. Based on the results of this study, these goals tend to focus on developing higher education, enhancing professional skills, closing the gaps between higher education results and the expanding demands of the market, reviving universities, and connecting to a knowledge-based society. This study concluded that the offered strategy will be a useful tool for comprehending how precisely these entities contribute to reaching the goals of the vision, that it is an important model for further research, that it helps analyze the performance of higher education potentialities, and that it improves readers' comprehension.

Al-Faouri (2023) demonstrated that for businesses to satisfy the growing demands of environmentally sensitive customers, integrating green knowledge management and technology has become essential. Examining the effects of green knowledge management—which includes green knowledge generation, application, sharing, storage, and acquisition—as well as technology on organizational sustainability from an economic, social, and environmental standpoint was the goal of this study. 288 IT firms from various industries in Jordan that provide IT solutions and services, including financial services, provided the data for this study. Utilizing structural equation modeling (SEM), the data was examined. With an estimate of 0.253 for this connection, the study's findings showed that green knowledge management had a favorable effect on organizational sustainability. This research indicated that the link between technology, organizational sustainability, and green knowledge management is mediated by knowledge-based leadership. In addition to offering recommendations and consequences to fill in the gaps in previous research, this investigation offered valuable insights and views for a deeper comprehension of this subject.

Elhouda & Yahiaoui (2023)sought to investigate how knowledge management may help health sector startups remain viable and expand by looking at the circumstances surrounding an Egyptian technology startup in the health industry, according to a collection of data that the startup supplied. This study concluded that knowledge management helps health sector startups grow and remain sustainable and that these organizations should invest more in knowledge and technology to ensure their success and longevity. It also suggested that medical and clinical knowledge be preserved and

used to its fullest potential to add value for patients and raise the standard of the health services they offer, which will increase and sustain their profits.

Study questions and objectives

The following primary question outlines the study's question: What is the role of knowledge management in achieving the sustainability of Saudi universities? The objective of the current study is to:

-Discovering the role of knowledge management in achieving the sustainability of Saudi universities (A comparative study).

- Determining the differences between the average scores of the sample members in identifying the role of knowledge management in the sustainability of Saudi universities according to university.

-Determining the differences between the average scores of the sample members in identifying the role of knowledge management in the sustainability of Saudi universities according to the variables of the study (gender, administrative work, academic rank, number of years of experience, specialization).

METHOD

Study Methodology

Since it aims to determine the degree of sustainability achieved at Saudi universities, the current research is regarded as a descriptive survey study. Likewise, to determine the function of knowledge management in Saudi universities' sustainability, the study uses the differential approach, which looks at variations in sample members' average grades according to the study variables (gender, university, academic rank, number of years of experience, and specialization).

Study Population

The study population consists of all members and leaders of the University of Hail (2121), Taif University (2766) members, and King Khalid University (3660).

Study Sample

An attempt is made to reach an appropriate number of approximately 2.5% of the study population of approximately 8547 members, with a total sample of approximately 214 members. Consequently, the study tool is distributed (randomly) to members of the study sample, including members and leaders of Hail University, Taif University, and King Khalid University (electronically). It was distributed to about (53) members at Hail University, about (69) members at Taif University, and about (92) members at King Khalid University.

Gender: The study separated the participants into male and female groups because the data indicated that, with a percentage of approximately 94.4%, females made up the largest group of faculty members and leaders in Saudi universities. Males, on the other hand, made up approximately 5.6% of the total leaders and faculty members in Saudi universities in the study sample- Table (1).

University: The study divided the members of the research sample from three Saudi universities. The study data showed that King Khalid University was the dominant group, where their percentage was about 43%, followed by Taif University, where their percentage was about 32.2%, then Hail University, where their percentage was about 24.8% of the total leaders and faculty members in Saudi universities in the study sample - Table (1).

Academic Rank: The study divided the members of the research sample into three university ranks: lecturer, assistant professor, and associate professor. The study data showed that the rank of assistant professor was the predominant category, as their percentage reached about 42.5%, followed by the rank of lecturer, where their percentage reached about 40.7%, then the rank of associate professor, where their percentage reached about 16.8% of the total leaders and faculty members in Saudi universities in the study sample - Table (1).

Number of Years of Teaching: The study divided the number of years of teaching for members of the research sample into two categories (10 years or less) and (10 years or more). The collected data showed that the predominant category is (10 years or more), as their percentage reached about 53.7%, followed by the second category (10 years and younger) represented about 46.3% of the total study sample - Table (1).

Specialization: The study divided the members of the research sample into two specializations: scientific and humanities. The gathered data showed that specialization in the humanities was the predominant category for faculty members and leaders in Saudi universities in the study sample, as their percentage reached about 68.7%, followed by specialization in scientific sciences, where their percentage reached about 31.3% of the total leaders and faculty members in Saudi universities in the study sample - Table (1).

Table 1
Distribution of sample members according to study variables

variable	Category	Number	%	Ranking
Sex	Males	12	5.6	2
	Females	202	94.4	1
	Total	214	100	-
University	Hail	53	24.8	3
	Taif	69	32.2	2
	King Khaled	92	43.0	1
	Total	214	100	-
Academic rank	lecturer	87	40.7	2
	Assistant Professor	91	42.5	1
	Associate Professor	36	16.8	3
	Total	214	100	-
Number of years of teaching	10 years and less	99	46.3	2
	More than 10 years	115	53.7	1
	Total	214	100	-
Specialization	scientific	67	31.3	2
	Humanitarian	147	68.7	1
	Total	214	100	-

Study Tools

1- A preliminary data form for leaders and faculty members at the universities in the research sample.

2- The survey is to assess how knowledge management contributes to Saudi universities' sustainability. The standard study tools were prepared, constructed, and designed, and then given to an expert panel of judges in the field of knowledge management sustainability to receive their opinions on their intent, how well they achieve the study's objectives and their perception of the dimensions and expressions. Based on their suggestions, several adjustments were made until the tool reached the perfect shape for the finished application.

Internal Consistency of the Study Tool

After the apparent validity of the tools was confirmed, the study calculated the Pearson correlation coefficient to determine the degree of consistency between each phrase and the total number of phrases to which each specific paragraph belonged.

By using the scale on a survey sample of twenty-five faculty members who were not part of the study sample, the validity of the internal consistency of the scale was confirmed. The Pearson correlation coefficient values were then calculated, and all these values were statistically significant at the significance level (0.01). Additionally, every correlation coefficient value was greater than 0.3, which is regarded as appropriate for maintaining the terms inside the scale (Odeh, 2010). As a result, every word on the scale was approved, and the scale's final version had 57 phrases- Table (2).

Table 2
Results of correlation, reliability, and validity coefficients between phrases evaluating the role of knowledge management in achieving the sustainability of Saudi universities

Phrases	Correlation Coefficient	Cronbach's Alpha coefficient	Self-honesty coefficient	Phrases	Correlation Coefficient	Cronbach's Alpha coefficient	Self-honesty coefficient
1	0.9593**	0.9792	0.990	30	0.9587**	0.9789	0.989
2	0.9597**	0.9794	0.990	31	0.9587**	0.9789	0.989
3	0.9594**	0.9793	0.990	32	0.9588**	0.9790	0.989
4	0.9587**	0.9789	0.989	33	0.9590**	0.9791	0.989
5	0.9590**	0.9791	0.989	34	0.9592**	0.9792	0.990
6	0.9596**	0.9794	0.990	35	0.9594**	0.9793	0.990
7	0.9591**	0.9791	0.990	36	0.9592**	0.9792	0.990
8	0.9588**	0.9790	0.989	37	0.9591**	0.9791	0.989
9	0.9587**	0.9789	0.989	38	0.9591**	0.9791	0.990
10	0.9586**	0.9789	0.989	39	0.9594**	0.9793	0.990
11	0.9595**	0.9794	0.990	40	0.9588**	0.9790	0.989
12	0.9603**	0.9797	0.990	41	0.9590**	0.9791	0.989
13	0.9593**	0.9792	0.990	42	0.9589**	0.9790	0.989
14	0.9590**	0.9791	0.989	43	0.9588**	0.9789	0.989
15	0.9594**	0.9793	0.990	44	0.9588**	0.9790	0.989
16	0.9589**	0.9790	0.989	45	0.9594**	0.9793	0.990
17	0.9588**	0.9790	0.989	46	0.9593**	0.9792	0.990
18	0.9589**	0.9790	0.989	47	0.9592**	0.9792	0.990
19	0.9589**	0.9790	0.989	48	0.9588**	0.9790	0.989
20	0.9591**	0.9791	0.989	49	0.9588**	0.9790	0.989
21	0.9591**	0.9791	0.990	50	0.9592**	0.9792	0.990
22	0.9594**	0.9793	0.990	51	0.9588**	0.9790	0.989
23	0.9596**	0.9794	0.990	52	0.9591**	0.9791	0.990
24	0.9595**	0.9794	0.990	53	0.9586**	0.9789	0.989
25	0.9594**	0.9793	0.990	54	0.9590**	0.9790	0.989
26	0.9593**	0.9792	0.990	55	0.9586**	0.9789	0.989
27	0.9592**	0.9792	0.990	56	0.9588**	0.9790	0.989
28	0.9586**	0.9789	0.989	57	0.9590**	0.9791	0.989
29	0.9592**	0.9792	0.990				

**Significant at 0.01 level.

By utilizing the Pearson correlation coefficient to determine the values of the inter-correlation coefficients between the scale's axes and total score, the construct validity of the scale was confirmed. At the significance level (0.01), all values were statistically significant, indicating a significant level of construct validity for the scale- Table (3).

Additionally, the Cronbach Alpha coefficient was used to confirm the stability of the study scale and the study instrument.

Table 3
Results of correlation, reliability, and validity coefficients between each axis and the total axes of the research sample

Axises	Correlation Coefficient	Cronbach's Alpha coefficient	Self-honesty coefficient
knowledge management	0.819**	0.9003	0.949
sustainable development	0.980**	0.9901	0.995
Total axis	0.723**	**0.8391**	0.916

**Significant at 0.01 level.

Correction of the Scale: In its ultimate form, the knowledge management scale for attaining sustainability in Saudi universities had 57 assertions dispersed along two axes. Since the variable expresses three options (to a large degree, to a moderate degree, and to a weak degree), The responses were categorized according to an ordinal system. The weights are represented by the numbers entered in the program, which are as follows: to a large degree = 3, to a moderate degree = 2, and to a weak degree = 1. After determining the length of each category of the three-point Likert scale, we compute the arithmetic mean (weighted average). The number of spaces is then divided by the number of selections to determine the duration of the period (in this case, the number of spaces is two spaces, with the first distance being between 1 and 2, and the second being between 2 and 3). Since there are three choices, the length of the period equals 0.7, and the distribution is as indicated in Table (4).

Table 4
Distribution of Period Length

Level	**Weighted Average**
Weak Degree	from 1.0 to1.67
Moderate Degree	from 1.7to2.33
Great Degree	from 2.4to3.00

Statistical Processing Methods:

To answer the study's first question, the data was statistically processed using the Statistical Program for the Social Sciences (SPSS). This involved calculating the arithmetic means and standard deviations for the study sample members' responses to the statements and axes evaluating the degree of knowledge management in attaining the sustainability of Saudi universities. To address the study's second question, a one-way analysis of variance (Scheffe test) was employed to determine the degree of statistically significant differences between the study sample members' average responses, and an Independent Samples T-test was employed to assess the degree of statistically significant differences at the significance level ($\alpha = 0.05$) between the study sample members' average responses regarding the contribution of knowledge management to the sustainability of Saudi universities.

FINDINGS AND DISCUSSION

The first question: What is the role of knowledge management in achieving the sustainability of Saudi universities?

To address the study's second question, arithmetic means and standard deviations were computed for the study sample members' answers to the axis assessing knowledge management's contribution to Saudi universities' sustainability - Table (5).

The first axis, knowledge management, which has thirty-eight statements, obtained an average score of 2.6, indicating a significant degree of improvement, according to the studies of the two axes of the research study sample. The first axis included four dimensions, as the first dimension related to creating and generating knowledge and defining its goals and included 10. Phrases received an average of 2.6, meaning a significant degree. The second dimension was related to participation and distribution of knowledge and included 10 statements. It obtained an average of 2.6, meaning a significant degree. The third dimension is related to organizing and storing knowledge and includes 7 statements, and it obtained an average of 2.7, meaning a significant degree. As for the fourth dimension, it relates to the application and employment of knowledge and includes 11 statements. It obtained an average of 2.7, meaning a significant degree. Although there were 19 phrases concerning sustainable development on the second axis, the average was around 2.5, indicating a significant degree. It was also shown that the total axes related to the role of knowledge management in achieving the sustainability of Saudi universities (A comparative study) obtained an average of about 2.6, i.e. a significant degree (Abualoush et al., 2018; Alkhayyal et al., 2019; Al-Sayed, 2021) - Table (5).

Table 5
Results of arithmetic means and standard deviations for the responses of the study sample members to the axes measuring the role of knowledge management in achieving the sustainability of Saudi universities

Axes	Phrases No.	Mean	st. deviation	weighted ratio	Result
The first axis: knowledge management	38	2.6	0.37	0.88	Great degree
The first dimension: creating and generating knowledge and defining its goals	10	2.6	0.40	0.87	Great degree
The second dimension: participation and distribution of knowledge	10	2.6	0.41	0.87	Great degree
The third dimension: organizing and storing knowledge	7	2.7	0.38	0.89	Great degree
The fourth dimension: applying and employing knowledge	11	2.7	0.39	0.88	Great degree
The second axis: sustainable development	19	2.5	0.48	0.83	Great degree
Total axes	**57**	2.6	0.37	0.87	Great degree

Considering the outcomes of the preceding table and putting the statements of the two study axes related to assessing the contribution of knowledge management to the sustainability of Saudi universities in descending order. Based on the weighted relative strength and average of each axis's claims independently, it turns out that:

The First Axis: related to knowledge management, as illustrated by Table (5) the first axis includes four dimensions:

The First Dimension: related to the creation and generation of knowledge and defining its objectives, as the weighted average of the first dimension was around 2.6, with a standard deviation of approximately 0.4 and a weighted relative strength of approximately 87%, as demonstrated by the data in Table (6). This suggests that the creation has a large relative relevance. Creating information and outlining its goals. To a large extent, every phrase in the first dimension fell into the category of agreement.

The Second Dimension: related to participation and the distribution of knowledge, as the weighted average of the second dimension was approximately 2.6, with a standard deviation of approximately 0.41 and a weighted relative strength of approximately 87%, as demonstrated by the results in Table (7). This suggests that the relationship between participation and knowledge distribution is significantly significant. To a large extent, every phrase in the second dimension fell into the category of agreement.

Table 6
Results of the first dimension related to creating and generating knowledge and defining its goals

Phrase	Great degree	%	Moderate degree	%	Weak degree	%	Mean	st. deviation	weighted ratio	Result	Rank
The process of searching for knowledge enhances keeping up with developments in work strategies and environment.	166	77.6	48	30.3	0	0	2.78	0.42	0.93	Great degree	2
Updating the faculty member database utilizes new experiences that can be benefited from.	184	85.9	30	14.1	0	0	2.86	0.35	0.95	Great degree	1
Investing in competent people helps monitor and identify new knowledge.	159	74.3	55	25.7	0	0	2.74	0.44	0.91	Great degree	3
There is constant access to research and studies related to the educational process and its development.	142	66.4	66	30.8	6	2.8	2.64	0.54	0.88	Great degree	5
The university benefits from the expertise and successful experiences of other universities.	135	63.1	61	28.5	18	8.4	2.55	0.65	0.85	Great degree	6
It is concerned with verifying graduate requirements and improving graduate quality by analyzing information and transforming it into tangible improvements.	106	49.5	101	47.2	7	3.3	2.46	0.56	0.82	Great degree	10
Improving skills and knowledge and enhancing competitiveness among members and other universities.	117	54.7	85	39,7	12	5.6	2.49	0.60	0.83	Great degree	8
Analyzing the available information and data to ensure the level of performance and identify areas of improvement within the university.	123	57.5	73	34.1	18	8.4	2.49	0.65	0.83	Great degree	9
Employing modern technological methods to obtain knowledge.	134	62.6	62	28.9	18	8.4	2.54	0.65	0.85	Great degree	7
It is concerned with creating and gathering information and knowledge to facilitate decision-making.	148	69.2	60	28	6	2.8	2.66	0.53	0.89	Great degree	4
Total first dimension	1414	66.1	641	29.9	85	4	2.6	0.40	0.87	Great degree	

Table 7
Results of the second dimension related to participation and distribution of knowledge

Phrase	Great degree	%	Moderate degree	%	Weak degree	%	Mean	st. deviation	weighted ratio	Result	Rank
Activating and strengthening cooperation between units and colleges within the university stimulates the exchange of knowledge and benefiting from it.	141	65.8	60	28.1	13	6.1	2.60	0.60	0.87	Great degree	7
The university encourages communication and partnership between departments and colleges to transfer expertise and improve cooperation among members.	116	54.2	85	39.7	13	6.1	2.48	0.61	0.83	Great degree	10
The university's information and communications system supports the processes of collecting, organizing, and sharing knowledge.	128	59.8	80	37.4	6	2.8	2.57	0.55	0.86	Great degree	8
Modern technology contributes to improving and facilitating the processes of research, exchange, and learning.	159	74.3	49	22.9	6	2.8	2.71	0.51	0.90	Great degree	2
The university supports the exchange of knowledge and experiences without obstacles.	106	49.5	108	50.5	0	0	2.50	0.50	0.83	Great degree	9
The university's knowledge management systems encourage participation and exchange of ideas among members to provide various suggestions and experiences.	135	63.1	73	34.1	6	2.8	2.60	0.54	0.87	Great degree	6
Knowledge management systems promote positive change within the university.	148	69.1	60	28.1	6	2.8	2.66	0.53	0.89	Great degree	3
It enhances the culture of organizational learning, which contributes to improving performance.	160	74.7	48	22.4	6	2.8	2.72	0.51	0.91	Great degree	1
Providing training, development, and knowledge exchange among members.	142	66.4	66	30.8	6	2.8	2.64	0.54	0.88	Great degree	5
Various means and methods are available to disseminate and share knowledge within the university.	148	69.1	60	28.1	6	2.8	2.66	0.53	0.89	Great degree	4
Total second dimension	1383	64.6	689	32.2	68	3.2	2.6	0.41	0.87	Great degree	

The Third Dimension: related to organizing and storing knowledge, the weighted average of the third dimension was approximately 2.7, with a standard deviation of approximately 0.38 and a weighted relative strength of approximately 89%, as demonstrated by the results in Table (8). This suggests that knowledge organization and storage are of significant relative importance. To a large extent, every phrase in the third dimension fell into the category of agreement.

The Fourth Dimension: related to the application and employment of knowledge, with a weighted average of roughly 2.7, a standard deviation of roughly 0.39, and a weighted relative strength of roughly 88%, Table (9)'s results demonstrated that there is a significant relative significance on the application and employment of knowledge. To a large extent, every phrase in the fourth dimension fell into the category of agreement.

Table 8
Results of the third dimension related to organizing and storing knowledge

Phrase	Great degree	%	Moderate degree	%	Weak degree	%	Mean	st. deviation	weighted ratio	Result	Rank
Technology is used to preserve knowledge and store information.	184	85.9	24	11.2	6	2.8	2.83	0.44	0.94	Great degree	1
Information and data are archived electronically for easy preservation from damage.	166	77.6	42	19.6	6	2.8	2.75	0.50	0.92	Great degree	2
Information is classified and stored in a systematic way that can be easily obtained.	166	77.6	36	16.8	12	5.6	2.72	0.56	0.91	Great degree	3
The university follows a policy of motivation and exchange of experiences.	123	57.5	85	39.7	6	2.8	2.55	0.55	0.85	Great degree	6
The university uses previous results to improve the decisions made.	148	69.2	60	28.1	6	2.8	2.66	0.53	0.89	Great degree	4
The university is interested in training members and workers on the skills of developing, organizing, and storing information.	136	63.6	78	36.4	0	0	2.64	0.48	0.88	Great degree	5
There is a method for storing tacit knowledge, which consists of exchanging experiences.	111	51.8	97	45.3	6	2.8	2.49	0.55	0.83	Great degree	7
Total third dimension	1034	69	422	28.2	42	2.8	2.7	0.38	0.89	Great degree	

Table 9
Results of the fourth dimension related to the application and employment of knowledge

Phrase	Great degree	%	Moderate degree	%	Weak degree	%	Mean	st. deviation	weighted ratio	Result	Rank
The stored information and knowledge contribute to the rapid exchange of information between members and students.	160	74.8	42	19.6	12	5.6	2.69	0.57	0.90	Great degree	6
New ideas are used to solve the problems facing the university.	154	71.9	60	28.1	0	0	2.72	0.45	0.91	Great degree	2
Knowledge management effectively contributes to providing feedback to members, students, and the university.	154	71.9	60	28.1	0	0	2.72	0.45	0.91	Great degree	3
It contributes to reducing the time required to respond to the information inquired about.	136	63.6	66	30.8	12	5.6	2.58	0.60	0.86	Great degree	9
Training opportunities are available for faculty members in the field of knowledge management application.	136	63.6	66	30.8	12	5.6	2.58	0.60	0.86	Great degree	10
Members are interested in encouraging students to engage in dialogue in the classroom to spread knowledge among them.	154	71.9	54	25.2	6	2.8	2.69	0.52	0.90	Great degree	5
Guides the university to websites that contain knowledge that is useful in achieving its goals.	147	68.7	67	31.3	0	0	2.69	0.46	0.90	Great degree	4
The university is interested in publishing new books and periodicals at centers and websites to increase the culture of members and students.	129	60.3	85	39.7	0	0	2.60	0.49	0.87	Great degree	8
Knowledge and information are used to find solutions to obstacles and implement new ideas.	147	68.7	61	28.5	6	2.8	2.66	0.53	0.89	Great degree	7
Knowledge and information provide opportunities for creativity, innovation, and presenting new ideas.	159	74.3	55	25.7	0	0	2.74	0.44	0.91	Great degree	1
The university uses knowledge to support environmental performance.	117	54.7	91	42.5	6	2.8	2.52	0.55	0.84	Great degree	11
Total fourth dimension	1593	67.7	707	30	54	2.3	2.7	0.39	0.88	Great degree	
The total of the first axis	5424	67	2459	30	249	3	2.6	0.37	0.88	Great degree	

The Second Axis: related to sustainable development, as the weighted average of the second dimension was around 2.5, with a standard deviation of approximately 0.48 and a weighted relative strength of approximately 83%, as demonstrated by the data in Table (10), indicating a significant relative relevance of sustainable development. To a large extent, every phrase in the second axis fell into the category of agreement (Abualoush et al., 2018; Al-Sayed, 2021; Kun, 2022; Mohiuddin et al., 2023).

Table 10
Results of the second axis related to sustainable development

Phrase	Great degree	%	Moderate degree	%	Weak degree	%	Mean	st. deviation	weighted ratio	Result	Rank
It is keen to communicate with various advanced agencies and bodies in order to reduce pollution.	141	65.9	60	28	13	6.1	2.60	0.60	0.87	Great degree	4
The university has human resources with knowledge efficiency in providing distinguished services.	141	65.9	61	28.5	12	5.6	2.60	0.59	0.87	Great degree	2
Community needs are studied and graduates are linked to the labor market.	117	54.7	91	42.5	6	2.8	2.52	0.55	0.84	Great degree	8
The university employs technological methods and modern techniques to be able to meet challenges.	117	54.7	85	39.7	12	5.6	2.49	0.60	0.83	Great degree	11
The university is interested in applying knowledge systems and methods that conform to standard specifications.	117	54.7	73	34.1	24	11.2	2.43	0.69	0.81	Great degree	16
The university has integrated strategies to qualify graduates, employees, and academics and train them on sustainability issues.	93	43.5	109	50.9	12	5.6	2.38	0.59	0.79	Great degree	19
It is concerned with students acquiring behaviors and skills that enable them to maximize local resources.	117	54.7	73	34.1	24	11.2	2.43	0.69	0.81	Great degree	17
Sustainable development programs are prepared and integrated into academic programs.	123	57.5	60	28	31	14.5	2.43	0.73	0.81	Great degree	18
The university is keen to implement the social responsibility system.	135	63.1	67	31.3	12	5.6	2.57	0.60	0.86	Great degree	5
Promotes sustainable research policy.	111	51.8	91	42.5	12	5.6	2.46	0.60	0.82	Great degree	12
It emphasizes the spread of technological culture and its relationship with societal ethics.	110	51.4	92	42.9	12	5.6	2.46	0.60	0.82	Great degree	13
Executive programs are prepared for volunteer work and achieving societal benefits to link the university and society.	134	62.6	74	34.6	6	2.8	2.60	0.55	0.87	Great degree	1
It is concerned with social justice and highlights human values and rights and their relationship to health and education.	141	65.9	61	28.5	12	5.6	2.60	0.59	0.87	Great degree	3
The university is keen to manage waste to ensure the preservation of the environment.	129	60.3	67	31.3	18	8.4	2.52	0.65	0.84	Great degree	9
The university relies on sustainable financial policies.	110	51.4	92	42.9	12	5.6	2.46	0.60	0.82	Great degree	14
The university supports sustainable initiatives to achieve community renaissance.	111	51.8	97	45.3	6	2.8	2.49	0.55	0.83	Great degree	10
The university supports the occupational and health safety system on a permanent basis.	123	57.5	85	39.7	6	2.8	2.55	0.55	0.85	Great degree	6
The university is keen to manage available resources in a sustainable manner.	111	51.8	85	39.7	18	8.4	2.43	0.64	0.81	Great degree	15
The university adopts cultural policies to spread the culture of sustainability.	129	60.3	72	33.6	13	6.1	2.54	0.61	0.85	Great degree	7
The total of the second axis	2310	56.8	1495	36.7	261	6.4	2.5	0.48	0.83	Great degree	

The second question: Are there statistically significant differences at the significance level (α = 0.05) in the averages of the role of knowledge management in achieving the sustainability of Saudi universities due to university?

The Independent Samples T-test was employed to determine the degree of statistically significant differences at the significance level (α = 0.05) between the average responses of Saudi university leaders and faculty members regarding the role of knowledge management in achieving the sustainability of universities according to the university variable. Table 1-1 shows that there were statistically significant differences at the significance level (α = 0.05) between the average responses of leaders and faculty members on the total axes of the research sample related to the role of leaders and faculty members in Saudi universities and the role of knowledge management in achieving the sustainability of universities according to the university variable (Elhouda & Yahiaoui, 2023; Khan et al., 2024; Tajpour et al., 2022).

Table 11
Results of the Independent Samples T-test reveal the significance of the differences between the average responses of leaders and faculty members in Saudi universities regarding the role of knowledge management in achieving the sustainability of universities according to the university variable.

Axises	T
The first axis: knowledge management	-2.394**
The second axis: sustainable development	-2.655**
Total axis	-2.409**

The third question: Are there statistically significant differences at the significance level (α = 0.05) in the averages of the role of knowledge management in achieving the sustainability of Saudi universities due to the variables (Gender, academic rank, number of years of experience, specialization)?

Table (12) shows that there are no statistically significant differences at the significance level (α = 0.05) between the average responses of leaders and faculty members on the total axes of the research sample related to the role of leaders and faculty members in Saudi universities and the role of knowledge management in achieving the sustainability of universities according to the gender variable. This was done to determine the extent to which there are statistically significant differences at the significance level (α = 0.05) between the average responses of leaders and faculty members in Saudi universities regarding the role of knowledge management in achieving the sustainability of universities according to the gender variable (Abualoush et al., 2018; Alkhayyal et al., 2019; Al-Sayed, 2021).

Table 12
Results of the one-way ANOVA test reveal the significance of the differences between the average responses of leaders and faculty members in Saudi universities regarding the role of knowledge management in achieving the sustainability of universities according to the gender variable

Axises	F	Sig. f
The first axis: knowledge management	1.703	0.185
The second axis: sustainable development	0.306	0.736
Total axis	1.128	0.326

Using the One-Way ANOVA test, the Scheffe test was used to determine the degree of statistically significant differences at the level of significance ($\alpha = 0.05$) between the average responses of Saudi university faculty and leaders regarding the role of knowledge management in achieving the sustainability of universities based on the academic rank variable. Table (13) demonstrated that, according to the academic rank variable, there were no statistically significant differences between the average responses of leaders and faculty members on the entire axes of the research sample related to the roles of leaders and faculty in Saudi universities and the role of knowledge management in achieving the sustainability of universities (Abualoush et al., 2018; Alkhayyal et al., 2019; Al-Sayed, 2021).

Table 13
Results of the one-way ANOVA test to reveal the significance of the differences between the average responses of leaders and faculty members in Saudi universities regarding the role of knowledge management in achieving the sustainability of universities according to the academic rank variable

Axises	F	Sig.	Sig. scheffe
The first axis: knowledge management	0.139	0.870	0.850
The second axis: sustainable development	1.731	0.182	0.973
Total axis	0.612	0.543	0.534

Table (14) demonstrates that there were no statistically significant differences at the significance level ($\alpha = 0.05$) between the average responses of leaders and faculty members on the total axes of the research sample related to the role of leaders and faculty members in Saudi universities regarding the role of knowledge management in achieving the sustainability of universities according to the variable number of years of teaching. This was done to determine the extent to which there are statistically significant differences at the significance level ($\alpha = 0.05$) between the average responses of leaders and faculty members in Saudi universities regarding the role of knowledge management in achieving the sustainability of universities according to the variable number of years of teaching (Mutayem & Al-Makhzanji, 2020; Ochoa-Jiménez et al., 2021; Russ, 2021).

Table 14
Results of the Independent Samples T-test reveal the significance of the differences between the average responses of leaders and faculty members in Saudi universities regarding the role of knowledge management in achieving the sustainability of universities according to the variable number of years of teaching

Axises	T
The first axis: knowledge management	-0.018
The second axis: sustainable development	0.462
Total axis	0.146

Table (15) shows that there were statistically significant differences at the significance level ($\alpha = 0.05$) between the average responses of leaders and faculty members on the total axes of the research sample related to the role of leaders and faculty members in Saudi universities and the role of knowledge management in achieving the sustainability of universities according to the specialization variable. This was done to determine the extent to which there are statistically significant differences between the average responses of leaders and faculty members in Saudi universities regarding the role of knowledge management in achieving the sustainability of universities according to the specialization variable (Al-Faouri, 2023; Al-Olayani et al., 2021; Sahoo et al., 2022; Weina & Yanling, 2022).

Table 15
Results of the Independent Samples T-test reveal the significance of the differences between the average responses of leaders and faculty members in Saudi universities regarding the role of knowledge management in achieving the sustainability of universities according to the specialization variable.

Axes	T
The first axis: knowledge management	-3.56**
The second axis: sustainable development	-5.83**
Total axis	-4.03**

**Significant at 0.01 level

RECOMMENDATIONS

1- Establishing knowledge management centers in universities that specialize in managing the teaching process, scientific research, and community service, using information technology and knowledge-based learning systems.

2- Implementing research projects at the university level and providing knowledge management programs.

3- Providing training courses in knowledge management to learn how to produce transfer and apply knowledge within the university.

4- Directing scientific research towards focusing on creativity, innovation, and innovation, and providing the infrastructure for applying knowledge management, represented by the material and technological capabilities.

ACKNOWLEDGEMENTS

The authors acknowledge support for the underlying research into the role of knowledge management in achieving the sustainability of Saudi universities, the Faculty of Education, the University of Hail, and the Saudi Arab Kingdom.

REFERENCES

Abualoush, S., Masa'deh, R., Bataineh, K., & Alrowwad, A. (2018). The role of knowledge management process and intellectual capital as intermediary variables between knowledge management infrastructure and organization performance. *Interdisciplinary Journal of Information, Knowledge, and Management*, *13*, 279–309. https://doi.org/10.28945/4088

Al-Faouri, A. H. (2023). Green knowledge management and technology for organizational sustainability: The mediating role of knowledge-based leadership. *Cogent Business & Management*, *10*(3). https://doi.org/10.1080/23311975.2023.2262694

Alkhayyal, B., Labib, W., Alsulaiman, T., & Abdelhadi, A. (2019). Analyzing sustainability awareness among higher education faculty members: A case study in Saudi Arabia. *Sustainability*, *11*(23), 6837. https://doi.org/10.3390/su11236837

Al-Kubaisi, S. (2005). *Knowledge Management* (1st Edition). Arab Organization for Administrative Development. https://library-iq.blogspot.com/2020/06/blog-post_57.html

Al-Olayani, F. M. A. H., El Emary, I. M., & Aqili, O. M. (2021). Knowledge management practices at the King Abdulaziz University to achieve sustainable competitive advantages in light of the modern university system & Saudi Arabia's Vision 2030. *International Transaction Journal of Engineering, Management, & Applied Sciences & Technologies*, *12*(7), 1–10. https://doi.org/10.14456/itjemast.2021.136

Al-Rashidi, N. F. (2020). Knowledge management as an entry point for developing educational administration in the State of Kuwait. *Arab Journal of Specific Education*, *4*(11), 1–22.

Al-Sayed, M. A. (2021). A proposed strategy to enhance the responsibility of Saudi universities towards environmental sustainability. *Journal of the College of Education - Al-Azhar University*, *40*(189), 200–242. https://dx.doi.org/10.21608/jsrep.2021.165755

Elhouda, S. N., & Yahiaoui, F. (2023). *Knowledge management in supporting the growth and sustainability of healthcare startups – BYPA-SS' case study*. The first national forum via remote tracking technology on: Knowledge management as a tool for strengthening the competitiveness of emerging enterprises, Abd elhamid Ben Badis University – Mostaganem. https://www.researchgate.net/publication/376713643_dwr_adart_almrft_fy_dm_nmw_wastmraryt_almwssat_alnashyt_fy_alqta_alshy_-drast_halt_mwsst_Bypa-ss-

_The_role_of_Knowledge_Management_in_Supporting_the_growth_and_sustainability_of_Healthcare_startups_-_

Hegazy, H. (2017). *Evaluation of biology curricula for the secondary stage in light of the dimensions and issues of sustainable development*. The Nineteenth Scientific Conference.

Ibrahim, H. K., Manaf, A. A., & Mathel, K. T. (2019). The role of knowledge management practices in promoting sustainable development: An applied study on a group of municipal directorates in Anbar Governorate using inferential statistics. *University College of Knowledge Journal*, *28*(1), 272–294.

Khan, A. N., Mehmood, K., & Kwan, H. K. (2024). Green knowledge management: A key driver of green technology innovation and sustainable performance in the construction organizations. *Journal of Innovation & Knowledge*, *9*(1), 100455. https://doi.org/10.1016/j.jik.2023.100455

Kidwell, J., Linde, K. V., & Johnson, S. L. (2000). Applying corporate knowledge management practices in higher education. *Educause Quarterly*, *4*, 69.

Kun, M. (2022). Linkages between knowledge management process and corporate sustainable performance of Chinese small and medium enterprises: Mediating role of frugal innovation. *Frontiers in Psychology*, *13*, 850820–850820. PubMed. https://doi.org/10.3389/fpsyg.2022.850820

Mathaisel, D. F. X., Manary, J. M., & Comm, C. L. (2009). *Enterprise Sustainability: Enhancing the Military's Ability to Perform its Mission*. CRC Press.

Mohiuddin, K., Nasr, O. A., Nadhmi Miladi, M., Fatima, H., Shahwar, S., & Noorulhasan Naveed, Q. (2023). Potentialities and priorities for higher educational development in Saudi Arabia for the next decade: Critical reflections of the vision 2030 framework. *Heliyon*, *9*(5), e16368–e16368. PubMed. https://doi.org/10.1016/j.heliyon.2023.e16368

Mutayem, M. A., & Al-Makhzanji, A. S. (2020). The knowledge economy as a mechanism for achieving sustainable development in Egypt. *Scientific Journal of Financial and Commercial Studies and Research*, *1*(1), 243–285. https://doi.org/10.21608/cfdj.2020.83941

Nejati, M., Shah Bin, A., & Bin Amran, A. (2010). Sustainable development: A competitive advantage or a threat? *Business Strategy Series*, *11*(2), 84–89. https://doi.org/10.1108/17515631011026407

Ochoa-Jiménez, S., Leyva-Osuna, B. A., Jacobo-Hernández, C. A., & García-García, A. R. (2021). Knowledge management in relation to innovation and its effect on the sustainability of Mexican tourism companies. *Sustainability*, *13*(24), 13790. https://doi.org/10.3390/su132413790

Russ, M. (2021). Knowledge management for sustainable development in the era of continuously accelerating technological revolutions: A framework and models. *Sustainability*, *13*(6), 3353. https://doi.org/10.3390/su13063353

Sahoo, S., Kumar, A., & Upadhyay, A. (2022). How do green knowledge management and green technology innovation impact corporate environmental performance? Understanding the role of green knowledge acquisition. *Business Strategy and the Environment*, *32*(1), 551–569. https://doi.org/10.1002/bse.3160

Selvanathan, R. G. (2013). Measuring educational sustainability. *International Journal of Higher Education*, *2*(1), Article 1. https://doi.org/10.5430/ijhe.v2n1p35

Staddon, R. V. (2023). Exploring Higher Education Students' Perspectives on Factors Affecting Use, Attitudes and Confidence with Learning Technologies. *International Journal of Instruction*, *16*(2), 31–52. https://doi.org/10.29333/iji.2023.1623a

Tajpour, M., Hosseini, E., Mohammadi, M., & Bahman-Zangi, B. (2022). The effect of knowledge management on the sustainability of technology-driven businesses in emerging markets: The mediating role of social media. *Sustainability*, *14*(14), 8602. https://doi.org/10.3390/su14148602

UNESCO. (2012). *Education for Sustainable Development: Sourcebook*. United Nations Educational, Scientific and Cultural Organization (UNESCO). https://unesdoc.unesco.org/ark:/48223/pf0000216383_ara

Weina, A., & Yanling, Y. (2022). Role of knowledge management on the sustainable environment: Assessing the moderating effect of innovative culture. *Frontiers in Psychology*, *13*, 861813–861813. PubMed. https://doi.org/10.3389/fpsyg.2022.861813

Yusuf, F. A. (2023). Total Quality Management (TQM) and Quality of Higher Education: A Meta-Analysis Study. *International Journal of Instruction*, *16*(2), 161–178. https://doi.org/10.29333/iji.2023.16210a