A Proposal to Enhance Sustainability in Saudi Universities in Light of the Saudi Green Initiative

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Article

A Proposal to Enhance Sustainability in Saudi Universities in Light of the Saudi Green Initiative

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Abstract: The development of sustainability, the improvement of the quality of life, and the protection of future generations have become of prime importance in light of climate changes and carbon emissions. Universities are at the top of institutions that should participate in creating an environmentally friendly infrastructure. This study thus aimed to explore the extent to which Saudi universities achieve sustainability in the light of the Saudi Green Initiative from the faculty members' perspective. Surely, this investigation would produce a proposal to promote sustainability in Saudi universities. A questionnaire consisting of five dimensions, namely academic sustainability, community partnership, resource management, planning and administration, and innovation and leadership was developed and administered to 120 faculty members from five Saudi universities. The participants' ratings of Saudi universities' achievement of sustainability dimensions ranged from high to moderate. Based on the results, a proposal was offered to take sustainability in Saudi universities to a higher level.

Keywords: sustainability; green universities; the Saudi Green Initiative

1. Introduction

The world is facing ever-emerging crises that threaten man's existence. Ways to prevent and overcome such crises are comprehensively addressed in the Sustainable Development Goals. The United Nations Sustainable Development Goals Report [1] reveals a serious danger to the 2030 Agenda for Sustainable Development due to multiple and successive crises, e.g., climate change. These crises and their complex interactions impact all sustainable development goals, creating occasional crises in education, the environment, peace, and security. To put the world on the correct track leading towards sustainability, concerted efforts are required worldwide.

To address these challenges, international conferences were held, e.g., the 1992 Rio Summit on Environment and Development [2], the 2002 World Summit on Sustainable Development [3], the 2012 Rio Summit on Sustainable Development and Green Economy [4], and the United Nations Summit on Sustainable Development [5]. The International Environmental Meeting in Stockholm, Sweden [6] acknowledged the importance of pluralism in addressing the planet's three crises of climate, nature and pollution. These conferences have increased awareness of environmental issues and sustainability.

The energy crisis and climate changes have contributed to increasing the awareness of individuals of the concept of environmental protection and sustainability within universities. Given the important role that universities can play in achieving sustainability, many international initiatives have come to emphasize the importance of sustainability in universities, e.g., Talloires Declaration 1990, which is one of the first initiatives that called for the application of education for sustainability in universities to achieve a sustainable future. Though it only focused on the environmental, it was a good step on the track of sustainability in universities [7]. The Kyoto Declaration 1993 called

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universities to refine their policy of sustainable development, increase environmental awareness and ethics on and off campus, and adopt the best applications of sustainable development [8].

Given the obvious weakness in achieving sustainability in universities and the need to measure sustainability efforts within the universities and explore their orientations towards achieving green practices in their current and future work, the international measure of sustainability in universities, UI GreenMetric, was adopted by the University of Indonesia in 2010. The adoption of this measure creates competitiveness among universities regarding their green orientations across six indicators, namely setting and infrastructure 15%, energy and climate change 21%, waste management 18%, water management 10%, environmentally friendly transportation 18%, and environment-related education and research 18% [9].

By reviewing the ranking of international universities in the indicator of environment-related education and research that represents 18% of the relative weight of the UI GreenMetric [10] for the year 2022, it was found that eight out of thirty Saudi universities entered the global ranking. More specifically, out of 1050 universities included in the ranking, King Abdulaziz University ranked 38, Qassim University 153, King Faisal University 293, Imam Abdulrahman bin Faisal University 311, King Khalid University 622, Taif University 825, King Saud bin Abdulaziz University for Health Sciences 894, and Prince Sattam bin Abdulaziz University 938. Although an increasing number of Saudi universities are now seeking to achieve sustainability, they are still at an early stage of applying sustainability and they need to exert further efforts to reach a comprehensive institutional shift towards sustainability.

In conjunction with international attention, the Kingdom of Saudi Arabia has given sustainability considerable attention. This is evident in the launch of the Tenth Development Plan 2015-2019 by the Ministry of Economy and Planning [11]. This plan set strategic objectives for the shift towards resource sustainability and environmental protection through expanding the application of sustainable development standards in managing natural resources; using solid waste in electric power generation and water desalination; developing systems for protecting the environment from pollution by improving waste management, reducing its volume, increasing its recycling rates and safe disposal; as well as improving environmental health and protecting the natural environment and wildlife.

The Kingdom's 2030 Vision aims to ensure the continuity of sustainable development and environmental security by preserving natural resources for future generations; reducing pollution by raising the efficiency of waste management; reducing desertification; making the best use of water resources through rationalization and the use of treated and renewable water; and protecting beaches, reserves and islands [12]. Furthermore, the Kingdom launched the National Program for Awareness and Sustainable Development "Environmental Awareness" initiative, which is one of the initiatives of the National Transformation Program 2020 [13] to promote environmental awareness and preserve the Kingdom's natural resources.

In the same context, the Kingdom lunched the Saudi Green Initiative and the Green Middle East Initiative 2021 to play a leading role in alleviating environmental challenges and contribute to global confrontation of climate change. Based on these initiatives, the Kingdom seeks to increase the vegetation cover by planting 10 billion trees over the coming decades; increasing green spaces 12 times as the largest reforestation program in the world; reducing global carbon emissions by more than 4%; and combating pollution and land degradation to promote the quality of life [14].

The Saudi Green Initiative is a national initiative that the Kingdom, one of the most important energy producing countries, is committed to. Since the launch of the 2030 Vision, the Kingdom has made great progress in facing difficult challenges in the field of environmental protection, but more efforts are still needed. The Saudi Green Initiative seeks to increase the Kingdom's reliance on clean energy, reduce carbon emissions and protect the environment in line with the 2030 Vision that aims to improve the quality of life and protect future generations.

In congruence with the aforementioned initiatives, the "Horizons" future plan for university education in the Kingdom [15] stressed the importance of achieving sustainability in universities regarding three basic dimensions of sustainability: social, economic, and financial. Public and private

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universities and research institutions are required to interact effectively with these ambitious initiatives and fulfill their duty towards the environment by encouraging innovative scientific research that addresses sustainability issues like climate change with the purpose of finding novel solutions to carbon emissions and developing environmentally friendly industries with economic value.

Literature Review

Asgarova et al.'s [16] study explored the social responsibility perceptions of university students in Aotearoa, New Zealand regarding social and environmental sustainability. The study relied on a thematic analysis of in-depth semi-structured interviews with 18 students. The study found a low level of activities designed to promote social and environmental sustainability. The students stressed that group work was the biggest obstacle to achieving sustainability goals. The study recommended including social and environmental sustainability topics in curricula and learning outcomes.

Saleem et al. [17] sought to understand the practices and perceptions of education for sustainable development (ESD) in university classrooms in Malaysia, and to explore how holistic, pluralistic and action-oriented approaches were linked to students' knowledge, attitudes and behavior regarding sustainability. The perceptions of 2678 students and 1013 teachers in four Malaysian universities were surveyed. The results revealed that comprehensive, pluralistic, and action-oriented approaches to teaching and learning ESD were widespread in Malaysian universities, with a correlation between ESD curricula and awareness of sustainability.

Al-Suwaiei and Al-Fakhry [18] studied the impact of sustainable change in achieving sustainability in Libyan universities from the perspective of faculty members. Using the descriptive analytical approach, the researchers developed a 52-item questionnaire to collect data from the participants (n = 222). A significant effect of sustainable change on sustainability in Libyan universities was found. The study recommended adopting the sustainable change model by Libyan universities because of its role in achieving and building sustainable value.

Khalidi and Muqimeh [19] assessed sustainability in higher education institutions in Algeria based on the views of faculty members. The study found that higher education institutions in Algeria did not apply sustainability. The study thus recommended that Algerian universities should develop a clear strategic vision for sustainability through the establishment of environment and sustainability committees and building on successful university sustainability experiences. Othman [20] proposed mechanisms for turning Egyptian universities into green universities to achieve sustainable development in light of the experiences of green universities in some foreign countries. The study used the comparative approach and concluded that green universities promote sustainable practices in green curricula, education and scientific research.

Kioupi and Voulvoulis [21] explored the contribution of American universities to sustainability and the development of sustainability competences in their graduates. The study proposed a six-step framework to develop university students' sustainability competences. It also offered tools to assess the alignment of university programs' learning outcomes (LOs) to sustainability and how to translate them into competences for sustainability. The study revealed some obstacles in existing assessment methods in terms of enabling students to develop and apply their competences, collecting data on student performance, and using collected evidence to evaluate if the students are developing the intended competences.

Hassan [22] investigated the reality of the environmental sustainability culture among university students in the light of climate changes and offered a future vision to enhance the environmental sustainability culture based on the study findings. Al-Sayed [23] surveyed the views of 181 Saudi university leaders on the most important responsibilities to be assumed by Saudi universities to achieve environmental sustainability. Based on the participants' views, Al-Sayed offered a proposed strategy to enhance the educational responsibilities of Saudi universities towards environmental sustainability. The study produced a list of 29 responsibilities. Saudi universities were found to exercise their responsibilities towards environmental sustainability to a moderate degree. Based on the study findings, Al-Sayed presented a strategy for enhancing Saudi universities' responsibilities to achieve the shift to sustainable environment.

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Ambusaidi and Al-Dayri [24] explored the acquisition of the principles of sustainability in education by postgraduate students at Sultan Qaboos University from their perspectives. Data was collected from 206 students using a scale of 30 items. The results showed that the degree of acquisition of sustainability principles by postgraduate students was generally high. The research sustainability dimension ranked first, followed by academic sustainability and social sustainability. The study recommended offering training courses for faculty members to train them on teaching the principles of sustainability to postgraduate students. Moghaddam [25] examined the role of the university in solving environmental problems and achieving sustainability through its various activities. The study made use of German universities' experiences in encouraging innovation in general and green innovation in particular. The study concluded that the university has a pivotal role in encouraging green innovation and supporting its practices.

Abdel-Wahhab [26] aimed to determine the readiness of Benha University—as a case study for Egyptian universities—to transition towards a sustainable green university in the light of its functional pillars. A questionnaire probed faculty members' opinions about their university's readiness and the dynamics of its turning into a sustainable green university. Most of the university's pillars, whether qualifying or transformative, were given medium ratings except for the pillar of "knowledge building and green culture" that was given a weak rating. The research ended with a proposal to enhance the dynamics of the transformation of Benha University and Egyptian universities into sustainable green universities. Al-Omari and Al-Arini [27] sought to determine the administrative requirements to activate the role of university administrations in the transition towards academic, research, and social sustainability. The study recommended benefiting from global indicators and systems specialized in sustainability and developing a strategic plan for the transition towards sustainability. The most important recommendations for transforming into academic, research and social sustainability included disseminating and documenting the best experiences and practices of sustainability, and encouraging the university community to participate in research sustainability activities.

Mujahid [28] reported that universities can play a major role in supporting sustainability and promoting sustainable development through research, education, and the application of sustainability in their establishments, community service, and campus operations. The study revealed that Arab universities have made strides to achieve sustainability, but they still have a lot to do in this regard. The researcher recommended benefiting from the experiences of the Universities of Newcastle in the United Kingdom and Maribor in the Republic of Slovenia. Finally, Alsaati et al. [29] highlighted the positive role of sustainability education and how students' knowledge of sustainability affects their awareness and behavior. The views of 500 students in different study programs in even Saudi universities were surveyed. The results showed that a high percentage of the participants heard the term sustainability in educational sources, but lacked deep knowledge of it. Students' behaviors and lifestyles related to sustainability reflected high rates of participation in sustainability and conservation measures. The researchers stressed that promoting awareness of sustainability among students entails involving stakeholders such as schools, local governments, and municipalities. They also recommended providing courses and workshops on sustainability, and supporting student activities on and off campus to promote sustainable behavior.

2. Method

2.1. Study Population and Sample

The study population consisted of faculty members in Saudi universities in the central region, namely Imam Muhammad bin Saud Islamic University, Princess Noura bint Abdul Rahman University, Prince Sattam bin Abdulaziz University, King Saud bin Abdulaziz University for Health Sciences, and Qassim University. The study sample consisted of 120 faculty members. The universities under study are located in the central region, the largest region in the Kingdom of Saudi Arabia, and are close to the residence of the researchers. Three of the universities appear on the

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Universities Integrity Ranking Index (UI Green Metric). Table 1 shows the characteristics of the participants.

Table 1. The characteristics of the participants.

	Variable	Frequency	%
University	Imam Muhammad Bin Saud Islamic University	14	11.7
	Princess Nora bint Abdul Rahman University	23	19.2
	Prince Sattam bin Abdulaziz University	53	44.2
	King Saud bin Abdulaziz University for Health Sciences	20	16.7
	Qassim university	10	8.3
College	Scientific	49	40.8
	Humanity	71	59.2
Rank	Professor	26	21.7
	Associate professor	57	47.5
	Assistant professor	37	30.8
	Total	120	100.0

2.2. The Research Instrument

To collect the required data, a questionnaire consisting of two parts was developed. The first part included the participants' demographic data: university, college, and academic rank. The second part included 45 items distributed under five main dimensions: academic sustainability (10 items), community partnership (10 items), resource management (8 items), planning and administration (9 items), and innovation and leadership (8 items). The participants responded to items based on a 5-pint Likert scale ranging from 1 "Strongly disagree" to 5 "Strongly agree".

To establish the construct validity of the questionnaire, the questionnaire was pilot-tested on 30 faculty members from outside the study's main sample and correlations among items and their respective dimensions, correlations among items and the total score, and correlations among dimensions and the total score were computed. Items correlated with their respective dimensions with coefficients ranging from 0.67 to 0.98 and with the questionnaire's total score with coefficients ranging from 0.56 to 0.95. Also correlations among dimensions and the total score and inter-correlations among dimensions were significant ($p = 0.01$), proving the questionnaire to enjoy sufficient construct validity.

The reliability of the questionnaire was established by the internal consistency method, using the data of the pilot sample ($n = 30$). Alpha reliability estimates for academic sustainability, community partnership, resource management, planning and administration, innovation and leadership, and the total questionnaire were 0.77, 0.81, 0.79, 0.77, 0.80, and 0.86 respectively, which reveals the questionnaire to be quite reliable.

3. Results

To answer the research question about the extent to which Saudi universities achieve sustainability (academic sustainability, community partnership, resource management, planning and administration, innovation and leadership) in light of the Saudi Green Initiative from the perspective of faculty members, descriptive statistics (means and standard deviations) were used. To identify if a mean is high, moderate, or low, Oxford's [33] scoring system: high (mean of 3.5 or higher), medium (mean of 2.5–3.4), and low (mean of 2.4 or lower) was used.

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The first research question "To what extent do Saudi universities achieve aspects of sustainability (academic sustainability, community partnership, resource management, planning and administration, innovation and leadership) in the light of the Saudi Green Initiative?

3.1.1. Academic Sustainability

The results in Table 2 show that faculty members' rating of the extent to which Saudi universities achieve academic sustainability is high (M = 4.19). That is, they highly agree that universities achieve academic sustainability. Means of academic sustainability items ranged between 4.30 and 3.98. Item 4 "The university highlights the importance of preserving the environment and sustainability awareness" received the highest rating (M = 4.30), followed by item 6 "The university offers incentives to students interested in protecting the environment and supporting green universities" (M = 4.26), and item 8 "The university integrates environmental knowledge and sustainability issues in lectures, e.g., energy consumption and water resources" (M = 4.24). Item 3 "The university holds workshops for students to achieve sustainability and recycling of food and waste," received the lowest mean (M = 3.98), followed by item 9 "The university cooperates internationally with advanced green universities to exchange ideas and develop environmental awareness" (M = 4.13). Overall, these results reveal that Saudi universities are well-aware of their role in achieving sustainability through their curricula and educational practices.

Table 2. The descriptives of academic sustainability in descending order.

No.	items	M	SD	Agreement	Rank
4	The university highlights the importance of preserving the environment and sustainability awareness	4.30	0.77	High	1
6	The university offers incentives to students interested in protecting the environment and supporting green universities	4.26	0.80	High	2
8	The university integrates environmental knowledge and sustainability issues in lectures, e.g., energy consumption and water resources	4.24	0.76	High	3
10	The university introduces courses concerned with building purposeful environmental ethics and values	4.23	0.85	High	4
7	The university is interested in spreading cultural awareness of the importance of the environment and sustainability through conferences and seminars	4.22	0.65	High	5
5	The university promotes a commitment to sustainability for students, faculty and alumni	4.21	0.66	High	6
1	The university guarantees green curricula in the study programs of all departments	4.19	0.79	High	7
2	The university is interested in nuclear energy research, renewable energy technology, engineering and waste recycling	4.13	0.84	High	8
9	The university cooperates internationally with advanced green universities to exchange ideas and develop environmental awareness	4.13	0.80	High	9
3	The university holds workshops for students to achieve sustainability and recycling of food and waste	3.98	0.94	High	10
	Total	4.19	0.62	High	

3.1.2. Community Partnership

It can be seen from the data in Table 3 that faculty members' rating of the community partnership dimension of sustainability is high (M = 4.23). The universities are keen to establish community partnerships, recognizing their importance in implementing sustainability initiatives and projects. They provide scientific and technical advice for environmental sectors and exert noticeable efforts to educate community members about sustainability and the preservation of the environment. This finding is in line with the study of Al-Omari and Al-Arini [27] which stressed the need to educate society about sustainability issues and challenges.

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Table 3. The descriptives of community partnership in descending order.

No.	items	M	SD	Agreement	Rank
19	The university holds partnerships with local community institutions to achieve sustainability and solve environmental problems	4.43	0.67	High	1
13	The university encourages participation in environmentally friendly events to promote green initiatives	4.35	0.67	High	2
14	The university participates in initiatives that support the societal sustainability	4.30	0.66	High	3
16	The university participates in environmental protection activities held by the local community	4.28	0.65	High	4
15	The university offers the expertise of faculty members to the community to benefit from	4.22	0.64	High	5
20	The university establishes supportive incubators for green projects on campus to communicate with external organizations	4.22	0.79	High	6
18	The university establishes platforms for sharing information with stakeholders and the community to support sustainability and green innovation	4.21	0.67	High	7
12	The university seeks to link the strategic goals of community service with the goals of green initiatives that support sustainability	4.13	0.79	High	8
11	The university designs campaigns to educate the community about environmental issues and the dimensions of sustainability	4.12	0.74	High	9
17	The university carries out activities and activates student clubs to promote sustainability in the university	4.03	0.68	High	10
	Total	4.23	0.69	High	

Means of the community partnership items ranged between 4.43 and 4.03. Item 19 "The university holds partnerships with local community institutions to achieve sustainability and solve environmental problems" achieved the highest mean (M = 4.43), followed by item 13 "The university encourages participation in environment-friendly events to promote green initiatives" (M = 4.35). Although item 17 "The university carries out activities and activates student clubs to promote sustainability in the university" ranked last, it received a high rating (M = 4.03). This indicates that universities are aware of the importance of community partnerships to educate citizens about sustainability to develop in them positive attitudes and behaviors towards the preservation of environmental resources. The universities are keen to provide technical consultations to local community partners, so they can play an active role in achieving various aspects of sustainability.

3.1.3. Planning and Administration

It is clear from data in Table 4 that faculty members' rating of the resource management dimension of sustainability is moderate (M = 3.45). That is, they moderately agree that the planning and administrative performance in universities supports sustainability. Means of this dimension ranged between 3.83 and 3.45, with three items achieving high means and six items achieving moderate means. Item 22 "The administration sets plans to achieve security and safety requirements to protect buildings and facilities" received the highest mean (3.83). Item 21 "The administration implements plans to save energy and rationalize spending on campus" received the lowest rating (M = 3.45).

Table 4. The descriptives of resource management in descending order.

No.	items	M	SD	Agreement	Rank
22	The administration sets plans to achieve security and safety requirements to protect buildings and facilities	3.83	0.60	High	1
27	The administration exploits buildings, equipment, and natural assets in investment activities	3.70	0.66	High	2
28	The administration expands intellectual and innovative investment by marketing intellectual and innovative products	3.56	0.67	High	3
23	The administration develops financial sustainability plans to enhance the efficiency of spending	3.42	0.78	Average	4
29	The university promotes resource efficiency and energy security	3.41	0.76	Average	5
25	The administration shows the importance of adopting technology in reducing waste and pollution	3.40	0.77	Average	6
26	The university is keen on the continuity of its plans and programs with the possibility of amending them in the light of changes	3.38	0.81	Average	7

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24	Senior administration supports sustainability in all its dimensions and programs	3.33	0.75	Average	8
21	The administration implements plans to save energy and rationalize spending on campus	3.18	0.78	Average	9
	Total	3.45	0.73	Average	

3.1.4. Innovation and Leadership

Means of items in this dimension ranged between 4.01 and 3.22, the highest of which (M = 4.01) was for item 36 "The university has a sustainability office to coordinate and direct sustainability in line with the university's vision". Item 35 "The university is interested in green training to enhance creativity" achieved the least mean (M = 3.22). Faculty members' overall rating of the innovation and leadership dimension of sustainability is moderate (M = 3.46). This indicates that Saudi universities need to exert more efforts to achieve sustainable leadership.

Table 5. The descriptives of innovation and leadership in descending order.

No.	Items	M	SD	Agreement	Rank
36	The university has a sustainability office to coordinate and direct sustainability in line with the university's vision	4.01	0.60	High	1
30	The University supports innovation of best practices and developments related to sustainability	3.86	0.66	High	2
32	The university adopts innovative and effective methods in environmental awareness	3.45	0.69	High	3
33	The university encourages collaboration with other universities to develop green innovation and sustainable projects	3.32	0.78	High	4
37	The university benefits from successful international experiences of green innovation	3.31	0.61	Average	5
31	The university establishes innovation centers to incubate entrepreneurial ideas and projects	3.30	0.70	Average	6
34	The university is interested in applied research related to solving the problems of society and the environment	3.26	0.79	Average	7
35	The university is interested in green training to enhance creativity	3.22	0.84	Average	8
	Total	3.46	0.71		

3.1.5. Resource Management

Means of the resources management items ranged between 3.67 and 3.22, with item 43 "The university sets laws and regulations for the sustainability and rationalization of natural resources" receiving the highest mean (3.67), followed by item 40 "The university instills optimal investment of environmental resources in students" with a mean of 3.61. Item 45 "The university offers educational programs to reduce excessive consumption of resources" came last with a mean of 3.22. The total mean of this dimension is 3.44, which is moderate. That is, despite the continuous interest in the comprehensive development of the environment and the enactment of rules and laws aimed at the sustainability of natural resources, this development focused on the enactment of laws and legislation and the optimal investment of natural resources. It has not so far produced a special approach to the development of a culture of sustainability and resource management [30].

Table 6. The descriptives of resource management in descending order.

No.	items	M	SD	Agreement	Rank
43	The university sets laws and regulations for the sustainability and rationalization of natural resources	3.67	0.77	High	1
40	The university instills optimal investment of environmental resources in students	3.61	0.70	High	2
39	The university encourages the rationalization of energy consumption on campus	3.58	0.79	High	3
41	The university demonstrates the importance of using renewable and safe energy in the long term	3.44	0.80	High	4
42	The university provides sufficient resources for the sustainability of the campus and its facilities	3.38	0.84	Average	5
44	The university provides a safe and healthy technological infrastructure suitable for achieving sustainability	3.37	0.72	Average	6

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38	The university uses environmentally friendly green transportation	3.28	0.99	Average	7
45	The university offers educational programs to reduce excessive consumption of resources	3.22	0.99	Average	8
	Total	3.44	0.82	Average	

4. Discussion

This study aimed to identify the contribution of Saudi universities to achieving sustainability in terms of academic sustainability, community partnership, planning and management, innovation and leadership, and resources management in the light of the Saudi Green Initiative. Faculty members' rating of the universities' achievement of academic sustainability is high. This can be attributed to the academic sustainability practices in Saudi universities, e.g., integrating green knowledge in curricula; involving students in planting and sustainability programs; and educating students, faculty members and employees on the importance of conserving energy and water, recycling waste and foods, and preserving the environment. This result echoes the study of Alsaati [29] which recommended offering courses on sustainability and supporting student activities on and off campus to promote their sustainable behavior. Through curricular and extracurricular activities, universities expose students to sustainability and environmental issues. According to Asgarova [16], integration of such issues in study courses and extracurricular activities develops in students a positive attitude towards sustainability.

The faculty members' responses showed that Saudi universities exert noticeable efforts to promote international cooperation with environmentally friendly green universities and provide students with courses and workshops to achieve university sustainability. This fining concurs with the study of Ambusaidi and Al-Dayri [24] and the study of Khaldi and Muqimeh (2022) which recommended the need to include the principles of sustainability in university functions and to benefit from the successful experiences of universities in the field of sustainability.

In regard to community partnership, universities proved to be aware of the importance of partnerships with local community institutions to educate community members to preserve the environment and sustain its resources, increase environmental awareness among segments of society to promote positive environmental behaviors, and enhance the knowledge and skills of workers in the private sectors. This result is consistent with the study of Mujahid [28] and the study of Al-Souaei and Al-Fakhry (2022) who emphasized the role of universities in supporting sustainability and its application to community service and campus operations. Saudi universities were found to support and collaborate with national initiatives that support sustainability, e.g., the "Environmental Awareness" initiative and the "National Program for Reducing Food Loss and Waste" initiative. This finding is consistent with the study of Abdel-Wahhab [26] which recommended that universities link goals of community service and environmental development to national development initiatives and goals.

There is agreement among the participating faculty members that administration in Saudi universities is keen on the achievement of sustainability in their policies and strategies, campus operations, education and research, environment and climate, and management and society. The results also revealed that administration exploits buildings, equipment, and natural assets of the university in investment activities by renting them as a kind of investment. These revenues are used to maintain and expand facilities.

The results also showed that Saudi universities have many researchers whose benefit is not limited to teaching or scientific research. Universities invest the human and intellectual capital and market it locally and globally in order to achieve financial sustainability and compensate for economic costs so that they can maintain their future production capacity. This concurs with the ESCWA's [31] report which maintains that educational institutions should focus on compensating for their expenditure to achieve financial sustainability. The results indicated a weakness in implementing plans to save energy and rationalize campus spending. This is in line with the study of Wang et al. [32] which provided university employees with training to promote their environmental behaviors.

The results of the fourth dimension, innovation and leadership, showed that the participants agreed that the sustainability office in universities should lead sustainable development and provide

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technical expertise. This includes monitoring sustainability performance and communicating sustainability measures and initiatives to the community. The results also showed that universities adopt sustainability oriented perceptions towards innovation with regard to developing new competencies that support green innovation and the acquisition of innovative and environmentally friendly technologies and processes. This is consistent with Moghaddam's (2021) study which confirmed that green innovation is one of the most modern methods that employ technology to protect the environment and achieve development.

The results revealed that there are weaknesses in Saudi universities in practicing green training to enhance creative capabilities. This finding converges with Al-Sayed's [23] study which concluded that Saudi universities assume their responsibilities towards environmental sustainability with a moderate to a weak degree. This fining is nonetheless inconsistent with the studies of Moghaddam [25] Othman [20] which emphasized the university's major contribution to the development of green concepts and green innovation.

The results of the fifth dimension about resource management indicated that there is agreement among the participants that universities enact laws and regulations for the sustainability and rationalization of natural resources and the optimal investment of environmental resources. Universities are concerned with biodiversity and the preservation of environmental systems through laws and regulations that aim at sustaining resources and rationalizing their consumption. This is consistent with Al-Sayed's [23] study and Hassan's [22] study. The results also showed that Saudi universities need to intensify their awareness and educational efforts to rationalize consumption in line with the national orientation towards the preservation of the environment. This concurs with Mujahid's [28] study which recommended benefiting from the experiences of the universities of Newcastle in the United Kingdom and Maribor in the Republic of Slovenia in adopting international practices that guarantee the highest standards of sustainability and environmental security.

5. The proposal

The second research question "What is the proposal to promote aspects of sustainability in Saudi universities in the light of the Saudi Green Initiative?"

Based on the study's findings, the following proposal is offered to take sustainability in Saudi universities to a higher level.

5.1. The Proposal's Vision

For Saudi universities to become a pioneering and distinguished model in the shift towards sustainability at the local, regional and international levels.

5.2. The Proposal's Mission

Developing a university that is capable of performing academic and research functions; effective in preserving the environment and natural resources; and pioneering in achieving sustainability on and off campus.

5.3. The Proposal's thought Foundations

- The Kingdom's 2030 Vision that places great emphasis on four aspects of sustainability, namely: environmental sustainability, financial sustainability, infrastructure sustainability, and social sustainability.
- The future plan for university education in the Kingdom of Saudi Arabia "Horizons 2029", which emphasizes achieving sustainability in three basic areas: social sustainability, economic stability, and financial sustainability.
- The shift towards sustainability is a recent trend in international universities. Thus, interest in sustainability has clearly increased in recent years. There are 1050 universities and colleges worldwide that have shifted towards sustainability based on the global index for classifying sustainability in universities (UI Green Metric).

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- Attention to sustainability increases researches and innovations, as the challenges and issues of sustainability require innovative and unconventional solutions.
- The weak interest of Saudi universities in the shift towards sustainability, as there are only two Saudi universities registered in the Global Sustainability Tracking and Classification System (STARS) for the year 2023, namely Prince Sultan University and King Abdullah University of Science and Technology, with 1160 universities and colleges within this system worldwide [34].

5.4. The Proposal's Objectives

- Encouraging Saudi universities to shift towards sustainability by developing a general framework that helps universities take the basic steps to start achieving sustainability.
- Unifying the efforts and orientations of universities to achieve a comprehensive transformation towards sustainability and keep abreast of global developments in this field.
- Raising the level of the culture of sustainability and increasing awareness of its issues and challenges inside on and off campus, with the aim of modifying negative attitudes towards the environment and natural resources.
- Linking the activities and operations of the university with sustainability to reduce the negative environmental impact of the university, in addition to applying best practices to enhance the positive impact.
- Establishing the concepts and terminology of sustainability in universities so that sustainability becomes an integral part of university life for employees, faculty members, and students.

5.5. The Requirements of Applying the Proposal

The most important requirements of achieving the proposal can be summed up in five main areas [35–38].

5.5.1. Academic sustainability

- Establishing a special committee to link courses and curricula at the university with sustainability to integrate sustainability concepts, principles and issues in the academic curricula.
- Including sustainability in educational activities, student researches and curricular and extracurricular activities, and graduation projects.
- Developing academic systems and regulations at the university to acquaint students with sustainability issues.
- Initiating academic majors related to sustainability studies, which grant the bachelor, MA or Ph.D. degrees.
- Cooperating with the sustainability team at the university to provide faculty members, students and employees with training programs, courses, seminars and workshops on sustainability.

5.5.2. Community Partnership

- Activating and supporting student societies and clubs related to sustainability.
- Educating the local community and involving it in social sustainability practices in cooperation with the Sustainability Department and the university.
- Making use of social media and the university's sustainability webpage to introduce the activities, events and efforts made by the university to achieve sustainability and spread the culture of community sustainability in the community.
- Including local community members in the university's sustainability teams and providing them with educational and training opportunities with the aim of developing their expertise and qualifying them to contribute to addressing sustainability issues in communities.
- Facilitating the participation of faculty members in international exchange programs and conferences targeting community sustainability.

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5.5.3. Resources Management

- Developing policies and plans to reduce resources consumption and depletion and to support the culture of productivity versus consumption.
- Developing super safety plans to protect university facilities and providing safety elements for faculty members, students, and employees.
- Using environment-friendly means of transportation on and off campus by faculty members, students, and employees.
- Adopting a policy for waste recycling by separating it from the source into four types: organic waste and food residue, plastic waste, metal waste, and paper waste.
- Providing a wastewater treatment plant at the university to make wastewater suitable for irrigating the green spaces on campus.

5.5.4. Planning and Administration

- Including the principles of sustainability in the university's vision, mission, and goals to plan the shift towards sustainability.
- Determining the competitive advantages that universities must focus on to achieve the shift towards sustainability, as the success of sustainable global universities has been urged by focusing on their competitive advantages that distinguish them from others.
- Building benchmarks in the main areas in which the university aims to achieve sustainability to assess the reality of sustainability in the university and the progress achieved after the onset of the shift towards sustainability.
- Using as references the best universities in the field of sustainability by reviewing the ranking of universities in the Global Sustainability Tracking and Classification System (STARS), or by reviewing the ranking of universities on the Sustainability Ranking Index in Universities (UI Green Metric).
- Providing the necessary funding for the Sustainability Department and relevant authorities in the university to carry out their sustainability tasks, and providing financial support for sustainability programs, projects and initiatives on and off campus.

5.5.5. Innovation and Leadership

- Supporting sustainable environmental innovations and projects through specialized university centers that oversee the preparation, implementation and evaluation of sustainable events.
- Establishing research and entrepreneurial incubators to support and adopt research and innovation activities in the field of sustainability. These incubators are to study and adopt innovative projects and provide the necessary support for them.
- Cooperation among universities and community institutions with regard to the development of green innovation and sustainable projects.
- Establishing centers for sustainable innovation to promote green economy concepts and green entrepreneurial ideas and projects.
- Benefiting from successful international experiences in encouraging green innovation and moving forward towards achieving and applying it.

6. The Expected Challenges of Applying the Proposal

- Lack of human competencies capable of leading the university's shift towards sustainability, and lack of necessary qualification of university employees in the field of sustainability.
- Lack of awareness in the university community of the negative impacts caused by universities on the environment and natural resources.
- Absence of sustainability in the strategic vision for the development of the university.
- Lack of training courses and programs addressing awareness in the university community of the importance of sustainability and its challenges.

- Lack of financial resources to support and finance programs and projects of the shift towards sustainability.
- The difficulty of keeping pace with the rapid developments in the shift towards sustainability, given its reliance on research, development and innovation.

7. Solutions to the Expected Challenges

- Providing training programs, courses, workshops, and seminars that educate the society on the importance of sustainability.
- Reviewing and developing regulations and laws to enhance universities' capabilities to achieve sustainability.
- Determining the training needs of faculty members and employees regarding the shift towards sustainability.
- Recruiting qualified competencies in the field of sustainability to work in the sustainability department at the university.
- Allocating material incentives for leaders, administrators, faculty members and students who are active in the transformation towards sustainability.
- The presence of a specialized team in the Sustainability Department at the university to review the latest global experiences, trends and practices in the transition to sustainability.

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