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Evaluating Saudi Arabian HEIs: Achievements, Strategic Gaps, and Future Roadmap for UN SDGs through THE Impact Rankings

[HAFIZ ABDUL WAJID](#) *

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Article

Evaluating Saudi Arabian HEIs: Achievements, Strategic Gaps, and Future Roadmap for UN SDGs Through the Impact Rankings

Hafiz Wajid *

Department of Electrical Engineering, Islamic University of Madinah, Al-Madinah Al-Munawarah, Saudi Arabia; hawajid@iu.edu.sa

Abstract: This paper evaluates the performance of Saudi Arabian higher educational institutions (HEIs) in achieving the United Nations Sustainable Development Goals (UN-SDGs) as reflected in the Times Higher Education Impact Rankings (THE IR). It uses two benchmarking frameworks: the European Union Association (EUA) and the UN-KSA Cooperation 2022–26 frameworks, to identify achievements and gaps. Additionally, the alignment of HEIs' performance with Saudi Arabia's 2024 Sustainable Development Report (SDR) is assessed. Hierarchical Cluster Analysis (HCA) is conducted to group HEIs based on their targeted SDGs. The paper also identifies lead HEIs for each SDG, along with partner and supporting HEIs, to address strategic gaps in SDGs 9 and 16, and Priority Areas 2-4 under the UN-KSA Cooperation framework 2022-26. Finally, a SWOT analysis highlights strengths, weaknesses, opportunities, and threats, providing actionable recommendations to enhance the contributions of Saudi Arabian HEIs towards achieving the SDGs.

Keywords: THE Impact Rankings; UN-SDGs; Hierarchical Cluster Analysis; EUA framework; UN-KSA Cooperation Framework; World Rankings; SWOT analysis

1. Introduction

Over the past few decades, the higher education (HE) system in KSA has underwent significant transformation [1]. Initially, the focus was on establishing a few key HEIs to meet the nation's educational needs [2–4]. However, with the introduction of Saudi Vision 2030 [5,6], there has been a concerted effort to expand and enhance the quality of HE. This initiative aims to transition the country from an oil-based economy to a knowledge-based one [7]. The Ministry of Education (MoE) has played a pivotal role in this transformation by overhauling curricula and raising education standards nationwide [8]. Notable achievements include: (i) the establishment of a total of 67 HEIs (29 public and 38 private) as of 2024; (ii) an increased enrolment rate in both tertiary education (with a gross enrolment ratio of nearly 71% and an average annual growth rate of over 6% since 2012) and higher education (by 2022, approximately 2 million out of 3.3 million Saudis aged 18-24 were enrolled, with 95% attending public sector HEIs); and (iii) the introduction of innovative programs designed to bridge the skills gap between graduates and labor market demands. (job placement rate found higher in case of public sector HEIs graduates) [8,9]. However, according to the Organization for Economic Co-operation and Development (OECD) Indicators of Education Systems (INES) program, KSA remains one of the lowest among OECD and partner countries for both tertiary and higher education [10].

The UN SDGs are a set of 17 global goals adopted in 2015, aimed at creating a prosperous future under the slogan "Transforming Our World" [11,12]. These goals address global challenges such as poverty, inequality, climate change, environmental degradation, peace, and justice. HEIs play a crucial role by integrating these SDGs into their curricula and operations, fostering a generation of graduates committed to sustainable development beyond mere knowledge acquisition [13–16]. Furthermore, in line with Saudi Vision 2030, which aims to enhance human capital and promote

sustainable economic growth, Saudi Arabia’s efforts to align HEIs with the UN-SDGs are commendable [17–19]. We recommend readers to consult an extensive report to grip detailed understanding specifically the proactive role HEIs are playing in advancing UN SDGs in relation to Saudi Vision 2030 [21].

Over the past two decades, global rankings such as the Times Higher Education (THE) World University Rankings [22], QS World University Rankings [23], and Academic Ranking of World Universities (ARWU) [24] have been established, evolved, and matured [25]. These rankings aim to evaluate HEIs worldwide using distinct methodologies and focus areas [26,27]. Renowned and leading in their field, these rankings provide a comprehensive overview of HEI performance. To avoid repetition, we recommend consulting the original sources for detailed information [22–24]. However, to highlight their significant role, Figure 1 illustrates that, as of 2024, these rankings cover approximately 8%, 6%, and 10% of the world’s estimated 25,000 HEIs and approximately 60%, 55% and 48% of world’s estimated 193 countries respectively.

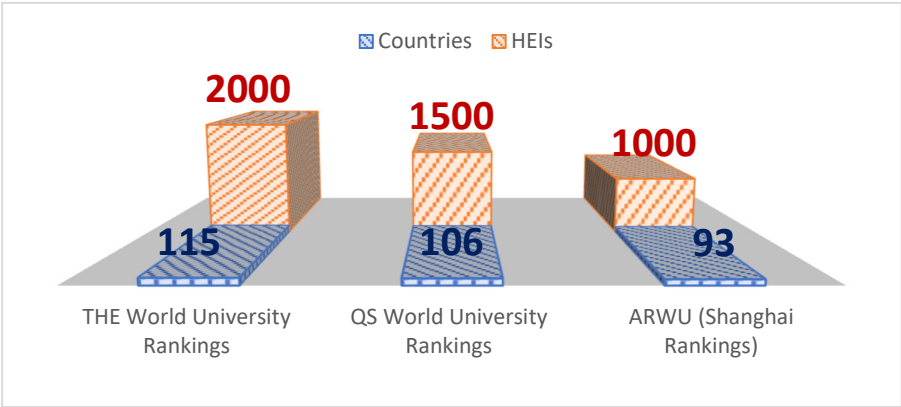


Figure 1. Participation of global HEIs as of 2024-25 in World University Rankings [22–24].

These rankings offer valuable insights for stakeholders, including educators, policymakers, and students, by highlighting institutional strengths and identifying areas for improvement. Beyond traditional rankings, there is a growing emphasis on sustainability-focused evaluations. These rankings underscore the increasing importance of social responsibility and sustainable development in HE. Detailed information is provided in Table 1 in chronological order.

Table 1. Sustainability-focused Global Assessment Platforms for HEIs.

Assessment Platform	Overview	Purpose	Regulatory Authority
[28] STAR, 2006 Sustainability Tracking, Assessment and Rating System	A transparent, self-reporting framework for HEIs to measure their sustainability performance	To provide a self-reporting tool for assessing sustainability	Association for the Advancement of Sustainability in Higher Education (AASHE)
[29] UIGWUR, 2010 UI GreenMetric World University Ranking	Evaluates HEIs based on sustainability efforts	To rank universities globally by sustainability practices	University of Indonesia
[30] LiFE, 2011 Learning in Future Environments	Supports managing and improving sustainability in HEIs	To promote continuous improvement and social responsibility	Environmental Association for Universities and Colleges (EAUC), UK

[31] HESI, 2012 Higher Education Sustainability Initiative	Enhances HEIs role in advancing sustainable development globally	To promote sustainable development commitments by universities	Partnership between various UN bodies (launched at Rio+20)
[22] THE IR, 2019 Times Higher Education Impact Rankings	Assesses HEIs on teaching, research, stewardship and outreach aligned with SDGs	To measure university societal impact through SDG metrics	Times Higher Education (THE)
[32] SET4HEI, 2024 Sustainability Evaluation Tool for Higher Education Institutions	An online resource for HEIs to map their contributions to SDGs	To help HEIs measure and improve their SDG impact	UNESCO IESALC in partnership with UNAI and other UN agencies

Table 1 demonstrates that modernizing HEIs requires a shift from merely participating in ranking systems to becoming impactful, mature institutions focused on two core elements [33]: a) Student Engagement: prioritizing students as primary stakeholders in sustainability initiatives to foster a sense of ownership and responsibility toward sustainable development [34]; and b) Sustainable Campus Models: given their size and population, HEIs resemble small cities, capable of making both positive and negative environmental imprints. To amplify positive impacts, HEIs should adopt responsible environmental practices, such as reducing water, energy, and paper consumption, utilizing renewable energy, promoting recycling, minimizing toxic emissions, implementing sustainable building practices, and increasing green spaces and landscaping [33,34]. Numerous studies further explore campus sustainability strategies within HEIs, highlighting efforts in environmental education, strategic planning, community engagement, and ecological responsibility. These studies often emphasize environmental sustainability over social dimensions [35–41]. A structured framework is essential for helping HEIs systematically integrate sustainable practices into operations, teaching, and research [42]. This study assesses the performance of HEIs in Saudi Arabia in achieving the UN SDGs using two frameworks specifically designed to address the UN SDGs: i) the EUA framework [43] and ii) the UN-KSA Cooperation Framework [20].

This study analyzes the progress of Saudi Arabian HEIs in advancing the UN-SDGs, using their performance in the THE IR as a benchmark. Section-2 briefly introduce THE IR followed by Section-3 which present methodology and explores the participation and achievements of Saudi Arabian HEIs in THE IR, with an in-depth evaluation of the top 100 ranked institutions and their coverage of specific SDGs, focusing particularly on institutions in the B1 ranking tier. Section-4 assesses the sustainability progress of Saudi HEIs in alignment with the EUA framework, while Section-5 evaluates progress according to the UN-KSA Cooperation Framework for KSA (2022–2026), addressing key priority areas: People, Planet, Prosperity, Peace, Partnerships, and cross-cutting issues. In Section-6, both frameworks are compared with nationwide SDG progress report. Section-7 presents a hierarchical cluster analysis of HEIs relative to UN-SDG performance, and Section-8 concludes with insights and recommendations. The appendix section contains Tables A1-A6 of Saudi Arabian HEIs participation in THE IR for years spanning 2019 till 2024 inherited from THE IR website [22].

2. Times Higher Education Impact Ranking (THE IR)

The THE IR, globally assess HEIs based on their contributions to the UN SDGs evaluating universities in four key areas: Teaching, Research, Stewardship, and Outreach. They provide a comprehensive view of how universities are tackling global challenges and striving to improve the world, beyond traditional academic criteria. Since 2019, there has been a steady increase in the

number of HEIs and countries participating in the THE IR worldwide. The number of universities has grown from 450 in 2019 to 2,152 in 2024, while the number of participating countries has risen from 76 to 125 (see Figure 2). This growth reflects the global commitment of HEIs to align with the UN SDGs.

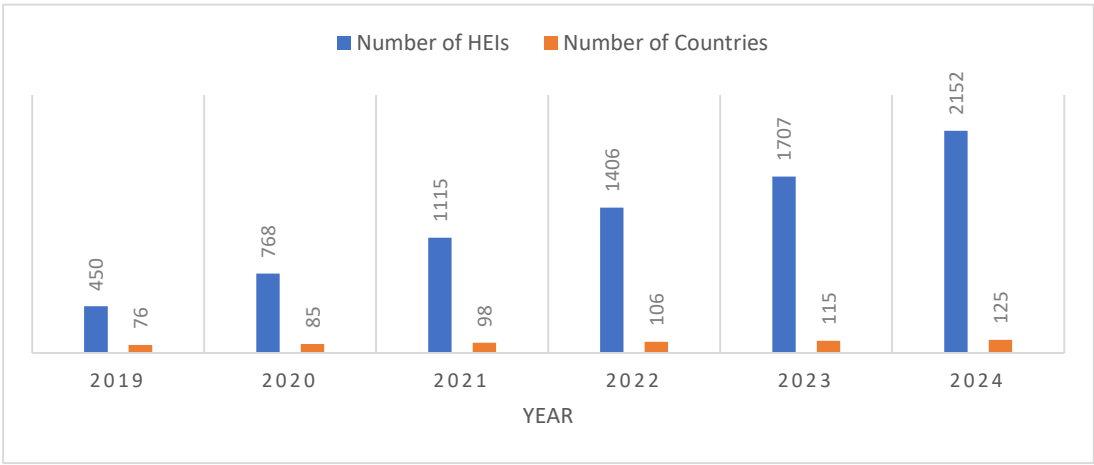


Figure 2. Participation of global HEIs and Countries in the THE IR since inception.

3. Methodology

The data is inherited from THE IR [22] for years spanning 2019 till 2024 related to participated Saudi Arabian HEIs. Descriptive statistical analysis is used to measure significant achievements and gaps in relation to EUA and UN-KSA frameworks for all UN-SDGs: 1-17. Data for these years is given in appendix section (see Tables A1–A6).

3.1. Participation and Progress Evaluation of HEIs of KSA in THE IR

This section examines the performance of Saudi Arabia’s HEIs (67 in total: 29 public and 38 private) in relation to the UN SDGs as assessed by the THE IR. Saudi HEIs first entered these rankings in 2019 with three institutions (two public and one private). By 2024, this number had increased to 32 institutions (24 public and 8 private), reflecting substantial growth. It is clear from Figure 3, that a linear regression forecast suggests that if this trend continues, all 67 Saudi HEIs will be involved in UN SDG efforts by 2030.

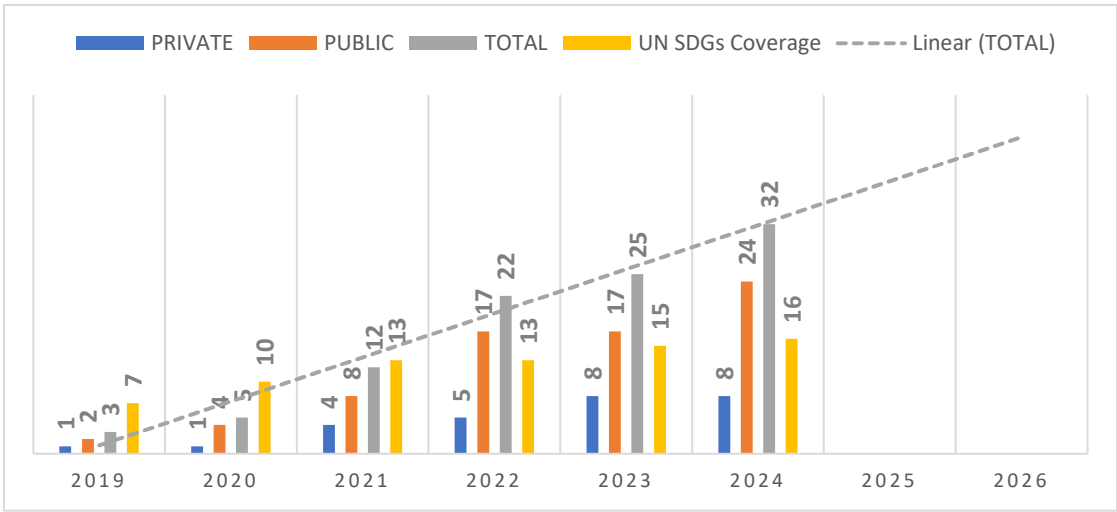


Figure 3. KSA HEIs participation in THE IR and UN SDGs coverage since 2019.

Additionally, the number of SDGs covered by these institutions has expanded, from 7 SDGs in 2019 to 16 in 2024 (see Figure 3), with only SDG 13 remaining unaddressed. Public sector HEIs show strong engagement, with 25 out of 29 participating, compared to just 8 out of 38 private sector HEIs.

In Table 2, complete list of all public sector HEIs, organized in chronological order by their established year, participation frequency and the highest achieved ranking bands i.e., B1 (1-100), B2 (101-200), B3 (201-600), and B4 (600+) is presented. These bands are selected for a compact representation of the data; however, the THE IR provide a more detailed distribution of these bands. Additionally, the appendix section contains comprehensive year-by-year details of achieved bands, targeted UN SDGs, participating HEIs, and the percentage coverage of the UN SDGs (see Tables A1–A6). Notably, four public HEIs including Taibah University, Taif University, Northern Border University, and Shaqra University have not participated in the THE IR at all.

Table 2. List of public sector HEIs of KSA.

Sr. #	Public Sector HEI Name	Short Name	Frequency of Participation in THE IR	Established Year	Highest Achieved Ranking Band/Year
1	Umm Al-Qura University	UQU	4	1950	B3/2021
2	Imam Muhammad bin Saud Islamic University	IMSIU	3	1953	B3/2022-23
3	King Saud University	KSU	2	1957	B2/2019
4	Islamic University of Medina	IUM	2	1961	B4/2023-24
5	King Fahd University for Petroleum and Minerals	KFUPM	4	1963	B1/2024
6	King Abdulaziz University	KAU	5	1967	B1/2019-20,2022
7	Princess Nora bint Abdul Rahman University	PNU	3	1970	B1/20212
8	Imam Abdulrahman Bin Faisal University	IABFU	4	1975	B2/2024
9	King Faisal University	KFU	4	1975	B1/2024
10	King Khalid University	KKU	5	1998	B3/2022
11	Taibah University	TaibahU	0	2003	Not participated yet
12	Taif University	TU	0	2004	Not participated yet
13	Qassim University	QU	5	2004	B3/2024
14	King Saud bin Abdulaziz University for Health Sciences	KSAU-HS	1	2005	B4/2024
15	Al Jouf University	JU	2	2005	B3/2022
16	Jazan University	JazanU	1	2005	B4/2024
17	University of Hail	UOH	3	2006	B4/2024
18	Al Baha University	BU	3	2006	B4/2024
19	Najran University	NU	2	2006	B4/2023
20	University of Tabuk	UT	3	2006	B4/2024
21	Northern Borders University	NBU	0	2007	Not participated yet
22	Prince Sattam Bin Abdulaziz University	PSAU	3	2008	B4/2022
23	King Abdullah University of Science and Technology	KAUST	3	2009	B2/2022-23
24	Majmaah University	MU	1	2010	B4/2024
25	Shaqra University	SU	0	2010	Not participated yet
26	Saudi Electronic University	SEU	3	2011	B3/2022
27	University of Bisha	UB	2	2014	B4/2023
28	University of Hafr Albatin	UOHB	1	2014	B4/2024
29	University of Jeddah	UJ	3	2014	B4/2023

Table 3 presents list of private HEIs that participated in THE IR. Notably, no private institution has reached band B1 (1-100). AFU attained band B2 (101-200) in 2019 followed by PMU, which has achieved the same band in 2023-2024. Furthermore, apart from YU, all other institutions have participated at least twice, with AFU only institution so far participated all six years, indicating potential for improvement and better rankings in the future (see Table 3). Additionally, participation from 30 private sector HEIs in THE IR is still pending. These institutions are not included here, but we encourage readers to consult MoE, KSA [8] for more information about them, if needed.

Table 3. List of private sector HEIs of KSA.

Sr. #	Private Sector HEI Name	Short Name	Participation Frequency	Founding Year	Highest Achieved Ranking Band/Year
1	Prince Sultan University	PSU	4	1998	B3/2022
2	Effat University	EU	2	1999	B4/2024
3	University of Business and Technology	UBT	3	2000	B4/2022
4	Al Yamamah University	YU	2	2001	B4/2023
5	Alfaisal University	AFU	6	2002	B2/2019
6	Batterjee Medical College	BMC	2	2005	B4/2023
7	Prince Mohammad Bin Fahd University	PMU	3	2006	B2/2023-24
8	AlMaarefa University	UM	4	2009	B3/2022-23

As shown in Figure 4(a), till 2022, a maximum of 36% of HEIs were classified in band B4. However, starting in 2023, this trend reversed, with over 60% of HEIs qualifying in band B4 due to increased participation. Additionally, since 2020, the majority of HEIs have been placed in the lower bands, B3 and B4. This indicates that only a small number of participating HEIs rank among the top 200 globally. Furthermore, Figure 4(b) clearly shows that over 50% of established HEIs have not yet participated in the THE IR, including (4 public and 30 private). Additionally, AFU is the only HEI participated in every edition of the THE IR. Moreover, only (6-16) % of the HEIs have participated one to three times, while 9% and 4% have participated four and five times respectively, which is critically low.

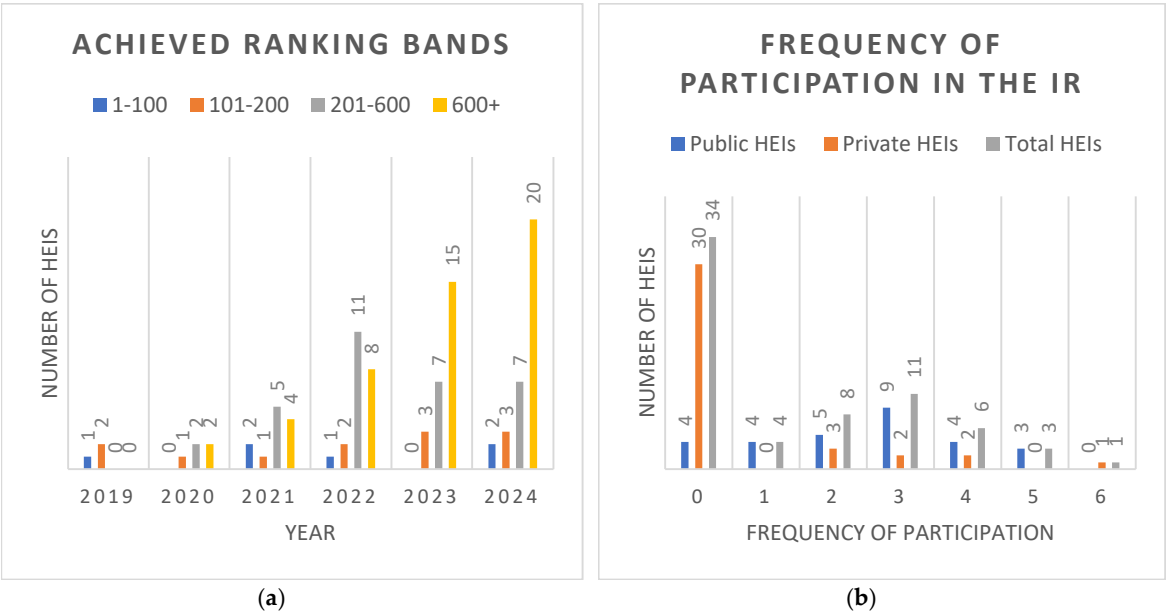


Figure 4. a) Achieved ranking bands and b) participation frequency in THE IR.

3.2. Top 100 Ranked HEIs of Saudi Arabia in THE IR

In this section, we evaluate the progress of the top 100 ranked HEIs, specifically KAU, PNU, KFUPM, and KFU, in the THE IR given in Table 4. These institutions represent only 6% of the total 67 HEIs in Saudi Arabia and nearly 13% of those that participated in the THE IR. Notably, KAU and PNU were among the founding institutions and have consistently achieved impressive global rankings within the top 100.KAU ranked 54th in the inaugural year of 2019 and maintained its position with a 46th ranking in 2021 and an impressive 4th position in 2022. Meanwhile, PNU reached the 27th position in 2021. Both universities were established in the 20th century and were also ranked in band B2 (101-200) in 2020 and 2022, respectively (see Tables 2 and 4).

Table 4. Yearly Performance Analysis of the Top 100 Ranked HEIs in THE IR.

	2019	2020	2021	2022	2023	2024
KAU	B1, 54th	B2	B1, 46th	B1, 4th	---	B3
PNU	---	B3	B1, 27th	B2	---	---
KFUPM	---	---	B4	B3	B3	B1, 81st
KFU	---	---	B4	B3	B2	B1, 99th

Despite their consistent performance, it is surprising that neither of these institutions appeared in the rankings in 2023, with PNU also absent in 2024. Nonetheless, these universities have the potential to lead and inspire the remaining HEIs in KSA. In 2021, KFUPM and KFU joined THE IR starting in the lowest band of B4. They have gradually improved each year, achieving rankings of 81st and 99th in 2024, respectively.

3.3. UN SDGs Coverage by B1 Ranked HEIs of KSA

Now, we discuss the coverage of UN SDGs by four B1 ranked HEIs over the years, as detailed in Table 5. Since SDG-17 is mandatory, all four institutions have addressed it, along with only SDG-8. Additionally, three of the institutions have focused on SDG-4. Furthermore, KAU and PNU both covered SDGs 4, 5, 8, and 10, while KFUPM and KFU both targeted SDGs 6, 7, and 8. SDG-9 is covered by KAU and KFUPM, and SDG-11 by KAU and KFU. Lastly, SDGs 1, 2, 12, 14, and 16 are each covered by only one of the four institutions. However, none of these 4 institutions addressed SDGs 3 and 13. In conclusion, SDGs 4 to 11 represent the collective strength of these four institutions. Their efforts in these areas can serve as a benchmark for other HEIs of KSA to follow:

Table 5. UN SDGs coverage by top 100 ranked HEIs of KSA.

HEIs Name	UN SDGs Covered														
	1	2	4	5	6	7	8	9	10	11	12	14	16	17	
KAU			✓	✓			✓	✓	✓	✓			✓	✓	
PNU			✓	✓			✓		✓					✓	
KFUPM					✓	✓	✓	✓				✓		✓	
KFU	✓	✓	✓		✓	✓	✓			✓	✓			✓	
Percentage Coverage by participated HEIs	25	25	75	50	50	50	100	50	50	50	25	25	25	100	

None of the private sector HEIs of KSA has achieved band B1(1-100) rankings so far.

4. Assessment of KSA HEIs’ Progress Based on EUA Framework

The European University Association (EUA), established in 2001, represents and supports higher education institutions across 48 countries [33]. The EUA plays a crucial role in shaping European higher education policies. Since 2015, the EUA has recognized the importance of the UN SDGs and has committed to working towards these goals both within Europe and with its global partners, equipping students to address global challenges effectively.

The EUA strongly advocates for HEIs to embed the UN-SDGs into their core strategies. It places particular emphasis on four key SDGs: SDG-4 (providing quality education), SDG-9 (fostering innovation through cutting-edge research), SDG-16 (promoting good governance and becoming pillars of civil society), and SDG-17 (building global and local partnerships). HEIs’ contributions to these four SDGs are essential for advancing the achievement of the remaining goals [33] (see Figure 5).



Figure 5. EUA Framework for UN SDGs (Courtesy of [45]).

Figure 6 illustrates the progress of KSA HEIs according to the EUA framework, focusing on four key SDGs. Starting with SDG-4, only 3 HEIs participated in 2019, with just one (33%) targeting this goal. Growth has been slow, and by 2024, only 60% of participating HEIs (20 out of 32) focused on SDG-4. Even assuming many of these institutions are likely research-oriented, which is not yet reflected in their performance on SDG-9. Alarmingly, a downward trend is observed for SDG 9, with only 13% (4 out of 32) of HEIs targeting it by 2024.

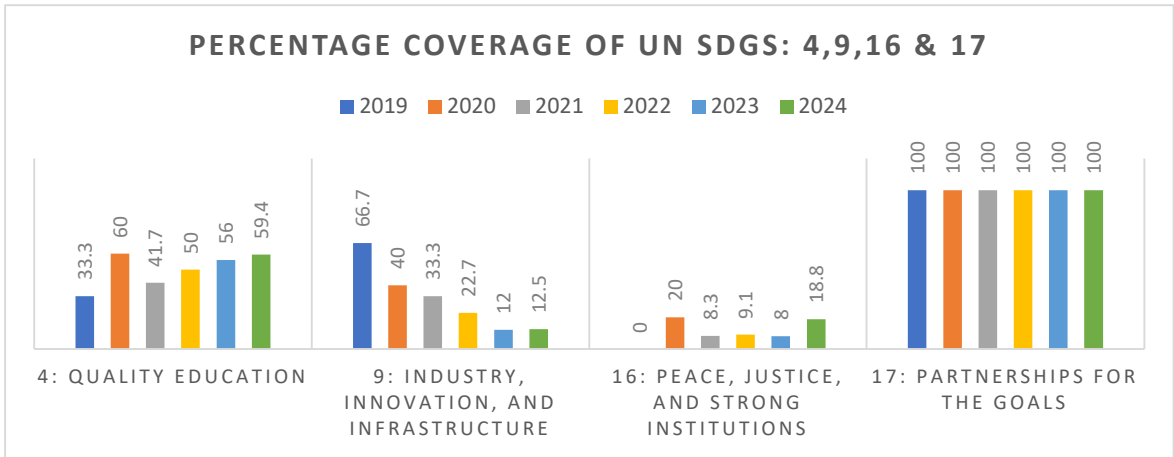


Figure 6. KSA HEIs performance in four key UN SDGs identified by EUA Framework [33].

As for SDG-16, the data suggests that HEIs have not shown strong commitment, with maximum participation reaching only 20% over the years. SDG-17, being mandatory, has been addressed by all participating HEIs. Additionally, we observe the participation of leading HEIs in relation to the essential SDGs outlined by the EUA framework. Table 3 shows that only KAU has targeted all these

critical SDGs. PNU and KFUPM also addressed SDG-4, while KFUPM is also focused on SDG 9. Figure 6 summarizes participation in 2024, indicating that 59% of all participating HEIs targeted SDG-4, 13% focused on SDG-9, and 19% on SDG-16. There is a strong need for greater commitment from all participating HEIs, including the leading institutions, to effectively target these SDGs for a lasting impact.

5. Assessment of KSA HEIs Progress Based on UN-KSA Cooperation Framework: 2022–2026

In this section, we evaluate the progress of KSA HEIs from 2019 to 2024 reflecting their priority on specific UN SDGs through the lens of THE IR in relation to the four Strategic Priority Areas of the United Nations Sustainable Development Cooperation Framework with the Government of the Kingdom of Saudi Arabia (2022-2026).

5.1. Strategic Priority Area-1: People

Strategic Priority Area 1 (SPA-1) emphasizes the importance of enabling all individuals to realize their potential with dignity, equity, and equality in a healthy environment, guided by the slogan “Leaving No One Behind” (LNOB). This priority area targets the following SDGs 1-5 [20].

Figure 7 clearly illustrates the participation trends of HEIs in relation to the UN SDGs. For SDGs 1 and 2, participation has remained extremely low over the years, with only 6% and 3% of HEIs engaged in these goals by 2024. In contrast, SDG-3 shows a significant level of engagement, with nearly 44% of HEIs participating in 2024, reflecting a strong emphasis on health initiatives. SDG-4 demonstrates substantial progress, with participation rising from approximately 33% in 2019 to about 60% in 2024. Lastly, for SDG-5, HEIs showed notable participation, starting with less than 20% in 2022 and increasing to just above 37% by 2024. SDGs 1 and 2 urgently require attention. Notably, among the institutions ranked in the top band B1 (1-100), only KFU targeted these two goals, and that was only in the year 2024. Surprisingly none of band B1 institutions targeted SDG-3.

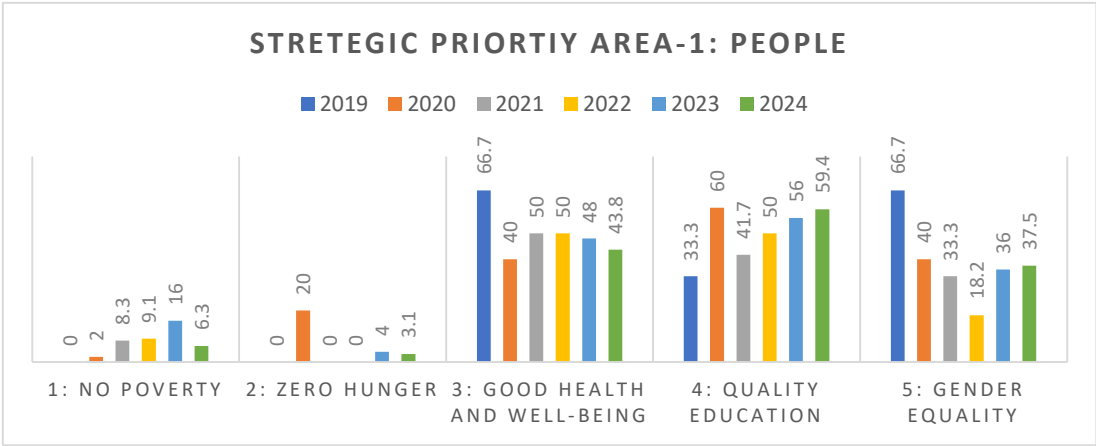


Figure 7. KSA HEIs performance related to SPA-1 through lens of THE IR.

5.2. Strategic Priority Area-2: Planet

Strategic Priority Area-2 (SPA-2) aims to protect the planet from degradation by promoting sustainable consumption and production practices. It emphasizes the sustainable management of natural resources and calls for urgent action on climate change, targeting SDGs 6 and 12-15 [20]. Figure 8 illustrates the performance of HEIs in relation to SPA-2. In 2021, 25% of HEIs participated in SDG-7, but this participation gradually declined to 12.5% by 2024. This is concerning, as HEIs worldwide are striving to become green or sustainable campuses. Small to medium-scale initiatives

must be undertaken by KSA HEIs to address this gap. For SDG-8, steady participation is evident, increasing from 40% in 2020 to nearly 44% in 2024.

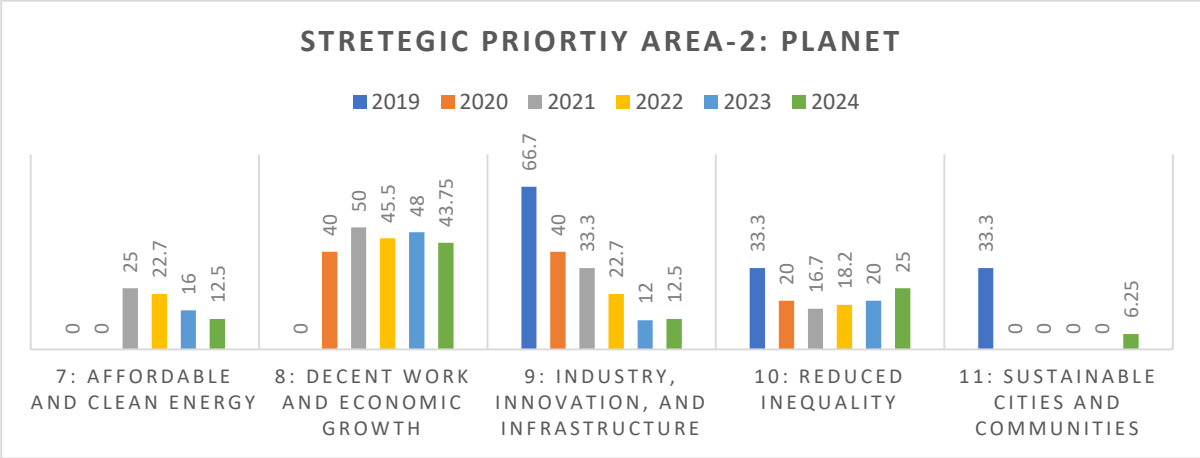


Figure 8. KSA HEIs performance related to SPA-2 through lens of THE IR.

SDG-9 showed a significant decline, with participation dropping from 66.7% in 2019 to 12.5% by 2024. SDG-10 had a below-expectation trend, with maximum participation reaching 25% in 2024. Unfortunately, SDG-11 was not targeted by any HEIs from 2020 to 2023, with critically low participation of 6% in 2024. SDGs 7 and 11 require significant attention from all HEIs to fully realize the potential of SAP-2. Among band B1 institutions in KSA, at least 2 out of 4 institutions targeted SDGs 7-11, including SDGs 7 and 11. Specifically, KFUPM and KFU focused on SDG-7, while KAU must reach out to other HEIs to enhance coverage for SDG-11. Furthermore, KAU and PNU can mobilize other HEIs specifically targeting SDG-10.

5.3. Strategic Priority Area-3: Prosperity

SPA-3 aims to ensure that all people can enjoy prosperous and fulfilling lives, focusing on SDGs 6 and 12-15 [20]. Starting with SDG 13, no HEIs have covered this goal so far. Similarly, SDG 15 has seen no participation since 2022, with critically low participation, peaking at just 4%, as shown in Figure 9. Interestingly, none of the HEIs targeted all SDGs under SPA-3 in 2019-2020. For SDGs 6, 12, and 14, the highest participation rates were 18.2%, 9.4%, and 13.6%, respectively. Overall, participation in SPA-3 is very poor, indicating a need for better planning, increased and collaborated efforts. Moreover, even top ranked band B1 institutions do not cover SDGs 13 and 15. SDGs 12 and 14 are covered only once by KFU and KFUPM. Finally, SDG-6 is covered by both KFU and KFUPM (see Table 4).

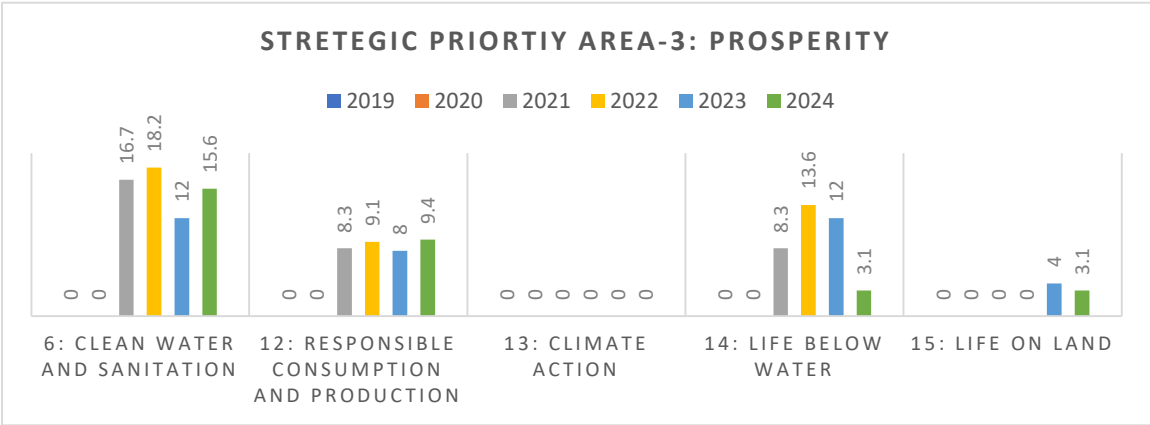


Figure 9. KSA HEIs performance related to SPA-3 through lens of THE IR.

5.4. Strategic Priority Area-4: Peace, Partnership, and Other Cross-Cutting Issues

SPA-4 aims to promote peaceful, just, and inclusive societies by mobilizing the necessary resources to achieve SDGs 16 and 17 [20]. However, there is a notably low participation rate in SDG-16 all over the years. Even in the year 2024 with 32 HEIs on board only 6 HEIs targeted this SDG (see Figure 10). Also, only KAU from the B1 ranked institutions listed in Table 4 targeted this SDG.

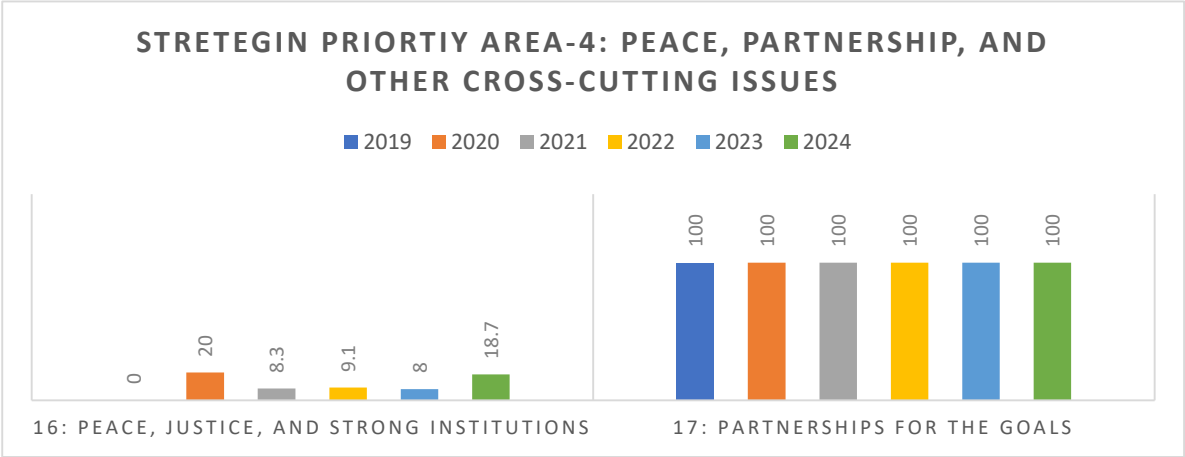


Figure 10. KSA HEIs performance related to SPA-4 through lens of THE IR.

In summary, Strategic Priority Areas 2-4 requires considerable attention and demand a responsible role by HEIs for smoother attainment of key pillars of KSA Saudi vision 2030.

6. Comparative Analysis of UN SDG Attainment Insights from EUA and UN-KSA by KSA HEIs with 2024 Sustainable Development Report of Saudi Arabia

The SDG Index and Dashboards annually assess SDG progress in 193 UN member states using 125 (98 Global & 27 specific to OECD countries) indicators. Only countries with less than 20% missing data are scored, covering 167 nations this year (2024), including Guinea-Bissau and new BRICS+ members which includes KSA. For detailed data and methodology, visit the SDG Transformation Center website. [46,47]. According to Saudi Arabia’s SDG report 2024 [47], SDG-4 shows moderate improvement, while SDGs 9 and 17 are on track, maintaining achievement. However, SDG-16 shows declining progress. Significant challenges remain for SDGs 4, 9, and 16, while SDG-17 faces remaining but less severe challenges (see Figure 11).



Figure 11. Saudi Arabi UN-SDGs attainment progress in SDR-2024 (Courtesy of [47]).

6.1. Comparison of EUA-Framework with SDR-2024 of KSA

Comparing the progress of UN-SDGs attainment by country and HEIs under the EAU framework reveals a positive correlation. As the number of HEIs increases, participation in SDG-4 also rises, with 60% of participating HEIs targeting this goal in 2024. However, 80% of all HEIs (48 in total: 13 participatory and 35 non-participatory) have not targeted SDG-4, highlighting a significant challenge. SDG-9 is on track, along with SDGs 8 and 17, due to key initiatives launched by governmental institutions, particularly the proactive role of MCIT. For more details, readers are encouraged to consult Saudi Arabia's comprehensive 2024 annual report titled "Digital & Space Sustainability" [48]. There is a notable upward trend in internet usage, mobile broadband subscriptions (per 100 population), and an above-average score of 3.6 in the Logistics Performance Index. Interestingly, the top three universities achieved an average score of 53/100 in THE IR in 2024 [36]. However, a decreasing trend is observed in HEIs targeting SDG-9 over the years (see SDG-9, Figure 6). In 2024, only four HEIs (13% of participatory) targeted SDG-9, including top scorers KFUPM, KAU, AFU, and UQU.

6.2. Comparison of UN-KSA Framework with SDR-2024 of KSA

SPA-1: We also examine country-wide progress in relation to SPA-1, though data for SDG-1 is missing. Major challenges for SDGs 2 and 5 have resulted in stagnant progress, while SDGs 3 and 4 show moderate improvement, though substantial challenges remain (see Figure 11). Notably, progress by HEIs aligns closely with national progress on SDGs 1-5, highlighting a clear opportunity for HEIs to play a strategic role in closing these gaps.

SPA-2: Data for SDG-10 is missing in the country-wide progress report. Major challenges exist for SDGs 7 and 11, with SDG-7 showing moderate improvement and SDG-11 remaining stagnant. SDG-8 is on track but still faces significant challenges (see Figure 11). Notably, the progress made by HEIs closely aligns with national progress for SDGs 7-11. It is crucial for both HEIs and national governing bodies to target SDGs 7 and 11.

SPA-3:

There is a positive correlation between the nationwide performance of SDGs 12-15 and the priority given to them by HEIs. Major challenges exist for SDGs 12-14, with SDGs 12 and 13 showing moderate improvement, while SDGs 14 and 15 remain stagnant (see Figures 9 and 11). Additionally, only 5 to 6 HEIs have targeted SDG-6 from 2021 to 2024, reflecting the country's significant challenges and stagnant progress (see Figure 11). This again demands utmost priority and a proactive role in addressing SPA-3 UN-SDGs.

SPA-4:

The country-wide progress for these SDGs has already been covered in Section-5.2.1. and is not repeated here to avoid redundancy.

7. Cluster Identification of HEIs in Relation to UN-SDGs

In this analysis, hierarchical clustering is used to identify patterns among HEIs in Saudi Arabia based on their coverage of UN SDGs. To simplify data visualization and interpretation, principal component analysis (PCA) is also applied for dimensionality reduction, ensuring that the primary patterns within the data are preserved.

The optimal number of clusters is determined using the silhouette method, which evaluates how closely related data points are within each cluster while distinguishing between different clusters, thus enhancing insightfulness. Seven distinct clusters are identified and illustrated in Figure 12, with details provided in Table 6. Additionally, Figure 13 presents a dendrogram depicting the hierarchical clustering of 33 Saudi HEIs, where the x-axis represents the HEIs, and the y-axis shows the dissimilarity or distance between clusters. Clusters are formed by merging HEIs with similar SDG coverage patterns, as indicated by the height at which two clusters converge.

Table 6. Clustering distribution of 33 HEIs of KSA using HCA.

Cluster	No. of HEIs	Names of HEIs
1	1	KFU
2	7	PNU, JazanU, BU, MU, EU, UBT, YU
3	1	PMU
4	2	KFUPM, KAUST
5	5	IUM, IABFU, KKU, UOH, UB
6	11	UQU, QU, KSAU-HS, NU, UT, PSAU, SEU, UOHB, AFU, BMC, UM
7	6	IMSIU, KSU, KAU, JU, UJ, PSU

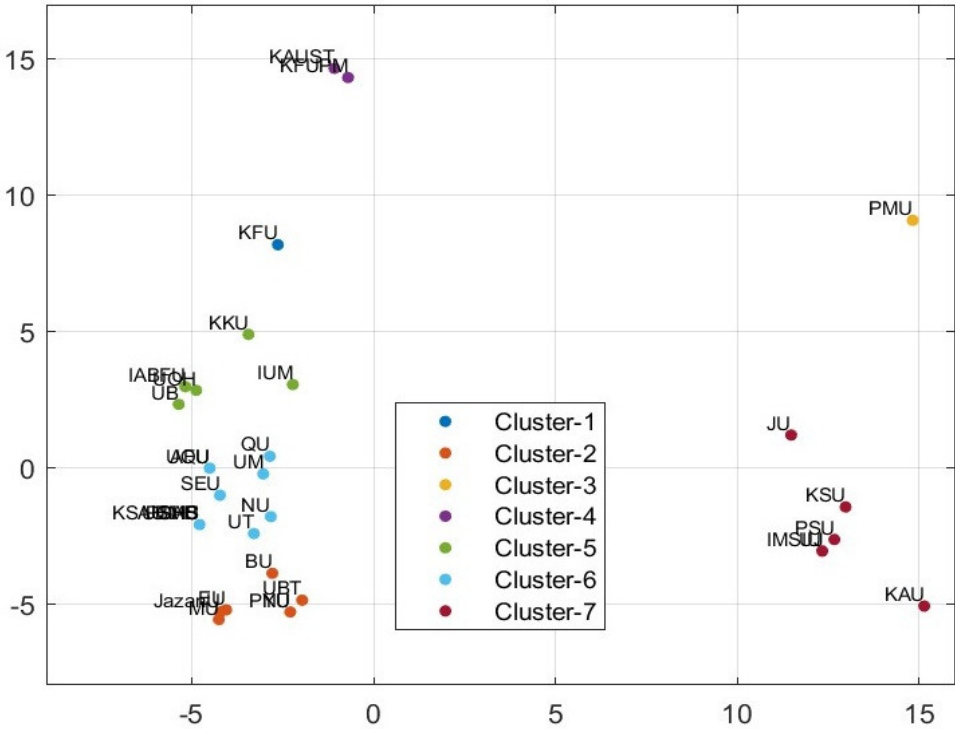


Figure 12. Two-dimensional hierarchical scatter plot of 33 HEIs of KSA using PCA.

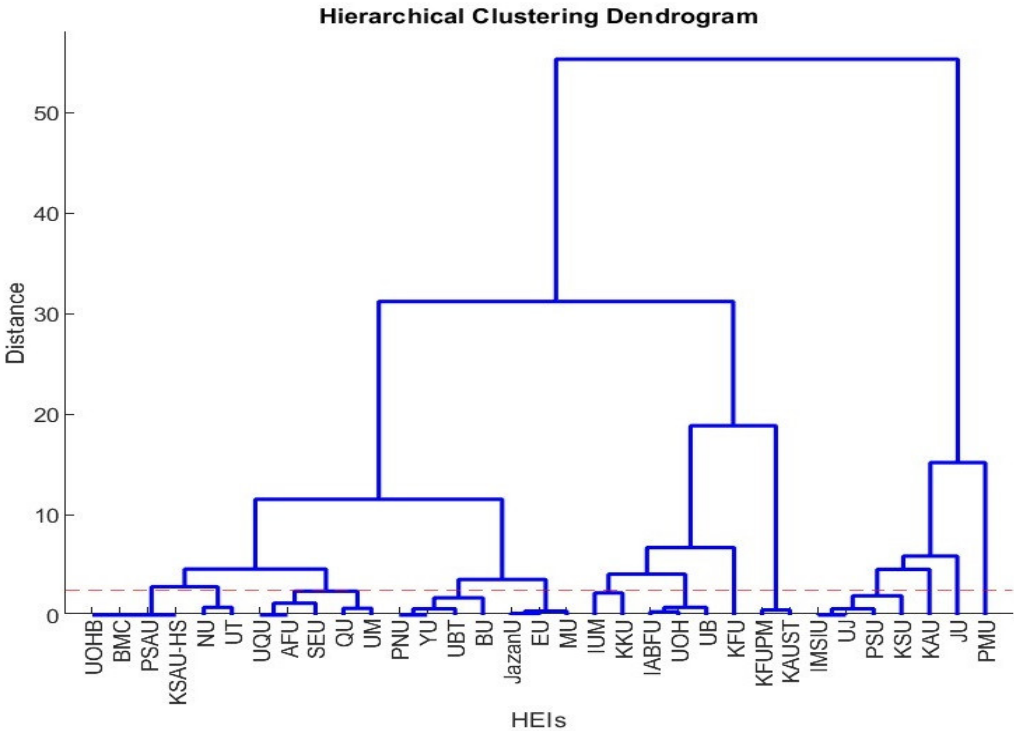


Figure 13. Hierarchical clustering dendrogram of 33 HEIs of KSA.

7.1. Key Insights and Strengths

The following subsections highlight unique group characteristics within the primary clusters shown in Figures 12 and 13, revealing the diversity in SDG coverage among Saudi HEIs.

7.1.1. Fully Aligned Groups

Four groups with fully aligned SDG focuses are identified from the dendrogram, as follows:

- **Group-1:** PNU and YU covering SDGs 4, 5, 8, and 10.
- **Group-2:** KSAU-HS, PSAU, UOHB, and BMC, covering SDGs 3, 4, and 5.
- **Group-3:** UQU and AFU covering SDGs 3, 4, and 9.
- **Group-4:** IMSIU and UJ, covering SDGs 4, 5, 8, and 16.

7.1.2. Closely Aligned Groups

Four closely aligned groups are also identified, with each HEI group sharing focus areas:

- **Group-1:** KFUPM and KAUST primarily focused on SDGs 3, 5, and 10.
- **Group-2:** EU and JazanU covering SDGs 3, 5, and 10.
- **Group-3:** NU and UT covering SDGs 3, 4, 5, and 8.
- **Group-4:** QU and UM covering SDGs 3, 4, and 8.

Each of these HEIs covers additional SDGs beyond those listed.

7.1.3. Diversified Groups

PMU and KFUPM demonstrate broad SDG engagement, covering six and seven SDGs respectively since their participation in THE IR.

7.1.4. Focused Groups

Three focused groups are identified, one from Cluster-2 and two from Cluster-6:

1. HEIs such as AFU and UQU excel in SDG 3, 4, and SDG 9.
2. HEIs such as KSAU-HS, PSAU, UOHB, and BMC also show strong focus on SDGs 3, 4, and 5.

7.1.7. Consistently Performing HEIs

Some HEIs demonstrate consistent SDG performance, maintaining coverage over a minimum of four years. Notable examples include:

- AFU, consistently active for six years, covering SDGs 3, 4, and 9.
- UQU, consistently active for four years, covering SDGs 3, 4, and 9.
- PSU, consistently active for four years, covering SDGs 5, 8, and 16.
- UBT, consistently active for four years, covering SDGs 5, 8, and 10.

Proposed Grouping of HEIs for Enhanced and Advanced Coverage of UN-SDGs

To align with the EAU and UN-KSA cooperation frameworks, Table 7 lists leading Higher Education Institutions (HEIs) recommended for each UN Sustainable Development Goal (SDG) based on their frequency of participation or ranking performance as shown in Tables 2 and 3. Additionally, these leading HEIs are paired with one private and one public sector HEI to fully utilize potential and resources through Public-Private HEIs Partnership (PPHEIP) [49]. In cases where no private HEI is found covering an SDG, only a public sector HEI is chosen as the leader. HEIs are also encouraged to take a proactive role in advancing UN SDGs. Furthermore, potential group members for each SDG are listed along with the desired actions.

Table 7. Proposed grouping of 33 HEIs in KSA for each SDG, with designated lead HEIs.

SDG	Lead HEIs	Role	Potential Group Members	Action
1	KFU, UM	Pioneering	UOH, KKU, IMSIU, QU, NU	A pioneering role is demanded from both KFU and UM nationwide, even though there is no data to measure progress (SDR-2024, KSA [47])
2	KFU	Seek more Collaborators, Strengthen and Lead	KKU	Opportunity for all HEIs, with a specific invitation to private sector HEIs, as they have not yet addressed this SDG
3	AFU, IABFU	Strengthen and Lead	UQU, PSAU, BMC, BU, UB, KSAU-HS, UOHB, JazanU	There is a clear opportunity for a strong Public-Private HEIs Partnership, as these
4	QU, AFU	Strengthen and Lead	UQU, UT, SEU, IUM, BMC, PSAU, KSAU-HS, NU, UB	SDGs are extensively targeted by both public and private sector HEIs. HEIs should leverage this strength to qualify for the Top-Tier ranking band B1.
5	PNU, PSU	Pioneering	EU, UBT, UJ, JazanU, MU, KSAU-HS, PSAU, UOHB	SDG-5 demands a pioneering role from PNU, taking the forefront, initiating actions, and making a significant impact

6	KAUST, PMU	Pioneering	KFU, KKU, KFUPM, QU	KAUST must play pioneering role utilizing potential strong group members
7	KFU, KKU	Benchmarked	KFUPM, KAUST, IABFU, JU, UOH, UB	Opportunity for Impactable Partnerships. All Four B1 HEIs are listed.
8	PNU, UM	Benchmarked	KAU, IUM, PSU, UJ, UBT, BU, PMU, YU	
9	KAU, AFU	Benchmarked	KSU, KFUPM, UQU, UOH	
10	KAU, UBT	Benchmarked	PNU, BU, MU, SEU, EU, YU, PMU, JazanU	A strong group must address the data availability gap under the leadership of KAU through proper planning and initiatives.
11	KAU	Strengthen and Lead	KSU, KAUST	(SDR-2024, KSA [47]) Become sustainable campuses.
12	KFU, PMU	Strengthen and Lead	IUM, SEU	Target SCI [43]. Demands more HEIs on board.
13		NOT COVERED YET		Opportunity for all HEIs Invitation and Opportunity for all HEIs
14	KFUPM, PMU	Seek more Collaborators, Strengthen and Lead	KAUST	Joint Research Ventures with NEOM (Red Sea). Demands more HEIs on board
15	UT	Seek more Collaborators, Strengthen and Lead	None	Opportunity for all HEIs
16	KAU, PSU	Strengthen and Lead	IMISU, KSU, JU, UJ, PMU	There is a clear opportunity for a strong Public-Private HEIs Partnership.
17	Mandatory SDG covered by all HEIs			

8. Conclusions and Recommendations

We present key findings of KSA HEIs in relation to their roles in achieving the UN-SDGs using a SWOT analysis framework. This approach highlights the core strengths, identifies areas for improvement, explores emerging opportunities, and addresses potential challenges facing HEIs as they contribute to Saudi Arabia’s Vision 2030 and global sustainability efforts.

8.1. Strengths

- **Rising Participation in THE IR:** There is a positive trend in KSA HEIs’ participation in THE Impact Rankings, with the goal of all 67 HEIs participating by 2030. Public sector institutions lead this trend, showing stronger engagement than private HEIs.
- **Strong Performance in Top-Tier Rankings:** Notable public sector HEIs like KAU, KFUPM, KFU, and PNU have achieved high ranks, with KAU securing the B1 band three times. These HEIs have demonstrated leadership in areas like Good Health and Well-being (SDG-3), Quality Education (SDG-4), Gender Equality (SDG-5).
- **Focus on Key SDGs:** Certain HEIs are positioned to lead in specific SDGs based on consistent performance, such as KFUPM and KFU in SDGs 6–8, and KAU and PNU in SDGs 4–5 and 10. PNU’s unique position allows it to inspire female-only campuses across KSA.
- **Foundation for Sustainable Campuses:** HEIs have shown interest in adopting green campus initiatives and contributing to sustainability, with an emphasis on SDGs essential for

sustainability, such as SDG 4 (Quality Education), SDG 7 (Affordable and Clean Energy), and SDG 17 (Partnerships for the Goals).

8.2. Weaknesses

- **Limited Top-Tier Participation Among Private HEIs:** Only 6% of KSA HEIs have reached the top B1 ranking, and all of these are public sector HEIs, highlighting a lack of high-performing private HEIs.
- **Lack of Focus on SDG-13 (Climate Action):** None of the HEIs have yet prioritized SDG-13, reflecting a gap in addressing climate-related goals, which are critical for sustainable development.
- **Gap in SDGs 1 and 10 Coverage:** There is limited national and institutional information and engagement on SDG-1 (No Poverty) and SDG-10 (Reduced Inequalities), with only minimal coverage from a few top-ranked institutions like KFU and KAU.
- **Inconsistent Prioritization of SDGs 9 and 16:** Innovation (SDG-9) and institutional governance (SDG-16) show lower prioritization in HEI activities and EUA framework, reducing progress in these critical areas.

8.3. Opportunities

- **Expanding Global Visibility and Collaboration:** Increased participation in global rankings provides KSA HEIs with greater visibility, opening opportunities for international collaboration and partnerships.
- **Leadership in Targeted SDGs:** HEIs like KFUPM, KAU, and PNU can lead in specific SDGs by mobilizing other institutions and providing roadmaps for addressing SDGs 9 and 16, aligning with national frameworks and global goals.
- **Encouragement of non-participating HEIs:** Engaging the 34 HEIs (4 public, 30 private) that are currently not participating in the rankings would amplify KSA's overall progress on the UN SDGs.
- **Potential for Green and Sustainable Campuses:** HEIs can prioritize SDGs related to sustainability (SDGs 4, 7, 9, 11–13, 15, and 17) to develop sustainable campuses, engaging with global sustainability indexes like the Sustainable Campus Index (SCI) [43].
- **Potential Candidates for Top-Tier Rankings:** Four out of eight private sector HEIs (namely, AFU, PSU, PMU and BMC) being very consistent over the years are potential candidates to qualify for B1 rankings. Similarly, two public sector HEIs namely UQU and PSAU must plan for B1 band.

8.4. Threats

- **Limited Participation from Private Sector HEIs:** The low participation of private sector HEIs in high-impact rankings could create an imbalance in SDG contributions and impact Saudi Arabia's overall SDG progress.
- **Misalignment with Governmental Priorities:** There is a noticeable gap in priority between HEIs and government entities, particularly for SDG-9 (Industry, Innovation, and Infrastructure), which could hinder collective SDG progress.
- **Insufficient Data for SDGs 1 and 10:** Lack of comprehensive data and participation related to SDGs 1 and 10 presents a threat to national and institutional efforts to reduce poverty and inequality.
- **Resource Limitations for Long-Term Sustainability:** The ongoing lack of resources and strategic emphasis on certain SDGs could prevent HEIs from achieving sustainable development, limiting their ability to meet both national and UN SDG targets by 2030.

Concluding above findings can act useful for policy makers and educational pinpointing areas where KSA HEIs can leverage their strengths, address weaknesses, capitalize on opportunities, and mitigate threats as they work towards the UN SDGs.

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Abbreviations

- The following abbreviations are used in this manuscript:
- HEIs

Higher Educational Institutions

UN-SDGs

United Nations Sustainable Development Goals

THE IR

Times Higher Education Impact Rankings

EUA

European Union Association

SDR

Sustainable Development Report

OECD

Organization for Economic Co-operation and Development

INES

Indicators of Education Systems

Appendix A

Appendix A.1

This section contains Tables A1–A6 of Saudi Arabian HEIs participation in THE IR for years spanning 2019 till 2024 inherited from THE IR website link given below [22] <https://www.timeshighereducation.com/world-university-rankings>

Table A1. Performance of KSA HEIs in the THE Impact Rankings: 2019.

Achieved Bands	HEIs Name	UN SDGs Covered						
		3	4	5	9	10	11	17
54th	KAU			✓		✓	✓	✓
	AFU	✓	✓		✓			✓
101-200	KSU	✓		✓	✓			✓
Percentage Coverage by Participated HEIs		67	33	68	67	33	33	100

Table A2. Performance of KSA HEIs in the THE Impact Rankings: 2020.

Achieved Bands	HEIs Name	UN SDGs Covered									
		1	2	3	4	5	8	9	10	16	17
101-200	KAU						✓	✓		✓	✓
	AFU			✓	✓			✓			✓
401-600	PNU					✓	✓		✓		✓
601+	KKU	✓	✓		✓						✓
	QU			✓	✓	✓					✓
Percentage Coverage by Participated HEIs		20	20	40	60	40	40	40	20	20	100

Table A3. Performance of KSA HEIs in the THE Impact Rankings: 2021.

Achieved Bands	HEIs Name	UN SDGs Covered														
		1	3	4	5	6	7	8	9	10	12	14	16	17		
27th	PNU				✓			✓		✓				✓		
46th	KAU							✓	✓	✓				✓		
101-200	PMU					✓		✓			✓			✓		
201-300	UM	✓	✓					✓						✓		
	AFU		✓	✓					✓					✓		
301-400	KKU		✓				✓	✓						✓		
	UQU		✓	✓					✓					✓		
401-600	PSU				✓			✓					✓	✓		
	IABFU		✓	✓	✓									✓		
601-800	KFU			✓		✓	✓							✓		
801-1000	KFUPM						✓		✓			✓		✓		
	QU		✓	✓	✓									✓		
Percentage Coverage by Participated HEIs		8	50	42	33	17	25	50	33	17	8	8	8	100		

Table A4. Performance of KSA HEIs in the THE Impact Rankings: 2022.

Achieved Bands	HEIs Name	UN SDGs Covered														
		1	3	4	5	6	7	8	9	10	12	14	16	17		
4th	KAU			✓					✓	✓				✓		
101-200	PMU					✓		✓			✓			✓		
	PNU			✓	✓			✓						✓		
201-300	IMSIU	✓		✓	✓									✓		
	UM		✓	✓				✓						✓		
	KAUST					✓	✓					✓		✓		
	KFU						✓	✓			✓			✓		
	PSU				✓			✓					✓	✓		
	301-400	KFUPM						✓		✓			✓		✓	
	KKU					✓	✓	✓						✓		
401-600	IABFU		✓		✓		✓							✓		
	JU		✓	✓				✓						✓		
	SEU		✓	✓						✓				✓		
	UQU		✓	✓					✓					✓		
	601-800	AFU		✓	✓					✓				✓		
	UOH	✓	✓						✓					✓		
	PSAU		✓	✓	✓									✓		
801-1000	BU		✓					✓		✓				✓		
	QU			✓	✓	✓								✓		
1000+	UBT				✓			✓		✓				✓		
	UJ				✓			✓					✓	✓		
	UT		✓	✓	✓									✓		
	Percentage Coverage by Participated HEIs		9	36	50	50	18	23	46	23	18	9	14	9	100	

601-800	JU	✓					✓								✓	✓	
	SEU	✓	✓						✓							✓	
	KSAU-HS	✓	✓	✓												✓	
801-1000	KSU	✓								✓					✓	✓	
	MU		✓	✓					✓							✓	
	UJ			✓			✓								✓	✓	
	UQU	✓	✓						✓							✓	
	YU			✓				✓		✓						✓	
	JazanU	✓			✓					✓						✓	
	EU			✓	✓					✓						✓	
1001-1500	UB	✓	✓				✓									✓	
	BU	✓						✓		✓						✓	
	UOH	✓	✓				✓									✓	
	UBT				✓				✓		✓					✓	
	IUM				✓				✓				✓			✓	
	NU	✓			✓				✓							✓	
1501+	UOHB		✓	✓	✓										✓		
Percentage coverage by Participated HEIs		6	3	44	59	38	16	13	44	13	25	6	9	3	3	19	100

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