



Designing a Framework towards Sustainability Leadership in a Higher Education Institution: A Case Study of Gulf University, Bahrain

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Abstract. This research deliberates the design and implementation of a sustainability leadership framework in a higher education institution. Recognizing the critical role HEIs play in fostering sustainable development, the research aims to identify effective leadership initiatives and strategies that promote environmental, social, and economic sustainability on campus. The research is methodologically grounded in a qualitative case study approach, as the data were collected through developed projects and documents' analysis and designed actions to assess the current state of sustainability initiatives and leadership practices at Gulf University, Bahrain. Based on the findings, a comprehensive framework emphasizing the design process, strategic leadership, stakeholder engagement, capacity building, design decisions, infrastructure settings and integrated governance is subjected. The proposed framework is aimed at examining a range of challenges and opportunities about how institutional leaders and HEIs can embed sustainability into their core missions, fostering a culture of responsible innovation, and enabling measurable progress toward sustainability goals. The case study reflects the results as valuable insights for policymakers, academic leaders, and sustainability practitioners seeking to advance sustainable practices within higher education settings.

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1. Introduction

The imperative for sustainable development has become a central focus across various sectors worldwide, and HEIs hold a unique and influential position in advancing these goals. Effective sustainability leadership is critical for integrating environmental, social, and economic considerations into the core functions of higher education, including campus operations, curriculum design, research activities, and community engagement. Sustainability leadership is understood to be concerned with creating current and future

benefits while improving the lives of all actors concerned and points to a different view of leadership that assumes¹. However, there remains a need for comprehensive frameworks that guide institutional leaders in adopting sustainable practices holistically and sustainably embedding them within organizational culture and governance at an institutional level.

1.1. Contextual Approach and Systematic Review

The deployed contextual approach can be considered as a reflective observation and a method of analysis and understanding that emphasizes the context and main traits of sustainability leadership “model” at Gulf University as it depicts how the university used to integrate sustainability into its institutional and cultural contexts to achieve specific goals. According to Lynch, B.M., et al., a sustainability leadership model is based on the situational leadership theory, considering three dimensions: leadership context, the individual as a leader, and leadership's internal and external actions². Primarily, the defined contextual approach was effectively focused on spotting the institutional context in relation to Gulf University's approach in shaping its sustainability vision in terms of transforming facilities and operations, incorporating sustainability in learning and research, developing a sustainability culture, fostering community engagement and designing activities towards managing sustainability implementation on campus. All these actions could be envisioned throughout a comprehensive process and measurable indicators underpinned by the defining sustainability vision, stressing the importance of cultural factors in embedding sustainability within the university.

Accordingly, the proposed measurable indicators of sustainability leadership at Gulf University are typically encompassing core areas such as environmental, social, educational and governance metrics tracking values, context, responsibility and implementation. At this level, it's important to mention that systemic typologies of indicators, scores, indices and rates have been allocated to these core areas to effectively generate and develop a basis for a designed framework. The basis of the process took reference to a brief benchmarking exercise for sustainability leadership in Higher Education Institutions (HEIs) which involves evaluating sustainability practices, leadership in implementing practices and impact on both the institution and broader community to identify sustainability metric indicators that involve evaluating and comparing the environmental performance of different entities. This aims to better understand work within HEIs and how they can drive improvements in their sustainability initiatives and foster leadership that positively impacts their campuses and communities.

In alignment with the reviewed literature, the contextual approach of this research took reference to the proposed model of Sustainable Leadership Pyramid (SLP) by Avery, C. and Bergsteiner H., that represents a comprehensive framework for organizational sustainability, integrating various practices, drivers, and outcomes inherent to the research context. Moreover, the model shows interconnected layers that suggest a cascading approach where foundational practices support higher-level practices, which in turn influence key performance drivers, ultimately achieving desired performance outcomes aligned with sustainability goals. The authors confirmed that sustainable leadership (SL) relies on complex interconnections between multiple practices³. A such statement highly associated with a sustainability leadership framework design shows that strong foundational practices support stakeholders' motivation and trust, driving key performance factors such as innovation and quality, in addition to enhancing organizational sustainability through improved reputation, satisfaction, and long-term

value. At this point, both contextual approach and systemic vision review could be characterized in terms of their scope, methodology and theoretical foundations, which emphasize a holistic understanding of complex interactions and the interplay of various factors within the case study as a contextual approach for this research.

Table 1. The Proposed Measurable Indicators of Sustainability Leadership at Gulf University (2019-2024)

No.	Implementation Area/ Indicators	Ratio	Score	Index	Indices	Rate
1	Environmental Impact Metrics and Sustainable Infrastructure		•			
2	Curriculum and Research, Sustainability-focused Programs and Research Outputs Index			•		
3	Sustainability Governance Structure Implementation Rate and Leadership Commitment to Sustainability					•
4	Student, Staff Engagement and Stakeholders Involvement Indices.				•	
5	Incentives, Recognition Programs and Sustainability Initiatives Scores	•				

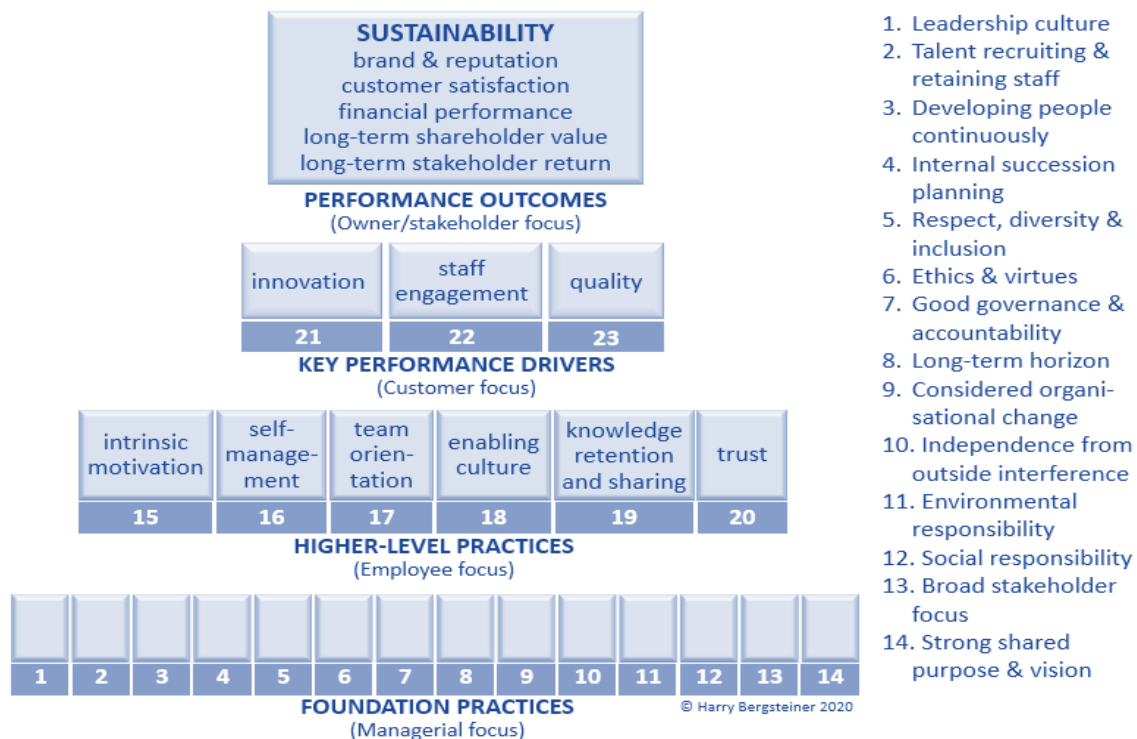


Figure 1. The Sustainable Leadership Pyramid (SLP)³

2. Methodology

The research methodology was deployed towards investigating a potential gap by exploring the design and implementation of a sustainability leadership framework within a higher education context using a case study approach to assess the existing

sustainability initiatives, leadership practices, and stakeholder involvement. Thus, a proposed framework was drafted aiming to empower institutional leaders to embed sustainability into their core missions, foster a culture of responsible innovation, and realize measurable progress toward sustainability objectives. Universities need leadership to create strategies with the vision of the future and connecting key-areas, involving stakeholders through coaching processes, inspiring people, and making communities stronger by adaptation in order to manage and support all these challenges and demands⁴. Besides, the gathered findings facilitated the development of a strategic model emphasizing key components such as strategic leadership, stakeholder engagement, capacity building and integrated governance.

The framework of sustainability leadership at Gulf University as a case study has essentially been tracked using a variety of integrated environmental, social, educational, and organizational governance metrics, indicators and indices as the discussion of sustainability leadership becomes essential at the organizational level⁵. Environmental indicators would display carbon neutrality progress, renewable energy usage, recycling and resources consumption, and green campus initiatives. Social metrics would gauge community engagement, accessibility to sustainability programs, and health and well-being initiatives. Educational efforts would be measured by the percentage of sustainability-focused curriculum, the volume of related research output, and the level of students and faculty participation in sustainability activities. Governance would be assessed through the presence of dedicated sustainability roles and committees. The decision and the development of comprehensive policy frameworks and transparent reporting aligned with global standards as sustainability leaders can promote positive externalities in the market and inside companies⁶. Additionally, there's a range of contextual metrics to ensure alignment with institutional and regional goals, responsibility initiatives fostering environmental actions and evaluation of programs' implementation effectiveness to stipulate a comprehensive representation. Tracking these indicators systematically shows how Gulf University projected to lead and demonstrate impactful sustainability practices.

Hence, this study employs a qualitative case study approach to explore and develop a sustainability leadership framework within a higher education institution, namely Gulf University in Kingdom of Bahrain. The used qualitative methodology enables an in-depth understanding of the complex dynamics, perceptions, and practices related to sustainability leadership at an organizational level mostly defined by institution leaders, considering a vast literature, studying if they (leader or follower) have a set of competencies, values, knowledge, and skills, which makes them engage in leadership⁷. Moreover, the case study design allows for a detailed examination of the current sustainability initiatives, leadership roles, stakeholder engagement and institutional culture.

This methodological approach enables the collection of reliable facts and contextual data, necessary to develop a nuanced framework tailored to the specific characteristics of the selected HEIs as case study. Also, document analysis was considered as a core input for the study. Consequently, relevant institutional documents such as sustainability reports, activities and events records, strategic plans, policy documents and operational plans and guidelines were reviewed and analyzed to assess formal commitments and initiatives related to sustainability. Moreover, based on a defined sampling strategy, the methodology has been nourished with a range of semi-structured interviews conducted with diverse groups of key stakeholders, including students, faculty, staff and community

partners participating in university activities and events, to assess their perceptions of the institution's sustainability efforts and leadership effectiveness as universities also could be seen as institutional leaders in the effort of promoting sustainability⁸. These interviews aimed to gather feedback and broader insights to capture perspectives on existing sustainability practices, leadership "styles" and challenges and opportunities for improvement. At this point, some of the reviewed literature such as the works of Randel et al., asserted that most of the surveyed sustainability leaders described their institutions as "Inclusive", which suggested that only a few of them regarded themselves as "Radical"⁹.

The inputs from stakeholders' feedback were transcribed, coded and analyzed thematically using qualitative data analysis software and relevant AI-powered tools, in respect of adhered to institutional ethical guidelines to ensure proper accessibility to resources, voluntary participation and data privacy policies. The analysis focused on identifying recurring themes, patterns and relationships associated with leadership practices, stakeholder engagement, challenges, barriers and opportunities identified within Gulf University context, intended to be a sustainable university. At this same point, Biasutti, M., et al., affirmed that there are significant barriers to the implementation of a sustainable university, for instance: the often legally guaranteed freedom of research and teaching, the lack of recognition of teachers who work with and for sustainable development, the lack of a desire for change and the lack of pressure from society¹⁰. Hence, the gathered findings from document analysis provided contextual support and triangulation for the qualitative data towards conceptualizing the framework intended to be constructed and designed as a model that reveals the traits of strategic leadership, stakeholder participation, capacity building, governance mechanisms and other associated indicators.

3. Results and Discussion

The presentation of sustainability performance across various domains reveals a comprehensive overview of Gulf University's progress toward embedding sustainability into its institutional framework. The results illustrate an overall high achievement in environmental impact and infrastructure, reaching 80%, indicating that sustainability considerations are fully integrated into the university's operational and infrastructural planning. However, the alignment of targets across other key areas suggests an opportunity for strategic realignment, particularly given the varied scores of 70% in curriculum and research, 50% in governance, 30% in stakeholder engagement, and a range of 10% in incentives. Accordingly, the results might be useful in terms of indicating a need for designing a sustainability framework adopting a comprehensive multi-dimensional model that aligns strategic goals with measurable targets across all key areas such as governance, stakeholder engagement, curriculum, research and incentives.

The analysis of curriculum and research underscores significant efforts, with 12% of programs and outputs focusing on sustainability-related topics. This indicates a substantial academic commitment. The data analyzed also highlights potential for further expansion to deepen this integration. The relatively high number of sustainability modules (9) and research outputs (9) demonstrate strengths that can be leveraged to foster a more sustainability-oriented academic environment and sustainability-based curriculum design.



Figure 2. Sustainability performance measurement across various domains (2019-2024)

The results confirm that the elements of the framework can be achieved by establishing collaborations across departments, increasing interdisciplinary co-research projects on sustainability and integrating sustainability themes into all levels of academic programs. Here, it's important to mention that at Gulf University, sustainability-oriented modules and related academic research are integrated at overall university, colleges and programs' levels.

In terms of governance, the implementation rate of sustainability structures and the leadership commitment index both stand at an appropriate level of progress (respectively 13 and 37). It indicates the promising stage of formal governance frameworks and implies that leadership's support, while present, constantly requires further improvement. It has been noticed that bridging the gap between structural implementation and leadership engagement may necessitate targeted initiatives such as leadership training and strategic inclusion of sustainability in decision-making processes. Additionally, based on this analysis, a recommended approach is to enhance governance by increasing leadership engagement and formalizing sustainability structures. This can be achieved through

targeted leadership coaching focused on sustainability, integrating sustainability considerations into strategic planning and decision-making processes, in addition to establishing clear accountability mechanisms. Strengthening these areas will facilitate the development of a more robust governance framework that effectively supports the university's sustainability objectives.

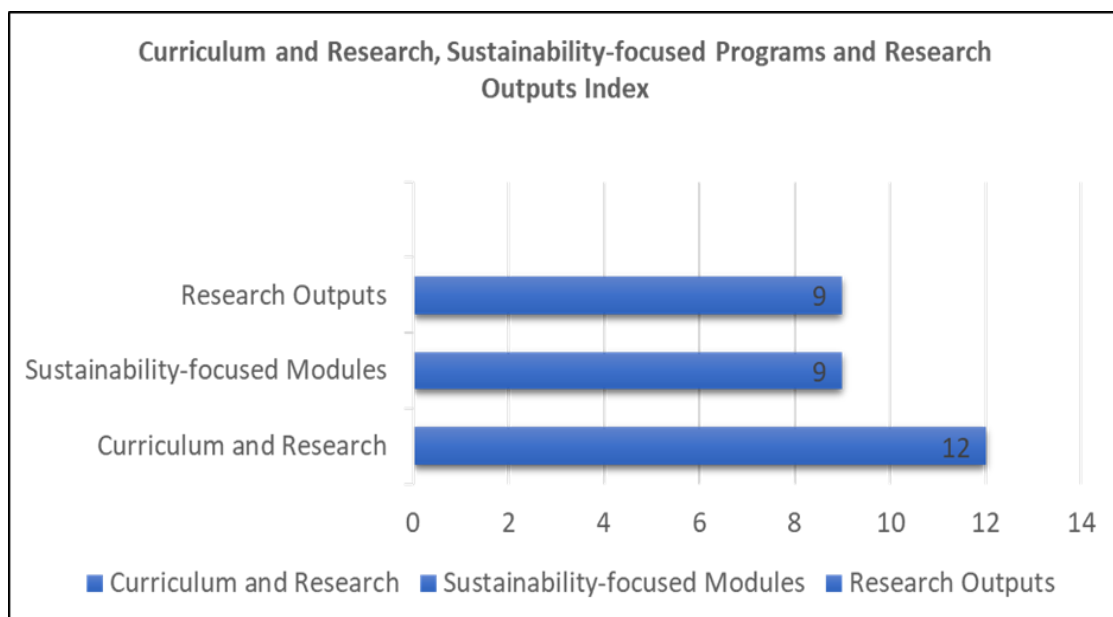


Figure 3. Programs and research outputs focusing on sustainability-related topics at Gulf University

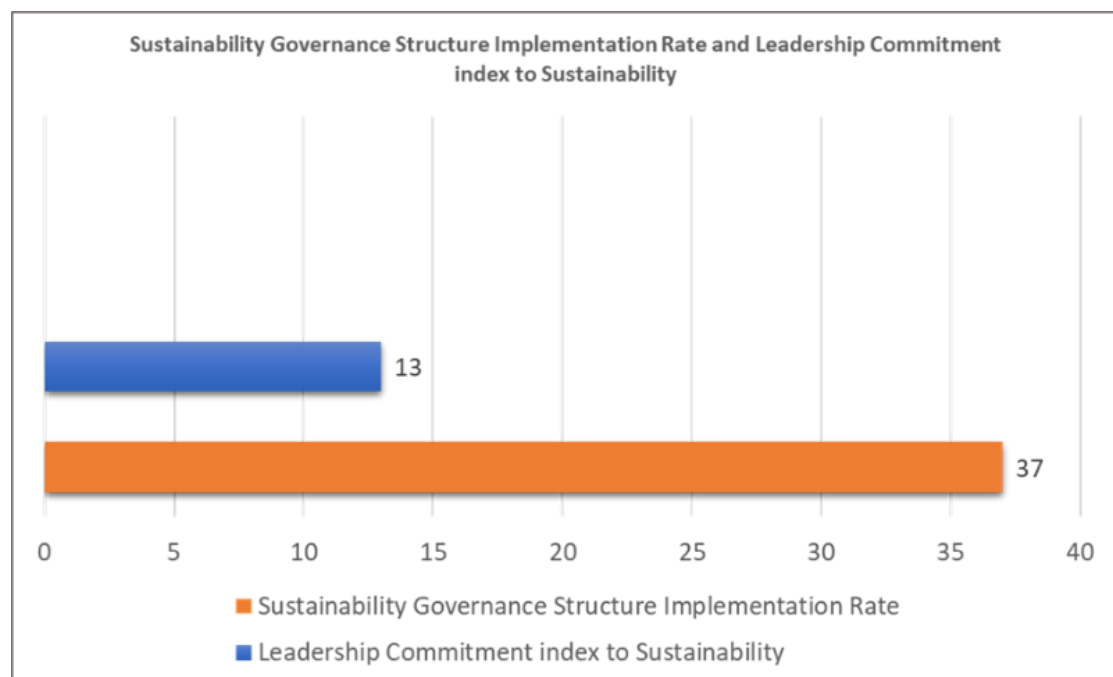


Figure 4. Sustainability structures and the leadership commitment index at the institutional level

The results showed that stakeholder and university community engagement is comparatively limited, with an overall involvement index of 30%. The data indicates that

stakeholder participation exceeds that of staff and students, yet the engagement levels remain low overall. Enhancing engagement could be achieved through targeted outreach, participatory projects and mechanisms that facilitate feedback, thereby fostering a more inclusive sustainability culture. The analyzed indices should be considered and incorporated into a comprehensive improvement plan aimed at establishing a robust sustainability leadership framework across the university, fostering strategic development and ongoing enhancement of sustainability practices.

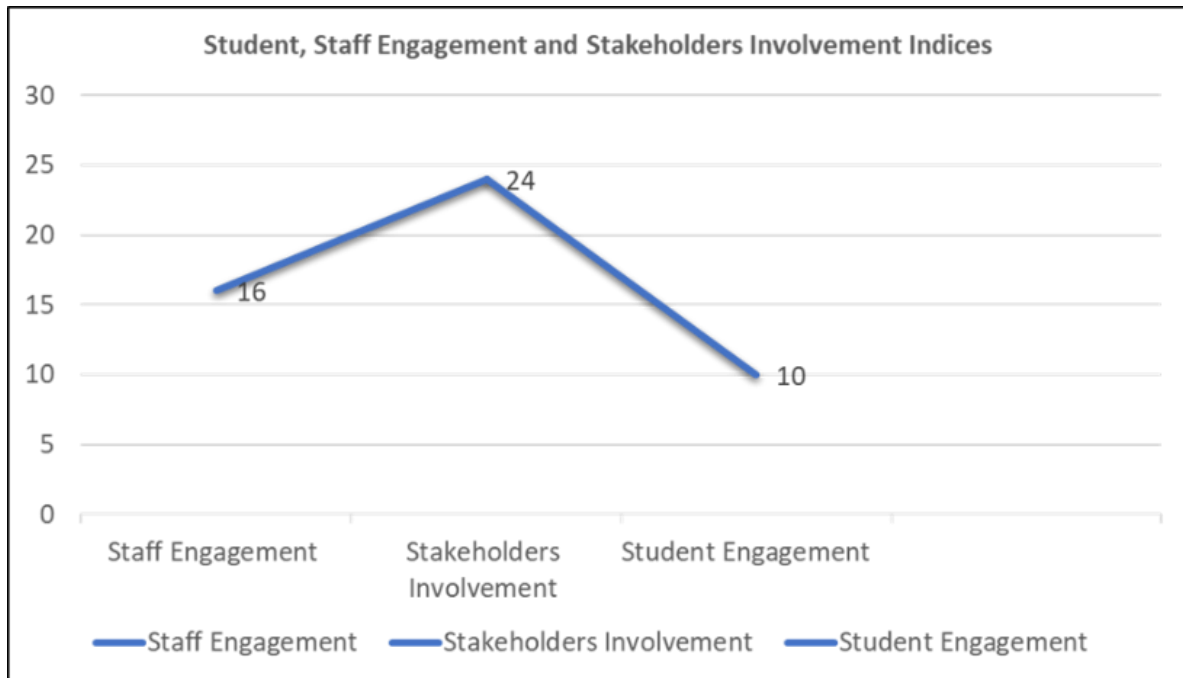


Figure 5. Stakeholder and community engagement indices (2019-2024)

Moreover, the results denoted that the incentives and recognition system appear underdeveloped, with only 10% of potential programs in place. Notably, incentives for sustainability efforts (scoring 24) are rather more developed than recognition programs (scoring 9) suggesting that while motivations exist, acknowledging and rewarding contributions require further emphasis. Strengthening these programs could serve to motivate sustained engagement and elevate institutional sustainability leadership efforts and characteristics within Gulf University context. Here, it's important to mention that a supportive and conducive context can facilitate the adoption and implementation of sustainable practices by providing the necessary resources, incentives and legitimacy by the decision-makers in the "situational" context the leaders are interacting. Antonakis, J., et al., confirm that in addition to the individual traits of a leader and the relationship between the leader and followers, the context plays a crucial role in determining the success of sustainability leadership¹¹.

Collectively, these findings indicate that while Gulf University has made commendable strides, particularly in environmental impact and academic integration, significant opportunities for growth remain, especially in governance, stakeholder involvement and incentives. Focused strategies targeting these areas such as enhancing leadership commitment, increasing stakeholder participation and developing robust academic recognition systems are vital in advancing overall sustainability leadership. According to Strand, R., the academic inquiry of leadership is mainly related to the

practical skills of an organization or individual to guide followers (i.e., employees and team members) and to take actions that have a considerable effect on the outcomes of an organization¹².

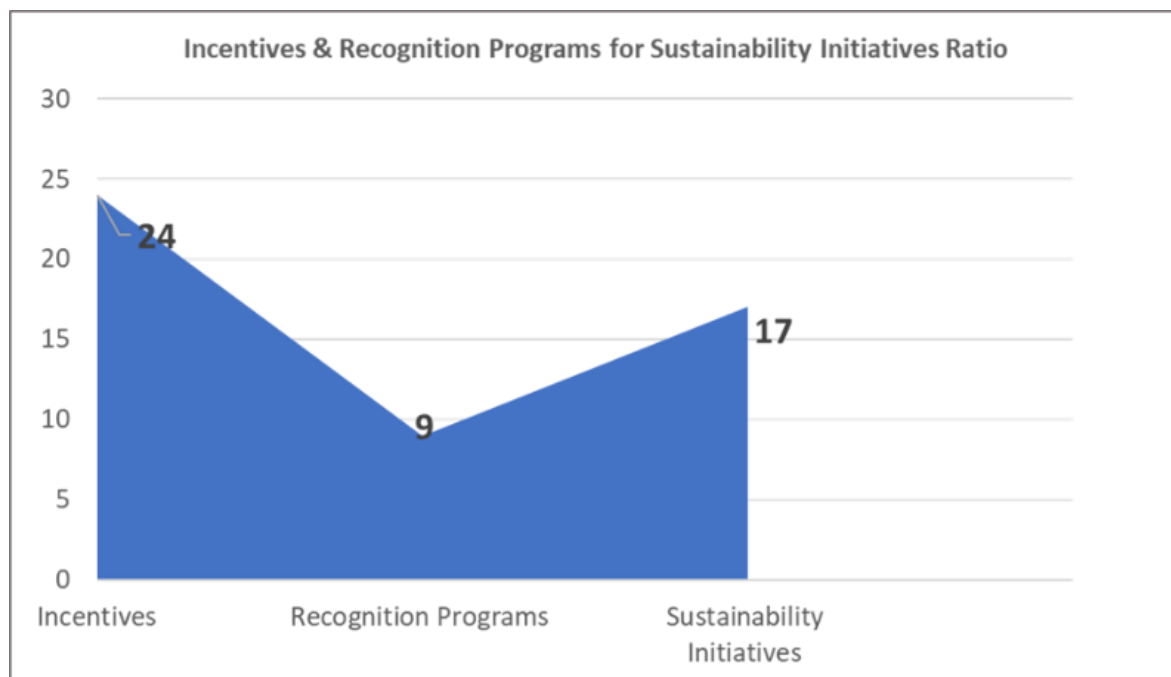


Figure 6. Incentives and recognition system rating in the context of Gulf University (2019-2024)

3.1. Developed Initiatives at an Institutional Level and Indicators for a Framework Design

The process of developing institutional initiatives towards establishing a sustainability leadership framework at Gulf University has required aligning first with institutional goals through a structured method. This, involved identifying goals by engaging stakeholders, anticipating decision-making, developing initiatives that support these goals and designing a relevant framework accordingly. Then, a range of indicators were set to measure accomplishment using defined criteria, with a mixture of quantitative and qualitative metrics.

Thus, the major initiatives representing the core components of the designed framework are the Sustainability and Development Makers Center (SDM-C), the Gulf University Sustainability Club (GUSC), the Sustainability Week Annual Event (GUSW), The Sustainable Engineering Hub (GUSEH) and the GU-SGDs Toolkit. Afterward, in relation to the effectiveness of the established framework, it's important to mention that regular reviews and adjustments were continuously implemented, incorporating stakeholder feedback, data collection and analysis sustaining strategic goals and continuous improvement.

3.1.1. The Sustainability and Development Makers Center (SDM-C)

One of the core components of the sustainability leadership framework at Gulf University is the Sustainability and Development Makers Center (SDM-C). The center focuses on promoting sustainability and development through a multi-faceted approach encompassing education and innovation, capacity building, operations and environment,

energy efficiency, green spaces creation, waste and water management and sustainable design alternatives. Key initiatives include “green campus” and “non-print campus” projects, building retrofits for daylight optimization and energy conservation, the development of green infrastructure such as “green studio cafe”, green roofs and corridors, implementation of recycling and composting programs, self-watering and water recycling solutions.



Figure 7. Sustainability and Development Makers Center (SDM-C) and Green Campus Project

The center also emphasizes education and research, offering sustainability inductions and conducting research on sustainable technologies and practices, with a global perspective and collaborative approach to addressing environmental challenges. The Sustainability and Development Makers Center (SDM-C) at Gulf University is demonstrating environmental leadership through a comprehensive, action-oriented approach to campus sustainability.

By implementing initiatives focused on energy efficiency, green infrastructure development and responsible resource management, the SDM-C is transforming the university into a living laboratory for sustainable practices. This leadership by the SDM-C extends beyond the campus through educational programs, research endeavors and collaborative partnerships, positioning Gulf University as a regional hub for environmental innovation and a model for other institutions seeking to advance sustainability on a local, regional and global scale.

When examining the organizational structure, it's instantly possible to perceive a structured approach where vision-driven actions in both institutional and cultural domains lead to tangible sustainability outcomes within the university, its campus area and its broader community and immediate educational and socio-economic environment. The organizational structure of the Sustainability and Development Makers Centre illustrates how a university can embed sustainability into its core institutional and cultural framework. By actively engaging with educational systems and socio-economic networks, the center facilitates the achievement of targeted sustainability goals. This structural approach enables the university to promote sustainable practices, foster innovative actions and build collaborative partnerships that align academic objectives with broader societal and environmental priorities and perspectives. Lozano, R. et al., confirmed that universities have been adapting themselves and redirecting their actions by developing their institutional leadership role in promoting SD; caring about their educational system and top management teams, staff, professors and researchers as sustainable leaders, and encouraging the development and education of tomorrow's

leaders who will assume important positions at companies, NGOs, and government¹³.

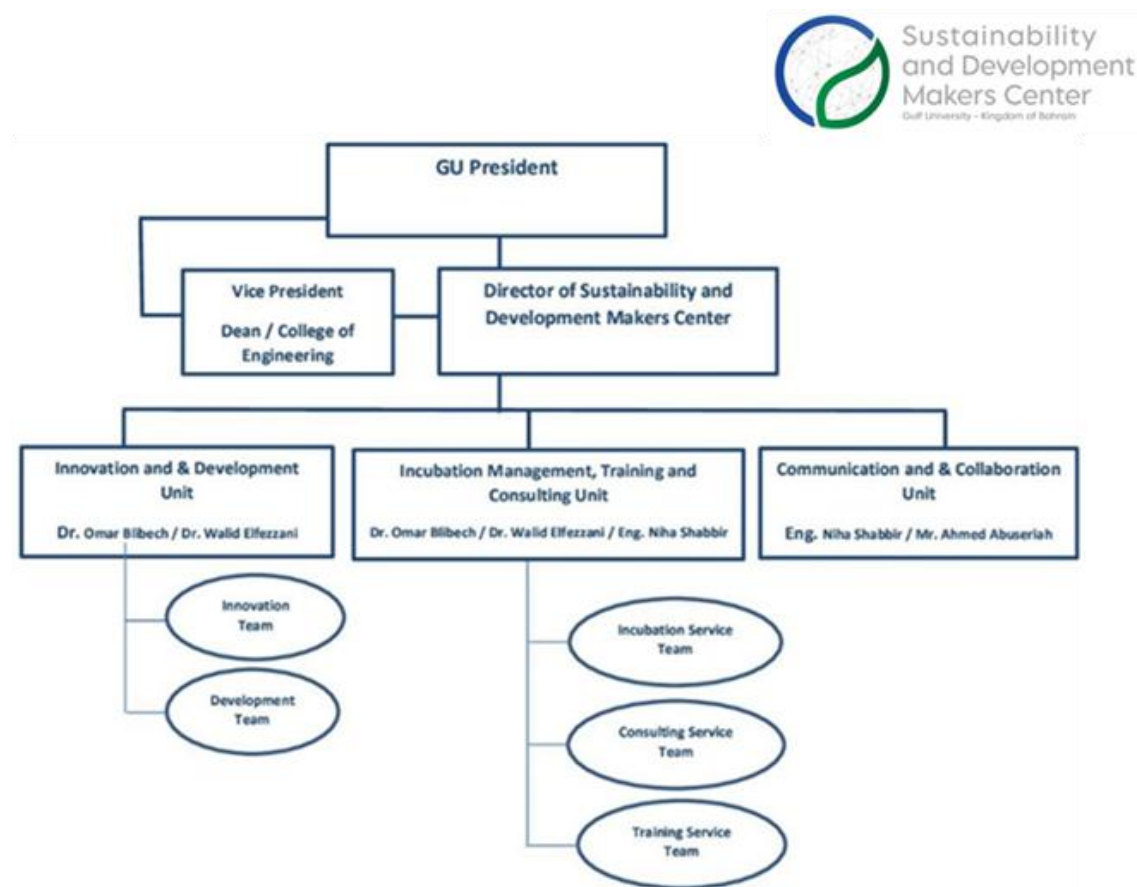


Figure 8. The organizational structure of the Sustainability and Development Makers Center (SDM-C) at Gulf University

From the operational point of view, the organizational structure operates hierarchically under the GU President, with the Vice President and the Dean managing academic and administrative functions for the College of Engineering. It features a mid-tier leadership layer, specifically, the Director of the Sustainability and Development Makers Center, overseeing multiple specialized functional units. These units include innovation and development teams, incubation management, training and consulting, communication and collaboration internally and externally, each with targeted core responsibilities considering that in terms of sustainability leadership, a given organization can generate positive and negative externalities along with their processes of creating and delivering value to their several stakeholders¹⁴. It's important to mention that one of the main challenges was related to continually foster collaboration, inspire innovative solutions and promote ethical responsibility to maintain an ongoing work and way of doing in embedding sustainability into organizational culture and driving positive, long-term change highly associated to a kind of leadership “know-how”, style or a mindset. According to Borges, J.C., et al., from the perspective of the individual, the style adopted by the leader, such as inclusive, visionary, creative, and altruistic, could contribute to sustainability leadership practices¹⁵.

Moreover, the structure emphasizes the aspects of role specialization, cross-unit collaboration and accountability, aligning strategic objectives with operational execution

in innovation, sustainability and organizational progress. Noting that additional potential challenges were noticed in terms of sustainability leadership highly associated with coordination complexity and overlapping responsibilities, requiring other facets of leadership in regard of the communication procedures and the defined roles related to the multi-flows' interactions between an organizational level, a decisional level and an institutional level. Designing actions, deciding on the designed actions and executing the actions is a core dilemma in framework in the sustainability leadership.

3.1.2. The Gulf University Sustainability Club (GUSC)

Building on the foundation of a comprehensive sustainability leadership framework, the process of linking the Sustainability and Development Makers Centre actions to the immediate institutional environment, overcoming the significant challenges related to an effective on-campus implementation of the designed actions, such as resource limitations, stakeholder engagement level, institutional inertia and ensuring alignment with broader sustainability vision. The Gulf University Sustainability Club (GUSC) was created to represent a commendable initiative that aligns with Gulf University's vision of advancing concrete and real-life sustainable practices and achieving the Sustainable Development Goals (SDGs). By focusing on promoting learning and fostering collaboration and leadership, the club was instituted to enhance the well-being of students, staff and local communities.

The Sustainability Club describes to what extent the HEIs need leadership to create strategies with the vision of the future and connecting key-areas, involving stakeholders through coaching processes, inspiring people, and making communities stronger by adaptation in order to manage and support all challenges and demands⁴. Consequently, the institutions' leadership developed a well-established scope of work leading to an effective achievement of the defined goals. The Gulf University Sustainability Club is mainly assigned to provide support and access to services as it's dedicated to providing necessary resources and support to its members and students' community, fostering an environment where sustainable practices can thrive. By enhancing campus life by organizing sustainable activities aiming to enrich campus life and nurture a culture of environmental stewardship. Raising awareness and inspiring initiatives through active engagement with university structures and members, the club seeks to raise awareness about sustainability issues and inspire environmental initiatives. Shaping profiles of leaders by actively involving members in its activities, the club aims to nurture future leaders who are committed to sustainability and social responsibility. Promoting a structured governance through the establishment of a well-defined organizational structure ensures effective governance and successful implementation of sustainable actions fostering community and impact by developing contributions and expanding the club's influence and nurturing a committed community dedicated to making meaningful contributions towards sustainability on campus.

Thus, the GUSC is set to become an influential part of Gulf University's community, driving positive changes and contributing significantly to a sustainable future, considering that developing leadership and empowerment of students should be seen as not only an effort by universities but from a systemic and situational perspective¹⁶.

Furthermore, as a core component of the designed framework, the Sustainability Club at Gulf University (GUSC) contributed to cultivating a sustainable and environmentally conscious university community. The data analysed, the documents and achievements showed that this dynamic structure inspired students to engage in

sustainable practices both in their everyday lives, academic progression, capacity building and future endeavours as the club's mission includes promoting awareness through events, workshops, competitions and campaigns, implementing sustainable initiatives on campus and in the local community, empowering student leadership to further the United Nations Sustainable Development Goals and expanding sustainability efforts by engaging with local and regional communities. The club proved that today's students that absorb the sustainability culture could become sustainable leaders of tomorrow. They may guide organizations to pass through an adaptive process of learning towards a more sustainable state, capable of dealing with complexity and goal conflicts between the social, economic, and environmental aspects⁶. Through its role and contributions, GUSC is committed to fostering a culture of sustainability within and beyond Gulf University campus, reflecting on the advantages of a designed framework for sustainability leadership.



Figure 9. The Sustainability Club: Empowering student leadership

3.1.3. The Sustainability Week Annual Event (GUSW)

Gulf University's approach to organizing "Sustainability Week" annual event is strategically aligned with both national and global sustainability goals. The event is designed to support Bahrain's Vision 2030, emphasizing education, environmental stewardship, and economic diversification, while also adhering to the UN's 17 Sustainable Development Goals (SDGs). Each year's activities are structured around key SDG themes such as clean energy, climate action, and sustainable cities, ensuring a focused and impactful agenda.

To maximize its reach and effectiveness, the university sustainability week event promotes multi-stakeholder collaboration, partnering with government bodies, as well as private sector leaders in Bahrain to sponsor panels, trainings, exhibitions and workshops. Additionally, through the sustainability week, the university engages with GCC universities and international organizations and institutions to share research and best practices, creating a well-rounded and globally informed event confirming that HEIs'

leaders need to understand and be aware of the several externalities of their activities on the systems and environments in which they interact¹⁷.



Figure 10. Sustainability Week 2024: “5-Day-Activities Program” for Multi-stakeholders’ collaborations

The Sustainability Week program was thematic and structured, with each day dedicated to a specific sustainability challenge and linkage to specific SDGs. The activities include keynote speeches from experts, hands-on workshops on recycling and green technology, and student competitions such as the Green Startup Challenge. Moreover, beyond campus, the university promotes community engagement through tree-planting initiatives, beach clean-ups, and public lectures to encourage broader societal participation.

A core aspect of Sustainability Week 2024 is its student-centric approach. The university management assigned the event organization to the Sustainability Club to empower students to lead year-round advocacy projects, while also integrating further SDG-focused courses and extracurricular activities into the curriculum since 2019 to ensure long-term academic engagement with sustainability ideas and values.

Definitively, Gulf University prioritized measurement and impact assessment through post-event surveys and public reporting. Annual sustainability reports track key metrics such as environmental awareness, green initiatives records and student engagement, allowing the university to refine future editions and demonstrate tangible progress toward its sustainability goals. This comprehensive approach ensures that Sustainability Week is not just a standalone event but a catalyst for lasting change confirming that sustainability leaders can promote positive externalities in the market and inside companies⁶.

The Gulf University Sustainability Week featured a diverse program of 38 activities, including 10 workshops, 7 panel discussions, 5 presentations, 3 training sessions, 4 interactive sessions, 2 induction events, 2 competitions, and 5 community engagement activities, facilitated by over 20 key speakers and panelists. These activities were strategically aligned with the UN's Sustainable Development Goals (SDGs), with a

significant emphasis on SDG 4 (Quality Education), accounting for 33 activities, followed by SDG 12 (Responsible Consumption and Production) with 22 activities, and SDG 17 (Partnerships for the Goals) with 20 activities. Further efforts supported SDG 15 (Life on Land) with 16 activities, SDG 11 (Sustainable Cities and Communities) with 15 activities, SDG 13 (Climate Action) with 12 activities, SDG 3 (Good Health and Well-being) and SDG 7 (Affordable and Clean Energy) with 10 activities each, and SDG 2 (Zero Hunger) and SDG 9 (Industry, Innovation, and Infrastructure) with 5 activities each, and SDG 14 (Life Below Water) with 4 activities, demonstrating the university's decisional level commitment to a broad range of sustainability objectives.

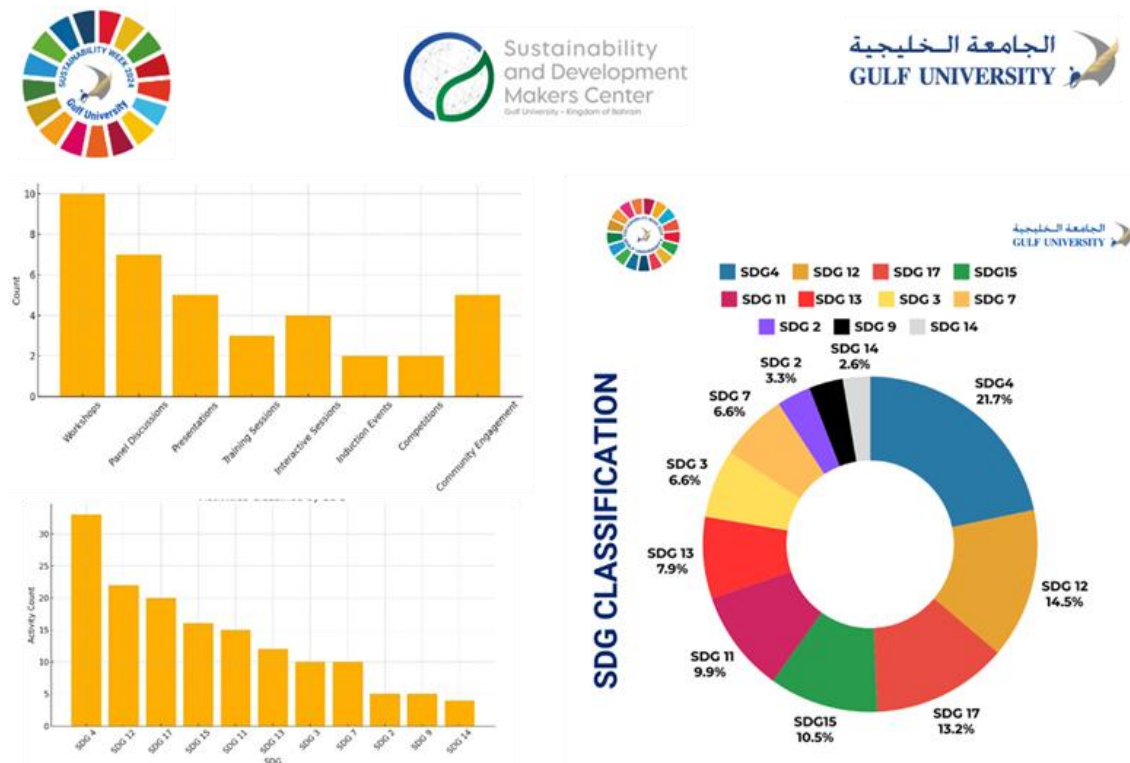


Figure 11. Sustainability Week 2024: Summary of activities by type classified by SDGs achievement

3.1.4. The Sustainable Engineering Hub (GUSEH)

The Sustainable Engineering Hub (GUSEH) can be considered as a well-designed initiative under the leadership of the Sustainability and Development Makers Center at Gulf University, towards an effective contribution to environmental leadership. The Hub aims to offer an innovative space with multidisciplinary and collaborative work environments, as well as formal and informal experiential learning environments. It encourages co-thinking, co-creating, and co-developing initiatives, actions and alternatives in alignment with the university's vision for lifelong learning and UN sustainable development goals, as well as Bahrain's Vision 2030. The GUSEH aligns with several Sustainable Development Goals (SDGs), including SDGs 9, 11, 12, and 13. By promoting sustainable infrastructure, responsible consumption and production, and climate action through the use of recycled materials, energy-efficient features and water conservation measures, the SEH contributes to achieving these goals.

The project was developed through a collaborative work involving engineering staff and students. The design process follows a 3Rs approach, focusing on extending the life

cycle of project components, structures and materials to support climate action initiatives at the university. The use of recycled shipping containers in the GUSEH provides a tangible example for campus inhabitants, raising awareness about sustainable development and the importance of community engagement in a higher education institution. It highlights how small actions can lead to significant changes.

The design of the Sustainable Engineering Hub follows a well-established process, considering both the pre-design development phase and the design development phase of the “GU Green Campus Project”. Reference is made to relevant conceptual and technical approaches for the architectural reuse of shipping containers to create living, working and learning environments. Notably, the designed new green studio cafe area aligns with SDG 13 (Climate Action) emphasizing the urgency of addressing climate change and its impacts. During the pre-design phase, extensive environmental and life cycle studies were conducted, drawing insights from similar international projects in higher education institutions and other contexts. This effort demonstrates an innovative approach in Bahrain and represents an exceptional contribution to environmental leadership.



Figure 12. The Sustainable Engineering Hub (GUSEH) at Gulf University: A collaborative platform for Green Campus design initiatives

The conversion of shipping containers into the GUSEH reduces the demand for new construction materials and minimizes waste generation. These containers are equipped with energy-efficient features such as insulation, sensor LED lighting and a portion of the air conditioning system powered by solar panels. These enhancements further improve their environmental footprint and contribute to mitigating climate change. Additionally, water collectors installed on the container roofs store moisture from humidity drops and can be utilized for various purposes, including plant watering. The design development process examines trendy sustainable solutions for their feasibility and viability. The Hub Project utilizes five 40-foot-old shipping containers, exploring functional and aesthetic alternatives with a specific focus on their environmental aspects, qualities and impact on the experiences, thinking, and awareness of campus inhabitants towards sustainability. It epitomizes the principle of thinking globally and acting locally, confirming an institutional vision deployed via an operational component of a framework for sustainability leadership.

3.1.5. The GU-SDGs Toolkit

Gulf University has designed an SDGs toolkit, a well-established database geared towards sustainability leadership. The university actively commits to the UN's Sustainable

Development Goals (SDGs) by integrating them into its operations. It offers a platform sustainability-focused initiatives by colleges and departments, encourages interdisciplinary projects related to the SDGs and promotes alternatives design for responsible consumption and production through waste management, recycling and digitalization. Efforts to build a sustainable campus include energy-efficient designs, renewable energy sources and conservation campaigns. The SDGs toolkit records how Gulf University partners with industries and communities to foster innovation, economic growth, education and social responsibility. At this point, Shawe, R et al., declared that the Principles for Responsible Management Education (PRME) and SDG inclusion in universities' activities reflect the need to focus not only on teaching and researching but also in developing new paradigms related to sustainability¹⁸. Prioritizing equality and diversity, the university aims to contribute to a more sustainable future through community engagement, research and collaboration.

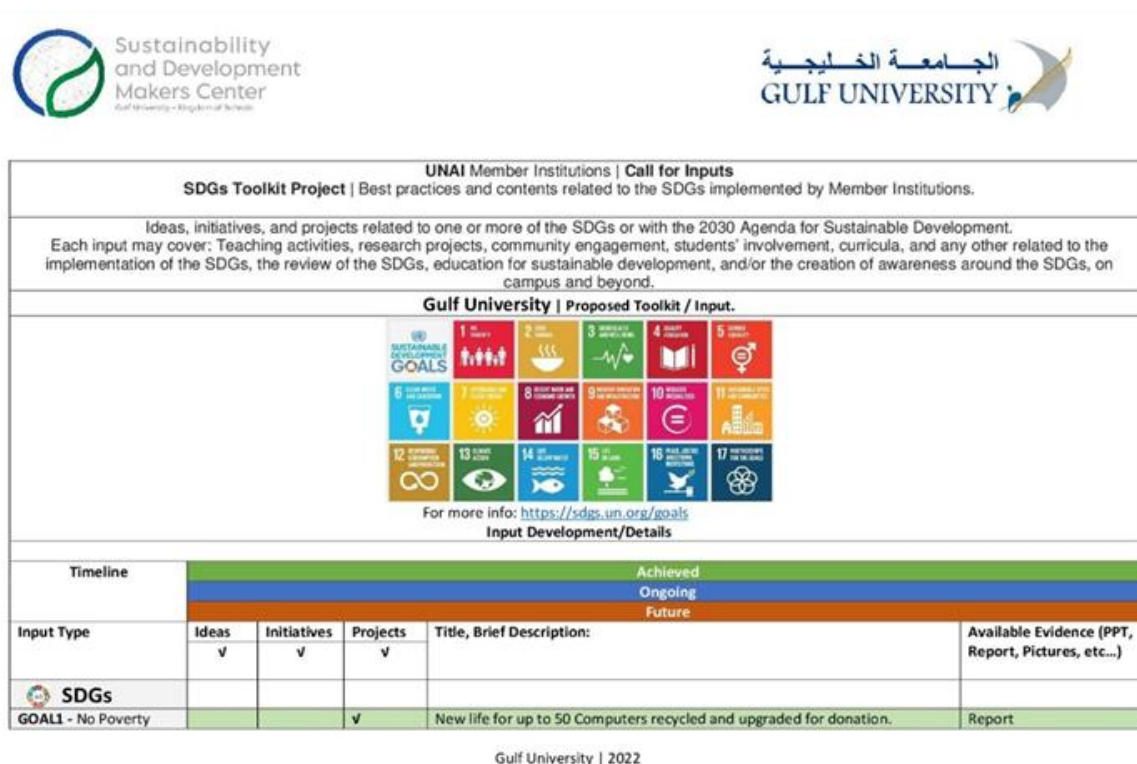


Figure 13. The GU-SDGs Toolkit: An indicators' dashboard for sustainability leadership

Overall developed initiatives at an institutional level and delineated indicators play a pivotal role in driving the traits of a Framework design towards sustainability leadership within a Higher Education Institution (HEIs) and the integration of Sustainable Development Goals (SDGs) into all aspects of campus life and academic pursuits. The university's engagement with sustainability is a challenge and it can be motivated by the institution's interest in enabling a new organization form and action focus by its high administration team¹⁹. Initiatives such as the Sustainability and Development Makers Centre (SDM-C) serve as central hubs fostering innovation, research and strategic partnerships aimed at advancing sustainability goals. Student organizations like the Gulf University Sustainability Club (GUSC) exemplify grassroots leadership by engaging students in awareness campaigns, community projects and advocacy, thereby cultivating a culture of sustainability on campus. Events such as Sustainability Week 2024 (GUSW24)

provide vital platforms for showcasing achievements, exchanging knowledge and motivating collective action. Additionally, to empower sustainable leadership across a HEIs, comprehensive tools such as the SDGs Toolkit and structured frameworks need to be conceived, developed and effectively assumed to guide institutional strategy, curriculum development and leadership practices.

By embracing these ideals and fostering collaborations among students, faculty and key stakeholders, HEIs' decision-makers can cultivate future-ready leaders equipped to embed sustainability into organizational culture and decision-making processes and can contribute to global sustainability efforts at different levels, contexts and situations. Universities may contribute to the sustainable development of their region and are recognized as pivotal institutions that can deal with problems, as well as provide the education of future leaders and the development of sustainable solutions for the future²⁰.

4. Conclusions

In conclusion, this study has demonstrated that cultivating effective sustainability leadership within Higher Education Institutions requires a comprehensive and context-sensitive framework that aligns institutional strategies, academic curricula and stakeholder engagement. Through the case study of Gulf University in Bahrain, it is evident that fostering a culture of sustainability demands a leadership that is visionary, inclusive, and capable of integrating the Sustainable Development Goals into core university practices. The proposed framework emphasizes the importance of strategic planning, capacity building, and collaborative governance to drive meaningful change as leadership is often concerned with change management and with preserving a 'structural tension' from which pursuing a shared vision is fueled²¹. Implementing such a framework can empower university leaders to champion sustainability initiatives, inspire campus-wide participation and position the institution as a vector for sustainable development within the broader community. Ultimately, this research underscores that sustainable leadership is not only pivotal for institutional resilience but also essential in shaping future generations of responsible global citizens committed to sustainable progress.

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Conflict of Interest

The author declares that there is no conflict of interest regarding the publication of this paper.

Authors Contribution

O.B. is the sole author of this manuscript and was responsible for all aspects of the research and writing. This includes the conceptualization of the study, the development of the theoretical framework and the design of the methodology, as well as data collection, analysis and interpretation, including the integration of institutional, organizational and socio-economic aspects of the study. **O.B.** also conducted the entire literature review, prepared all figures and narrative sections and was responsible for drafting, revising and finalizing the manuscript. All research decisions, analytical directions and interpretations reflect the author's independent work. Inputs and contextual insights derived from acknowledged colleagues and institutional structures are duly recognized in the Acknowledgments section. No other individuals or parties contributed to the authorship, analysis or writing of this paper. **O.B.** conducted the critical revision, reviewed and approved the final version of the manuscript.

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