Implementing the Sustainable Development Goals (SDGs) in Higher Education Institutions: A Case Study from the American University of Beirut, Lebanon

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1 Introduction

1.1 The Scope and the Stakes

The Sustainable Development Goals (SDGs), adopted by all member states of the United Nations in 2015, describe a universal agenda that applies to all countries. UN members are urged to adopt and implement SDG policies in light of dwindling natural resources and impending climatic changes, as their palpable burden is increasingly felt on sustainable livelihoods and infrastructure worldwide [1, 2]. Higher education institutions (HEIs) were called on to take a leadership role, through research and educating students in relation to the goals and by inspiring engagement within their communities. While most universities now address environmental sustainability and/or sustainable development in some form, fewer universities have embedded an integrative or holistic approach to sustainability and the integration of the SDGs in both academic and applied domains. In this chapter, we will present a strategy for an integrative and holistic implementation of SDGs in HEIs, drawing on the case of the American University of Beirut (AUB), Lebanon. Through a higher vision, strategic direction, and collective efforts, AUB was able to surmount big barriers commonly identified in the literature as restricting the implementation of SDGs on university campuses [3, 4]. This was demonstrated by the

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M. Ali S A Al-Maadeed et al. (eds.), *The Sustainable University of the Future*,
https://doi.org/10.1007/978-3-031-20186-8_12

significant leap made in its worldwide ranking against the global performance tables that assess universities integrating the United Nations' call on SDG partnerships [5]. The chapter will make the case for the implementation of SDGs in all the sphere of actions of a HEI, i.e., research and education in the age of Industry 4.0; socio-cultural impact; operations; governance; and external leadership. It will describe the steps taken to formulate a strategic plan for the implementation of SDGs in all these domains by drawing on the case of AUB for inspiration. A strategy that will be described in five specific implementation components as follows.

2 Rallying Forces Around SDGs and Launching the Vision

2.1 The Importance of Senior Management's Commitment to SDGs

The importance of senior management's commitment to SDGs, its role in building up a vision that integrates them, its ability to effectively communicate the vision with campus community, and to rally the community around specific targets as illustrated in the case of AUB VITAL 2030 vision.

AUB adopts a system of shared governance where stakeholders partake in the constituency, and responsibility goes in tandem with accountability [6–8]. AUB's message and core values enshrine this institution in the fabric of Lebanese society which prides itself in being a culturally diverse and inclusive hub for the entire region. The long-lived partnership raised generations of leaders in influential positions, be they economic, agricultural, infrastructural, medical, or social, all imbued with AUB's liberal arts education and ethos [9]. The whirlwind of political transformations throughout Lebanon's modern history saw AUB stand firm, a flagship of social cohesion in addition to excellence in education. Tolerance, respect, and diversity in a polarized political environment came at great costs, however, requiring vigilance and untiring diplomacy. The parties did not always speak AUB's language, and many counterparts viewed dialogue as purposeless. Yet, AUB managed to include key players on its board of trustees, and through its dedication to shared governance, discourse, and a spirit of openness, it was able to align its priorities with those of Lebanon and the region [10]. This aspect was studied by Philip Zgheib of the Olayan School of Business (OSB) who analyzed the link between political networking potential and the impactful decision making of Lebanese expatriates worldwide. After that, his research sought to explain the origin of the Lebanese diaspora's involvement in international entrepreneurship, and in a third installment on the topic, Zgheib and his colleagues estimated the association between level of education and entrepreneurial impact [11–13]. Analyzing the answers of 264 Lebanese 1st generation entrepreneurs; Zgheib et al. found the level of education to be the most significantly associated factor with entrepreneurial-related variables, which include leadership and "entrepreneurial orientation" as coined by the authors.

Specifying the generational rank was critical because Lebanese expatriates have been settling abroad since the 17th century, making them an integral part of the societies they've adopted [14]. Albert Hourani for instance, who is a renowned reference on the topic frequently quoted in this research, is a 1st generation British Lebanese. He extensively researched Lebanese diaspora and taught at the AUB in 1938, yet he was born in Manchester England not Lebanon. His father, Fadlo Hourani, matriculated at the AUB a couple of decades before that [15]. This goes to show the enduring impact of AUB, and consequently, the impact of its graduates up to this day. Dr. Zgheib's coauthors included researchers from several renowned Arab universities, and included entrepreneurs, like Abdulrahim Kowatly, who eventually joined the OSB Faculty. Kowatly and Zgheib's 2013 project maps under SDG 8 "Decent Work and Economic Growth" according to Scopus. It clearly satisfies SDG 17 as well "Partnership toward the Goals", since the partnership of the coauthors coming from many institutions, led to a successful example of what the UN calls Education for Sustainable Development (ESD). ESD is described by climate and education experts Nhamo and Mjimba, as an essential characteristic of Sustainable Universities [16, 17]. Such visionary approaches parallel the international effort that produced the SDGs as formulated in 2015. Once the UN's Agenda 2030 is reassessed, it will undoubtedly include similar contributions to forecast the way forward. Starting 2019 AUB unveiled a new thematic approach called VITAL 2030 [18], forecasting a comprehensive plan to realign AUB's vision with its long-term goals and to benchmark its objectives.

The simultaneous cataclysms (political, economic, pandemical) endured by each stratum of the social fabric required quick reflex, and true to its pioneering second nature, AUB rose to the challenge. The result of several in-depth retreats spelled out five broad lines coupled with consequential long-term goals and specific stratagems with quantifiable elements to make sure the walk fits the talk. In VITAL, V stands for "Valuing AUB Community", I for "Integrating the Humanities", T for "Transforming the University Experience", A for "Advancing Research at AUB", L for "Life: Lifting the Quality of Health and Medicine in the Region."

The initiation of any research project at AUB closely follows the standard Plan-Do-Check-Act (PDCA) approach. Education experts Estévez and Chalmeta add the term "strategic planning" to the standard PDCA scheme. The same term which accurately describes the process is employed in the AUB's lexicon [19, 20]. In fact, one of the conditions research proposals must meet is compatibility with the faculty's strategic planning, which the research committee in every faculty ensures [21]. The research committee members are chosen from the faculty as part of their service to the community, an intrinsic aspect of shared governance at AUB. Strategic planning starts with the invitation of "directive" human resources to the AUB family, using Estévez and Chalmeta's characterization of successful contribution to methodology by an institution's Human Resources. Estévez and Chalmeta's work divides Human Resources' contributions into four vectors defined as a directive subdivision, a coordination group, facilitators, and action groups. Strategic planning starts with an invitation from the "directive" Human Resources to the institution's constituents. The directive action represented by upper management, is

equivalent to the board of trustees (BOT) at AUB which instigates, contributes to, empowers, and validates the strategic planning. Through shared governance, the strategic planning which develops organically in each department, matures through faculty retreats, then back to the BOT table. The coordination group, represented by the board of deans (BOD), is headed by the provost. Through their authority delegated to the university librarian, they ensure that the generated data and dissemination of research follow the proper path, starting with the board of ethics or institutional review board (IRB) for instance, till the publication of results through the library's AUB-Scholar repository. The AUB-Scholar search engine will be discussed later to show the extent of SDGs related research. The facilitators' part is accomplished by the faculty members, partnering researchers, and advisors, but do not include funders or stakeholders, as by AUB's Grants and Contracts Department's regulations, in order to safeguard the integrity and independence of research. The action groups at AUB can be suitably represented by initiatives like AUB Innovation Park (AUB-iPark), which is an accelerator for new ideas started by students intending to launch a new concept into the marketplace. This will be discussed further in the next section. Stakeholders can be a part of the action groups, because once the research is published and the results are validated, conflict of interest subsides, and transmissibility/dissemination of best practices become the priority. What follows is a mapping exercise of VITAL 2030 to the 17 SDGs, listing actual practices/projects and echoing the gist of SDG 4's 7th goal, which characterizes education for sustainable development (ESD) as a catalyst for equity and equality, promotion of just and strong institutions, responsible consumption, and sustainable infrastructure, and most importantly partnerships for the goals. The first frame symbolized by VITAL's V, stands for valuing community and sharing AUB's core values. It naturally aligns with SDG 4 "Quality Education", SDG 5 "Gender Equality", SDG 10 "Reduced Inequalities", SDG 11 "Sustainable Communities", and SDG 16 "Just and Strong Institutions". Its objectives start with affirming and communicating AUB's unwavering commitment to accountability, cooperation, diversity, empathy, equity, integrity, respect, and transparency. VITAL 2030 sets forth concrete mechanisms to realize the goals of inclusivity without regard to economic status, recruiting the best academic prospects based on intellectual potential not financial abilities. Achieving these lofty goals can only take place when relevant and realistic funding is made available through endowments for research centers, accelerators and incubation hubs, and financial aid/scholarships. The sustainability of such plans is hence ensured, and strategic growth is streamlined with core values and ethos.

The I in VITAL is for "Integrating the Humanities" into purpose-oriented education and the 4th revolution; Industry 4.0. The benchmarking process in this area extends to all levels of AUB constituency, revealing the benefits of immediacy in shared governance. Calculating the success rate of a program's learning outcomes, could start with the class average in a midterm quiz and end up on a Board of Deans meeting agenda. E-learning, new media, data literacy, and technology imbue all the current disciplines. AUB has hybridized data into curricula and outreach, under the aegis of Industry 4.0. Digitizing the museum collection of the Archeology Department and the first editions of Arab Nahda manuscripts are good examples.

Offering 3-D printing workshops at the Interdisciplinary Design Practice Program takes the practice of concretizing the abstract to the next level [22–24].

AUB ScholarWorks can be used to further illustrate the practical ease in digitized research reporting [25]. A search for "SDG and Quality Education" will yield 128 results. Out of these results, more than 98% mention more than two SDGs and no less than 90% is dedicated research about enhancing sustainability as it directly relates to the 169 objectives of the 17 SDGs. Refining the search in the results page to include SDG and education for sustainable development (ESD) yields 39 results, the first is a policy brief by the Task Force on Climate Change, Sustainable Energy and Environment. It is a typical international collaboration published in partnership with the Department of Economics and spanning over three continents, several universities, and research centers [26]. It tackles the student initiatives relying on information and communication technologies (ICT) and the importance of incubation hubs like AUB-iPark to lead such projects to fruition and a spot in the market place. Enhancing the relevance of AUB as a center for innovation and research through its outreach activities, community service, and as accelerator can hence be measured as a quantifiable objective. The link to the Department of Economics following the search on AUB ScholarWorks shows the recent submissions of its faculty members to peer reviewed journals, showing SDG and sustainability-related research first. A further search of the Department of Economics' publications using "sustainability" for instance yields nine papers starting from 2010. Another search using "green" also yields nine publications, four in common with the first search.

T in VITAL stands for "Transforming the University Experience", it is the third pillar of the new thematic. It is validated through the practice of uncompromising transparency, a solid line of communication throughout the shared governance process, and the lived experience of student services and facilities, epitomized by the regenerating ease of campus life and immersed in respect, diversity, equity, and inclusion.

A: "Advancing Research at AUB" inevitably aligns the VITAL 2030 vision with SDGs 13 "Climate Action", 14 "Life below Water", 15 "Life on Land", and 17 "Partnerships for the Goals". The proximity of the campus to the sea allows for firsthand testimony of the urban carbon footprint unavoidable, with the biology department literally located by the shore. The Environment and Sustainable Development Unit (ESDU) at the Faculty of Agricultural and Food Sciences is yet another model of interdisciplinary and applied research. With international partnerships and endowments, this quintessential center combines outreach to state-of-the-art research where farmer, merchant, and researcher, in Lebanon and the region, advance the quest for knowledge along sustainable livelihoods [27].

Lastly, L in VITAL 2030 is the common denominator symbolized by "Life: Lifting the Quality of Health and Medicine in the Region", a theme synonymous with AUB's Medical Center and Faculty of Medicine. It aligns with SDG 3 "Good Health and Wellbeing", and it is validated by the world-class research that sets AUB apart. The development of a sustainable business model, giving all strata of Lebanese society and the region access to the latest clinical services relies on state-of-the-art data applied in medical records, distance learning, machine learning, and the promotion of a healthy lifestyle (Table 1).

Table 1 Mapping of the VITAL 2030 elements to SDGs

VITAL 2030						
V	SDG 4 	SDG 5 	SDG 10 	SDG 11 	SDG 16 	
I	Industry 4.0					
T	Transforming University Experience					
A	SDG 13 	SDG 14 	SDG 17 			
L	SDG 3 					

3 Connecting the University to SDG Networks

3.1 Relevant SDGs Networks and Active Contribution

This part emphasizes the importance of being effectively connected to relevant SDGs networks and how active contribution and mutual benefit advance toward SDGs implementation. Being connected stimulates motivation and fosters a culture of implementation in the different spheres of action of an HEI. Maintaining local, regional, and international ties facilitates education and research in support of the widely adopted SDGs. In September 2019, AUB inaugurated the Tala and Madiha Zein AUB Innovation Park (AUB iPark). In addition to immersing the students in latest Industry 4.0 tech and helping them "develop innovative ideas into profitable and scalable startups", AUB iPark centers on AUB's status as a hub of fact-based and deontology-prone entrepreneurship in Lebanon and the region [28]. The AUB iPark's incubation program heralds the digital revolution by initiating undergraduate students to the notion of expandable startups and validation of new ideas in order to build and accelerate a potential project then lead it to the market for execution and commercialization. The invitation extends to graduates, alumni, or researchers working with students. The gist of the initiative is to enjoin AUB students "from the heart of the startup ecosystem Beirut Digital District (BDD)" to convert an idea into a viable business by incubating it, accelerating the venture, connecting with

industry specialists and mentors, and bringing together the creators of the idea with potential partners, talents, and investors, with all the projects listed in their database [28]. About the same time, AUB has partnered with Global Compact Network Lebanon (UN-GCNL) to offer students the chance of directly affecting the implementation of SDGs oriented policy. The Global Compact Network comprises around 70 local networks that are globally aiming to provide a "learning platform that facilitates heightened awareness, exchange of expert knowledge, and policy dialogue on sustainability and the 17 SDGs". The Lebanon network was started at the OSB Business school at AUB "with the ultimate goal of mobilizing a movement of sustainable companies and stakeholders to create a better Lebanon [29]." Both AUB and AUBMC partook in this collaboration becoming GCNL partners, and a Communication on Progress was published, as will be elaborated later in the chapter on the SDG reporting aspect. GCNL invested 100,000 USD and launched a call for proposals inviting AUB students to "incentivize and develop projects that have practical applications, with AUB increasingly being recognized as a hub for all SDG thinking and action across Lebanon." The successful applicants were invited to present their project at a dedicated conference at AUB, marking the inauguration of a partnership enduring the turbulence of the pandemic year. GCNL also collaborated with the Nature Conservancy Center at AUB (AUB-NCC) on the 2018 initiative International Biodiversity Day at AUB (IBDAA). IBDAA is an innovative approach to education with a focus on applied sciences; "IBDAA invites professors to enroll their classes in a competition to raise awareness of current environmental concerns by offering original and viable solutions" [30]. The GCNL led initiative in partnership with AUB took on "one of the Sustainable Development Goals set by the UN for 2030: 'Sustainable Cities and Communities' partnering with several Lebanese universities" under the AUBNCC umbrella.

In August 2021, AUB partnered with GCNL again to launch the call to join the "SDG Brain Lab Initiative", which included an incubation program, much like AUB iPark, culminating in a specialized training with professionals in the field amongst GCNL partners. The added value in this recent collaboration was the extension of the invitation to the medical school and nursing students through WEFRAH. WEFRAH is a Faculty of Agricultural and Food Sciences (FAFS) initiative that incorporates the foci of renewable resources and health into the Water-Energy-Food (WEF) Nexus and it aims to create a university-wide SDG-oriented approach, as will be discussed further in the chapter. The contributions of students in the domain of health bring in a fresh perspective to entrepreneurship that is grounded in the core values of AUB, as an HEI primarily committed to the educational and health service in Lebanon and the region. The invitation called on students to "join the SDG Brain Lab Program, an accelerator that aims to enable and nurture the change makers of tomorrow and empower the Lebanese youth between 18 and 24 years old in advancing the 17 Sustainable Development Goals of the UN 2030 Agenda on a national scale [31]." The innovative inclusion of future health professionals into the SDG fold brings a breath of fresh air to the field of healthcare because their AUB education centers these students around

integrity and work ethic, allowing the future leaders and change makers to visualize a sustainable business model of health from a WEFRAH perspective. Such collaborations are a few examples of AUB centered initiatives around the SDGs theme. They can suitably serve as a model for university centered approaches tackling the most pressing concerns of the future generations, by providing the inevitable stakeholders a seat at the table, taking stock of decisions not just results. GCNL was launched in September 2015 and initially hosted at the American University of Beirut (AUB). In 2018, a legal entity was established for the sole purpose of hosting GCNL's Secretariat and the MOU with the UN Global Compact was updated reflecting this new hosting arrangement.

4 Promoting SDGs Initiatives on Campus

4.1 Implementing SDGs in a HEI as Holistic Approach

Promoting SDGs initiatives on campus: Individual initiatives targeting one or more SDGs exist in most HEIs. However, implementing SDGs in a HEI requires a collective, integrative, and holistic approach. Its success depends on how effective the HEI is in promoting and supporting campus-wide initiatives in research and education and developing cross-disciplinary team-based entrepreneurship and partnerships, reaching out to faculty, staff, and students in addressing global challenges. WEFRAH's AUB entry for University of Indonesia's GreenMetric call for posters "Universities, UI GreenMetric and SDGs in the Time of Pandemic" illustrates this part. The gist of the WEFRAH initiative consists in increasing synergy among various AUB departments, research centers, and policy units. Launched by the Faculty of Agricultural and Food Science (FAFS) to solicit engagement and multiply collaborations between AUB Faculties and Schools, it particularly promotes interdisciplinary partnership "by nurturing a bottom-up, participatory approach within AUB and between AUB and its external stakeholders." The methodology of WEFRAH stems from the nexus of Water-Energy-Food (WEF) in arid and semiarid climate, which our area has confronted since time immemorial or slightly after, congruent with historical/archeological accounts. Humanities are hence an indispensable partner whose contributions stand on equal footing with the financial, agronomical, or geopolitical perspectives. The innovative aspect in FAFS' approach was the inclusion of the Resources and Health fields to the WEF nexus. The proximity of other faculties, to name one factor, be it in terms of common specialties or casual scientific discussions, binds the AUB family in their quest for knowledge, providing fertile ground for WEFRAH. The initiative "opens venues for collaboration with other universities within Lebanon and its outcome and action-oriented approach links naturally and organically to the Sustainable Development Goals (SDGs) 2030 by presenting a contextualized, relevant approach to their achievement in the MENA region, using the AUB vehicle as a

regional hub for innovations in water-energy-food-health nexus and interconnectedness in renewable resources in arid and semiarid regions [32]." A typical SDGs-related activity launched campus-wide and eliciting collaboration between faculty staff and students, was the project proposal addressing the salinity of the water well during the pandemic, in a remarkably dry year marked by shortages of water and power cuts. It was the AUB entry for the UI GreenMetric Sustainable Campus call for posters [33]. AUB's campus has been its flagship for the last five decades, but its water well became brackish due to decreased rainfall, and unsustainable consumption of the Beirut aquifer [34]. Extraction overload left the water table brackish and polluted. To mitigate the recently increased salinity, a plan for responsible consumption using less purchased fresh water was devised, with the help of experiential education and the innovative use of infrastructure. The movement restrictions of the pandemic were overcome through the efficient health system (streamlined vaccination program), and the educational facility (greenhouse/nursery labs) availing in-house services to the involved students [35]. AUB's campus is arguably one of the most memorable in the area, comprising a diverse variety of native and exotic flora. The in-house well sufficed during the past four decades but the new trend in climate change stifled that. Uncontrollable digging of wells due to lack of urban planning and exploding population numbers resulted in the transformation of most Beirut wells into brackish water reservoirs [36]. The physical plant department had launched a gradual replacement of salt-sensitive hedges with more salt-tolerant ones. Thanks to a comprehensive SDGs inclusive planning, a gradual transplantation of salt-tolerant species on campus to replace the cover plants requiring fresh irrigation water was already taking place [37]. However, the exponentially rising salinity recently exacerbated the problem. This led to an increased (and excessive) outsourcing of water, which kept the campus verdant but ran a hefty bill. By setting up nurseries using the expertize of the students in plant breeding, the program would be fast tracked while saving the cost of new saplings, and a separate brackish water system would be used to irrigate the new arrivals as they come out of the in-house nursery. The dynamic vaccination program, would give the students priority access to attend to the plant nurseries [38]. The initial campus-wide plan was to reduce freshwater use, then morphed into a proposal to fast track the multiplication and transplantation of high salt tolerance varieties. SDGs like "Life on Land", "Climate Action", and "Clean Water" buttress the theoretical core of the project, while others influence the methodology, specifically "Innovation in Infrastructure", and "Sustainable Urban Planning" both intrinsic to the AUB ethos of neighborhood partnership and improving quality of life. The proposal to replenish the campus with high salt tolerance species allows the sea flora, which had bestowed on the Lebanese coastline and Beirut their particular biodiversity since time immemorial, to reconquer a small space long lost to intensive urbanization and population density [39]. Beirut's coastline exemplifies the typical karstic propensity of the Lebanese terrain and is typified by the illustrious Raouche area's Pigeon rocks. The particular karst ecosystem and its accompanying biodiversity survived urbanization to a

limited extent in the tiny part of the Raouche area called Dalieh, but it is increasingly bearing the brunt of "advancing city building" and overpopulation [40, 41]. AUB campus became the default protectorate due to its remaining patch of vegetation, defying the rabid real estate demand. Beirut has more trees on buildings than on land, and for the most part, its vegetation aims to denote a selective lifestyle rather than safeguarding the indigenous botanical patrimony. The advantage of AUB campus provides a much-needed natural extension and vital space for this ecosystem [42]. AUB is also situated in the natural continuation of the karst formation incline and is suited to act as shelter to many inhabitants of the Dalieh ecosystem, especially if the indigenous flora is allowed to thrive. Decreasing the effect of nonindigenous invasion favors wildlife conservation while fitting in a stricter freshwater use policy [43]. The reestablishment of the indigenous ecosystem may even extend to the sea floor, where algal diversity is intrinsic to life below water [44]. The reintroduction of endemic species and return of costal flora may end up saving more than water. The continuation of the habitat, downhill from the nearby ecosystem that Dalieh provides, can serve to protect many herptile and insect species that require the endemic seacoast flora to survive. Many indigenous and endemic amphibians and reptiles are currently endangered. Providing the suitable ecosystem which reestablishes their habitat would support the hidden lives of underground dwellers. The preserved underwater diversity may to be prove an essential cornerstone preserving the whole arch above, at an age of incrementally microbe resistance and dramatically receding microbiome [39, 45–47].

Another beneficial aspect of this initiative is the contribution to the "Quality Education" SDG by using the expertize of the Department of Agriculture of FAFS to train the students in hands-on plant breeding. The contextual nature of this exercise highlights the concept of solution-based thinking and addressing issues at the regional level, which the program has weaved into its vision and curriculum [48]. The WEFRAH initiative aims to influence policy and create research-based solutions. Based in FAFS, it focuses its vision through the lens of interdepartmental collaboration toward critical solutions in the context of arid and semiarid areas [32]. In this particular project, the collaboration with the Physical Plant Department allows for the optimal use of the irrigation system, by separating the brackish source and using the in-house well to irrigate without having to purchase freshwater [49]. Similar collaboration with the AUB vaccination program allows the fast-tracked vaccination of the students who would be working in the labs to breed the salt-tolerant species already found on campus, saving funds, promoting SDGs, and benefiting the students through experiential learning. The unsustainable practice, even if it is currently affordable, will contribute to depleting another aquifer, likely in the vicinity of the one no longer used for freshwater supply [50].

Another campus-wide project currently introduced is Solar Power. Elaborated on in the final part of this chapter, Dreaming the Future starts in the heart of the young through collegial discourse, experiential learning, exchange of ideas and expertize, and methodical grit.

5 Reporting and Increasing University SDGs Ranking

5.1 Tracking Progress in SDGs Implementation

Reporting and increasing the university ranking on SDGs: Tracking progress in SDGs implementation shows the extent of commitment of the university community toward the goals. Reporting on SDGs for the entire campus is quite a tedious task especially in large universities. This requires constant and regular tracking, the involvement of all the faculties, centers, and units, and the hard work of dedicated staff to collect and present an overall picture of sustainability on campus. The production of a sustainability report and the participation in international world rankings on SDGs help an HEI track its progress and measure the success of its strategic direction in implementing SDGs.

In 2019, the first SDG cohort of student-led initiatives in various SDG-related projects with high social impact presented their projects to stakeholders, faculty, students, and staff [51]. The event was the culmination of a campus-wide collaboration between AUB and Global Compact Network Lebanon, and led to the multiplication of similar projects, and the hybridization of new incentives to include elements of each previous success to advance participation from all likely contributors and allow new ideas to reach full potential, whether they have originated in the mind of a sophomore or a postdoc fellow. The SDG Brain Lab initiative by GCNL followed suit and included elements of AUB iPark then in the same spirit of collaboration, extended the invitation to all major Lebanese universities [28, 31]. The goal of these initiatives is matching the best idea with the most suitable audience through an incubation space which benefits from the most relevant expertize.

In 2021, FAFS' SDG initiative prepared a poster and video presentation to participate in the seventh International Workshop on UI GreenMetric World University Rankings (IWGM 2021) addressing the theme of "Universities, UI GreenMetric, and SDGs in the Time of Pandemic", held online on 25–26 August 2021 on Zoom and their YouTube Channel. Titled "Campus by the Sea: Adapting the Landscape to Evolving Salinity," it was included in the poster presentation session [52]. Surely enough, reporting the university's SDGs contributions, whether by incorporation into the curricula, or undertaking projects and partnerships toward these goals got noticed by the Times Higher Education World University Rankings (THE) [5, 53]. Even though 2020, the year of the pandemic, left its indelible mark on AUB, especially the Medical Center (AUBMC), reporting was relaunched and both a Sustainability Report for AUB and a Communication on Progress for AUBMC were published, detailing the institution's commitment to sustainable practices. It helped AUB jump from THE 300th rank to 87th between 2019 and 2021 [5, 53]. AUBMC's commitment to the 17 SDGs normally stresses its involvement in expected areas like health, safety, and the environment. Following the combined crises starting with the November 2019 revolution, the deeper involvement of AUBMC became evident. Whether through the lens of ER admissions or the solidarity of AUB community and its contribution to "Just and Strong Institutions" and "Equitable

Representation" SDGs, AUB's stakes in halting the country's downward spiral increased, as it became clear HEIs had a major part holding up the roof. Historically, "Good Health and Wellbeing" (SDG-3) had been the hallmark of AUBMC, due to its state-of- the-art healthcare service and steady involvement in social wellbeing providing the community with access to its services through the OPD clinics. "Climate Action", "Clean Water and Sanitation", and "Affordable Clean Energy" (SDGs 13, 6, 7) are inherent to AUBMC's normal functioning, mostly due to the vigilance of EHSRM Department (Environmental Health, Safety, and Risk Management). Starting from irrigation water use to the power plant, laboratories, pharmacy, kitchen, and laundry reaching the cafeteria and coffee shops, the emblems of recycling and sustainability signal the special awareness and effort dedicated to the environment. The existential challenge that led AUBMC to lay off an unprecedented number of its employees became a conduit to its involvement in several SDGs that were not directly addressed before. The ethical commitment to the community as a whole and to its staff, tied AUBMC to the emerging fight against poverty and even hunger. The devaluation of the Lebanese currency made the ghost of hunger a tragic reality, long after the collective memory of the 1916 Great Famine. SDG 1 "Fighting Poverty" hence became a priority, and although AUBMC was historically only involved as training grounds for "Quality Education" (SDG-4), it found itself committed to providing funding for education, through the extension of employees' education benefits to all the furloughs, to stave off another future crisis. The Beirut port explosion made it clear yet again that AUBMC's bond to Lebanon is primal. The reaction of faculty and staff in the face of this tragedy showed their mettle and elucidated their ties to the community. Economic sustainability, being sine qua non, led to a drastic review of the original expansion plan. Previous enthusiasm following Lebanon's brief economic spurt had led to what in hindsight was unplanned growth. The currency crisis forced some of the expansive plans to a grinding halt, leading the seemingly impervious institution to reckon with the notions of "Sustainable Growth, Reduced Inequalities, and Infrastructure" (SDGs 9, 11, 12). The "build it and they will come" optimistic approach had to evolve in light of the catastrophic countrywide situation, leading AUB to adopt a more prudent stance [54, 55]. Reporting the process not only benefits the institution by highlighting its SDG contributions, but it more importantly favors the transmission of experiential learning and benefits of hindsight.

6 Dreaming the Future

6.1 HEI Success in Implementing a Lasting Commitment to SDGs

Dreaming the future: An HEI's success in implementing a lasting commitment to SDGs can be demonstrated by its relentless dedication to make a difference, always going the extra mile to bring about positive change to society. An SDGs-focused HEI

is well connected to its society and its needs. It can identify and bring-up consensus to support critical projects integrating key solutions to current global challenges. The challenges that compromise the health and wellbeing of future generations are specific to the environmental setting that each HEI shares with its community. This vantage point makes HEIs unique in their ability to locate and address these tasks.

AUB was built on a vision of Lebanon and region that can be best described as "dreaming the future". The fourth revolution only bolstered this ethos, as all the student-based initiatives show. When the dean of Agriculture, seven decades ago designated a 100 hectares plot in the midst of the Bekaa valley to found the 1950s state of art research and outreach facility, it embodied the industrial revolution. The center for Advancing Research, Enabling Communities (AREC) was the epitome of agricultural engineering, and represented the ideal of science in sheer practice, as hands-on as it gets [56]. The notion of fact-based and applied science was firmly planted, raising generations of leaders and pioneers of the field in Lebanon and the region. AREC introduced novel production techniques and innovations in agronomy, poultry, irrigation, crop production, etc. It was the unique approach to sustainable livelihoods that set it apart from the agricultural paradigm of the time. The idea of partnership between farmer and engineer, the notion of outreach made the dreamed future at reach. Even when the dream was interrupted during the civil war, the famine of 1915–1918 was never an option, due in great part to the extensive poultry production sector that AREC introduced to Lebanon [57]. Even when the dream was out of reach, it was surely protected. AREC now houses in its seed bank the collection of the International Center for Agricultural Research in the Dry Areas (ICARDA) since the war in Syria threatened the original seed bank located in Aleppo [58]. The introduction of no-till conservation agriculture (CA) was another milestone that further solidified the partnership of AUB toward the sustainable goals. The Millennium Development Goals at the time, leading to the current detailed version, permeated the interest in the first and foremost resources necessary for life, water, and soil. In July 2015 Milano, Italy during the World Expos' Universal Fair, Lebanon got a special recognition from the Expo organizers who awarded the Department of Agriculture at the American University of Beirut, a Best Food Security Practice Award for its project on Conservation Agriculture. The AUB research team had collaborated with the Ministry of Agriculture since 2007 introducing the practice of No-Till Conservation Agriculture to Lebanon. The pilot project ended in 2009 with an increase in No-Till from 40 to 500 hectares. By 2011 it had continued unabated, to reach 1100 ha, saving farmers around 300 $/ha/yr. in labor and land preparation. The Ministry of Agriculture has since formed a Committee on CA/No-Till, to actively promote the practice, with the aim of reaching 70.000 ha or a third of agricultural farmed land in Lebanon. It is a paradigm shift that will incrementally increase crop yield, cut labor costs, and reduce agrochemical seepage to underground water. It morphed the archetypal vision and creed of the farmer using state-of-the-art science and machinery to inculcate a new approach to farming based in fact-finding. Originally starting as a mere suggestion, the success of the no-till CA project is an example of the much-needed collaboration between farmer, student/researcher, and legislator. As many farmers felt ready to alter their perception of CA and adopt the No-Till system, the social perception of farmers is

starting to follow lead, increasing the awareness of our need for partners toward a sustainable ecosystem, and a state of food security [59].

Currently, AUB leads another great vision of the future through the applied research on machine learning in the field of irrigation. The return to the source is exemplified in the constant concern with aridity, now a worldwide burden with the increasingly felt effects of climate change and modern production needs. The Internet of Things (IoT) holds the promise and the distant dream that a force beyond the horizon, like satellites, can help with the proper planning to overcome unplanned accidents like drought and floods. The advances in satellite-based estimates of irrigation requirements, and machine learning are currently the bulk of irrigation research activity done in the department of Agriculture. The ability to develop accurate algorithms using Google Earth Engine that would inform consequential programming related to agronomical practices epitomizes the IoT in practice [60, 61]. It entices the young just as the first mechanical horizontal feed mixer and distributor belts in a modern barn, in 1953, amazed the farmer and the agricultural student alike. Actualizing the vision of ubiquitous sustainability and conjuring a food secure world informed by fact-based theory and applied science start by teaching sustainability, incorporating it as a learning outcome in curricula. Many faculties include sustainability as a pillar in designing course syllabi, course learning outcomes, and program learning outcomes, so that novel ideas come full circle from the drawing board of a sophomore, to an alum's desk in parliament or the IMF, and back into the drawing board again for feedback and improvement [62, 63]. The aviation lighthouse sitting in front of AUB's lower campus, all but forgotten and dwarfed by current seafront luxury apartments, was a symbol of technological advances in communication when it was built. Transistor technology had surpassed previous lighthouse technologies, cutting edge as they once were, just as strong electrical projectors replaced optical systems or wood pyres and whale oil-based lamps before those. GPS technology and remote sensing advances have now replaced most of these compasses, and ongoing research is aiming to replace the fossil fuels running the engines they guided. Renewable energy like solar power is an indispensable resource, worth more than luxury flats, as green bonds are slowly outpacing classical mortgage, municipal bonds, or other debt securities [64–66]. It particularly rings true in Lebanon where their carbon footprint is felt on both climactic (micro) and economic (macro) sustainability levels [67–69]. The proposal to transform the Communication Tower near AUB, in collaboration with the Lebanese Ministry of Environment for instance and AUB's Center for Civic Engagement and Community Service, into a solar panel installation will not only recapture the innovative spark AUB invokes, but it will also harbor the dream of the future, a sustainable future and a legacy reflecting a deep understanding of the stakes.

Acknowledgments Special thanks to WEFRAH, the Faculty of Agricultural and Food Sciences (FAFS), and AUB leadership for helping promote this effort and the intrepid support during the darkest periods these past 2 years had to offer. Also, the office of Institutional Effectiveness and Decision Support (IEDS), the Physical Plant Department (PPD), AUB Medical Center, the office of Environmental Health, Safety, and Risk Management (EHSRM) for the continued collaboration and assistance during the harshest times of the pandemic and turmoil.

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