Journal of Cleaner Production 299 (2021) 126915

Contents lists available at ScienceDirect

Journal of Cleaner Production

journal homepage: www.elsevier.com/locate/jclepro

A framework for the implementation of the Sustainable Development Goals in university programmes

Walter Leal Filho [a, *], Fernanda Frankenberger [b, j], Amanda Lange Salvia [c], Ulisses Azeiteiro [d], Fatima Alves [e], Paula Castro [f], Markus Will [g], Joost Platje [h], Violeta Orlovic Lovren [i], Luciana Brandli [c], Elizabeth Price [k], Federica Doni [l], Mark Mifsud [m], Lucas Veiga Ávila [n]

[a] Research and Transfer Centre „Sustainable Development and Climate Change Management, Hamburg, University of Applied Sciences, Faculty of Life Sciences Ulmenliet 20, D, 21033, Hamburg, Germany
[b] Pontifical Catholic University – PUCPR, Business School, R. Imac. Conceição 1155, Curitiba, PR, 80215-901, Brazil
[c] University of Passo Fundo, Graduate Program in Civil and Environmental Engineering, BR 285, Passo Fundo/RS, Brazil
[d] Department of Biology & CESAM Centre for Environmental and Marine Studies, University of Aveiro, Campus de Santiago, Aveiro, Portugal
[e] Universidade Aberta & CFE/UC Centre for Functional Ecology of the University of Coimbra, (UID/BIA/04004/2019), Portugal
[f] CFE-Centre for Functional Ecology - Science for People & the Planet (UID/BIA/04004/2019), Department of Life Sciences, University of Coimbra, Portugal
[g] University of Applied Sciences Zittau/Goerlitz, Theodor-Körner Allee 16, 02763, Zittau, Germany
[h] WSB University in Wroclaw, ul. Fabryczna 29-31, 53-609, Wroclaw, Poland
[i] Faculty of Philosophy, University of Belgrade Cika Ljubina 18-20, 11 000, Belgrade, Serbia
[j] Positivo University – UP, Business School, R. Prof. Pedro Viriato Parigot de Souza 5300, Curitiba, PR, 81280-330, Brazil
[k] Manchester Metropolitan University, Department of Natural Sciences, Chester Street, Manchester, M1 5GD, UK
[l] Department of Business and Law University of Milano-Bicocca, 20126, Milan, Italy
[m] Centre for Environmental Education & Research, University of Malta, Msida MSD, 2080, Malta
[n] Federal University of Santa Maria – UFSM, R. Ernesto Barros 1345, 96506-322, Cachoeira do Sul, RS, Brazil

ARTICLE INFO

Article history:
Received 23 October 2019
Received in revised form
24 March 2021
Accepted 27 March 2021
Available online 2 April 2021

Handling editor: Prof. Jiri Jaromir Klemeš

Keywords:
Sustainability in higher education
SDG framework
SDG focus
SDG higher education
SDG implementation

ABSTRACT

There is a perceived need to develop approaches, methods and tools that may help higher education institutions to systematically introduce the Sustainable Development Goals (SDGs) into research and teaching as an intrinsic part of their programs. However, at present, there is a gap in the literature on the suitable means to do so. This paper addresses this gap by examining the many foci and commitments for and about the SDGs that are currently included in university programs. An overview of the SDGs' focus at universities was presented using a survey to gather qualitative and quantitative data. . Based on current trends and gaps, this paper identifies the need for a framework which may be of assistance in facilitating the inclusion of the SDGs as a whole, and individually targets in particular in the programs of institutions of higher education. The scientific contribution of this paper value lies in the fact that this is one of the first papers to tackle the need for a framework which caters to a more systematic introduction of the SDGs in university programs. The basis for the framework approach, here introduced, includes institutional, thematic, structural and personal/individual aspects which need to be considered for proper implementation of the SDGs at the university level.

1. Introduction

Since the member states of the United Nations adopted the 2030 Agenda for Sustainable Development in 2015 along with the Sustainable Development Goals (SDGs), much has been written about their environmental, social, economic and political implementation, and intrinsic challenges. Research, innovation and sustainable education are the most essential drivers for achieving the SDGs at

* Corresponding author.
E-mail addresses: walter.leal2@haw-hamburg.de (W. Leal Filho), ferfrank1@hotmail.com (F. Frankenberger), amandasalvia@gmail.com (A.L. Salvia), ulisses@ua.pt (U. Azeiteiro), fatimaa@uab.pt (F. Alves), pcastro@ci.uc.pt (P. Castro), M.Will@hszg.de (M. Will), johannes.platje@wsb.wroclaw.pl (J. Platje), violeta.orlovic@f.bg.ac.rs (V.O. Lovren), brandli@upf.br (L. Brandli), e.price@mmu.ac.uk (E. Price), federica.doni@unimib.it (F. Doni), mark.c.mifsud@um.edu.mt (M. Mifsud), admlucasveiga@gmail.com (L.V. Ávila).

https://doi.org/10.1016/j.jclepro.2021.126915
0959-6526/

the global level, although the main local issues and problems can lead the sustainable research on some specific SDGs such as SDG 4, 11 and 13, as an international survey demonstrated (Salvia et al., 2019). The SDGs are believed to offer new incentives for sustainability in higher education, as Chambers and Walker (2016, p.3) claim: “meeting the contemporary challenges of sustainability is a catalyst for change.” In particular, Leal Filho et al. (2018, p. 1) state that the Sustainable Development Goals offer "a good opportunity to reinvigorate sustainable development research," and there are proposals to “realize the transformative potential of the SDGs” (Hajer et al., 2015, p.1652). These statements can be enlarged to state that the SGDs may act as catalysts to achieve sustainability at higher education institutions (HEIs), since Vladimirova and Le Blanc (2016) demonstrate links between education and the majority of SDGs. The risk to not entirely achieve the SDGs by 2030 is realistic, and there is an urgent need to enhance efforts by HEIs and to speed-up the SDGs’ implementation in several crucial academic areas (Leal Filho, 2019).

Many universities around the world seek to include the SDGs in their teaching or research. The SDGs’ role and integration in higher education is discussed in some studies that highlight different topics, such as transnational collaborations between universities in the framework of research and teaching activities (Caniglia et al., 2017), sustainability-oriented higher education networks (Dlouhá et al., 2018), means of implementation (Elder et al., 2016; Spangenberg, 2017) and the main obstacles and barriers to integrate sustainable development in universities (Leal Filho et al., 2017). An important factor that is useful for boosting the integration of sustainable development in universities is innovation as documented on an international survey (Leal Filho et al., 2019a), which showed that improvements in products, processes and services related to environmental issues may be achieved by deploying innovative approaches.

In some universities, education for sustainable development is already included in their study programs, but a deeper analysis of specific details - such as the online description of unit courses (Torres et al., 2017) - shows a limited presence of the SDGs in the curriculum and syllabus. Also, many universities perceive the need for improvements in teaching and learning about sustainable development, but the awareness about the SDGs in many HEIs is still lacking, as some studies demonstrate (e.g. Kanapathy et al., 2019).

In some HEIs, experiential learning activities are carried out to stimulate students to become engaged in SDG issues (Venkiteswaran and Cohen, 2018; Dean et al., 2019) or to enhance discussions about climate change (Carreira et al., 2017), but these initiatives are largely isolated. Furthermore, some case studies offer insights about actions to implement the SDGs at HEIs (Kolb et al., 2017) or to stimulate students’ awareness of sustainable development in general and on specific SDGs, such as economic development, resilience, and inclusion (Kopnina, 2018), in particular. Despite some interesting results, previous studies are often limited to some modalities of HEIs (Stead and Stead 2010; Aragon-Correa et al., 2017; Beddewela et al., 2017; Neal, 2017) or to unique case studies (Coleman and Gould, 2019), without any possibility to generalize findings and conclusions.

The proposal of a set of recommendations (Aragon-Correa et al., 2017) is not sufficient to address the lack of a broader and flexible tool which effectively integrates the SDGs at different levels of education - i.e., course, discipline and cross-disciplinary levels concerning curricular and co-curricular options (Rusinko, 2010) - or a model to develop the SDGs’ education policy, research and practice (Kolb et al., 2017; Cantell et al., 2019). To advance the implementation of the SDGs in higher education around the world, it is essential to develop a robust framework that can contribute not only to identifying priority issues in programs but also to building partnerships within and across HEIs worldwide. For instance, an extensive assessment performed in the field of Responsible Management Education (RME) in the context of Agenda 2030 and the SDGs (Storey et al., 2017) indicates that the emergence of the SDGs as a framework for RME needs wider engagement by all fields of higher education. In this context, the development of a framework may offer a tool (Skalicky et al., 2018) that has positive implications on how HEIs and educators can design, implement and measure SDG programs. For example, in the academic business context, Christ and Burritt (2019) highlighted the importance of finding holistic solutions to SDG problems and engaging practitioners through the development of a transdisciplinary framework, as it may help big businesses and multinational companies address the difficulties of sustainable development. In the same perspective, the development of a theoretical and holistic framework is useful for stimulating mindfulness and creativity in the learning process and in integrating these qualities into Higher Education for Sustainable Development (HESD) (Hensley, 2020). The conceptual framework is also useful for combining different types of responsiveness and various levels of coordination strategies, which can stimulate the participation of ministries of the member nations in implementing the SDGs (Wong, 2019).

An analysis of the literature identifies the fact that currently there are few guidelines or frameworks to systematically implement the SDGs in university programs. This paper addresses this gap by examining the many foci and commitments for and about the SDGs currently included in university programs. Based on such trends and gaps, this paper produces a guide for a framework which may be of assistance in facilitating the inclusion of the SDGs as a whole, and of specific targets, in HEIs. The contribution of this paper lies in the fact that it is one of the first papers to tackle the need for a framework that caters to a more systematic introduction of the SDGs in university programs.

The background of the paper is the fast speed with which the SDGs are being pursued around the world, a trend unparalleled by the limited literature that focuses on their implementation at higher education institutions, where they are particularly important.

The theoretical framework of the paper is a set of previous studies on the SDGs, referred to in this section and in the next one, guided by the gap in the literature on frameworks for sustainable development implementation at universities, with a specific focus on the SDGs. This theoretical basis has also guided the choice of research methods, which are discussed in the methodology section of this paper.

2. SDGs in university programs

2.1. Contribution of universities to the SDGs

As stated earlier, HEIs play a key role in fostering sustainable development and in the implementation of Agenda 2030 and its 17 Sustainable Development Goals. Engagement with the realization of the SDGs is considered a fundamental responsibility of HEIs (SDSN Australia/Pacific, 2017). Furthermore, given the critical role universities have in ensuring the success of the SDGs, they have a moral imperative to embody support for the SDGs as part of their social missions and core functions (SDSN Australia/Pacific, 2017).

The progress towards the SDGs at universities requires the involvement of different actors. Universities and other institutions such as NGOs, enterprises and think tanks are influential in regards to the provision of expertise and knowledge (El-Jardali et al., 2018). This is based on the assumption that science-informed policy and decision making will be more coherent and effective in facilitating

concrete measures and progress with the SDGs (Boulton, 2009; Crow, 2014; Griggs et al., 2017; SDSN Australia/Pacific, 2017). In this perspective, universities and HEIs can play a critical role in providing the scientific basis for informed policy at national and international levels, leading to the adoption of an approach that is science-policy interface-oriented (Watson, 2005; van den Hoven, 2007). Universities may be the main actors that stimulate scientific and political communities to successfully work together for decision-making (Watson, 2005; Wardekker et al., 2008) and for the development of a specific methodology (Hinkel, 2011), such as a framework on the SDGs' implementation.

Many universities are often considered to be role models (Verhulst and Lambrechts, 2015; Leal Filho et al., 2015) and promising places where sustainable practices can be tried out in their core elements - education, research, campus operations and experiences, institutional frameworks, reporting and community outreach (Lozano et al., 2013).

The possible contributions of universities to the SDGs are manifold. However, previous studies highlighted the importance of identifying further advantages of embedding SDGs in key areas (Leal Filho et al., 2019b). These areas are:

a) Research and development
b) Learning and teaching
c) Governance and campus operations
d) Civic engagement and community outreach

It is essential to provide more details about specific actions or policies related to each area in order to develop a managerial model (Velazquez et al., 2006) and to emphasize synergies by adopting a holistic approach (Mcmillin and Dyball, 2009).

Due to their relevance, the key areas are described in turn.

(a) Research and Development

Addressing the SDGs and the particular challenges that hamper their achievement will require new types of knowledge, i.e., transdisciplinary knowledge (Jahn, 2012; Kates, 2012; Klein et al., 2001). This involves action knowledge, but also new ways of making decisions and solving goal conflicts. The services that universities offer to society are crucial in terms of research, discovery, knowledge creation, adaptation, diffusion and implementation. Universities play a crucial role in providing the knowledge and skill base, as well as technological and social innovations to underpin the implementation of SDGs. Transdisciplinary and sustainability sciences also refer to the active involvement of non-academic actors such as innovative companies as well as actors from municipalities and civil society, for instance in the form of a living lab (Bergvall-Kåreborn and Ståhlbröst, 2009; Schneidewind, 2014). An approach geared towards participatory sustainability research can be successfully performed by universities by enhancing the effectiveness of such research and its societal effects (Wiek et al., 2014).

(b) Teaching and Learning

Universities have, as a huge advantage, access to students with many different motivations, and these need different approaches in order to interest them in the SDGs. It is hence the HEIs' task to ensure that they provide students with capabilities and professional and personal skills they need as future leaders and decision-makers (i.e. competencies for SD, see for instance (UNESCO, 2017)). More specifically, this means that students should be equipped with knowledge, skills, motivation and creativity to address the SDGs. This requires providing in-depth academic and vocational expertise to implement real-life solutions for the SDGs.

Teaching students to become not only active "citizens of the 21 century", but also facilitators of change in their communities or working environments in the future, adds to the complexity and responsibility of the universities' role. The contributions to quality education required by the SDG framework comprises efforts to integrate ESD (Education for Sustainable Development) as an approach to promote learner-centered and transformative teaching practices by emphasizing interdisciplinarity, as sustainable development concepts are embedded across several disciplines (Annan-Diab and Molinari, 2017). However, the variety of (social, cultural and institutional) contexts as well as the teachers' perspectives creates specific environments for performing good teaching, sometimes applying significantly different strategies and methods (Lozano, 2014). Therefore, the scientific contribution of universities in implementing SDGs and integrating ESD should comprise the development of the teachers' capacities, including their ability to "better contextualize their teaching and create more culturally inclusive learning environments" (Thaman, 2010, p.353).

(c) Governance and Operations

Like other organizations, universities, with their staff and students, can cause significant socio-ecological and economic impacts due to their mere existence and campus operations, as well as the indirect impacts caused by the technologies invented. However, universities also represent a particular type of organization: they are complex and diverse. They may act as role models for other types of public and private institutions if they would "walk the talk" by implementing SDG principles in their strategic and operational policies and governance structures. Mori Junior et al. (2019) report that the "walk the talk" viewpoint highlights how campuses can lead by example in terms of operational excellence and use the campus as a test bed for innovation. It is a fact that in many universities around the world there are several innovative examples of environmental initiatives related to green building design, recycling and reusing, energy-efficient lighting, water-conserving fittings and public transportation, independent of whether they are a result of environmental policies or other factors (Leal Filho et al., 2017). Washington-Ottombre et al. (2018) draw attention to campus sustainability in the U.S. in recent decades, and conclude that initially it emerged as informal ecologically-focused, campus-confined initiatives at HEIs that prioritized educating agents of change and modelling change. Over time, campus sustainability has evolved towards more formal, holistic, extramural policies at HEIs that assume the role of agents of change.

The global SDGs can be supported by implementing fundamental principles - such as outlined in the SDG Accord (EAUC, 2018) - within extensive spheres like governance structures and operational policies and decisions, such as those relating to employment, finance, campus services, support services, facilities, procurement, human resources, and student administration (SDSN Australia/Pacific, 2017).

(d) Civic engagement and community outreach

Universities "have a special social responsibility in societal development, particularly in the education of future leaders and in the proliferation of public awareness about sustainability" (Amaral et al., 2015, p. 156). Hence, they should have the capacity and responsibility to make a positive impact in their local areas, as well as to guide national and international policies (Watson et al., 2012). Universities are in the position to strengthen public engagement and participation, and can initiate and facilitate cross-sectoral dialogue (SDSN Australia/Pacific, 2017). Aligned with this view, Shiel et al. (2016) have shown that, although universities have the

potential to play a role in enabling communities to develop more sustainable ways of living and working, sustainable communities may only emerge with facilitation, community learning and continuing efforts to build their capacities. Thus, the university's engagement with capacity building in the community is essential for sustainable development at the local level (Clifford and Petrescu, 2012; Too and Bajracharya, 2015).

2.2. Advantages and benefits for universities

Engaging with the SDGs should not be considered a burden or additional task. The UN SDGs represent a global framework that is accepted, adopted and supported by a wide range of governments, businesses, investors and civil society actors. Therefore, universities can benefit from this broad support. Key benefits may include (SDSN Australia/Pacific, 2017):

a) Demonstrating impact as a sustainable university
b) Networking and community building with external stakeholders
c) Capturing demand for ESD and SDG-related teaching and learning
d) Accessing new funding schemes.

For instance, universities can communicate to their external stakeholders about how they contribute to global and local sustainable development, human well-being and environmental health. The impacts of universities on sustainable development outside their organizational boundaries can be distinguished into scholarly activity influenced by academic research outputs (e.g., innovative technologies, sustainability concepts) and a non-academic impact on civil society, public policies or media (Thomas and Ormerod, 2017; Findler et al., 2019). Another form of a contribution to positive change towards sustainability is community outreach (Berchin et al., 2019),[1] i.e., initiatives of universities to engage in a mutually beneficial way with the communities in their region. Demonstrating their impact on real-life problems related to sustainable development could make universities more relevant in the eyes of their stakeholders, including government, community and cooperation partners. Early adoption of SDG-related activities and education will also enhance resilience for expected changes and upheavals. Beyond what is known as the "third mission," sustainability transformations may be supported through cross-sector partnerships with diverse local actors in a specific location, region or societal sub-sector. This may lead to a new species of university (Trencher et al., 2014; Schneidewind, 2014), which also could be seen as a unique selling point (USP) in the competition for grants and subsidies.

Recognizing the knowledge gap on the role of the university in performing the "third mission," which is often reduced to technological transfer and support to economic development, some authors call for the "co-creation for the sustainability paradigm," which assigns HEI with a new role in realizing the "fourth mission"-moving from the narrow technological focus towards a societal focus (Trencher et al., 2014; Rinaldi et al., 2017). By engaging in the implementation of SDGs, which includes the development of partnerships and collaborations, universities have better chances to develop mutually beneficial relations with communities, based on social needs particularly well understood by the social sciences and humanities. In such a way, the community plays a role of both "a teacher and site of learning" (Clover et al., 2010), acting as a partner in building stronger transformative potential, not only of educational institutions but of the community as a whole. In this way, higher education and the community partnership may contribute not only to the well-being of society, but also to the quality of teaching and the operations of universities (Pejatovic and Orlovic Lovren, 2018).

The strength of the SDGs is to provide a common framework and hence a nucleus for stakeholders from different sectors to cooperate on shared interests. This creates a valuable opportunity for universities to form new partnerships with government, industry and community (Duran y Lalaguna and Dorodnykh, 2018) as well as multidisciplinary partnerships for innovation (SDSN Australia/Pacific, 2017). Also, the SDGs can provide at the university level a common and inclusive language to discuss sustainable development (IARU, 2018).

Another aspect here is the possibility for enhanced collaboration between teachers and students, with common sustainability initiatives which strengthen their relationship as well as improve their connections with other stakeholders. Finally, this could also help raise grants via new funding mechanisms, including government agencies, international banks or even philanthropic endowments.

When universities re-think their role in society, for instance, by engaging in SDGs, they become more effective in responding to societal needs. They then may become more relevant as change agents in solving the grand challenges. As the SDGs together form a global framework that is broadly agreed by a wide range of stakeholders, they provide a guiding structure especially when looking at their interrelations (Griggs et al., 2017; El-Jardali et al., 2018; UNESCO, 2017).

By working to achieve the SDGs within the spheres of campus operations, the universities can reduce their consumption of resources, such as water and electricity for example, and save costs. According to the experience reported by some universities in the International Alliance of Research Universities (IARU, 2018), the SDGs are an opportunity to leverage management focus on and priority of campus sustainability. SDGs offer universities a unique opportunity to reflect on the ways they operate and may encourage them to make further efforts to become more sustainable (Leal Filho et al., 2017).

To sum up, the SDGs are seen as an opportunity for overcoming many barriers (see Ávila et al., 2017; Leal Filho et al., 2018) and achieving sustainability implementation in HEIs (Leal Filho et al., 2017).

Despite many efforts of universities to adopt SDGs as an overarching framework in their engagement activities and strategic plans, there is no convergence on a framework or guidelines for providing best practices and procedures. To our knowledge, there are no academic studies that have identified specific interrelationships between actions or policies (and related advantages) of the SDGs and universities' core functions. This kind of analysis can point out the effective ways to adopt SDGs in universities, showing both the positive impact on their structure and governance and the related practical implications in terms of organizational transformations (Baker-Shelley et al., 2017). In addition, the following analysis responds to the call from the University Global Compact Partnerships (n.d.) for discontinuing isolated efforts and emphasizing the universities' voice in the debate on the global development agenda. As a summary, Table 1 shows the advantages of engaging the SDGs in universities, relating to their core functions.

[1] Outreach activities are often not considered as impacts, as they take place within the academic sphere and under the direct control of a university (Findler et al., 2019).

Table 1
Some advantages of incorporating the SDGs at university programmes.

Advantages	Core function to which they contribute
1. Increases the university relevance to local and regional stakeholders (government agencies, community groups, and cooperation partners)	All functions
2. Increases efficiency in responding to societal needs.	
3. Boosts the credibility of the university's sustainability efforts	
4. Provides support towards achieving sustainability implementation in HEIs.	
5. Helps to foster a shared understanding of sustainability.	Research and Development Learning and Teaching Governance and campus operations
6. Focus on the SDGs can add value when competing for grants and subsidies.	Research and Development Learning and
7. Enables international alliances for shared SDG learning and research	Teaching
8. Improves the quality of teaching and the operating frameworks of universities	Learning and Teaching
9. Strengthens the links between teaching staff and students	
10. Improves the connections between the university and outside stakeholders	Civic engagement and community outreach
11. Gains on resource efficiency that collaborative work can provide	Governance and campus operations
12. Efficient use of the resources leads to lower CO^2 emissions	
13. Catalyzes cost savings in campus' operations	
14. Fosters a culture of sustainability on campuses	

3. Methodology

There is a paucity of research on frameworks to implement the SDGs in HEIs. Based on the need to address this gap and to develop a framework for the implementation of the SDGs in universities' programs, a survey was prepared based on a mixed method research design, as the instrument was designed to collect qualitative and quantitative data on the current implementation status of the SDGs at universities. The authors reviewed the list of items to minimize redundancies and to ensure that all relevant questions were considered. The survey was pre-tested by a panel of academics within sustainability areas at different universities in various countries, in order to gather personal views, opinions and perceptions that could contribute to the framework development.

The applied survey instrument was composed of seven questions (six closed questions and one open-ended question) and structured in a way so that it could gather information on the experiences of the participants, derived from the universities they work at. The questionnaire also collected sociodemographic characteristics of each university, and a number of questions examined, amongst others, the degree of awareness about the SDGs in the institution, methods to engage in the process leading to the implementation of the SDGs, the engagement of the institution in organizing SDG specific events, and a focus on the importance afforded by the institution to the implementation of each individual SDG. Table 2 presents the survey items, which aimed at portraying the opinions and realities of HEIs with regard to their outlook and practice in implementing the SDGs within the institution.

The survey was disseminated online (by using the Google Forms tool) and was carried out from 14th May to June 3, 2019. Data were analysed through descriptive statistics, which allows one to summarize and aggregate the information.

4. Results and discussion

4.1. Sample analysis

A total of 28 responses were received and provide the basis for this assessment. Table 3 presents the list of participating universities.

The majority of the responding HEIs were founded between 1900 and 2000 (15), while others were either founded between 1800 and 1900 (7) or following the year 2000 (5) making most of the cohort composed of fairly "new universities." Only one university was founded before 1800.

The sample was made up of both public (78.6%) and private HEIs (21.4%). There was a good spread of total student numbers within all universities. The distribution of total number of students per responding HEI is illustrated in Table 4.

The first quantitative question focused on the degree of awareness of the SDGs. The majority of responses indicated that universities have a high degree of awareness (35.7% - very high and high), followed by medium degree (32,1%), and low degree (32,1% - low and very low).

On the second quantitative question, about the practices the university has which allow it to systematically engage in the process leading to the implementation of the SDGs, there is a wide range of responses and a noticeable skew in the institutional processes. Each respondent could choose more than one practice. The majority of the HEIs have either implemented a Strategy (21.1%), Action program (19.3%), a Policy (19.3%), or a Work plan (19.3%). Membership in sustainability groups is only 3.5%, although the survey was sent to a group focused on sustainability. There are also HEIs involved in a range of other processes or activities including training and funding schemes – but these do not appear to be very popular. Only 5.3% of the respondents indicated that their universities do not engage in practices for the SDGs. The majority of respondents chose either one or two categories, showing low perception of SDG implementation. The results are illustrated in Table 5:

Concerning the third question, focusing on training and information and the organization of specific events focusing on the SDGs, the majority of the responses were centered in the middle: to some extent (42.9%) and in a limited manner (42.9%), as shown in Table 6.

The fourth question characterized the current focus on the SDGs as part of campus operations. Responses were to a certain extent equally distributed, but slightly skewed to the negative replies with 21.4% (low) and 17.9% (very low). Table 7 illustrates these results:

The fifth question focused on the importance afforded to research, teaching, and extension of the SDGs. It appears that HEIs afford most importance to research (14% for "very high"). Nonetheless, all three domains scored less than 50% in the top rankings (research- 32%, teaching 43% and extension 36%) – seemingly pointing to an area that is still in its embryonic stage. Of the four universities with a very high score on research, three also have a high or very high score on teaching and 3rd mission. From the eight universities with a low score on research, seven also have a low score on 3rd mission and low-medium score on teaching. It shows that the universities could implement actions that involve the three

Table 2
Survey parameters.

Topic	Question	Assessment Scale
General questions	HEI Name, Country, Foundation Year, number of students, classification (public, private)	
Governance	How would you rate the degree of awareness about the SDGs on your institution?	( ) very high ( ) quite high ( ) medium ( ) low ( ) very low
	Which of the following does your university have in order to allow it to systematically engage in the process leading to the implementation of the SDGs? (multiple answers possible)	( ) Policy ( ) Strategy ( ) Action Programme ( ) Work Plan ( ) Other:
Training/ Information	Does the institution engage in the organization of specific events focusing on the SDGs?	( ) to a great extent ( ) to some extent ( ) on a limited manner ( ) on a very limited manner
Infrastructure	How would you characterize the current focus on the SDGs as part of the campus operations?	( ) very high ( ) quite high ( ) medium ( ) low ( ) very low
Operational	How would you characterize the current institutional focus on the SDGs as part of the following areas of action: Research, Training and Extension (3rd mission)	( ) very high ( ) high ( ) medium ( ) low
	How would you rate the institutional focus currently given to the implementation of each SDG? (SDG1 to SDG17)	( ) priority focus ( ) strong focus ( ) average focus ( ) little to no focus
Final remarks	Comments and/or highlights	

This study is explorative by nature and does not aim in drawing generalizable statements. Therefore, a non-random sampling method such as purpose sampling is appropriate (Palinkas et al., 2015). The survey was disseminated via a web link through an invite-email to over 140 University representatives (rectors, sustainability office managers, researchers/teaching staff) participating in the Inter-University Sustainable Development Research Programme (IUSDRP, https://www.haw-hamburg.de/en/ftz-nk/programmes/iusdrp.html). This group was selected due to the high involvement of its members with sustainability activities. Both validity and reliability are ensured, since universities from different contexts participated in this study, and the respondents are well-informed sources and familiar with the concept of sustainability and how it is connected to their universities' initiatives.

areas combined, as a means to enhance engagement towards sustainability. Table 8 illustrates the results:

In the last question, which asked about the institutional focus currently given to the implementation of each SDG, the results indicated a broad range of responses from universities. However, some SDGs are of more importance than others. The SDGs which received the highest priority include SDG 4 (Quality Education) with 36% priority focus, SDG 5 (Gender Equality) with 25% priority focus, and SDG 16 (Peace, Justice and Strong Institutions) with 24% priority focus. The SDGs which received the least focus are SDGs 2, 9 and 15 (each with 4%), and SDG 14 (0% - as previously indicated by the research of Vladimirova and Le Blanc, 2016). It appears that the SDGs within a more social framework are given more importance than those SDGs whose focus is more on the natural environment. This may be because the social elements of some SDGs are stronger than the environmental ones, which are usually the focus of more environmentally oriented SDGs such as Life under Water (SDG14) or Life on Land (SDG 15). All responses vary in different countries/regions and in relation to their economic development. The results are illustrated in Fig. 2.

Regarding the priority focus or strong focus that the universities give to SDGs, one university in Brazil indicated all SDGs and one in Nigeria indicated 16 SDGs. On the opposite side of the spectrum, five universities indicated no SDGs as a priority focus or strong focus, thereby showing a big difference in the SDGs implementation across all regions.

The different perceptions may be because the level of emphasis on SDGs does vary among regions and economic development conditions, which reflect the natural differences between industrialized and developing nations.

In the open-ended question, the responses varied according to context and individual opinions, but some areas and trends emerged. For instance, from the 28 respondents, 10 (36%) provided additional comments. Of these, 20% were from respondents who rated their institutional focus on the implementation of SDG17 as a "priority focus;" 10% rated it as "strong focus;" 30% were from respondents giving a rating of "average focus" and 40% were from respondents giving a rating of "little or no focus." The majority of respondents (70%) providing comments had the perception that their institutions did not have a strong or priority focus on SDG17, as can be observed in the following comments: "*I have therefore been advocating and pushing for the incorporation of the SDGs in research and teaching* (…), *but there is no* funding *to start any initiative yet*", "*Institutional culture, policy/strategy/action plans or need for are just some of the barriers to sustainable development in (…) HEIs*." and "*It would be interesting to implement international collaborative educational project on SDGs inside the Network* (…)".

It can be assumed that the aim of SDG17, cooperation and partnerships, is not as concrete as other SDGs. Also, the way SDG17 was formulated does not clearly make it central to achieving the other SDGs. In other words, the perceptions about SDG17 are not as strong as with the other goals.

A strong emphasis on advocating information sharing and collaboration between institutions emerged from those

Table 3
List of participating universities, according to geographical location.

Region	Country	University
Africa	Cameroon	The University of Bamenda
	Nigeria	Obafemi Awolowo University
	Liberia	University of Liberia
	South Africa	University of Johannesburg
Asia/Oceania	Australia	Southern Cross University
	Bangladesh	Asian University for Women
	China	University of International Business & Economics
	Iran	Islamic Azad University, Rasht Branch
	Malaysia	Universiti Sains Malaysia
Europe	Germany	Cologne Business School
	Germany	Philipps-Universität Marburg
	Ireland	University of Limerick
	Italy	University of Verona
	Italy	Politecnico di Torino
	Serbia	University of Belgrade
	Spain	University of Cadiz
	Spain	University of La Coruña
	Ukraine	Chernihiv National University of Technology
	Ukraine	Ukrainian National Forestry University
	United Kingdom	University of the West of England Bristol
North America	United States	Macalester College
	United States	University of Wisconsin - Stevens Point
South/Central America	Brazil	Universidade de Passo Fundo
	Brazil	Federal University of Bahia
	Brazil	Federal University of Santa Maria
	Brazil	Federal University of Rio Grande do Norte
	Brazil	Amazonas Federal Institute
	Guatemala	Galileo University

The responses originated from four continents and included 21 different countries, as shown in the regional distribution of respondents in Fig. 1. The numerical data collected were analysed through descriptive statistics (average and frequency) through IBM SPSS. The open-ended question formed an essential part of the data collected, and responses were analysed through content analysis aligned to perceptions of institutional focus on the implementation of the 17 SDGs, from which some themes emerged (Kawulich, 2017). Themes were grouped based on the respondents' perception of the institutional focus on SDG17 Partnerships for the Goals, as SDG17 reporting is identified as core to participation in the Times Higher Education (THE) University Impact Rankings (Times Higher Education, 2019a).

Table 4
Regional distribution of responding HEIs.

Total number of students	Frequency	Percentage
Up to 5000 students	4	14.3
Between 5001 and 10,000 students	4	14.3
Between 10,001 and 20,000 students	6	21.4
More than 20,001 students	14	50.0
Total	28	100.0

Table 5
University practices to engage in SDG implementation.

University Practices	Frequency	Percentage
Strategy	12	21.1
Action Program	11	19.3
Policy	11	19.3
Work Plan	11	19.3
Membership in sustainability groups	2	3.5
Research Projects	1	1.8
Funding schemes	1	1.8
Meetings	1	1.8
Students initiatives	1	1.8
Sustainability centre	1	1.8
Training	1	1.8
Awareness about SDG	1	1.8
Nothing	3	5.3
Total	57	100

Table 6
University event organization to focus on SDG implementation.

Organization of specific SDG events	Frequency	Percentage
To a great extent	3	10.7
To some extent	12	42.9
In a limited manner	12	42.9
In a very limited manner	1	3.6
Total	28	100.0

Table 7
Campus operations and their focus on SDGs.

Campus operations and their focus on SDGs	Frequency	Percentage
Very high	2	7.1
Quite high	6	21.4
Medium	9	32.1
Low	6	21.4
Very low	5	17.9
Total	28	100.0

Table 8
Importance afforded to SDG teaching, research and the 3rd mission.

Categories	Very high	High	Medium	Low
Research	14% (4)	18% (5)	39% (11)	29% (8)
Teaching	7% (2)	36% (10)	25% (7)	32% (9)
Extension (3rd mission)	11% (3)	25% (7)	21% (6)	43% (12)

respondents who perceived a priority or strong institutional focus on SDG17.

Two themes emerged from respondents who had the perception that their institutions had an average, little or no focus on the implementation of the SDG17. The first was a need for institutional policy and support for the implementation of SDGs (e.g. "*There is no*

Fig. 1. Regional distribution of responding HEIs.

policy on SDGs within the University"; "There is a need for support *to allow achieve this goal").* The second was variability in focus on different SDGs at an institutional level, with SDG 5 (Gender Equality), for example, being identified as a priority compared to other SDGs by several institutions, since this goal is aligned with other institutional policies (e.g. "*It's main noticeable focus has been gender equality (…). Despite this there still remains a large imbalance."; "For the high/strong focus there are Research Centers established for gender, peace, etc. Sustainability unfortunately is not prioritized, though").* This is consistent with other works (e.g. Kanie et al., 2019), which outlined the emergence of new governance strategies for sustainable development.

4.2. Reflection on the results and discussion

As can be seen, the results indicate that universities have a high degree of awareness about the SDGs, which differs from the research of Kanapathy et al. (2019). On the one hand, it can be argued that the respondents are affiliated with HEIs that participate in a sustainability network. On the other hand, the focus these HEIs give to several SDGs shows that, on average, only 13% of the SDGs are a priority focus in these universities. Personal or individual awareness about a given SDG might influence how universities implement it in its programs. It is necessary to offer SDG-training opportunities to students, staff and faculty to promote a shared and inclusive language to discuss sustainable development (IARU, 2018).

Even though many HEIs have action programs, strategies, policies or work plans for sustainability, many do not have a framework specific to the SDGs. Also, perceptions of the implementation of the SDGs through the organization of events, campus operations, research, education, and the 3rd mission broadly tended to be rather limited. The need for institutions to include the SDGs holistically in their systems has been advocated by Leal Filho et al. (2017). Besides, the sustainability-oriented higher education networks could be strengthened in order to engage in SDG implementation, as supported by El-Jardali et al. (2018), as networking "may be an important mechanism for systemic change in higher education" (Dlouhá et al., 2018, p. 1; SDSN Australia/Pacific, 2017). Duran y Lalaguna and Dorodnykh (2018) agree that SDG implementation in universities offers partnership opportunities with government, industry and the community.

Our results indicate the necessity of engaging the university in SDG specific events, which may enhance the awareness of sustainability. Teachers will be able to integrate ESD and promote a better learning environment, as supported by Thaman (2010). By enhancing the sustainability awareness within the university, it will be possible to promote a positive impact on local communities, as advocated by Watson et al. (2012).

In addition, our results suggest that the goals within a more social context are given more importance than those with an environmental focus. Haddock-Fraser et al. (2018) suggest that such differences may be due to internal drivers, such as the influence of key individuals in an organization (who tend to steer the efforts in their preferred direction), or to external drivers such as policies, regulations, and priorities given by funding bodies.

A vital component of an effective framework to promote the implementation of the SDGs is to have a precise alignment of each SDG to external drivers and institutional policies. Mechanisms such as the recent Times Higher Education Impact Ranking (Times Higher Education, 2019b), an evidence-based measure of global universities' success in achieving the SDGs, can act as positive external drivers, linking the implementation of the SDGs to institutional reputation.

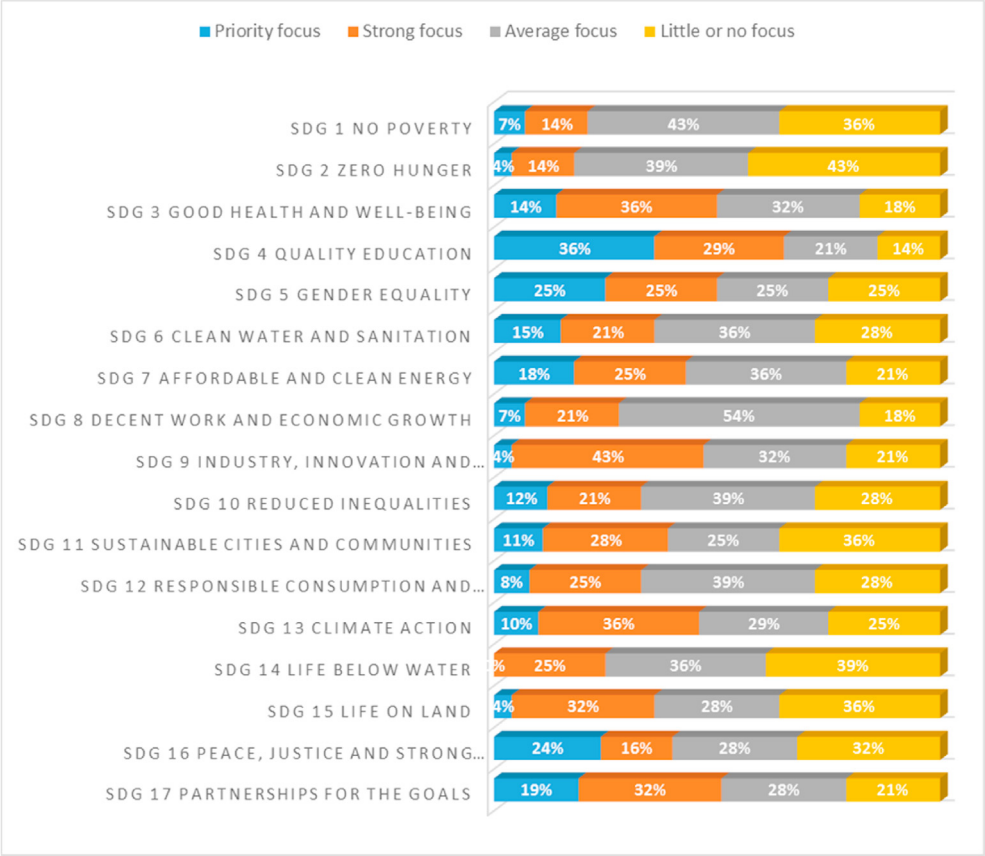

Fig. 2. Perception of priorities of respondent institutions concerning the implementation of each of the SDGs.

The data gathered from the survey, cross-checked against the literature, suggests that to yield the expected benefits, a possible framework to include the SDGs in higher education needs to take a set of factors into account, as illustrated in Fig. 3.

In addition, Table 9 describes the elements that need to be part of an institutional framework, which may have the ambition to cater to the inclusion of the SDGs.

It is believed that through a concerted institutional agenda, universities may not only make the SDGs central to their strategic institutional frameworks, but also mobilize civil society and hence contribute to great visibility of the SDGs among their broad audiences and networks.

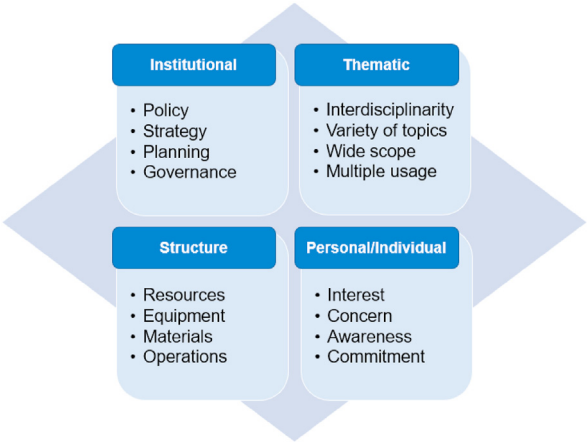

Fig. 3. Factors to be considered in order to yield the expected benefits of the SDGs implementation.

5. Conclusions

This paper has outlined the need to pay attention to the SDGs in university programs and has produced guidelines for developing frameworks, which may help guide the efforts of HEIs in pursuing the SDGs more systematically. The present work has two main implications. Firstly, it outlines the relevance of, and the need for, a more significant emphasis on the SDGs in the context of teaching, research and operational initiatives at HEIs. Based on their scope and thematic diversity, the SDGs offer an unrivalled opportunity to raise awareness among students and support staff about sustainable development and its many ramifications.

The second implication of this work is strategic. Many HEIs struggle today on how best to incorporate the SDGs in their operations. . Efforts in this field are hindered by many barriers, some of which were outlined in this paper. In order to move forward, the framework guidance developed and presented in this paper may help organizations to tackle the different areas where the action is needed, vis-a-vis effective handling of matters related to the SDGs at the institutional level.

The original and unique contributions from this paper to knowledge are twofold: the paper is one of few that tackles the need for a framework to cater to a more systematic introduction of the SDGs in university programmes. Also, it contributes to knowledge by demonstrating the different levels of emphasis and priorities that HEIs give to the SDGs. Its central message is that the different levels of emphasis need to be better understood in order

Table 9
Framework for the inclusion of the SDGs in Higher Education Programs. Source: the authors.

Item	Relevance	Outcome
The setting of an institutional commitment towards the SDGs	Caters to a whole-institution approach	Inclusion of the SDGs in the institutional thinking
Elaboration of a work plan	Gives a sense of direction	Offers guidance on what is to be done by when
Agreement on a budget for the implementation	Provides a financial footing for the activities	Demonstrate institutional commitment and support
Mapping progress in the implementation	Establishes a baseline for the documentation of developments	Records progress and areas where improvements are needed
Embed the SDGs in university operations	Inserts SDGs thinking into day-to-day practices	Greater awareness about the impacts of institutions on the achievement of the SDGs
Integrating the SDGs across disciplines	Caters to a wider awareness of the SDGs in teaching programs	Well informed students and more interdisciplinary learning activities
Consideration of the SDGs across research areas	Inclusion of SDG thinking in research projects	Greater societal impact of the research
Combined involvement of staff and students	Mobilization of the key groups	Common understanding of the SDGs and their relevance reflected in their actions
Communication to and with external stakeholders	Information to partners, suppliers and service providers	Showcases the good work done and catalyzes reflection also among external organizations
Monitor and report on results	Measurement of the outputs	A clear indication of the levels of success
Evaluation of the work	Ascertain changes and transformations achieved	Objective overview of the impacts

to catalyze actions in respect of some SDGs (such as SDG17) whose values do not seem to be apparent to some universities, which, as a result, are not very active in pursuing them.

But despite the progress reported in this paper, there are still many research gaps, which should be addressed in future research. One of them is, for instance, the need to define reliable indicators, which may ascertain the extent to which specific sub-goals have been reached. Also, a system to monitor and document progress is necessary. Further, research is needed on how to prioritize the achievement of specific goals, without endangering others.

Implementing and embedding the SDGs in university structures is admittedly a complex task, but one that is worth the effort, since it ensures that institutional approaches are consistent with them. Institutional approaches are more efficient than ad hoc ones and allow scarce resources to be deployed in a more efficient manner. They also offer a sounder basis for continuity than isolated initiatives. As a growing number of universities are offering education programs on sustainable development, an institutional framework in place can add weight and more credibility to their efforts. They may also attract more students and help to recruit more staff with the expertise needed.

One additional element that should be mentioned is the potential influences of the crisis triggered by COVID-19 on sustainability processes and frameworks in higher education. This is a matter of serious concern for three main reasons.

Firstly, COVID-19 is adding pressure to university programs and budgets. This means that fewer funds may be available to support sustainability efforts.

Secondly, having been forced to suddenly switch to online teaching and learning, some institutions have given these items priority. Thirdly, academic staff now have much more additional work, possibly leaving them with less time to devote to sustainability-related activities.

But the COVID-19 crisis may also offer some opportunities, such as the enhancement of digital learning for sustainable development (Hamburg University of Applied Sciences has established a platform for this purpose: https://dl4sd.org/) and the promotion of more integrative teaching and research approaches. It may also give a new impulse to the development of new means to reduce materials and energy consumption, reduce CO2 emissions, and make university operations more sustainable.

But there will be a world after COVID-19. And in this context, a framework for the inclusion of the SDGs in university programs may offer an opportunity to contribute more significantly to global efforts towards a more sustainable future, where health issues are better taken into account and seen in a sustainable development context.

Credit Author Statement

Walter Leal Filho - paper conceptualization, instrument design for the survey, paper review, conclusion

Fernanda Frankenbeger - data analysis, paper review, corresponding author

Amanda Lange Salvia - instrument design for the survey, data collection, data analysis, paper review

Ulisses Azeiteiro - chapter 1 (Introduction)

Fatima Alves - chapter 1 (Introduction)

Paula Castro - chapter 1 (Introduction)

Markus Will - chapter 2 (SDGs in University Programmes), paper review

Joost Platje - chapter 2 (SDGs in University Programmes)

Violeta Orlovic Lovren - chapter 2 (SDGs in University Programmes)

Luciana Brandli - chapter 2 (SDGs in University Programmes)

Elizabeth Price - data analysis, discussion, English review

Federica Doni - chapter 1 (Introduction), paper review

Mark Mifsud - Methodology, data analysis

Lucas Veiga Ávila - Survey statistics, map organization, paper review

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Appendix A. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.jclepro.2021.126915.

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