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Governance in the implementation of the UN sustainable development goals in higher education: global trends

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Abstract

Governance is a key component for implementing sustainable development (SD) initiatives in university teaching, research, and projects. This line of thinking also applies to implementing the United Nations (UN) sustainable development goals (SDGs). Despite the role of governance in guiding processes related to the SDGs, few studies have examined these relations in an integrative manner in higher education. To bridge this knowledge gap, this study assesses the connections between governance and implementing the SDGs at higher education institutions (HEIs). Specifically, it relies on two main methods. The first is a bibliometric analysis, where the literature on the topic has been analyzed. The second method uses case studies from a sample of universities. The combined dual approach has identified the extent to which governance issues influence how these organizations perceive and handle the SDGs. The study provides valuable recommendations that may assist HEIs in implementing the SDGs with a due emphasis on governance.

1 Governance and leadership in guiding sustainability initiatives at higher education

Governance at higher education institutions (HEIs) involves the structures and procedures for making decisions on issues affecting the university community and its stakeholders (Abubakar et al., 2020). It is argued that central to sound governance for HEIs in this century is achieving sustainability by strategically aligning their mission and activities with each institution's respective sustainability goals. An effective governance structure consists

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of functional leadership with adequate autonomy to fulfill its duties and guarantee the integrity of HEIs according to its missions and visions for achieving sustainable development (SD). Governance also plays a vital role in the entire management framework to promote campus sustainability through pedagogy, research, campus operations, and outreach. The role of governance in fostering sustainability at HEIs is also crucial in selecting campus sustainability plans and models, such as utilizing the university as a living laboratory and embedding universities within networks of regional social, environmental, and economic resilience (Leal Filho et al., 2022a, 2022b, 2022c; Yusoff et al., 2021). The success of governance in guiding campus sustainability planning and implementing initiatives relies heavily on factors such as strategic planning, leadership commitment, robust support, sustainability culture, effective communication, and feedback mechanisms (Abdullah et al., 2017).

Campus governance can contribute to achieving the United Nations (UN) sustainable development goals (SDGs) at HEIs. While achieving SDG4 (ensuring quality education) is expected to be the central contribution of HEIs, sustainability teaching and exporting the principles of sustainable consumption to the larger community can help attain other SDGs. Indeed, HEIs have something to offer and contribute to all 17 SDGs, including building partnerships for SD. Abubakar et al. (2020) suggested that restructuring the governance of HEIs should include the following key issues: the first issue is that governance requires developing a clear sustainability vision, policies, and strategic plan for the respective HEI; the second issue is implementing SD objectives in education, research, outreach, partnerships, and campus operations. In addition, Abdullah et al. (2017) suggested incorporating sustainability principles and objectives into the implementation structure of campus plans.

Mader et al. (2013) highlight that good governance and management at an HEI include a leadership structure that promotes transparency, accountability, tracking, reporting, and planning systems. The authors posit that the following key elements can ensure sustainable leadership: the first consists of establishing a coordination committee headed by a qualified senior executive who reports directly to the head of the institution. The committee should be responsible for implementing the sustainability plan and targets and coordinating the overall environmental, social, and economic pillars of SD across all operations and activities of the HEI. Secondly, committee members should recognize, establish a link, and leverage existing sustainability efforts across the HEI and similar institutions. Third, governance entails constant collaboration and linkages across all relevant departments and units, such as capital works and facilities. Fourth is ensuring an audit and monitoring system for the HEI and regularly reporting the outcomes to the committee's head. The authors conclude that establishing efficacious management and governance structures is essential to successfully formulate, plan, and implement SD policies related to core activities and operations of any HEI (Mader et al., 2013).

Many studies indicate that university management or leadership decides the priorities of activities to be initiated and followed through on campus (Mader et al., 2013; Rieg et al., 2021; Stephens & Graham, 2010). Furthermore, leaders at HEIs are crucial to initiating and promoting the university's continuous support for a wide range of activities and guaranteeing their success. Universities can engage in ground-breaking activities focusing on various subjects, including sustainability and SD, both on and out of campus (Bauer et al., 2021). Good governance involving responsible leadership allows everyone, including staff and students, to take responsibility for their actions, accept risk, and develop innovative methods to deal with problems. Furthermore, it allows people to develop leadership skills and initiatives that can assist the university and the general community (Davis & Goedegebuure, 2017). University management can direct teaching,

learning, and research toward initiatives necessary for local, national, and global change and address the wider population's challenges (Bauer et al., 2021). Boards of trustees are also expected to play a leadership role in governance for sustainability at HEIs.

Furthermore, HEIs leadership can provide platforms for co-creation and collaboration among faculties and disciplines, which may have a greater impact on their initiatives. Good governance can also coordinate the organization of inputs from different backgrounds, such as scientific and societal, creating initiatives that may help solve complex real-world problems (de Giesenbauer & Müller-Christ, 2020; Queiroz Machado et al., 2022). Aside from the initiatives practiced on campus, as mentioned above, higher education administrators can collaborate to create programs and initiatives with collective action to assist in researching and embedding sustainability within surrounding communities. This effort can be facilitated when administrators can leverage internal assets toward programs that can assist people outside of the academy, and this can also create a synergistic effect of creating opportunities for graduates to take their sustainability training into regional jobs that require sustainability skills and competencies, thus closing the loop on best practice impacts of effective HEI governance for sustainability. Furthermore, they can direct staff toward understanding, communicating, and documenting the impact of programs on sustainability (Smith et al., 2017), especially to donors and boards of trustees. A key example of university management and leadership playing a key role through initiatives can be taken from the COVID-19 pandemic. Leadership in universities led to the mobilization of resources, expertise, and human resources that assisted in combating the spread of the disease while embodying adaptive resilience at an institutional level. Apart from support for teaching, HEIs leadership kept scientific research at universities ongoing and often acted as a catalyst for scientific and technological development, even during the pandemic's peak (Leal Filho et al., 2022a, 2022b, 2022c). Many universities had leadership that could reorganize priorities to engage in research, support communities, reduce the pandemic's impacts, raise awareness, or disseminate data (Anholon et al., 2020).

Despite the significance of governance in achieving SDGs at HEIs, several institutions implement sustainability initiatives without a formal governance framework (Bauer et al., 2021; Mader et al., 2013). Effectively advancing SD at HEIs requires coordination through a sound governance framework and institutional commitment. In several HEIs of the Global South, SD efforts lack an efficient institutional framework because of challenges, including a lack of standard practices and guidelines and forms of accreditation or generating and sharing best practices (Anholon et al., 2020; Davis & Goedegebuure, 2017). The SD efforts in several HEIs often center only on crafting SD visions and implementing some sustainability initiatives without a formal structure to guarantee success (Abubakar et al., 2020) or to centralize sustainability across all functional units of an entire university 'ecosystem.'

To fill this knowledge gap, the present study assesses the connections between governance and the implementation of the SDGs at HEIs using a combined approach of bibliometric analysis and case studies. It contributes to identifying the extent to which governance issues influence the ways the SDGs are perceived and handled by HEIs. The study provides valuable recommendations that may assist HEIs in implementing SDGs with an expected emphasis on governance. Achieving SDGs at HEIs is a complex and comprehensive endeavor requiring a systematic and integrated process under a governance framework rather than loose and arbitrary initiatives. It may take years to accomplish. This study is vital in helping address existing leadership shortcomings and gaps, promoting new solutions, and innovating ways of making HEIs more sustainable to streamline and speed

up the process throughout higher education. Good governance is a key success factor in implementing SDGs in HEIs.

2 Governance and sustainable development practices in a higher education context

Universities are leaders in education, research, and innovation, having a key role in social change and promoting SD (Blasco et al., 2020). This important role can be seen in recent efforts such as the Decade of Education for Sustainability Development (2005–2014) and target 4.7 of the SDGs (Shulla et al., 2020; Trechsel et al., 2018). The SDGs and their targets involve a complex range of economic, social, and environmental challenges, requiring implementation throughout public and private organizations, including universities (Hoque et al., 2017; Zhu et al., 2021). HEIs that want to promote a culture of sustainability and responsibility will not be able to act as echo chambers or observers (Vogt & Weber, 2020). Rather, implementing the SDGs throughout the university system will require systemic paradigm shifts and a whole-institution approach in which HEIs adopt relevant policies and practices and provide funding and resources to support those new goals (Leal Filho et al., ; Sterling, 2004). This change in HEIs could raise their leadership quality, preparing the ground for a sustainable evolution of these institutions (Giesenbauer & Tegeler, 2020) while hopefully attracting top talent to faculty, staff, and student positions. This section provides an analysis of examples of two types of SD in practice: green office (GO) and green campuses.

Bautista-Puig and Sanz-Casado (2021) analyzed sustainability in HEIs through five dimensions. Three of them—University Governance, Assessment and Reporting, and Campus Operations (through a green or sustainability office)—can be seen as governance, management, and practices to promote sustainability in HEIs. The cited authors found a high association between a sustainability plan and having GO by analyzing the correlation between sustainability practices. The GO, or sustainability office, coordinates and supports sustainability actions, staff, faculty training, and budget line items dedicated to sustainability initiatives. They also foster awareness among students and staff on matters related to SD (Leal Filho et al.,).

The first GO was established at Maastricht University in 2010. Since then, the model has been replicated by 35 universities across Europe. The GO model is open-source to tailor-make it to individual, institutional needs. GOs cover a wide range of activities; for example, they co-organize sustainability events, conduct overviews of sustainability courses, co-design new courses, lobby for waste separation and solar cells, or advise student groups and staff who want to act on sustainability. In Vrije Universiteit Brussel (VUB), Brussels, GOs initiated a local food pickup station with 300 members and 25 weekly orders, while Maastricht University boosted e-waste recycling by 190%. Utrecht University convinced the caterer to introduce a daily vegan option in the cafeteria and developed the first sustainability report at Magdeburg University, Maastricht University, and Konstanz University (Adomßent et al., 2019).

Green Campus Initiatives (GCIs) models encompass HEIs' sustainability initiatives, which require interaction between education and awareness (people), buildings/environment (place), and management (processes) at HEIs. One kind of GCI is on-campus housing. Four universities in the south of Brazil are GCIs' examples of the categories such as clean energy, energy efficiency, water efficiency, waste management, sustainable

transport, and education for sustainable development (ESD) (Ribeiro et al., 2021). They are replacing conventional lamps with LED lamps and installing presence sensors to activate lights in corridors and rooms (energy efficiency); rain harvesting systems are being installed in the new buildings, along with cisterns and faucets based on technologies to avoid water waste (efficient water use). Even though recycling presents a challenge at universities, they have facilities that allow selective waste collection. Therefore, they are implementing ESD within their policies (Ribeiro et al., 2021).

In the United States of America (USA), Hopkins (2022) gave some examples of universities that have initiatives related to green campuses, such as North Carolina State University, Virginia Tech, and the University of South Florida. North Carolina State University provides an online green living guide for students with recommendations on topics including transportation, eco-friendly eating, energy conservation, waste diversion, wellness, and water conservation (NC State University, 2021). Virginia Tech promotes sustainable living through LED lightbulbs, organic sheets, a drying rack for clothes, and The Green Office Certification Program to train staff, faculty, and students with the tools they need to work in more sustainable office areas (Virginia Tech, 2021). The University of South Florida (USF) living-learning communities focused on green lifestyles as options for students at Maple Hall, participating in various campus greening measures and sustainable programming, an annual swap shop, and a documentary series. The USF Patel College of Global Sustainability fosters sustainable urban communities and environments through collaborative research, education, and community involvement (University of South Florida, 2023).

It is unlikely that a single governance approach will work for all HEIs to promote sustainability. However, Fig. 1 outlines a more appropriate structure to place governance within central administration to develop SD strategies and policies for the Green Offices for implementing campus-based SD operations. While a specific, systemic strategy for advancing the SDGs in any given institution seems to be a common precursor to such action, the basic strategies benefit from being tailored to the local context and particular situation (Lang et al., 2006; Levesque & Wake, 2021). Furthermore, each university has its culture, governance structures, and goals that will influence which strategies will most likely result in a sustainability transition (Leal Filho et al., 2022a; Stephens & Graham, 2010).

Fig. 1 A schematic overview of the relationship between governance, SD strategies, Green Office, and campus operations

3 Methods

This research is based on a mixed methods approach of bibliometric assessment and case studies to provide a more complete and subtle understanding of connections between governance and implementation of the SDGs in HEIs. Combining these methods benefits from the strengths of both methods while overcoming each method's limitations. Also, this approach will improve the study's reliability by supporting and validating the findings from each method. Below is the description of each method.

(a)   A bibliometric assessment to understand the connections between governance and implementation of the SDGs in HEIs from the literature (Perianes-Rodriguez et al., 2016).

(b)   Case studies complementing the bibliometric analysis to understand better how universities with a well-known reputation in sustainability address the issue in their governance, policies, and practices to promote 'green' campus management (Yin, 2014). Exploring the common themes and outcomes of the studies is expected to shine more light on the emerging theory regarding how governance influences the implementation of sustainability at HEIs worldwide.

The bibliometric analysis employed to collect and review publications was based on the search string presented in Table 1. This table was created to find related publications in the Web of Science (WoS), an academic database with more than 182 million records published in more than 34,888 journals, books, and procedures (WoS, 2021).

The search string returned 423 publications on 25 September 2021. The chosen software to perform the bibliometric assessment was VOSviewer, whose main feature consists of constructing and visualizing a bibliometric network (VOSviewer, 2021). The method used to interpret and summarize the data was pursued through a co-occurrence analysis of a network graph, which represents the output, and the node's diameter represents the frequency of occurrence of a term. The vicinity of this to another term indicates that they are expected to be associated, thus belonging to the same thematic cluster, due to their co-occurrence frequency (Perianes-Rodriguez et al., 2016; Van Eck & Waltman, 2010, 2014).

Subsequently, through an in-depth review of the literature and among the identified 423 publications, six selected case studies were discussed to provide greater insight into the role of governance in the UN SDGs implementation in HEIs. Furthermore, this study also attempted to identify which universities, in a sample of 30 institutions from different countries, have a sustainability strategy or action plan and a member of senior management whose competence includes sustainability. Finally, the examples gathered provide an overview of the extent to which universities have strategies or action plans commonly used as part of governance implementation mechanisms. For this, the QS World University Rankings were adopted.[1]

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[1] https://www.topuniversities.com/university-rankings/world-university-rankings/2023 (Accessed: 18 February 2023).

Table 1 WoS search string and the number of publications

Search string	Number of documents	Time frame
TS=(("SDG*" OR "Sustainable development goal*" OR "agenda 2030" OR "2030 agenda") AND ("academi*" OR "universit*"OR "higher education institut*" OR "HEI*" OR "higher education") AND ("governance" OR "govern*" OR "administration" OR "polic*") AND ("implement*" OR "action*" OR "best practice*" OR "success stor*" OR "operationali*" OR "achiev*" OR "monitor*" OR "adoption" OR "deploy*" OR "application*" OR "attain*"))	423 publications	2015–2021

4 Results and discussion

The results and discussion of this study are divided into two subsections. The first aims to discuss through a bibliometric assessment what other authors have already studied about the role of governance in the UN SDGs implementation in HEIs. The second subsection aims to present some best practices and initiatives at universities to illustrate the role of governance—including green/sustainability offices as examples of governance strategies—in implementing the SDGs. Moreover, this study discusses case studies from 30 HEIs in different countries regarding the existence of a sustainability strategy or action plan and the role, if any, of a senior management stakeholder whose competencies include sustainability.

4.1 The role of governance in implementing the UN SDGs in higher education

Figure 2 illustrates the landscape of key concepts the researchers discovered when studying HEIs' governance in implementing the SDGs, which was achieved through the co-occurrence analysis performed on VOSviewer software. The output data generated a network
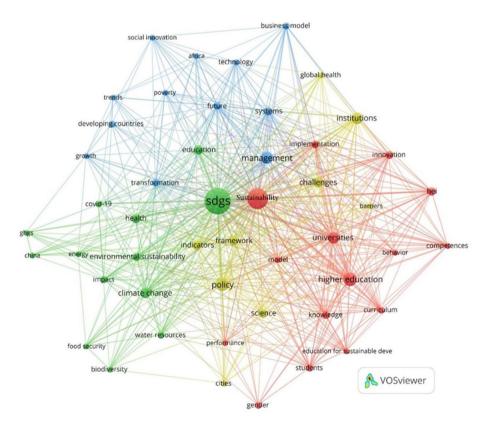

Fig. 2 Co-occurrence of key concepts on governance in implementing the United Nations Sustainable Development Goals in higher education

graph consisting of four clusters that represent the main research strands of governance, such as managerial processes and policies (Paletta & Bonoli, 2019), how universities assemble internal resources to implement green campus operations—since the green campus is one of the aspects deriving from governance, how they are implementing sustainability into their educational systems such as teaching and learning, research, and services to the community, as well as how they are contributing to the UN 2030 SD Agenda (Blanco-Portela et al., 2017; Rieg et al., 2021). The analysis shows that managerial processes and issues related to integrating sustainability into the education system have received more attention. In addition, the transformations that occurred following the COVID-19 pandemic have also received considerable attention, as the intersection between the clusters on the left side of the figure indicates. This relationship is expected to be an area that will gain more attention in the coming years, considering the increasing use of smart solutions and technologies in HEIs (Leal Filho et al., 2022b; Sharifi et al., 2021).

The blue cluster is closely related to the management concept of how HEIs could move toward a sustainability transformation process through practices and internal organization. Therefore, this cluster embraces these terms: management, transformation, growth, systems, future, technology, business model, and social innovation. This construct is highly reputed in the literature, which explores the drivers and barriers that could foster or hamper HEIs in their journey of shifting management processes toward sustainability (Blanco-Portela et al., 2017; Mader et al., 2013; Rieg et al., 2021). Also, management includes the proposal of appropriate methods, like the Supplier, Input, Process, Output, and Customer (SIPOC), which intends to analyze these issues at universities and understand how to align HEIs' strategies and policies with the SDGs (Fleacă et al., 2018). The transformation toward a more sustainability-oriented university is also connected to innovation processes, which Sanches et al. (2021) envisioned as an opportunity to nurture the modernization and integration of sustainability in universities. Indeed, harnessing technology and social innovation in governance approaches is critical for aligning HEI initiatives and activities with SDGs. In this context, some studies in this field are directed at identifying the main barriers to innovation, such as the management engagement and support during this process, as well as addressing the lack of other issues like establishing an environmental committee, technology, commitment of allied organizations, guidelines, policies, and adequate infrastructure (Ávila et al., 2017, 2019). An additional discussion related to the transformation of universities' business models due to such a dynamic landscape, as described by Rof and team (2020), seems to be an emerging research field through the lens of innovation for sustainability and responsible management that more researchers legitimize (Bikse et al., 2016; Fleacă et al., 2018; Hueske & Pontoppidan, 2020).

The yellow cluster, in turn, considers terms such as policy, indicators, framework, challenges, barriers, and institutions. Despite being the smallest in the number of terms when compared to the others, this cluster brings the perspective of the HEIs' governance role in implementing sustainability, either in the campus operations or strategies, through policy frameworks, accountability, and monitoring systems (Leal Filho et al., 2021; Zahid et al., 2020). This perspective is crucial in studying governance for sustainability because while the blue cluster is related to transformation and innovation processes, the yellow considers whether universities are facing challenges and barriers in implementing indicators, institutional frameworks, and evaluation initiatives that could nurture the governance of the SDGs implementation at HEIs (Calitz et al., 2018; Du et al., 2020; Paletta & Bonoli, 2019; Sanches et al., 2021). This cluster, in particular, highlights the significance of institutional reforms and evaluation/monitoring frameworks to mainstream SDG-oriented agendas in HEIs and track progress toward integrating SDGs in university-based activities. This

situation is unsurprising as the role of evaluation/monitoring in accelerating actions toward achieving the goals of plans, policies, and programs is widely acknowledged across different domains (Sharifi, 2019).

The red cluster illustrates how governance contributes to ESD in HEIs. It embraces constructs such as innovation, competencies, curriculum, students, knowledge, and ESD. According to various studies, this field aims to explore the administrative and policy aspects that could foster the implementation of sustainability across disciplines and curricula, as well as boost efforts from higher management teams and staff in enabling different learning and teaching approaches that could assist ESD (Albareda-Tiana et al., 2018; Franco et al., 2019; Kolb et al., 2017). The discussion on how to enhance students' engagement in dealing with the challenges affecting the achievement of sustainability (Leal Filho et al., 2019a, 2019b), as well as the best pedagogical approaches to develop sustainability literacy, competencies, and attitudes among students (Ahamad & Ariffin, 2018; Caldana et al., 2021; Redman et al., 2021; Sonetti et al., 2019), are also relevant concepts of this cluster. The central position of the term 'behavior' on the right corner of this cluster is a testament to the importance of behavioral changes across different stakeholders to achieve transformational changes toward integrating the SDGs agenda in HEIs. Fostering such changes will only be possible with the will and commitment of university managers. They should lead efforts in reforming the curricula and enhancing the competencies to adapt to such reforms. In addition, this cluster's focus relies not only on students' enthusiasm but primarily, it centers on the universities' leaders (staff and workforce) through assessing and emphasizing the importance of training so that professionals can achieve a substantial knowledge level of competencies, and leadership, aligned with the sustainability challenges, to support campus operations, teaching, and research practices toward sustainability (Kolb et al., 2017; Leal Filho et al., 2020).

Finally, the green cluster brings about a discussion about the role of HEIs in contributing to the SDGs, focusing on the universities' negative and positive externalities, especially on their impacts on the environmental dimension of sustainability, like climate change, energy, and food security (O'Keeffe, 2016; Sonetti et al., 2019; Zhu et al., 2021). It also tackles how HEIs are organizing their campus operations and managerial systems to either mitigate their impacts, e.g., energy inefficiency, greenhouse gas emissions, inefficient building systems, or wastewaters, or adapt their practices and activities to the 2030 Agenda for SD, legal regulations, and other initiatives, such as the green transitions (Amaral et al., 2020; Callisto et al., 2019; Gholami et al., 2020; Sanches et al., 2021; Tintoré et al., 2019). Strong connections between terms in this cluster and those in the others, e.g., transformation and policy, indicate that as living labs and innovation ecosystems, HEIs can lead actions toward addressing sustainability and climate change challenges. Moreover, they can lead by example and pave the way for scaling sustainability initiatives toward achieving SDGs (Fig. 2).

4.2 Case studies of good governance practices in implementing the UN SDGs in HEIs

To enhance the legitimation of the governance role in implementing the UN SDGs among HEIs, six selected case studies extracted from the literature review are presented and analyzed along with the four concept clusters of Fig. 2. The universities selected for discussion are well known for their sustainability governance and leadership reputation in implementing sustainability systemically, not only in their educational and

Table 2 Case studies on governance support in implementing SDGs at HEIs

Institution/Country	Sustainable development initiative	References
Manchester Metropolitan University (United Kingdom)	Manchester Metropolitan University's carbon management plan (2020–2026) focuses on energy efficiency. It achieved the international standard for environmental management ISO 14001:2015 in 2016 – making it the first university to achieve this challenging certification. It also has an Annual Environmental Sustainability Statements report on progress toward achieving environmental goals as set in the Environmental Sustainability Policy and Strategy	Manchester Metropolitan University (2019)
Freie Universität Berlin (Germany)	The university has implemented several measures to protect resources, reduce energy consumption, and combat climate change, such as targeting energy efficiency, waste management, and recycling. In addition, the structural and technical infrastructure are essential factors contributing to the university's operational performance through cost-effectiveness and energy efficiency projects, aiming for climate-neutral campus operation by 2025. Other projects are also relevant to GCIs, such as the *CarbonThink*, which aims to carbon storage by recycling organic material, and the Blooming Campus Initiative, which was created to protect the campus's biodiversity by examining the green areas and their potential in aiding the insects on the campus	Freie Universität Berlin (2020)
BOKU University of Natural Resources and Life Sciences (Austria)	This university was one of Austria's first to start the ISO 45001 implementation process. This institution also adopted the EU Eco-Management and Audit Scheme (EMAS) in 2006, evidencing its interest in sustainable campus operations. The institution believes that climate protection and ecological responsibility are key factors and should be embedded in the daily processes of staff and students. In this sense, the higher administration is also committed to the campus' environmental management, sponsoring the CO_2 compensation system, which was implemented in 2002 to remediate the CO_2 emissions produced internally by the university operations	BOKU University of Natural Resources and Life Sciences (2019)

Table 2 (continued)

Institution/Country	Sustainable development initiative	References
Royal Institute of Technology (KTH) (Sweden)	The KTH has developed its annually revised policy for SD to support and improve the sustainability work conducted within the institute. A sustainability office and the KTH's environmental management system team are responsible for implementing clear goals and management of campus practices that guarantee an efficient environmental management system. The institute has launched the University-wide sustainability objectives 2021–2025 and climate objectives 2021–2045 with actions planned for six core areas, including efficient resource management and a climate-neutral environment. In these areas, targets related to travel and transport, procurement and waste management, sustainable buildings, food and food services, biodiversity, and ecosystem services were settled. The institute is certified according to the international environmental and management standards ISO 14001	Royal Institute of Technology (2021)
Turin Polytechnic (Italy)	A green team was created in 2015 to contribute to the university's transition toward a low-carbon university. Also, this institution has developed an Engagement Plan composed of action provisions related to mobility and transport, food, water, waste, urban outreach, energy, building, and green procurement. Since 2009, the institution has bought 100% of its electricity from a renewable-certified source. The sustainability report uses the global reporting index (GRI) approach	Politecnico di Torino (2020, 2021)

Table 2 (continued)

Institution/Country	Sustainable development initiative	References
Aalto University (Finland)	Aalto University adopts the campus approach as a living lab to experiment with the available sustainability research within its immediate surroundings. The university considers that the key environmental impacts of its campus are related to energy, consumption, transport, and recycling. To cope with those impacts, it has actively worked to develop energy efficiency and produce its energy in a sustainable, friendly manner. As a result, since 2012, the university has decreased its annual carbon dioxide emission by 40%. It intends to become a carbon–neutral campus by 2030	Aalto University (2021)

research practices but also in their campus operations (Sanches et al., 2021). As shown in Table 2, the universities are: (1) Manchester Metropolitan University, (2) Freie Universität Berlin, (3) BOKU University of Natural Resources and Life Sciences, (4) The Royal Institute of Technology, (5) Turin Polytechnic, and (6) Aalto University.

The fact that the sustainability efforts in these cases are institutionalized- and not "ad hoc"- and that there are budget provisions for the sustainability work suggests that there are clear indicators of leadership support. Also, as shown in Table 2, the management of campus operations at the universities aims to enhance efficiency while mitigating the universities' negative impacts on several fronts. For example, all the case studies show a deep concern about climate protection and ecological responsibility by tackling these issues through several initiatives and policies directed at improving energy-use efficiency, conservation of resources, promoting awareness regarding energy efficiency, waste management, recycling, and transportation, while enhancing campus biological diversity. The latter is aligned with the green cluster, where universities are expected to contribute to the SDGs, protecting the environment and contributing to green transitions. In contrast, the blue cluster focuses on transformation and innovation processes HEIs undertake toward green transitions.

Another peculiar aspect of the case studies here is the extent to which formal governance mechanisms and environmental management standards and tools exist. Examples of these tools and the international environmental management standard are the International Organization for Standardization (ISO) 14,001; occupational health and safety management—ISO 45001; and the EU Eco-Management and Audit Scheme (EMAS). These management systems are also connected to the yellow cluster since they are related to the set of policies, management frameworks, and indicators to deal with sustainability challenges at HEIs (Disterheft et al., 2012; Jones et al., 2013).

To further discuss governance practices in implementing the UN SDGs in higher education, Table 3 presents a set of 30 HEIs ranked first by the QS World University Rankings 2023 while showing the existence, or not, of a sustainability strategy/action plan besides the existence of a senior administration member responsible for sustainability.

As shown in Table 3, among the 30 HEIs ranked first in the QS World University Rankings 2023, 83.3% (25 HEIs) have sustainability action plans and strategies directly related to the topic. Moreover, 70% (21 HEIs) have at least one member of the senior administrator responsible for sustainability. Therefore, the top 18 HEIs have both action strategies and senior management members involved with sustainability, which shows the commitment assumed by these HEIs regarding sustainability governance, reaffirming its importance in implementing the UN Sustainable Development Goals in the higher education context.

According to Leal Filho et al. (2017), HEIs can implement sustainability concepts in several university dimensions and relate these to their institutional framework, governance, and organizational change management. Most of the analyzed HEIs have a department responsible for sustainability in the institution—usually named the green office or sustainability office. At the same time, most institutions have a committee responsible for discussing and implementing SD strategies. The committees are inclusive and comprise students, staff, and managers, who discuss the topic dialogically.

Nevertheless, despite being well positioned in the ranking, some universities still need action plans and senior administration members responsible for sustainability. For example, in Nanyang Technological University (Singapore), Cornell University (USA), Columbia University (USA), and Johns Hopkins University (USA) there are action plans related to sustainability. However, there is no member responsible for this in the senior

Table 3 Sustainability governance efforts of top global universities in the QS World University Rankings 2023

Rank	University/Country	Students (2022)	Existence of a sustainability strategy/action plan	Existence of a member of the senior administrator responsible for sustainability
1	Massachusetts Institute of Technology (MIT) (USA)	11,934	Yes	Yes
2	University of Cambridge (UK)	24,270	Yes	Yes
3	Stanford University (United States)	16,937	Yes	Yes
4	University of Oxford (United Kingdom)	25,554	Yes	Yes
5	Harvard University (United States)	7,153	Yes	Yes
6	California Institute of Technology (USA)	2,397	Yes	Yes
7	Imperial College London (UK)	17,000	Yes	Yes
8	University College London (UK)	43,900	Yes	Yes
9	ETH Zurich (Switzerland)	24,500	Yes	Yes
10	University of Chicago (USA)	7,526	Yes	Yes
11	National University of Singapore	38,596	Yes	Yes
12	Peking University (China)	31,606	Yes	Yes
13	University of Pennsylvania (USA)	23,030	Yes	Yes
14	Tsinghua University (China)	53,302	Yes	Yes
15	The University of Edinburgh (UK)	25,951	Yes	Yes
16	École Polytechnique Fédérale de Lausanne (Switzerland)	12,720	Yes	Yes
16	Princeton University (USA)	8,361	Yes	Yes
18	Yale University (USA)	14,525	Yes	Yes
19	Nanyang Technological University (Singapore)	33,000	Yes	No
20	Cornell University (USA	25,582	Yes	No
21	The University of Hong Kong (China)	33,702	No	No
22	Columbia University (USA)	26,678	Yes	No
23	The University of Tokyo (Japan)	28,806	No	No
24	Johns Hopkins University (USA)	32,049	Yes	No
25	University of Michigan (USA)	47,659	Yes	Yes

Table 3 (continued)

Rank	University/Country	Students (2022)	Existence of a sustainability strategy/action plan	Existence of a member of the senior administrator responsible for sustainability
26	Paris Sciences et Lettres University (France)	17,000	No	No
27	The University of California (USA)	45,435	Yes	Yes
28	The University of Manchester (UK)	40,000	Yes	Yes
29	Seoul National University (South Korea)	30,273	No	No
30	Australian National University (Australia)	26,000	No	No

administration. In turn, The University of Hong Kong (China), The University of Tokyo (Japan), Paris Sciences et Lettres University (France), Seoul National University (South Korea), and Australian National University (Australia) have neither.

5 Conclusion and recommendation

In this paper, a mixed methods approach was used to better understand the connections between HEIs' governance with their implementation of the SDGs, including a focus on how universities with a well-known reputation in sustainability address the issue in their governance, policies, and practice. A rich literature that delves into multiple dimensions of governance and SDGs was found, including (1) how the internal management of an HEI creates drivers and barriers to advancing SDGs; (2) how policy framework and monitoring systems can nurture SDGs implementation; (3) how governance can advance ESD across disciplines and curricula; and (4) how governance related to SDGs can result in various negative and positive externalities of campus efforts and operations. The in-depth case studies brought together these pieces, validating the importance of governance in advancing the SDGs in these various ways. The case studies also demonstrate the need for any HEI governance system to be structured with that institution's specific context and needs.

This paper has some limitations. The first is that it analyzed aspects of governance in an SD context without deepening the debate on institutional constraints or the shortcomings of 'sustainable development' as a guiding concept. Secondly, the number of case studies analyzed is insufficient to consider all governance initiatives being implemented to date. Nevertheless, despite these constraints, the study contributes to filling the identified knowledge gap in the literature since it provides useful insights into the extent to which matters related to governance influence efforts to implement SD elements in HEIs.

The lessons and implications from this study are multi-fold. First, it is not to be expected that the type of governance required to advance the full suite of SDGs in HEIs will be created overnight, considering that the needed types of structures, policies, benchmarks, and educational systems will take time to develop, especially in the slow-moving bureaucracy of higher education, as highlighted by Trechsel et al. (2018). Secondly, it is observed that an adequate governance system is extremely helpful in ensuring support for sustainability initiatives. Moreover, this helps to provide some continuity instead of working on an ad hoc basis.

Taking incremental steps to address any of the steps illuminated in this paper would bring HEIs closer to the goal of implementing sustainability. However, in order to yield long-term benefits, some recommendations are made:

1. Governance initiatives need to be open and inclusive, considering sustainability characteristics and be long-term instead of focusing on short-term goals.
2. Governance processes should consider the variety of initiatives in HEIs, be they staff or student-led, and take these and their experiences into account.
3. Proper financial provisions should be made to support governance-related efforts since the starvation of funds may reduce efficiency.
4. Faculties should be empowered in governance decisions related to sustainability, as faculties have the biggest impact on student learning; undertake the most research; are involved with grants and collaborations across institutions; and have the academic freedom to question dominant paradigms precipitating unsustainability.

5. The role of a president/chancellor, and thus the board involved with hiring such a person, is important. Any HEI with a leader who does not understand sustainability and cannot articulate how their university is addressing the SDGs is currently ill-equipped to be led down a sustainability/SDG pathway, especially moving forward in this century with the impacts of rapid global heating still to come.

Finally, it is emphasized that HEIs governance systems should be geared to promote sustainability across the board, with the active participation of senior management on the one hand and academic and non-academic staff and students on the other. HEIs need to emphasize sustainability in education programs, as emphasized in the recent in-depth analysis about achieving the UN 2030 Agenda. Without all commitment, there will be no progress in this respect. Thus, governance is an important part of efforts to achieve the SD Agenda in higher education.

Data availability Data will be made available on reasonable request.

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