

Global Trends in Sustainability Policies in Higher Education



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Abstract Higher education institutions (HEIs) around the world have played a crucial role in promoting sustainable practices. Global sustainability policies gain importance, providing guidelines and principles that can lead these institutions towards a more sustainable management. There are several main international documents and guidelines, such as the UN 2030 Agenda, UNESCO guidelines and the UN Global Pact. In the context of higher education, the sustainable development goals play a relevant role, guiding institutions to incorporate sustainability into research, education and campus operations. The implementation of sustainability policies in HEIs varies considerably depending on the geographical and institutional context and the resources available. This study identifies and analyses critical success factors (CSFs) and challenges associated with the implementation of sustainability policies in HEIs. Successful case studies demonstrate that a strong leadership, interdisciplinary research and collaborative partnerships can drive transformative change. Global trends in sustainability policies point out to an increasing emphasis on interdisciplinary research, promoting collaborative efforts to tackle complex sustainability problems. Sustainability for HEIs is a path of no return once started. These institutions are no longer just seen as entities that possess knowledge, but as entities that can use that knowledge to be sustainable and pass on to others the principles of preserving what is the future of society and the planet, taking an active part in sustainable development.

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1 Introduction

Sustainability has become a global priority, reflected in all sectors of society, including higher education (Tretyakova and Kotomina 2020). In recent years, universities worldwide have played a crucial role in promoting sustainable practices through scientific research and education and by adopting concrete policies and actions aimed at reducing environmental impact and promoting sustainable development (Krogman and Machlis 2018; Popelo et al. 2023). Higher education institutions are central players in the training of aware citizens, capable of facing the environmental, social and economic challenges facing the world today (Sepasi et al. 2018; Konst and Friman 2021; Park 2024).

The concept of sustainability transcends mere environmental management and encompasses social, economic and ethical aspects, as set out in the United Nations Sustainable Development Goals (SDGs). In particular, SDG 4, which focuses on quality education, and SDG 13, which deals with climate action, are directly applicable to higher education. Universities, as well as being centres of knowledge and innovation, have a responsibility to lead by example, implementing sustainability practices on their campuses and influencing public policy and behaviour (Bebbington and Unerman; 2018; Rosati and Faria 2019; Salvia et al. 2019).

However, integrating sustainability into universities faces numerous challenges. Firstly, there is a huge disparity in the implementation of sustainable practices between institutions in different regions of the world (Chaudhary and Dey 2020); Konst and Friman 2021; Tullio et al. 2021). While some universities are at the forefront of green innovation, others face financial, cultural or political constraints that hinder the adoption of such practices. Lack of adequate funding, obsolete infrastructure and resistance to change are significant obstacles. In addition, the lack of a uniform international regulatory framework for sustainability in higher education creates inconsistencies in the approaches adopted by institutions (Lattu and Cai 2020; Menon and Suresh 2022).

It is in this context that global sustainability policies gain relevance, providing guidelines and principles that can guide universities towards more sustainable management (Sepasi et al. 2019; Dabija et al. 2023). International organizations such as the UN and UNESCO have launched initiatives to promote sustainable development in educational institutions, encouraging the adoption of practices that integrate sustainability into their curricula, campus management and day-to-day operations (James and Card 2012; Levesque and Wake 2021). Therefore, documents such as the 2030 Agenda for Sustainable Development and the Framework for the Implementation of Education for Sustainable Development (ESD) for 2030 serve as a reference for universities to align their actions with global objectives.

This research aims to analyse the main international and national policies that guide universities towards sustainable management. By mapping the most influential policies and examining how they are being implemented in different contexts, it will be possible to identify best practices and propose solutions to the challenges that remain.

2 International Policies in Higher Education Institutions

This section aims to describe the main international documents and guidelines, such as the UN 2030 Agenda, UNESCO guidelines and the UN Global Pact. Therefore, the main global documents and sustainability guidelines that guide higher education institutions will be analysed.

2.1 *Agenda 2030 and the Sustainable Development Goals*

The 2030 Agenda for Sustainable Development, adopted by the United Nations General Assembly in 2015, is one of the most important milestones for sustainable development and one of the most important documents in the context of global sustainability policies (Blanc 2015; Aftab et al. 2020). The Agenda 2030 is a call to action for all countries, institutions and individuals, promoting the eradication of poverty, protecting the planet and ensuring peace and prosperity for all by 2030. In this sense, it's legitimate to say that it also encourages higher education institutions (HEIs) to play a leading role in creating more sustainable societies by offering high-quality education and research, as well as promoting the adoption of sustainable practices on their campuses (Konst and Friman 2021). Of the 17 sustainable development goals (SDGs) that make it up, several directly impact higher education, such as SDG 4 (Quality Education), SDG 11 (Sustainable Cities and Communities) and SDG 13 (Climate Action) (Ashida 2022; Silva et al. 2023; Sukmana 2023).

As seen, in the context of higher education, the SDGs play a central role, guiding institutions to incorporate sustainability into three key areas: research, education and campus operations and authors like Ashida (2022), Silva et al. (2023) and Sukmana (2023) consider that the most relevant SDGs for higher education institutions are SDG 4, 13 and 11.

SDG 4—Quality Education

SDG 4 seeks to ensure inclusive, equitable and quality education, promoting life-long learning opportunities for all. Universities are seen as central platforms for the fulfilment of this goal, given their role in training future leaders, professionals and researchers. This goal encourages these institutions to (Sweileh 2020; Filho et al. 2022a):

- Update curricula to include content related to sustainable development;
- Promote equal educational opportunities, including access for people from disadvantaged groups;
- Develop interdisciplinary research programmes that address global problems such as climate change, biodiversity loss or social inequality;
- Form partnerships with other higher education institutions and sectors of civil society to broaden the impact of education in sustainable development.

SDG 11—Sustainable Cities and Communities

This goal is of great relevance to HEIs located in urban areas, where interaction between the institution and the local community can be an example of sustainability. SDG 11 encourages these institutions to (Goubran 2019; Ashida 2022; Filho et al. 2022a):

- Build partnerships with municipalities and NGOs to develop local solutions to challenges such as urban transport, sustainable housing or the management of public spaces;
- Create “green campuses,” with sustainable infrastructure, energy-efficient buildings and living spaces that encourage sustainable mobility (bicycles and public transport);
- Promoting social inclusion and local economic development through the creation of “green” jobs and sustainable entrepreneurship initiatives.

SDG 13—Climate Action

SDG 13 focuses on taking urgent action to combat climate change and its impacts. HEIs thus play a vital role in this field, both in producing innovative climate research and in reducing their own environmental impact. Amongst others, expected actions include (Álvarez-Castañón and Romero-Ugalde 2021; Polo et al. 2019):

- Developing carbon neutrality policies aimed at reducing greenhouse gas emissions on institutional campuses;
- Promoting applied research into green technologies and innovative solutions to combat climate change;
- Educating the university community (students, teachers and staff) about sustainable practices such as energy efficiency, waste management and sustainable mobility.

In terms of implementation in higher education institutions, those that integrate the 2030 Agenda into their operation are committed to actions beyond the classroom context. Sustainability must be visible in every aspect of the institution, from the research it produces to how it manages resources such as water, energy and even waste. Commitment to the SDGs offers a powerful framework for transforming HEIs, providing a long-term vision for institutional sustainability and the formation of conscious global citizens (Ashida 2022; Popelo et al. 2023).

2.2 UNESCO Education for Sustainable Development (ESD) for 2030

UNESCO has launched the Education for Sustainable Development (ESD) for 2030 programme, a framework for implementing ESD, intending to accelerate the integration of sustainable development into education systems worldwide, at all levels of education, including higher education. The programme aims to increase education's role in building a more just and sustainable world, to train individuals capable of contributing innovative solutions to global problems and to transform education into a central tool for tackling global challenges such as climate change, environmental degradation, inequality and poverty (UNESCO 2020, 2024).

The ESD for 2030 Roadmap proposes a series of actions to make higher education institutions drivers of transformation towards more sustainable societies. Some of the main actions may include (Wiek et al. 2011; UNESCO 2020):

- **Reforming curricula** so that sustainability is a central part of teaching programmes.
- **Training educators and researchers** to integrate sustainable development into their courses and research projects.
- **Encouraging interdisciplinarity**, so that students understand the interconnection between different areas of knowledge (natural sciences, social sciences, economics, etc.) in solving global problems.
- **Promoting global and regional partnerships** between universities, governments and companies to share good practices and develop common solutions to sustainable challenges.

The focus of ESD for 2030 is to create a generation of students who not only have technical and professional skills but also a strong ethical and social awareness of their role in building a sustainable future.

2.3 United Nations Global Compact

The United Nations Global Compact (UN Global Compact), launched in 2000, is an international initiative aimed at promoting sustainable corporate citizenship, based on 10 universal principles in the areas of human rights, labour, environment and anti-corruption. Although originally created for companies, the Global Compact also involves universities, encouraging them to adopt practices that promote sustainability on and off their campuses. Therefore, many universities around the world have joined it. This agreement encourages institutions to lead change through sustainable initiatives ranging from responsible resource management to integrating sustainability into teaching and research (United Nations Global Compact 2024).

The Global Compact's 10 principles are strongly aligned with the practices that universities should implement to promote sustainable management; however, the three principles highly relevant to higher education sector are numbers 7, 8 and 9.

Principle 7—Precautionary Approach to Environmental Challenges (United Nations Global Compact 2024): This principle encourages universities to adopt a precautionary approach to environmental challenges, developing policies that reduce the ecological footprint and promote carbon neutrality. Universities must be proactive in managing environmental risks, developing strategies to mitigate environmental impacts before major problems occur. This is in line with their role of educating and researching, enabling them to be leaders in innovation and good environmental practice (Disterheft et al. 2015).

Principle 8—Undertake initiatives to promote greater environmental responsibility (United Nations Global Compact 2024): This principle is extremely relevant for universities, as it requires the promotion of environmental responsibility at all levels. In addition to implementing internal policies, universities play a key role in educating future leaders and professionals in sustainability practices. This involves not only the sustainable management of the campuses themselves but also the development of curricula that integrate environmental responsibility into various areas of knowledge (McAteer et al. 2023).

Principle 9—Encourage the Development and Diffusion of Environmentally Friendly Technologies (United Nations Global Compact 2024): Universities participating in the Global Compact are encouraged to lead the research and development of new environmentally friendly technologies, promoting innovation in the area of renewable energies, waste management and resource efficiency (Otto et al. 2021).

Based on these principles, it's possible to anticipate that there is an impact in HEIS. The commitment to the Global Compact implies that these institutions, in addition to promoting sustainable governance within their operations, must also act as agents of change in society. This can be done through:

- Applied research into sustainable technologies (Beck 2023): By developing partnerships with companies and governments, HEIs can contribute to the creation of technological solutions that reduce carbon emissions or improve resource management.
- Social responsibility (United Nations Global Compact 2024): Universities that join the Global Compact are committed to including socially responsible practices, such as gender equality and inclusion, in their operations and curricula.
- Partnerships with the private sector (Fussler et al. 2017): Many universities use the Global Compact as a bridge to create collaborations with companies that also adhere to the 10 principles, creating a synergy between education and sustainable innovation.

Several universities around the world integrate the principles of the Global Compact into their operations. Several higher education institutions have adopted environmental awareness programmes, incentives for using greener transport, recycling waste and integrating sustainable practices into their operational processes (Ounsanha 2018). The University of Sydney, for example, is an active signatory

that includes sustainability in its business and management programmes, while Lund University in Sweden carries out cutting-edge research into renewable energies in line with the Compact's environmental principles. The Valaya Alongkorn Rajabhat University in Thailand intends to develop green university behaviour to provide the opportunity for the development of a green university.

It seems that joining the Global Compact provides HEIs with a clear framework for improving their internal operations and playing a more active role in the fulfilment of the sustainable development goals (SDGs).

2.4 Higher Education Sustainability Initiative (HESI)

The Higher Education Sustainability Initiative (HESI) is a global platform launched in 2012 during the United Nations Conference on Sustainable Development (Rio + 20). HESI is a platform for HEIs, international organizations and other stakeholders that promotes sustainability in higher education. Universities that join HESI commit to integrating sustainability principles into their operations and forming partnerships to amplify their impact. The initiative's main objective is to involve higher education institutions in promoting the sustainable development goals (SDGs) and integrating sustainability into all aspects of their operations and teaching programmes (United Nations, n.d.).

HEIs that join HESI are committed to integrating sustainability principles into their curricula and research projects, which includes developing courses and disciplines that educate students about the interconnections between environmental, social and economic sciences; to reduce the environmental impact of its campus operations by promoting the efficient management of resources such as energy and water, reducing waste production and adopting measures to minimize the carbon footprint; to foster social responsibility and community involvement through initiatives that encourage the active participation of students and staff in sustainability actions; and to collaborate with other institutions in networks to share good practices and joint projects aimed at achieving the SDGs (United Nations, n.d.).

One of HESI's characteristics is its ability to create global cooperation networks between HEIs, governments and international organizations. By sharing good practices and examples of success, institutions can increase their efficiency and impact in terms of sustainability. The initiative also encourages them to report regularly on their progress towards sustainability goals, promoting transparency and accountability (United Nations, n.d.).

Many higher education institutions have joined HESI. For example, from Portugal, the Nova University Lisbon, stated that "Joining the HESI community, following NOVA's accession to the United Nations Academic Impact (UNAI) in January 2023, represents an important recognition of this university's ongoing commitment to

sustainable development, which is reflected in its educational offer, the priorities of the research agenda and institutional practices”¹.

2.5 European Strategy for Sustainable Development

The European Sustainable Development Strategy was adopted by the European Union (EU) with the aim of integrating sustainability into all its policies, promoting balanced, inclusive and sustainable economic growth. This strategy is closely linked to the UN’s Sustainable Development Goals (SDGs) and aims to make Europe lead the transition to a more sustainable economy and society.

European HEIs play a central role in the implementation of the European Sustainable Development Strategy, being agents of change both in terms of scientific research and the training of new professionals capable of facing global challenges (Tarozzi and Mallon 2019; Jadrić et al. 2022). These institutions are encouraged by the EU to Council Recommendation (2022):

- (1) incorporate sustainability into their curricula, creating courses that address topics related to renewable energies, resource management, biodiversity, social innovation or others.
- (2) increase applied research into sustainability, focussing on areas such as green technologies, energy transition, circular economy and smart cities.
- (3) develop sustainable infrastructures, implementing efficient solutions for energy consumption, waste management and water use on campus.

EU contributes to these goals by supporting programmes such as Horizon Europe (main funding instrument for research and innovation in Europe) and European Alliance of Universities for Sustainability (aim of fostering transnational collaboration on sustainability), and initiatives like sustainable campuses and the European Green Deal (initiative that aims to make Europe the first carbon–neutral continent by 2050) and public–private partnerships (partnerships between universities and companies) that encourages interdisciplinary research and transnational collaboration, allowing HEIs from different countries to work together on large-scale projects (EU Funding and Tenders Portal, n.d.).

¹ <https://www.unl.pt/noticias/nova/nova-junta-se-a-iniciativa-das-nacoes-unidas-para-a-sustabilidade-do-ensino-superior/>.

3 Implementation of Sustainability Policies in Higher Education Institutions

In this section, we will analyse how the implementation of sustainability policies in HEIs varies considerably depending on the geographical and institutional context and the resources available. With some examples, we will analyse how different institutions in different regions have adopted, adapted and implemented these policies.

Examples of higher education institutions from various regions of the planet will be presented, namely, Europe, North America, Africa, Asia-Pacific and Latin America. These institutions are just a few that in some ways stood out for the sustainability policies and practices adopted.

3.1 Higher Education Institutions in Europe

In Europe, HEIs are at the front of this sustainable transition, acting as centres of innovation and research. Sustainability is seen as a strategic priority, especially if we look at international sustainability policies such as the European Green Deal and the guidelines of the European Strategy for Sustainable Development (Popelo et al. 2023).

The University of Copenhagen² (Denmark), Wageningen University³ (Netherlands) and Universidade Nova de Lisboa⁴ (Portugal) are examples of European institutions that have already adopted practices that make a difference in the context of sustainability. The Danish institution is an example of a sustainable campus, with initiatives to reduce carbon emissions, manage energy efficiently and promote recycling (University of Copenhagen, n.d.). In the case of the Dutch institution, it stands out that its campus is ecological and green, with sustainable buildings and facilities, where the vitality of staff and students is prioritized and the healthiness of the food offered in the campus restaurants and waste management is taken into account (Wageningen University & Research, n.d.). Lastly, the Portuguese university stands out for the existence of innovative projects, namely Route Zero, Nova Zero Waste and Nova Green Labs. Route Zero is a project that the project aims to drive systemic transformation across infrastructure, institutional processes, and collective behaviours; Nova Zero Waste where an interdisciplinary team collaborates towards a goal of transforming NOVA's Campi into zero waste precincts; and, the Green Labs project with the mission to revolutionize laboratory practices to reduce the consumption of water and energy and waste production, including toxic waste (NOVA Sustainability,

² <https://about.ku.dk/facts-figures/sustainability/>.

³ <https://www.wur.nl/en/about-wur/sustainability.htm>.

⁴ <https://sustainability.unl.pt/>.

n.d.). These universities can serve as models for other institutions seeking to align themselves with the sustainable development goals (SDGs).

3.2 *Higher Education Institutions in North America*

In the United States and Canada, sustainability policies at universities are often driven by individual institutional initiatives, but with a strong alignment with the SDGs and the recommendations of the Association for the Advancement of Sustainability in Higher Education (AASHE⁵). Corroborating this, Franco et al. (2018) study underscores that while universities are making strides in integrating sustainability into their policies and curricula, these efforts often lack coordination, which can hinder their effectiveness in addressing broader social and environmental challenges. This insight is crucial for understanding how individual institutional initiatives can be better aligned with global sustainability frameworks. This means that fragmented nature of sustainability initiatives within higher education institutions in North America highlights the necessity for a cohesive strategy that aligns with the sustainable development goals (SDGs) and the recommendations of AASHE.

The same happens with the study by Finlay and Massey (2012). The paper emphasizes the necessity for universities to realign their practices to foster a culture of sustainability, which is essential for addressing pressing social issues and promoting ecological literacy within academic settings, through the application of the ecocity model as a strategic framework for guiding sustainability initiatives in North American higher education institutions. Consequently, this aligns with the user task by highlighting how individual institutional initiatives can be harmonized with broader sustainability goals, such as the sustainable development goals (SDGs) and the recommendations from AASHE, thereby illustrating the interconnectedness of local actions and global sustainability frameworks.

For instance, the University of California,⁶ Berkeley, USA, which is situated in one of the densest metropolitan areas in the country, benefits greatly from an abundance of environmentally friendly transportation options. Ninety-five per cent of students get to campus primarily by bicycle, bus and other environmentally friendly means. The entire campus is managed organically, meaning that no inorganic pesticides, fungicides, or fertilizers are used. The exception is a small portion of the land, less than five per cent, where wood stumps and recently weeded areas are treated with inorganic materials (UC Berkeley, Administration 2021).

Another example is the University of Northern British Columbia⁷ (UNBC), Canada. The HEI asserts its status as Canada's Green University™ and, in accordance

⁵ AASHE is an association of colleges and universities that are working to create a sustainable future and its mission is to empower higher education to lead the sustainability transformation.

⁶ <https://sustainability.berkeley.edu/news/uc-berkeley-receives-highest-rating-platinum-sustainability-achievements>.

⁷ <https://www.unbc.ca/sustainability>.

with UNBC's new vision of "Leading a Sustainable Future," is dedicated to reducing its environmental impact and operational expenses. As a result of these efforts, they are continuously awarded one of Canada's Greenest Employers. Employers have created remarkable sustainability projects and are attracting employees because of their environmental leadership (UNBC Sustainability, n.d.).

3.3 Higher Education Institutions in Africa

In the African context, the implementation of sustainability policies in universities is a topic of growing importance, but presents unique challenges compared to other regions. There are African universities facing financial and infrastructural constraints, but at the same time there are inspiring examples of how institutions are adopting sustainable practices in line with global sustainable development goals. Mutinda and Liu (2021), in their study, focus on African institutions and highlight the importance of aligning sustainability efforts with international agreements, providing a framework for understanding how universities can effectively integrate sustainability into their missions and practices.

Here are some examples of success. At the University of Nairobi, Kenya, the African's Women Studies Centre⁸ has the mission of promoting intellectual inquiry by and on African women through teaching, research, policy advocacy and outreach, and to engage with policy makers, women's and civil society organizations, to bring African women's perspectives into scholarship and development in their own country, Africa and the world (African Women's Studies Centre 2024).

At Stellenbosch University,⁹ South Africa, a Casual Day is celebrated annually to raise awareness about the full inclusion and equity of persons with disabilities in South Africa. In opinion pieces for the media, experts at Stellenbosch University emphasize the importance of inclusive employment opportunities and comprehensive healthcare services for persons with disabilities (Stellenbosch University 2024). These examples demonstrate the importance of sustainability in different aspects of social life in Africa.

3.4 Higher Education Institutions in Asia–Pacific

Higher education institutions in the Asia–Pacific region seem that are increasingly adopting sustainability policies, influenced by international pressure and regional commitments to the Paris Agreement and the SDGs (Rubio et al. 2022).

⁸ <https://awsc.uonbi.ac.ke/index.php/basic-page/our-vision>.

⁹ <https://www.sun.ac.za/english/Lists/news/DispForm.aspx?ID=10842>.

The National University of Singapore¹⁰ (NUS), Singapore focuses on energy efficiency and waste management policies and has implemented a series of initiatives aimed at reducing energy consumption in its buildings. For example, NUS is maximizing the installation of campus rooftop solar panels and enhancing energy efficiency of laboratory equipment to achieve the goal of decarbonization. It also has a research programme that promotes the use of clean technologies, with a focus on sustainable mobility solutions (NUS, n.d.).

Monash University¹¹ in Australia has developed an ambitious plan to become carbon neutral by 2030, with measures that include decarbonizing its operations and a strong commitment to renewable energies. In 2005, it set an energy reduction target of 20 per cent; in 2017, it committed to achieving zero-carbon emissions; in 2020, it made 45,000 LED lighting upgrades that saved 2.5 million dollars in energy; it installed 12,000 solar panels on its campuses and reduced its energy intensity by 24 per cent. By 2022, they have committed to: start implementing the Monash-Engie Alliance to explore opportunities for co-developing scalable zero-carbon solutions, two electric bus chargers installed on the Clayton Campus bus loop, 55% of their energy needs supplied by renewable energy. In addition, Monash is an example of integrating sustainability into research projects and social innovation. They are committed to fighting what they call modern slavery. They want a future without labour exploitation and rights violations. This hidden, large-scale exploitation within their community often harms those least able to defend themselves (Monash University 2024).

3.5 Higher Education Institutions in Latin America

In Latin America, higher education institutions are adopting sustainability policies within a context of socio-economic challenges. However, these institutions have demonstrated a great capacity for innovation, particularly in the areas of social responsibility and natural resource management (Scavarda et al. 2022; Chica 2023).

The University of São Paulo¹² (USP), Brazil, develops conservation actions, seeking to build a sustainable institution in a participatory way. The USP Recicla project aims to contribute to building sustainable societies, through initiatives aimed at minimizing waste, conserving the environment and improving quality of life, as well as training people committed to these ideals, making the institution an example of responsible consumption and proper waste disposal. Another project arises from the fact that in 2012, USP declared around 2,165.98 hectares of its total area (capital and countryside) as Ecological Reserves, committing to and acting for the conservation of its green areas and ecological reserves (Superintendência de Gestão Ambiental, n.d.).

¹⁰ <https://sustainability.nus.edu.sg/>.

¹¹ <https://www.monash.edu/about/strategic-direction/sustainable-development>.

¹² <https://sga.usp.br/>.

The Pontifical Catholic University¹³ (PCU) of Chile has an Institute for Sustainable Development that promotes courses, actions and events related to sustainability. The sustainability of this HEI is based on aspects ranging from the community and a culture of sustainability (e.g. Women at PCU; Promotion, participation and action in sustainability), to sustainability in people's training, to cutting-edge knowledge for sustainable development (e.g. Research centres and their contribution to sustainability; Innovation, transfer and development for sustainability), to public commitment and links with society (e.g. PCU's contribution to public policies; Contribution to culture and to arts) and finally, to the sustainable Campus (e.g. Carbon footprint and emissions; Transport; Water; Energy and construction; Materials and waste) (Instituto para el Desarrollo Sustentable, n.d.).

4 Critical Analysis and Discussion of the Implementation of Sustainability Policies

To properly analyse the implementation of sustainability policies in higher education institutions, it is important to identify the critical success factors and the challenges they face in order to be successful.

Although we are on the right path and have made progress, the fact is that the implementation of sustainability policies in HEIs faces several challenges. Resource limitations, cultural and institutional differences and even institutional commitment to this topic, dictate the success or failure of institutions in terms of commitment to sustainable development through adoption of the 2030 Agenda and SDGs and, consequently, in the implementation of sustainable practices. Thus, some higher education institutions, especially in less developed regions, tend to face difficulties in obtaining adequate financing to implement sustainable policies as opposed to those based in more developed areas with more resources. Another important factor is cultural and institutional differences since these cultural differences and political priorities can influence the way sustainability is viewed and applied. Some HEIs, even for reasons of "survival", may prioritize immediate economic growth to the detriment of sustainable practices. It is a fact that the successful implementation of a sustainability policy depends on the full support of senior management, translated into institutional commitment, and this is something that is not always guaranteed.

Several studies, such as those mentioned in the following chapters, identify the Critical Success Factors (CSFs) and challenges associated with the implementation of sustainability policies in HEIs. In a study carried out by Nogueiro et al. (2022), in addition to the Critical Success Factors, the benefits, barriers, tasks, challenges and possibly other elements associated with the Sustainable Development of HEIs were identified.

¹³ <https://desarrollosustentable.uc.cl/>.

4.1 Critical Success Factors for the Implementation of Sustainability in Higher Education Institutions

The critical factors that influence the success of Sustainable Development begin with a specific level of understanding on the part of the stakeholders of each higher education institution (Salleh et al. 2019). Table 1 identifies these CSFs and the respective authors, on which a critical analysis will be made.

This table presents the eight Critical Success Factors (CSF) for implementing sustainability in higher education institutions (HEIs): leadership, resources and infrastructures, education and training, organizational culture, employee engagement, communication and information, evaluation, monitoring and control, and stakeholders. Each CSF is linked to authors that in their studies demonstrate the importance of those elements for sustainability in HEIs.

The table maps out the diverse and multi-dimensional nature of sustainability in higher education, showing that a combination of internal and external factors influences the success of these initiatives. Following, a more detailed analysis of each Critical Success Factor.

4.1.1 Leadership

Leadership is, in fact, a factor of success for the implementation of sustainability in higher education institutions. Drăghici (2019) referred that developing leadership in

Table 1 Critical success factors (CSF) for the implementation of sustainability in HEIs, by author

CSF	Author(s)
Leadership	Zhao et al. (2024), Supriyanto et al. (2024), Filho et al. (2022b), Drăghici (2019), Acuña and Male (2022), Aung and Hallinger (2022)
Resources and infrastructures	Handayani et al. (2023), Kioupi and Voulvoulis (2019), Filho et al. (2019), Arefin et al. (2021)
Education and training	Karim (2021), Palomino et al. (2021)
Organizational culture	Halmaghi et al. (2023), Roos et al. (2022), Morgan and Fok (2023)
Employee engagement	Sabila (2024), Acuña and Male (2022)
Communication and information	Konst and Friman (2021), Voci and Karmasin (2021), Filho et al. (2019), Park (2024)
Evaluation, monitoring and control	Vykydal et al. (2020), Shonibare et al. (2023), Tabucanon et al. (2021)
Stakeholders	Filho et al. (2019), Aung and Hallinger (2022), Son-Turan (2020)

Source Own elaboration

sustainability and teaching practices is essential for fostering a culture of sustainability. In 2022 the following authors also emphasized the importance of leadership. Filho et al. (2022a, b) highlighting the importance of strategic planning and stakeholder engagement in sustainability reporting demonstrate how effective leadership can drive institutional commitment to sustainable development, in the end enhancing the overall sustainability performance of HEIs. Aung and Hallinger (2022) research stresses that sustainability leadership is essential for transforming university practices, particularly through the engagement and commitment of several stakeholders. Another interesting point of view is the one from Acuña and Male (2022). These authors' study highlights the presence of toxic leadership in Chilean universities, but it also reveals that this leadership style did not significantly impact academics' work engagement levels. This is relevant because while the study does not directly affirm the positive impact of employee engagement on sustainability, it emphasizes the importance of exploring this relationship further to enhance sustainability practices in HEIs. More recently, Zhao's (2024) study underscores how strategic leadership can drive innovation and knowledge integration, ultimately contributing to the successful adoption of sustainable practices in HEIs. The study by Supriyanto (2024) underlines that while sustainable leadership alone may not directly impact academic performance, it plays a pivotal role in shaping the educational framework that supports sustainability initiatives within institutions.

4.1.2 Resources and Infrastructures

Resources and infrastructure in higher education institutions are key elements for successfully implementing sustainability policies. Green infrastructures, such as low-energy buildings and efficient waste management systems, provide a suitable physical environment for the sustainable practices that can be adopted at the institution. Handayani et al. (2023) effectively underscore the critical role of resources and infrastructure in the successful implementation of sustainability initiatives within higher education institutions (HEIs). The authors highlight the integration of sustainable development goals (SDGs) into university operations is contingent upon adequate infrastructure and resources, which are essential for enhancing overall university performance and ensuring effective sustainability practices. Additionally, investment in qualified technological and human resources in HEIs is essential to promote innovation and research in sustainability. By proposing a systemic framework that connects the sustainable development goals (SDGs) to educational outcomes, Kioupi and Voulvoulis (2019) emphasize that adequate resources and supportive infrastructure are essential for fostering an environment conducive to sustainability transformation.

Allocating funds for green technologies and the ongoing training of lecturers and students are critical to integrating sustainability into the governance and curriculum of universities. Filho et al. (2019) emphasize that financial investment in sustainable practices and technologies is essential for fostering an educational environment

that prioritizes sustainability. In addition, the study highlights the need for continuous professional development and training programmes for faculty and students to enhance their understanding and implementation of sustainability principles. Arefin et al. (2021) effectively underscore the importance of allocating funds for green technologies and ongoing training for both lecturers and students as critical components for integrating sustainability into the governance and curriculum of universities.

4.1.3 Education and Training

Education and training are critical success factors for the implementation of sustainability in HEIs since they provide the necessary basis for raising awareness and developing skills. These institutions are crucial in integrating sustainability into their curricula, promoting critical thinking and practical solutions to various challenges. A study by Karim (2021) emphasizes the importance of equipping students with knowledge of sustainability action skills, strategies, and issues, which are essential for fostering environmentally sustainable behaviour among future educators. In addition, the continuous training of the academic community enables the effective implementation of sustainable policies. Investing in specific educational and training programmes ensures that these institutions lead the movement towards a more sustainable future, aligning themselves with global sustainability requirements. Palomino et al. (2021) effectively underscore the critical role of education and training in the implementation of sustainability within higher education institutions (HEIs). Their study highlights that promoting Education for Sustainable Development (ESD) is essential for cultivating responsible citizenship among future teachers, who are pivotal agents of change in fostering sustainability.

4.1.4 Organizational Culture

Organizational culture is also a critical success factor in implementing sustainability in HEIs. Thus, a culture that values sustainability facilitates sustainable development by the adoption of responsible environmental and social practices. To be successful, transformation requires the involvement of all levels of the organization, promoting values and behaviours that favour the sustainable development (Hiswara et al. 2023). Integrating a sustainable culture in institutions, involves top-down and bottom-up approaches, ensuring that leadership and employees are committed to the institutional sustainable mission. Aligning organizational values with sustainable practices contributes to the institution's organizational culture serving as a catalyst for a long-term change. In a study by Halmaghi et al. (2023), the authors explore the, what they call, intricate relationship between organizational culture and sustainable development management within the Romanian higher education context, emphasizing that a supportive culture is essential for fostering sustainable practices. This study emphasize how aligning institutional capacities with sustainable development goals (SDGs) requires a collaborative culture that encourages change and innovation. Another

study stress that a strong sustainability culture, fostered through effective governance, which is essential for embedding sustainable practices within HEIs (Roos et al. 2022). By utilizing empirical data from German institutions, the authors demonstrate how operationalizing sustainability governance can bridge gaps in sustainability management and promote a holistic sustainability culture. These findings reinforce the idea that organizational culture is crucial for the successful implementation of sustainability initiatives in higher education. Morgan and Fok, in a research published in 2023, point out how organizational culture and quality improvement practices significantly influence the relationship between green initiatives and sustainability performance. These authors, by demonstrating that a supportive organizational culture enhances employees' perceptions of sustainability practices, the study reinforces the assertion that fostering a positive organizational culture is essential for achieving sustainability goals within educational institutions.

4.1.5 Employee engagement

When employees are actively involved, they become promoters of sustainable practices, helping to integrate these initiatives into the organization's daily routine. Engagement is not only just about participation but also includes commitment and creativity, which has a positive impact on sustainability objectives. An effective engagement strategy encourages employees to feel part of the changes, fostering an environment where their ideas and actions are valued. The findings of the study of Sabila et al. (2024) indicate that prioritizing employee engagement initiatives can lead to improved organizational performance, thereby reinforcing the notion that engaged employees are vital for advancing sustainability efforts within HEIs. In this sense, this study underlines the significant role of employee engagement in enhancing perceived organizational support and employee retention, which are essential for fostering a dedicated workforce. A study from Acuña and Male (2022) provides insights into the relationship between leadership styles and employee engagement within higher education institutions (HEIs), specifically in the context of toxic leadership. Their research found the presence of toxic leadership in Chilean universities but also revealed that this leadership style did not significantly impact academics' work engagement levels. This suggests that factors beyond leadership behaviour may influence engagement, indicating the need for a broader understanding of how to foster employee engagement effectively to support sustainability efforts in higher education settings. This finding underscores the complexity of employee engagement as a critical success factor for implementing sustainability initiatives in HEIs.

4.1.6 Communication and information

Communication and information are critical for the promotion of Sustainability Policy and sustainable practices and it's the reason to be a critical success factor. Effective communication and adequate dissemination of information are critical

factors for the success of sustainability strategies in higher education institutions. Through clear and transparent communication, the understanding and commitment of all the actors involved can be guaranteed. Sharing relevant information about sustainability objectives, practices and progress, both internally (among staff, teachers and students) and externally (with the community and stakeholders), helps to create a favourable organizational culture. When communication channels are efficient, adherence to sustainable initiatives becomes stronger and more cohesive. Konst and Friman (2021) highlight that the commitment of HEIs to promote sustainability through strategic communication and information sharing is essential for fostering a culture of sustainability. Achieving the goals of the 2030 Agenda for Sustainable Development requires not only integrating sustainability into educational practices but also enhancing communication strategies that engage all stakeholders. By presenting qualitative examples of how Finnish HEIs are progressing in their sustainability efforts, the authors illustrate that effective communication and information dissemination are vital for driving meaningful change and promoting sustainable practices within academic environments.

Communication is essential for engaging audiences and disseminating knowledge related to sustainability, which is vital for fostering a culture of sustainability within academic settings (Voci and Karmasin 2021). By analyzing the integration of media and communication aspects into sustainability science curricula across European institutions, these authors reveal the existence of a significant gap in this area, suggesting that enhancing communication competencies is crucial for empowering students and stakeholders to become active participants in sustainable development.

Reinforcing the importance of this critical factor, a study by Filho et al. (2019) emphasizes that fostering a culture of sustainability requires not only the dissemination of information but also active engagement and collaboration among stakeholders. Park's (2024) research highlights the importance of effective communication among educators, administrators and students in fostering a shared commitment to sustainability. The study emphasizes that clear institutional support, policies and guidelines are essential for facilitating sustainability initiatives, while also advocating for interdisciplinary collaboration and active student engagement.

4.1.7 Evaluation, Monitoring and Control

Evaluation, monitoring and control are crucial elements to ensure the effectiveness of sustainability initiatives in HEIs. These processes provide exact data on the progress made concerning the targets set, allowing for necessary adjustments along the way. Implementing regular evaluation tools helps to identify shortcomings, monitor performance and make informed decisions. Without a robust evaluation and control system, sustainability risks being a vague ideal with no tangible results. It is essential that evaluation methods are continuous and based on clear and measurable indicators. By presenting a case study from The VSB-Technical University of Ostrava, Vykydal et al. (2020) illustrate how systematic assessment and evaluation can lead to improved sustainability practices and overall institutional effectiveness.

The study discusses the implementation of quality management systems, including the ISO 9001 standard and the EFQM Excellence Model, which incorporate sustainability principles and highlight that the quality of education is intrinsically linked to the effectiveness of management systems within universities, emphasizing that robust assessment and evaluation frameworks are essential for ensuring educational quality in the context of sustainable development. Shonibare et al. (2023) by examining various accounting tools—financial, managerial, and environmental—illustrated how systematic assessment and evaluation contribute to the successful integration of sustainability into higher education management. Their study enhances that sustainability initiatives require robust accounting practices to measure and evaluate their effectiveness, thereby ensuring that institutions can track progress and make informed decisions. A study published in 2021 by Tabucanon et al. emphasizes the importance of evaluating sustainability performance through various dimensions, including administration, environment and education/research, particularly among different sizes of HEIs, demonstrating that larger HEIs participating in sustainability assessments, such as UI GreenMetric, tend to achieve higher sustainability performance. They also stressed that many HEIs are increasingly committed to integrating sustainable development (SD) into their policies and practices, yet they face challenges related to resource requirements and the effectiveness of sustainability assessment tools.

4.1.8 Stakeholders

Stakeholders are vital for implementing sustainability strategies in HEIs. These groups range from students, teaching staff and employees to the external community and institutional partners. Active participation ensures that sustainability initiatives and practices are inclusive and reflect the needs of everyone involved. From the beginning, Stakeholders must be involved to obtain feedback, create a sense of collective responsibility and strengthen commitment to the objectives. Additionally, continuous involvement promotes transparency and collaboration, which are essential factors for the long-term success of any sustainable practices. A study by Filho et al. published in 2019 states that active involvement and collaboration between stakeholders are important for promoting a culture of sustainability. The findings of Son-Turan's (2020) research suggest that a holistic approach involving multiple value propositions is necessary to foster stakeholder collaboration, which is essential for establishing innovative financial models and sustainability-focussed employment programmes within HEIs. Sustainability leadership is essential for transforming university practices, particularly through the engagement and commitment of various stakeholders (Aung and Hallinger 2022). Aung and Hallinger (2022) proposed a conceptual model emphasizing that fostering strong relationships with stakeholders can enhance institutional resilience and promote a shared vision for sustainability. Stakeholder involvement in sustainability initiatives is therefore important.

4.2 Challenges for the Implementation of Sustainability in Higher Education Institutions

Concerning challenges that HEIs may face, Nogueiro et al. (2023) highlight the studies by Aleixo, Leal and Azeiteiro (2018), Disterheft, Caeiro, Azeiteiro and Leal Filho (2015), Larrán Jorge, Herrera Madueño, Calzado Cejas and Andrades Peña (2015), Salleh et al. (2019), Velazquez et al. (2005), and Verhulst and Lambrechts (2015). The studies by these authors have enabled the identification of important elements for the implementation of sustainability in HEIs. Although each of them reported on these elements in different contexts and realities, namely the countries where these studies were carried out, it is possible to see the existence of common and divergent challenges. Other authors' studies corroborate these findings, as will be analysed below. A compilation of several challenges that HEIs may have to face when implementing the sustainability dimension as a quality factor, and from which CSFs can be obtained, are presented in Table 2.

Table 2 Challenges for the implementation of sustainability in HEIs, by author

Challenges	Author(s)
Autonomy Internationalization Long-term strategic planning	Aleixo et al. (2018), Yevdokimenko et al. (2020), Filho et al. (2019), Konst and Friman (2021)
Fundraising and financing Reorganization of the institutions' business structure Investment in Research and Development	Aleixo et al. (2018), Salleh et al. (2019), Verhulst and Lambrechts (2015), Strielkowski et al. (2020)
Qualification of teaching staff Development of interdisciplinarity	Velasquez et al. (2005), Verhulst and Lambrechts (2015)
The conservative organizational structure of HEIs Cultural awareness Great work pressure and lack of time	Aleixo et al. (2018), Salleh et al. (2019), Velasquez et al. (2005), Larrán Jorge et al. (2015)
Motivation of human resources Those responsible for Sustainable Development often articulate this task with other	Larrán Jorge et al. (2015), Verhulst and Lambrechts (2015)
Attracting students and foreigners Knowledge transfer	Aleixo et al. (2018)
Excellence and quality	Larrán Jorge et al. (2015), Velasquez et al. (2005), Verhulst and Lambrechts (2015)
Response to market needs Development of networks and partnerships	Velasquez et al. (2005), Verhulst and Lambrechts (2015), Aleixo et al. (2018)

Source Own elaboration

Implementing sustainability in higher education institutions (HEIs) faces a number of challenges that need to be addressed in order to guarantee success, preferably in the long term. The autonomy of HEIs is essential, as it allows institutions to develop strategies tailored to their specific needs and contexts. However, internationalization brings new opportunities and pressures, requiring HEIs to adapt to global standards and promote sustainability at an international level (Anastasiadis et al. 2020).

Long-term strategic planning is crucial to integrate sustainability into all areas of the institution (Aleixo et al. 2018). This challenge is magnified by the need to raise funds and financing (Verhulst and Lambrechts 2015; Aleixo et al. 2018; Salleh et al. 2019), a determining factor for the success of sustainability initiatives, especially in environments with limited budgets. In addition, the reorganization of HEIs' business structures may be necessary to create more sustainable and effective models.

Investment in research and development (R&D) is also a priority, contributing to innovation in sustainable practices. At the same time, the qualification of teaching staff and the development of an interdisciplinary approach are essential to tackle the complexity of sustainability. However, conservative organizational structures can hinder the implementation of these changes, while cultural awareness and the motivation of human resources (Larrán Jorge et al. 2015; Verhulst and Lambrechts 2015) are decisive factors. Tabucanon et al. (2021) underscores the critical role of assessment, evaluation and control as success factors for the implementation of sustainability in higher education institutions (HEIs). However, these authors also highlight that many HEIs are increasingly committed to integrating sustainable development (SD) into their policies and practices, yet they face challenges related to resource requirements and the effectiveness of sustainability assessment tools.

Work pressures and lack of time also complicate the implementation of sustainability, especially when those responsible for this area accumulate functions. The ability to attract students, including foreign ones (Aleixo et al. 2018) can help spread sustainable practices and foster knowledge transfer. Excellence and quality, along with responding to market needs, must be prioritized, while HEIs develop networks and partnerships that strengthen the impact of their sustainable initiatives (Velasquez et al. 2005; Larrán Jorge et al. 2015; Verhulst and Lambrechts 2015; Aleixo et al. 2018). Those responsible for sustainable development articulate the importance of employee engagement in initiatives such as education, research, and community outreach with the collaborative efforts required to effectively implement sustainability within HEIs. Furthermore, the findings underscore the need of fostering a culture of commitment among staff to achieve meaningful progress in sustainability efforts (Lozano et al. 2015).

Neves et al. (2023) articulate the critical role of employee engagement in higher education institutions (HEIs) by emphasizing the integration of knowledge management (KM) and spirituality as a means to enhance organizational sustainability. It posits that motivated and committed collaborators are essential for achieving the mission and objectives of HEIs, thereby fostering a culture that promotes innovation and effective knowledge sharing.

These are challenges that HEIs can face in the implementation of sustainability. Therefore, combining all these factors is fundamental if HEIs want to effectively integrate sustainability into their daily practices.

5 Final Considerations, Limitations and Future Research Proposals

The journey towards integrating sustainability into higher education presents both opportunities and challenges. Higher education institutions (HEIs) play a vital role in promoting sustainable development but face several obstacles or challenges in implementing sustainability policies. As explored in this paper, global policies, global policies are essential to guide sustainability practices in universities and polytechnics. Documents such as the UN Agenda 2030 and the sustainable development goals (SDGs) establish clear goals for HEIs to achieve. These global policies encourage the exchange of good practices and collaboration between institutions. Additionally, international organizations often offer financial incentives and support for universities to implement sustainable initiatives.

In the study, it was possible to identify that integration of sustainability into higher education is highly uneven, since institutions face several challenges such as autonomy, internationalization, long-term strategic planning, fundraising and financing, reorganization of the institutions' business structure, investment in Research & Development, qualification of teaching staff, development of interdisciplinarity, cultural awareness, knowledge transfer, the conservative organizational structure of HEIs, great work pressure and lack of time, motivation of human resources, those responsible for Sustainable Development often articulate this task with other, attracting students and foreigners, excellence and quality, response to market needs, and development of networks and partnerships.

One of the biggest challenges is related to limited resources, especially in less developed regions, where HEIs often lack adequate funding to support sustainable initiatives. The diverse regional contexts and the financial, cultural and political disparities between institutions have been, among other things, challenges to adopting a unified approach to sustainability. In fact, cultural and institutional differences influence the adoption of sustainable practices, leading to variations in their implementation.

Despite these difficulties, HEIs have a significant impact on sustainable development. They provide quality education and conduct research that aims to solve urgent sustainability challenges, preparing future leaders.

For sustainability to be effectively integrated into the mission of universities, long-term strategic planning is necessary. The development of networks and partnerships is crucial to institutions facing financial and structural barriers. Institutions that succeed in sustainability show strong leadership, proper resource allocation, and a commitment to interdisciplinary education. Successful case studies demonstrate that,

by way of example, strong leadership, interdisciplinary research and collaborative partnerships can drive transformative change.

The implementation of sustainable practices on its campuses, such as reducing carbon footprint, waste management and resource conservation, also sets an example for the surrounding communities. Furthermore, many universities get involved with local communities, promoting sustainability initiatives and influencing public policies, expanding the culture of sustainability. Collaboration with governments, NGOs and the private sector further reinforces this impact.

It's also important to have an update in faculty qualification, ensuring that professors are prepared to address sustainability issues, which may require a reorganization of the operational structures of some institutions.

There are, therefore, best practices and proposed solutions for some challenges such as leadership and governance, since for a successful implementation of sustainability, HEIs must have strong leadership and adequate organizational governance. These institutions must therefore integrate sustainability into strategic planning, ensuring top-down commitment. With regard to resources, the importance of financing is highlighted, especially since addressing the financial disparity between institutions, ensuring international funds for universities with few resources, particularly in developing regions, is essential to guarantee the implementation of a sustainability policy. Another really relevant aspect of this type of teaching is curricular reform. HEIs are under external pressure (which may be direct or indirect) to update their curricula in order to also focus and relate their content to topics related to sustainability in all disciplines, thus encouraging interdisciplinary research. With regard to sustainable infrastructures, institutions must prioritize the construction of energy-efficient campuses, the integration of waste management and the promotion of ecological technologies, among other practices aligned with better generalized management of resources and their efficiency.

Global trends in sustainability policies point out to an increasing emphasis on interdisciplinary research, promoting collaborative efforts to tackle complex sustainability problems. More universities are integrating sustainability topics into their teaching programmes, preparing students with the necessary skills. Initiatives such as the European Green Deal aim to achieve carbon neutrality, encouraging HEIs to make similar commitments. Public–private partnerships are also becoming more common, facilitating innovation and resource sharing for sustainability projects.

Sustainability for HEIs is a path of no return once started. Society looks at higher education institutions in a different way from the traditional one. Although they face challenges in implementing sustainability policies, they continue to play a crucial role in promoting a sustainable future. They are no longer just seen as entities that possess knowledge, but entities that can use that knowledge to be sustainable and pass on to others the principles of preserving what is the future of society and the planet, taking an active part in sustainable development.

Limitations

A limitation of the study was the lack of comparative analysis between the various regions identified in order to understand what differentiates them and the causes of this differentiation in the implementation of sustainability policies.

Another limitation was the lack of analysis of the CSFs in the context of each region in order to understand which one or ones have the greatest influence on the implementation of sustainability in HEIs.

Future Research

Investigating the impact of sustainable leadership on long-term institutional performance in higher education, particularly how leadership styles influence the adoption and success of sustainability initiatives across different cultural and economic contexts.

Comparative analysis of CSF and challenges on the implementation of sustainability in higher education institutions per region, namely, Europe, North America, Africa, Asia-Pacific and Latin America.

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