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Integrating sustainability in higher education: a critical review of the literature

Integracja zrównoważonego rozwoju w szkolnictwie wyższym: krytyczny przegląd literatury

ABSTRACT

Higher education institutions (HEIs) are increasingly expected to advance the Sustainable Development Goals (SDGs) through teaching, research, campus operations, and community engagement while demonstrating measurable impact. This article conducts a systematic critical review of 109 peer-reviewed studies (2020–2025) retrieved from Scopus, Web of Science, and Google Scholar using PRISMA-aligned screening.

The literature is synthesised into six streams: curricular integration; SDG-oriented research and the third mission; operationalisation in university management; evaluation and monitoring; stakeholder roles; and governance and leadership. Despite rapid growth, the field remains highly fragmented conceptually, methodologically, and geographically, with heterogeneous indicators and limited cumulative explanation of how integration stabilises across university functions.

Most studies describe initiatives, drivers, and barriers, but rarely specify the mechanisms that coordinate domains, align strategy with practice, and sustain change over time. Moreover, human well-being is central to the SDGs, which are seldom treated as explicit outcomes; impacts on students, staff, and surrounding communities are typically inferred through indirect proxies such as competencies, reputational performance, or environmental metrics. In response, the article proposes a systems-theory conceptual model structured by CIPO logic (Context/Input–Process/Operation–Output).

STRESZCZENIE

Instytucje szkolnictwa wyższego (HEIs) są coraz częściej zobowiązywane do realizacji Celów Zrównoważonego Rozwoju (Sustainable Development Goals, SDGs) poprzez dydaktykę, badania naukowe, zarządzanie kampusem oraz zaangażowanie społeczne, przy jednoczesnym wykazywaniu mierzalnych efektów tych działań. Artykuł przedstawia systematyczny, krytyczny przegląd 109 recenzowanych publikacji z lat 2020–2025, zidentyfikowanych w bazach Scopus, Web of Science oraz Google Scholar, z wykorzystaniem procedury selekcji zgodnej z wytycznymi PRISMA.

Literatura została zsyntetyzowana w sześciu nurtach badawczych: integracja treści programowych, badania ukierunkowane na SDGs i trzecia misja uczelni, operacjonalizacja zrównoważonego rozwoju w zarządzaniu, ewaluacja i monitoring, rola interesariuszy oraz ład organizacyjny i przywództwo. Pomimo dynamicznego rozwoju badań, obszar ten pozostaje rozproszony koncepcyjnie i metodologicznie, z heterogenicznymi wskaźnikami oraz ograniczoną zdolnością do wyjaśniania mechanizmów stabilnej integracji SDGs w różnych funkcjach uczelni.

Większość analiz koncentruje się na opisie inicjatyw, czynników sprzyjających i barier, rzadko identyfikując mechanizmy koordynujące strategię i praktykę oraz umożliwiające trwałość zmian. Ponadto dobrostan człowieka, mimo że stanowi centralny element SDGs, jest rzadko ujmowany jako explicite definiowany rezultat; wpływ na studentów, pracowników i społeczności lokalne bywa wnioskowany pośrednio.

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The model frames universities as complex adaptive systems shaped by economic, social, and environmental conditions; treats SDG integration as a coordination mechanism rather than a portfolio of isolated actions; and positions evaluation and monitoring within the process as a continuous feedback function enabling organisational learning. Human well-being is specified as the core output of SDG integration, providing a basis for future empirical validation and cross-country comparative research.

Keywords: Higher education institutions (HEIs), sustainable, human well-being, sustainability integration, Sustainable Development Goals.

W odpowiedzi na te luki artykuł proponuje koncepcyjny model oparty na teorii systemów, ustrukturyzowany zgodnie z logiką CIPO (kontekst/nakłady – proces – rezultaty). Model ujmuje uczelnie jako złożone systemy adaptacyjne, traktuje integrację SDGs jako mechanizm koordynacyjny oraz lokuje ewaluację i monitoring jako ciągłą funkcję sprzężenia zwrotnego. Dobrostan człowieka zostaje zdefiniowany jako kluczowy rezultat integracji SDGs, stanowiący podstawę dalszych badań empirycznych i porównań międzynarodowych.

Słowa kluczowe: instytucje szkolnictwa wyższego (HEIs), zrównoważony rozwój, dobrostan człowieka, integracja zrównoważonego rozwoju, Cele Zrównoważonego Rozwoju.

1. INTRODUCTION

Since the adoption of the 2030 Agenda for Sustainable Development, higher education institutions (HEIs) have been assigned a central role in achieving the 17 Sustainable Development Goals (SDGs). Universities are expected to mobilise their functions in teaching, research, campus operations, and community engagement to support sustainable and resilient societies (Leal Filho et al., 2020, 2022b; Berchin et al., 2021). The Education for Sustainable Development for 2030 (ESD 2030) framework further stresses the responsibility of education systems, especially higher education, to cultivate sustainability competences such as systems thinking, critical reflection, and action competence, positioning universities as key agents of societal transformation (Kioupi & Voulvoulis, 2022; Makrakis & Kostoulas-Makrakis, 2023). At the same time, HEIs face increasing pressure from governments, quality assurance bodies, global rankings, and civil society to demonstrate measurable contributions to the SDGs and to "walk the talk" of sustainability (Caputo et al., 2021; Weiss et al., 2021). Integrating sustainability has thus become a core element of the contemporary university's public mandate rather than an optional add-on.

In parallel, scholarly work on sustainability and SDG integration in higher education has expanded rapidly. Reviews and bibliometric analyses document a strong increase in publications since the mid-2010s, with a clear acceleration after 2015 (Leal Filho et al., 2020; Tafese & Kopp, 2025). To capture this development in a focused way, this article relies on an author-constructed dataset covering the period 2020–2025. An initial pool of 122 records was identified through database searches and backward–forward citation tracking, after applying inclusion criteria related to the integration of sustainable development and/or SDGs in higher education, 109 peer-reviewed articles were retained. These studies address, among others, curriculum reform and competence-based education (Lozano et al., 2022; Angelaki et al., 2024), innovative pedagogies for sustainability (Makrakis & Kostoulas-Makrakis, 2023) campus and "green university" initiatives, and leadership, governance, and reporting frameworks for sustainability in HEIs (Caputo et al., 2021; Probst, 2022). The temporal distribution of these 109 articles confirms a clear upward trend in SDG related higher education research over the review period.

Despite this growth, the field remains fragmented and only partially systematised. Research is spread across disciplines: education, management, environmental studies, economics, and regional studies, and employs diverse labels such as "sustainability", "SDGs", "ESD", "green universities", and "responsible management education". Studies operate at different levels of analysis, ranging from individual courses and programmes to institutional case studies and national or cross-national comparisons (Mattos et al., 2023; Sun, 2025). Much of the literature consists of single-case or small-N studies and descriptive "good practice" reports, often based on heterogeneous indicators and limited shared conceptual foundations (Leal Filho et al., 2020). Although several authors propose frameworks, for example, competence-based models (Kioupi & Voulvoulis, 2022; Lozano et al., 2022) or systems and paradox-oriented views of sustainability in higher education (Kemp & Scoffham, 2022; Christou et al., 2024). These efforts tend to focus on specific dimensions and do not yet form a coherent, mechanism-based account of how sustainability becomes embedded across HEIs.

A further and particularly important limitation is that human well-being, although a fundamental aim running through the SDGs, is rarely addressed explicitly in this literature. Most studies concentrate on institutional structures and processes (strategies, governance, reporting, partnerships) or on intermediate educational outcomes such as knowledge, attitudes, and sustainability competencies among students and staff. Only a relatively small subset of articles engages directly with psychological well-being, mental health, resilience or quality of life in connection with sustainability initiatives in higher education, for example, work on resilience and psychological well-being among university Staff (Yu et al., 2025), and analyses of stress, uncertainty and changing working and learning conditions during system disruptions (Crawford & Cifuentes-Faura, 2022; Mair & Druckman, 2023). Even in these cases, well-being goals typically appear as a side theme and are not integrated into broader models of SDG implementation and institutional change.

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These observations point to a clear research gap. Existing studies offer valuable insights into particular aspects of SDG integration in higher education: curriculum change, competence development, governance, campus practices, and reporting. But they typically address these dimensions in isolation. There is still a lack of an integrated, systemic, and mechanism based model that explains how universities incorporate sustainable development into their structures and everyday practices, and how this process translates into the human well-being of students, staff, and surrounding communities.

This article aims to address this gap by providing a critical review of the literature on integrating sustainability in higher education, based on the author constructed dataset of 109 articles, and by synthesising the findings into a conceptual model that links institutional processes of SDG integration with human well-being outcomes. The review is guided by three research questions:

RQ1. How have universities integrated the SDGs and the broader sustainable development agenda into their core functions of teaching, research, operations, and external engagement?

RQ2. What theoretical perspectives and underlying mechanisms does the existing literature use to explain the processes and dynamics of sustainability and SDG integration in higher education?

RQ3. To what extent, and in what ways, does existing research address the implications of sustainability and SDG integration for human well-being, specifically the well-being of students, staff, and surrounding communities?

The remainder of the article is structured as follows. Section 2 presents the Materials and methods, including the search procedures, selection and exclusion criteria, and the analytical strategy used to construct and examine the dataset of 109 articles. Section 3 offers a critical review of the literature on SDG integration in higher education, organised into six research streams: (3.1) integration of SDGs into teaching and curricula, (3.2) integration of SDGs into research and the third mission, (3.3) operationalisation of sustainability in university management, (3.4) evaluation of SDG implementation, (3.5) the role of stakeholders and (3.6) governance and leadership in SDG integration. This section closes with a synthesis (3.7) that highlights the fragmented and non-integrated nature of the literature and identifies the main research gap. Section 4 develops a conceptual model for integrating sustainable development in higher education with an explicit emphasis on human well-being, by outlining (4.1) its conceptual assumptions, (4.2) Conceptual model specification and (4.3) the theoretical contribution of the model. Section 5 concludes the article by providing a concise synthesis of the findings, discussing theoretical and methodological contributions, outlining practical implications for universities, and proposing directions for future research, including empirical validation of the model, the development of evaluation tools, and cross-country comparative studies.

2. MATERIALS AND METHODS

The approach adopts a systematic critical literature review approach. The document search was conducted across three major academic databases from November 3rd to November 16th, 2025: Scopus, Web of Science, and Google Scholar, which are widely recognized for indexing high-impact journals in the fields of Higher education, sustainability, and social sciences, covering the period 2020–2025. Given the search terms used in the equation: TITLE-ABSS-KEY ("Sustainability" AND "Higher Education" OR "University"). Importantly, the 2020–2025 restriction applied only to the studies included in the review dataset; foundational methodological and theoretical references used to guide the review procedures and conceptual development (e.g., PRISMA and the CIPO framework) were treated as established frameworks and were therefore not subject to the same time limits.

To ensure the relevance and quality of the reviewed literature, a rigorous screening and selection process aligned with PRISMA guidelines was applied (Moher et al., 2009). Peer-reviewed articles published between 2020 and 2025 in English were included to ensure consistency in analysis; articles in other languages were excluded due to linguistic accessibility constraints and the need for coherent comparative synthesis. From the initial pool of 122 articles collected from Scopus (35) and Google Scholar (77), and Web of Science (10), there was no article duplication that needed to be removed. The remaining 122 unique records for screening. Titles and abstracts were reviewed to evaluate alignment with the review focus, sustainability in HEIs. Studies had to explicitly address HEI sustainability dimensions, such as curriculum integration, campus operations, governance, or community engagement. Non-English studies, opinion pieces, and off-topic papers were excluded at this stage.

Out of the 122 screened records, 5 articles were excluded due to irrelevance; they lacked an explicit HEI sustainability focus or did not meet the empirical or theoretical depth required.

The remaining 117 articles were assessed in full-text form. Here, a secondary exclusion phase was conducted to ensure conceptual depth, context alignment (e.g., relevance to Sustainable Development Goals [SDGs]), and empirical rigor. Articles were excluded if they were purely theoretical (e.g., frameworks with no application) or if they dealt with sustainability but not in the higher education context. This resulted in the exclusion of 8 articles at this stage. Ultimately, 109 articles (the total identified) met all criteria and were included in the final systematic review, as shown in Figure 1. These works span from 2020 to 2025 and demonstrate growing scholarly attention toward HEI sustainability. The inclusion strategy ensured both breadth and depth, enabling the review to capture diverse perspectives, methodological approaches, and global case studies. This corpus supports robust synthesis, and rather than providing a purely descriptive synthesis, the selected studies were subjected to a critical, thematic, and mechanism-oriented analysis to identify research streams, reveal gaps, and develop a conceptual model linking SDG integration to human well-being.

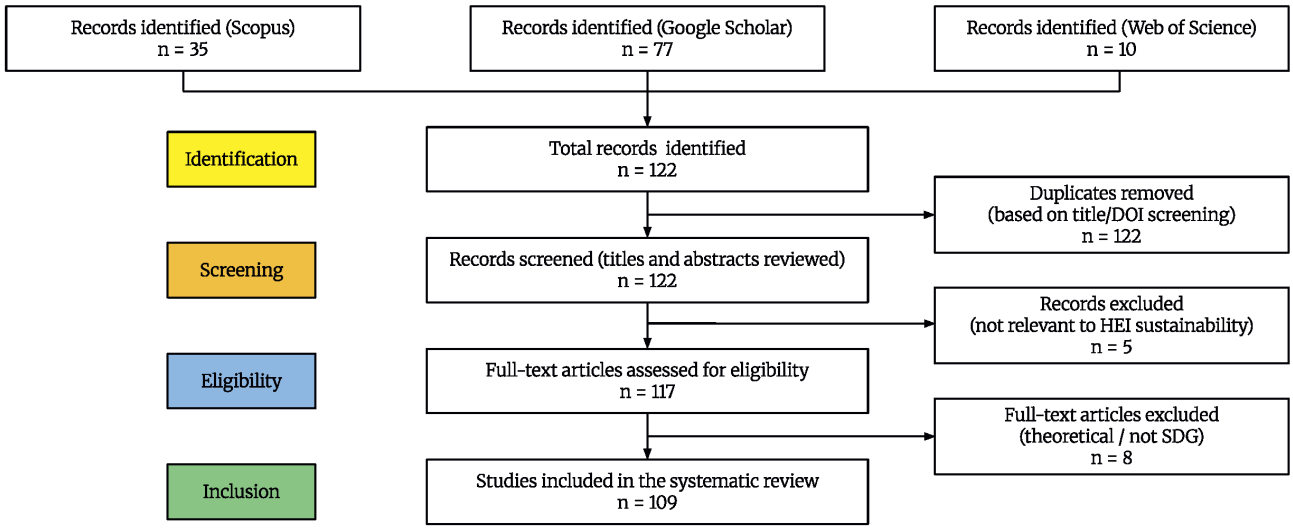

Figure 1. PRISMA Flow Diagram and Identification of Relevant Studies.
Source: Elaborated by the authors and based on Moher et al., 2009).

3. CRITICAL REVIEW OF THE LITERATURE ON SDG INTEGRATION IN HIGHER EDUCATION

3.1. Stream 1 – Integration of SDGs into teaching and curricula

The first and most visible strand of research examines how universities integrate sustainable development and the SDGs into teaching and curricula. Across many studies, HEIs are presented as key agents of sustainability transitions, contributing through programmes in engineering, technology, business, and the social sciences, through living labs, green campus initiatives, student projects, and the use of AI, IoT, and big data in both learning and resource management (Aghajani et al., 2025; Ankareddy et al., 2025; Berchin et al., 2021; Moher et al., 2009). Ramakrishna (2021) emphasises curriculum reform as a core pathway for embedding sustainability in higher education, highlighting the need for interdisciplinary design and competency-based approaches aligned with the SDGs. At the same time, the picture is geographically uneven: leadership, declarations, and networks are heavily concentrated in the Global North, while institutions in the Global South often depend on short-term projects under severe financial and capacity constraints (Hassan & Ahmad, 2025; Ramakrishna, 2021).

Systematic reviews document a rapid increase in ESD related publications, but also a strong concentration on isolated modules and local pedagogical innovations. Bataeineh & Aga (2022), Hinduja et al. (2023), Lim et al. (2022), Obrecht et al. (2022), and Ramakrishna (2021) show that most initiatives remain course-based and are weakly embedded in institutional strategies. Case studies confirm that integration is frequently "bolt-on": sustainability appears as a separate ethics or environmental course rather than a transversal curriculum principle (Figueiró et al., 2022). SDG mapping exercises indicate that only a small fraction of courses explicitly reference sustainability or the SDGs, with a marked bias towards environmental themes and uneven coverage of goals linked to poverty, inequality, or social justice (Cleveland et al., 2023; Drissi et al., 2025; Figueiró et al., 2022; Lim et al., 2022; Machado & Davim, 2023). The overall pattern is one of genuine but partial curricular change: growth in ESD content, but fragmented, thematically skewed, and highly dependent on individual champions.

A second body of work concentrates on sustainability competencies. Here, there is broad agreement that ESD should cultivate systems, futures, strategic and normative thinking, collaboration, and critical reflection, rather than simply adding more content (Ansari, 2025; Eichentopf & Kasperidus, 2025; Idoiaga Mondragon et al., 2023; Makrakis & Kostoulas-Makrakis, 2023; Lozano et al., 2022). A multi-country survey (Lozano et al., 2022) shows that competencies such as critical thinking, interdisciplinarity, and interpersonal collaboration are rated as crucial but are among the least systematically targeted, while more easily managed skills (assessment, planning, personal involvement) receive greater emphasis. Frameworks that combine technology assessment, systems thinking, and system dynamics, or participatory, ICT-enabled ESD, offer promising designs (Idoiaga Mondragon et al., 2023; Makrakis & Kostoulas-Makrakis, 2023; Nguyen et al., 2025), but there is still no widely accepted competency model, especially in business education, and evidence of actual competence development remains scattered and methodologically thin (Ansari, 2025; Probst, 2022). Picatoste et al. (2025) show that exposure to SDG-related content in higher education is associated with higher levels of sustainability awareness and pro-social orientations among young people. However, their findings also suggest that educational impacts are primarily captured at the level of attitudes and intentions, with limited evidence on how such learning translates into sustained behavioural change.

Pedagogical innovation is the third recurring theme. Project- and problem-based learning, case studies, service learn-

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ing, community engagement, and living labs are widely presented as suitable vehicles for integrating SDGs into higher education (Angelaki et al., 2024; Cornet et al., 2024; Leal Filho et al., 2025b; Picatoste et al., 2025; Podgórska & Zdonek, 2024; Tasdemir & Gazo, 2020). These approaches are reported to increase student interest in sustainability, support lifestyle changes, and strengthen links with local communities and enterprises. Digital and AI-supported learning environments further extend this repertoire, with studies highlighting their potential to personalise learning, widen access, and support sustainability-related skills, while also warning about ethical issues, the digital divide, and the "technologisation" of sustainability (Abulibdeh et al., 2024; Alam et al., 2023; Al-Hail et al., 2024; Eichentopf & Kasperidus, 2025; Fošner, 2024; Opesemowo & Adekomaya, 2024; Othman et al., 2024; Shenkoya & Kim, 2023; Suryanarayana et al., 2024; Trevisan et al., 2024). Critical reviews, however, point out that the empirical evidence on the effectiveness of these pedagogies is less robust than often assumed: many studies rely on small, self-selected samples, short time horizons, and weak designs, which makes it difficult to attribute specific learning or behavioural changes to particular teaching approaches (Asad et al., 2025; Probst, 2022).

Taken together, this stream offers a detailed picture of how SDGs and sustainability are being introduced into courses, programmes, and teaching practices. It shows that universities are experimenting with ESD, competence-based designs and innovative pedagogy, and that these efforts can influence students' knowledge, attitudes and, to some extent, behaviour. Yet the perspective remains predominantly classroom-centred. Institutional strategies, governance structures, organisational cultures and incentive systems usually appear only as background "drivers" or "barriers", not as central mechanisms in their own right. Almost none of the studies conceptualise SDG integration in teaching as part of a wider institutional process that can be modelled in systemic, mechanism-based terms, nor do they explicitly link this process to outcomes in human well-being for students, staff, and communities. In this sense, Stream 1 illustrates the broader pattern that underpins the research gap identified in this article: rich but fragmented insights into particular aspects of SDG integration, and a striking absence of integrated frameworks explaining how these educational practices are embedded in university structures and how they ultimately translate into well-being.

3.2. Stream 2 – Integration of SDGs into research and the third mission

A second stream of scholarship examines how universities align their research and third mission activities with the SDGs. This literature starts from the same ambivalence stressed by Ankareddy et al. (2025) and Munaro & John (2025): HEIs are simultaneously powerful drivers of sustainability through knowledge production and innovation, and significant contributors to environmental degradation through energy use, mobility, and consumption. In response, universities increasingly reposition research agendas and outreach under the SDG umbrella, framing themselves as "change agents" in green and just transitions, yet in practice, privileging environmental and economic dimensions over social ones (Moher et al., 2009; Munaro & John, 2025; Tafese & Kopp, 2025).

Recent work on smart green campuses conceptualises university infrastructure as an integrated socio-technical system in which energy, water, waste, and digital technologies are jointly managed to support SDG implementation (Kurniawan et al., 2025). Case studies of living labs and community-based projects such as the Live-in-Labs programme in India show how students and academics co-produce solutions with rural communities using participatory tools and experiential learning, linking SDGs to concrete issues like water, sanitation, renewable energy, and livelihood improvement (Cornet et al., 2024). Makrakis and Kostoulas-Makrakis (2023) similarly demonstrates how ICT-enabled, negotiated curricula can mobilise multiple stakeholders around local SDG challenges. Rodríguez-Zurita et al. (2025) synthesize evidence on service learning and community engagement as vehicles for SDG-oriented education and knowledge transfer. At the same time, they highlight persistent tensions: course objectives frequently take precedence over community needs, students are often underprepared for field engagement, and impact on communities is rarely assessed systematically or over longer time horizons (Asad et al., 2025; Leal Filho et al., 2025b).

Citizen science and digitally mediated outreach form a second cluster. Here, communities and students act as data collectors or co-analysts in monitoring air quality, waste, biodiversity, or other SDG-related indicators, often supported by AI, IoT, and social media platforms. Leal Filho et al. (2024) and Islam & Khan (2023) go further by using NLP and AI-based text analysis to map more than 15,000 outreach projects in a Brazilian university onto SDGs, revealing both the breadth of social and economic contributions and a striking disconnection between actual SDG-related work and how it is described and reported. Al-Hail et al. (2024) and Abulibdeh et al. (2024) add a more critical note: social media and AI tools expand spaces for informal learning, visibility, and networking around sustainability, but their integration into formal research, teaching, and assessment practices remains patchy, uneven, and normatively contested.

The third major theme concerns university community partnerships and the institutionalisation of the third mission. Borsatto et al. (2024) conceptualise HEI community partnerships in sustainability science as long-term collaborations that align resources, decision-making processes, and outcomes across university and societal actors, and propose a performance index to capture inputs, processes, and perceived results. Plummer et al. (2021) show that sustainable leadership fosters social innovation initiatives in universities, which in turn are associated with better sustainable performance across teaching, operations, engagement, and governance. Iqbal & Piwowar-Sulej (2022) analyse public engagement practices in European universities and find that inclusion and social justice are rhetorically en-

dorsed but remain weakly embedded in the strategic management of the third mission. Lo Presti et al. (2024) and Uzorka et al. (2024) emphasise that meaningful student and community engagement requires deliberate strategies, resources, and enabling organisational cultures; otherwise, participation is symbolic and short-lived. Comparative and review studies show that sustainability-oriented research and third mission activities are embedded in a highly uneven global landscape, where models, indicators, and 'good practice' narratives are predominantly produced in and for Global North institutions, while universities in the Global South are constrained to fragmented, short-term engagements that are less likely to be captured, evaluated, or scaled (Ankareddy et al., 2025; Hassan & Ahmad, 2025; Leal Filho et al., 2022a; Leal Filho et al., 2022b; Shrestha, 2025). This imbalance is echoed in the research-collaboration ecosystem: bibliometric mapping shows co-authorship networks concentrated in a few Global North countries (with the UK as a central hub), while many developing countries remain peripheral with weak international linkages (Tien et al., 2022). This suggests that SDG-oriented research capacity is partly shaped by universities' structural position in transnational collaboration networks.

Taken together, this stream is methodologically rich but highly fragmented. Empirical work ranges from in-depth qualitative case studies and action research to small-sample surveys, bibliometric and semantic mapping, fuzzy multi-criteria indices, and bespoke partnership scales (Borsatto et al., 2024; Caputo et al., 2021; Ghani et al., 2022; González-Torre & Suárez-Serrano, 2022; Griebeler et al., 2022; Leal Filho et al., 2025b; Menon & Suresh, 2022a). Most designs focus on outputs and perceptions of projects, reported competencies, self-assessed satisfaction, presence of policies or reports, rather than on clearly specified causal mechanisms or robust counterfactuals. Social outcomes, and in particular the human well-being of students, staff, and surrounding communities, are sporadic and are usually proxied by self-reported empowerment, motivation, or behavioural intentions (Holst et al., 2024; Luna-Krauletz et al., 2021) rather than by more direct and comparable indicators. As Li et al. (2025) and Fia et al. (2022) note, research and third mission activities are often analysed separately from governance, curriculum, and campus operations, and mostly at the level of isolated projects or single institutions.

These observations point to a clear limitation of the second stream. Existing studies on participatory research, citizen science, and university–community partnerships provide rich, context-specific accounts of how universities engage with SDGs in their research and outreach. However, they rarely converge on a shared conceptualisation of "SDG-oriented third mission", lack standardised indicators, and seldom trace the mechanisms through which governance arrangements, partnership design, and research practices translate into tangible well-being changes for university members and local communities. In other words, this stream tells us a great deal about what kinds of SDG-related projects and partnerships exist, but far less about how these activities are systematically embedded in institutional structures and how, in interaction with teaching and campus operations, they contribute to or fail to contribute to human well-being.

3.3. Stream 3 – Operationalisation of sustainability in university management

A third strand of the literature shifts attention from what universities teach or research about sustainability to how they govern and run themselves as organisations. Here, SDGs are translated into strategic plans, governance structures, management tools, and campus infrastructures. Reviews show that many HEIs now reference sustainability or SDGs in their mission and long-term strategies, often supported by dedicated offices, committees, or climate roadmaps (Leal Filho et al., 2020; Omazic & Zunk, 2021; Tasdemir & Gazo, 2020). Conceptually, this is framed as a "whole-institution approach" in which sustainability should be embedded across leadership, organisational structures, HRM, incentives, and external partnerships, not only in curricula (Bautista-Puig & Sanz-Casado, 2021; Kohl et al., 2022; Stanciu & Condrea, 2023; Uzorka et al., 2024). In practice, however, several studies find a persistent implementation gap: strategic documents signal commitment, but the routines, resource allocations, and internal accountability mechanisms of the university change only marginally (Budihardjo et al., 2021; Christou et al., 2024; Duarte et al., 2023). Sustainability thus risks remaining a symbolic priority, weakly coupled to everyday managerial decision-making.

This concern has prompted strong interest in policies, regulations, and indicator systems as levers to "hard-wire" sustainability into university management. A policy centred illustration is provided by Sanchez-Carrillo et al. (2021), who show through global evidence and the UAE case that sustainability agendas are increasingly institutionalised via national visions and sectoral plans, and translated into university-level strategies, curricular policies, green campus regulations, dedicated sustainability units, and reporting aligned with global benchmarks (e.g., THE Impact Rankings and campus assessment tools). Rather than focusing on stated commitments, the study identifies a series of organisational bottlenecks limited sustainability awareness, weak interdisciplinary capacity, resource constraints, and resistance to change that mediate how sustainability policies are translated into day-to-day academic and operational practices. Building on corporate ESG approaches, scholars increasingly frame sustainability reporting in HEIs as a governance tool, aimed less at expanding indicator sets than at aligning decision-making, accountability, and cross-unit coordination around sustainability objectives (Caputo et al., 2021; Moher et al., 2009; Shrestha, 2025). At the system level, Ghani et al. (2022) show that government policy, accreditation, and external audits are powerful enabling conditions for ESD, but they are often absent, inconsistent, or weakly enforced, especially in low-resource settings (Hassan & Ahmad, 2025; Ramakrishna, 2021).

On the operational side, the most visible expression of sustainability in management is the development of "green cam-

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puses" and sustainable infrastructures. Universities across regions have introduced energy-efficient buildings, renewable energy installations, water conservation, waste-reduction and 3R programmes, sustainable transport schemes, and biodiversity initiatives, frequently framed as "living labs" that connect operations with student projects and research (Abo-Khalil, 2024; Berchin et al., 2021; Drissi et al., 2025; Leal Filho et al., 2021). Composite indices and fuzzy assessment frameworks suggest that some institutions have reached relatively high levels of environmental performance, while still exhibiting weaknesses in areas such as mobility, hazardous waste, community linkage, and data management (Ghani et al., 2022; Rodríguez-Zurita et al., 2025). Work from Asia and Latin America underlines that these operational achievements are highly sensitive to organisational configuration: without stable governance structures, ring-fenced budgets and mechanisms for cross-unit coordination, green-campus measures remain a collection of technical fixes rather than a vehicle for organisational learning (Abo-Khalil, 2024; Leal Filho et al., 2022b; Stanciu & Condrea, 2023). The evidence points to structural differences in institutional capacity: universities with stable governance, predictable funding, and integrated management systems are more able to sustain investments in infrastructure and reporting, whereas institutions facing fragmented authority and resource volatility struggle to move beyond ad hoc operational fixes (Hassan & Ahmad, 2025; Holst et al., 2024; Leal Filho et al., 2022b; Ramakrishna, 2021; Shrestha, 2025;).

Digitalisation and AI add a further layer to this management agenda. On the one hand, universities deploy AI, IoT, and data analytics to optimise energy and building management, plan maintenance, monitor emissions, and manage waste, promising operational gains and cost savings (Bokolo, 2021; Kurniawan et al., 2025). On the other hand, studies from South Africa, Asia, and the Middle East highlight substantial infrastructural, financial, and human-capacity constraints, as well as ethical and governance concerns around privacy, bias, and technostress (Khan et al., 2025; Leal Filho et al., 2022b; Trevisan et al., 2024). This is particularly problematic given evidence that digital divides and unequal access to infrastructure can deepen existing inequalities between institutions and regions (Holst et al., 2024; Trevisan et al., 2024).

Taken together, this stream shows that many universities do move beyond the classroom and experiment with strategic commitments, policies, reporting systems, and infrastructural innovations. It also shows that these efforts are typically fragmented across functions, driven by external rankings or individual champions, and rarely analysed as part of a coherent institutional system. Most studies focus on whether particular strategies, tools, or campus practices are present or not, far fewer examine how different management arrangements interact over time, or how they shape the lived experience and well-being of students, staff, and surrounding communities. Organisational learning, systems thinking, and whole institution approaches are frequently invoked as aspirations (Bautista-Puig & Sanz-Casado, 2021; Christou et al., 2024; Tasdemir & Gazo, 2020), but they are not yet translated into an integrated, mechanism-based model of university governance for sustainability.

3.4. Stream 4 – Evaluation of SDG implementation

A fourth stream concentrates on how SDG implementation is measured in higher education. Instead of analysing new initiatives, some authors design and test indicators, rankings, and assessment tools from THE Impact Rankings, STARS, GMID, AMAS, SAQ, GASU, UEMS, SWOT, and UI GreenMetric to GRI-based sustainability reports and bespoke university indices. Across these contributions, there is broad agreement that metrics can enhance transparency, underpin strategic management, and make sustainability more "real" by tying it to data and benchmarks (Basheer et al., 2024; Berchin et al., 2021; Javed et al., 2025; Moher et al., 2009; Serafini et al., 2022; Shrestha, 2025; Singh et al., 2023). From a measurement perspective, Journeault et al. (2021) argue that sustainability evaluation systems tend to privilege what is easily quantifiable, often at the expense of social processes and longer-term outcomes. This insight helps explain why many SDG assessment tools in higher education emphasise inputs, activities, and environmental indicators. Rosak-Szyrocka et al. (2022) highlight that the spread of sustainability and quality assessment tools has produced a highly fragmented evaluative landscape, in which indicators vary widely in scope, assumptions, and comparability. For higher education institutions, this fragmentation complicates benchmarking and weakens the role of evaluation as a driver of coherent strategic change.

One cluster of studies examines global rankings and reporting frameworks. Analyses of sustainability reports based on GRI and SDG Compass coding show that a small group of institutions report extensively on energy, climate, labour, and governance, and can demonstrate relatively high "SDG coverage", while most universities remain absent or highly selective reporters (Caputo et al., 2021; Shrestha, 2025). Work on Spanish universities and the DI2030A index reveals that even among institutions with sustainability reports, attention is unevenly distributed across pillars: suitability (coverage of environmental, social, economic, and governance dimensions) is acceptable, but priority, depth, and stakeholder reach are weak (Griebeler et al., 2022). Comparative analyses indicate that many campuses focus on what rankings can easily count, waste, energy, transport, while data and indicators on social justice, economic resilience, and educational transformation are either absent or marginal (Abo-Khalil, 2024; Omazic & Zunk, 2021; Rodríguez-Zurita et al., 2025). This line of work consistently raises concerns about symbolic adoption and "greenwashing", where reporting and ranking become reputational tools more than mechanisms for learning and accountability (Caputo et al., 2021; Javed et al., 2025).

A second cluster develops institution-specific indicator systems and combined indices. Some frameworks assemble broad sets of sustainability indicators spanning governance, environment, economic viability, academic integration, and social

responsibility, and test them through expert panels or stakeholder surveys (Journeault et al., 2021; Menon & Suresh, 2022a; Rosak-Szyrocka et al., 2022). Others measure sustainability performance using quantitative indices, such as fuzzy-logic environmental sustainability scores (Ghani et al., 2022) or weighted issue sets that identify "critical starting points" like SD-oriented vision, 3R waste management, and SD-enhancing educational systems (Tabucanon et al., 2021). Still others develop reliable scales to assess how deeply sustainability is embedded in institutional identity and everyday experience: the COMPLEXUS-based instrument for environmental education for sustainability (González-Torre & Suárez-Serrano, 2022), or the WIA-Scale, which shows strong associations between perceived whole-institution approaches, sustainable behaviour, and empowerment among learners and educators (Luna-Krauletz et al., 2021). At the macro level, Holst et al. (2024) combined CIHE and EESDI indices link the quality of higher education with eco-economic sustainability across countries, revealing spatial spillover and Matthew effects in benefit distribution. A PRISMA-based review of 23 sustainability assessment methods similarly concludes that no tool comprehensively covers all three pillars and core university functions across both policy and implementation levels, and that many rely on self-reported data and Global North assumptions limiting cross-context comparability (Gutiérrez-Mijares et al., 2023). Taken together, these tools significantly broaden the range of assessment methods, but they are mostly developed and tested in isolation, often within single institutions or national systems.

Across this stream, high methodological fragmentation is a central diagnosis. Reviews emphasise that existing tools differ not only in scope and scale from micro-perceptions to campus operations to national systems, but also in indicator selection, weighting schemes, aggregation rules, and underlying assumptions about what "counts" as sustainability performance (Fia et al., 2022; Ramakrishna, 2021; Rodríguez-Zurita et al., 2025). Environmental indicators are typically over-represented, while social equity, institutional learning, community impact, and student or staff well-being are thinly operationalised (Duarte et al., 2023; Rodríguez-Zurita et al., 2025; Rosak-Szyrocka et al., 2022). Stakeholder-based studies further show that students, academics, and administrators assign different priorities to indicators, complicating attempts to construct consensual scorecards (Basheer et al., 2025). This methodological fragmentation is also visible in life-cycle based organisational assessment. A review of studies on organisational life cycle sustainability assessment (OLCSA) shows that most research still focuses on partial approaches (such as O-LCA, SO-LCA, or E-LCC). Very few studies apply a full OLCSA framework in universities, pointing to ongoing gaps in the integration of all three sustainability pillars, organisation-wide measurement and reinforcing calls for standardised, context-sensitive assessment frameworks for HEIs (Wafa et al., 2022).

Crucially, very few instruments make their theory of effectiveness explicit. Most indices and rankings reward the existence of policies, structures, and activities, but do not specify or measure the mechanisms through which these are expected to lead to substantive educational, social, or well-being outcomes. Whole-institution scales and macro-indices represent important advances, but they operate either at the level of perceptions or at highly aggregated country data; they do not yet connect institutional arrangements and campus practices to concrete changes in the lives of students, staff, and surrounding communities (Holst et al., 2024; Luna-Krauletz et al., 2021; Rodríguez-Zurita et al., 2025). Overall, the field shows a wide range of evaluation tools, but they lack coherence: numerous indicators, rankings, and tools, but no widely shared framework or consensus on criteria that would define effective SDG implementation in universities, or explain how measured performance relates to the broader human outcomes that sustainable development is meant to advance.

3.5. Stream 5 – Role of stakeholders

A fifth stream brings stakeholders to the centre stage. Here, students, teachers, staffs, and external partners appear not as passive recipients of SDG policies, but as potential co-producers of sustainable change. Empirical work shows that when students are treated as leaders rather than beneficiaries through hands-on campus projects, community engagement, student-led clubs, and recognition mechanisms, their sense of ownership and responsibility for sustainability increases significantly (Lo Presti et al., 2024). Similar patterns are seen among academic and professional staff: where whole-institution sustainability is not only communicated but actually experienced in everyday work, educators report higher motivation, fewer perceived barriers, and stronger alignment between personal values and institutional agendas (Gutiérrez-Mijares et al., 2023; Luna-Krauletz et al., 2021). At the interface between university and society, studies on HEI community partnerships and outreach initiatives underline that long-term, trust-based collaborations can enhance both local problem-solving and the relevance of teaching and research, especially when communities help define priorities and evaluate results (Berchin et al., 2021; Borsatto et al., 2024).

Yet this literature is much clearer about who should be involved than how these groups are coordinated in practice. Stakeholders are typically analysed in separate silos: students, faculty, managers, community actors, firms, governments, each with their own motivations, perceptions, and constraints. Reviews repeatedly emphasise that stakeholder engagement is "crucial", but offer little detail on the organisational mechanisms that connect top-down strategies with bottom-up initiatives (Duarte et al., 2023; Fia et al., 2022; Leal et al., 2024; Uzorka et al., 2024; Wafa et al., 2022). Where frameworks do model stakeholder roles, they tend to identify enablers such as partnerships, media, formal recognition, and institutional commitment, without examining how these elements are actually coordinated over time, or how conflicts between stakeholder priorities are negotiated (Leal et al., 2024; Stanciu & Condrea, 2023). Students often prioritise social issues and campus experience, administrators em-

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phasise finance and reputation, and academics stress autonomy and academic freedom. But these divergences rarely feed into the design of governance structures, metrics, or decision-making processes (Caputo et al., 2021; Rosak-Szyrocka et al., 2022).

A smaller set of contributions begins to open this "black box" of coordination, but mostly in single cases. Interactive initiatives such as SDG seminar series, participatory curriculum labs, or living-lab style partnerships illustrate promising practices for bringing together diverse actors and sustaining cross-boundary conversations (Jillani et al., 2022; Leal Filho et al., 2025b; Makrakis & Kostoulas-Makrakis, 2023; Tasdemir & Gazo, 2020). Network analyses of regional and global HEI consortia highlight the role of intermediary organisations in diffusing norms and practices, but also show that community actors and less-resourced institutions remain weakly represented in agenda-setting and governance (Hassan & Ahmad, 2025; Leal Filho et al., 2025a). Overall, however, the literature offers only fragments of a theory of stakeholder coordination. We still lack comparative, mechanism-oriented studies that explain how universities design and sustain coordination arrangements among students, staff, and external partners; how power, incentives, and capacities shape whose voices matter; and how different coordination models influence not only formal SDG outputs, but the lived experience and well-being of those inside and around the institution.

3.6. Stream 6 – Governance and leadership in SDG integration

A final stream focuses explicitly on governance and leadership as the "invisible infrastructure" of SDG integration. Across reviews and case studies, governing bodies, executive teams, and dedicated sustainability units are consistently described as preconditions for any credible whole-institution approach: institutions that embed sustainability in their mission, statute, and strategic plans, allocate budgets, and create formal structures (councils, green offices, SDG committees) are more likely to move beyond symbolic commitments (Bautista-Puig & Sanz-Casado, 2021; Omazic & Zunk, 2021; Stanciu & Condrea, 2023; Zahid et al., 2021). Elmassah et al. (2022) emphasise that sustainability outcomes in higher education are strongly conditioned by institutional governance capacity, including leadership commitment, coordination structures, and policy coherence. Their analysis reinforces the view that without supportive governance arrangements, SDG initiatives remain vulnerable to fragmentation and short-termism.

Empirical work on sustainable leadership reinforces this picture: leadership oriented to ethical purpose, learning, and stakeholder inclusion tends to stimulate social innovation and, indirectly, broader sustainable performance, while unconstrained managerial discretion can dilute these effects (Plummer et al., 2021). Studies on digital and sustainability leadership in public universities likewise show that strategic direction, governance for digital transformation, and leadership capacity shape whether new technologies actually enhance sustainable performance rather than merely add complexity (Al-Hail et al., 2024; Bokolo, 2021; Ezquerra-Lázaro et al., 2021; Khan et al., 2025; Trevisan et al., 2024). In systemic reviews of HEI sustainability, governance, and leadership, they appear less as background conditions than as the main "levers" linking national policy, formal recognition, finance, and internal (Ankareddy et al., 2025; Leal et al., 2024; Ramakrishna, 2021).

At the same time, research on these levers is limited and fragmented. Governance is often one dimension in large mapping or review studies listed alongside operations, education, research, and outreach without sustained analysis of how decision rights, incentive systems, or formal rules actually structure SDG implementation (Drissi et al., 2025; Fia et al., 2022; Javed et al., 2025; Rodríguez-Zurita et al., 2025; Ruiz-Mallén & Heras, 2020). Many articles record the presence of strategies, plans, and offices, but stop short of examining how these bodies deliberate, how they prioritise between competing goals, or how they handle tensions between environmental, social, and economic objectives (Leal Filho et al., 2020; Omazic & Zunk, 2021). Even complex frameworks, such as Pizzutilo and Venezia's maturity model of social responsibility (moving from "laggard" to "pioneer" institutions) or whole-institution approaches grounded in systems thinking and organisational learning, remain largely conceptual or are illustrated by a small number of high-profile, well-resourced universities (Bautista-Puig & Sanz-Casado, 2021; Christou et al., 2024; Elmassah et al., 2022; Tasdemir & Gazo, 2020). There is little comparative work on how governance configurations differ across regions, sectors, or resource levels, and almost no longitudinal analysis of how reforms unfold over time in more constrained contexts.

This stream also shows how governance is routinely acknowledged but discussed at a surface level. Reviews call for "strong leadership", "institutional commitment," or "alignment of strategy and practice", but rarely specify the concrete coordination routines, feedback mechanisms, or accountability arrangements through which these aspirations should be realised (Aghajani et al., 2025; Kohl et al., 2022; Uzorka et al., 2024). Studies modeling the "drivers" of sustainability often identify government policy, official recognition, leadership, and organizational commitment as powerful drivers, but treat them as static nodes in the structural schema rather than dynamic mechanisms for communicating information, resolving conflicts, and redistributing resources (Leal et al., 2024; Stanciu & Condrea, 2023; Zahid et al., 2021). Work on indicators and rankings further documents that governance elements are embedded in assessment tools, but primarily as checklists — whether a policy, plan, or office exists — rather than as windows into how governance actually shapes everyday practices and lived experience (Caputo et al., 2021; Menon & Suresh, 2022a; Rosak-Szyrocka et al., 2022). Overall, this stream confirms that governance and leadership are widely recognised as crucial for SDG integration, but current research offers only a fragmented and largely descriptive understanding of how SDG-oriented university governance works in practice, especially beyond the archetypal well-funded institutions of the Global North.

3.7. Synthesis of the literature review: identification of the research gap

Across the six streams, the literature on SDG integration in higher education is abundant but highly fragmented. Studies concentrate on specific domains: curricula, competencies, campus operations, stakeholder engagement, governance, or assessment without offering an integrated view of how these elements interact as parts of a single transformation process. Despite frequent references to "holistic" or "whole-institution" approaches, there is still no widely accepted conceptual model that treats SDG integration as a systemic, dynamic process is taking place across levels and functions of the university. Most contributions catalogue initiatives, drivers, and barriers, but rarely unpack the underlying mechanisms through which governance, incentives, power relations, and stakeholder constellations shape trajectories of change. Crucially, almost none of this work explicitly links the degree or form of SDG integration to human well-being of students, staff, or surrounding communities beyond indirect indicators such as competencies, employability, or institutional performance. These gaps motivate the present section. The model proposed in Section 4 is conceptual and will be empirically examined in subsequent research. This is introduced in general terms to clarify its components and the hypothesised dependencies and relationships between them, grounded in the reviewed literature and aligned with what previous studies has already established in each block for the human well-being of key stakeholder groups.

4. PROPOSAL OF A CONCEPTUAL MODEL FOR INTEGRATING SUSTAINABLE DEVELOPMENT IN HIGHER EDUCATION

4.1. Conceptual assumptions

Universities should be treated as complex adaptive systems rather than linear organisations. Within the context of and continuously negotiating with economic, social, and environmental environments, their sustainability efforts emerge from interactions across multiple sub-systems (strategy, teaching, research, operations, engagement, evaluation). This aligns with calls to rethink HEIs through complexity and systems thinking, where change is non-linear, feedback-driven, and highly context-dependent (Al-Hazaima et al., 2025; Christou et al., 2024). It also helps explain why "whole-institution" integration is repeatedly advocated yet unevenly achieved in practice (Ankareddy et al., 2025; Bautista-Puig & Sanz-Casado, 2021).

On this basis, integration is conceptualised as a multifaceted process of alignment across missions and functions, not the accumulation of standalone projects. Reviews consistently show that HEIs may advance green campus measures, isolated curriculum reforms, or reporting exercises, yet still fail to produce coherent transformation because links between domains remain weak or missing (Moher et al., 2009; Ramakrishna, 2021; Rodríguez-Zurita et al., 2025). Mechanistically, this points to the importance of coordination and learning loops and how practices diffuse, become institutionalised, and feed back into routines and resource allocation. An argument reinforced by organisational and transformative learning perspectives in sustainability transition work in HEIs (Elmassah et al., 2022; Tasdemir & Gazo, 2020).

Within these dynamics, governance, organisational culture, and stakeholder engagement operate as primary leverage points because they set the "rules of the game" that determine whether sustainability becomes embedded or remains peripheral. Stakeholder-based accounts underline that without supportive leadership, incentives, structures, and HRM practices, initiatives risk becoming symbolic or dependent on individual champions (Leal et al., 2024; Uzorka et al., 2024). Enabler- and mechanism-oriented studies similarly suggest that policy, accreditation/audit pressures, institutional commitment, and leadership function as upstream drivers shaping what happens in curriculum, research, and operations (Frizon & Eugénio, 2022; Leal et al., 2024). Yet the governance literature itself is often shallow, frequently naming leadership as important without unpacking how governance structures coordinate across units or resolve trade-offs (Ankareddy et al., 2025; Ramakrishna, 2021).

Methodologically and theoretically, the field remains plural rather than cumulative: systems thinking and whole-institution approaches (Bautista-Puig & Sanz-Casado, 2021; Christou et al., 2024), complex adaptive systems (Priyadarshini & Abhilash, 2022), organisational/transformative learning (Trevisan et al., 2024), stakeholder perspectives (Uzorka et al., 2024), and framework-driven enabler modelling (Menon & Suresh, 2022b) are all used, often side by side. Some work specifies clearer causal pathways, for example, sustainable leadership operating through social innovation to influence institutional performance (Plummer et al., 2021). But overall, the literature still tends to describe what universities do more than how and why stable integration as an institutional process.

Finally, despite SDGs being fundamentally human-centred, empirical research rarely traces SDG integration to well-being outcomes for students, staff, or surrounding communities; impacts are more often inferred from environmental metrics, activity counts, or reputational indicators (Caputo et al., 2021; Rosak-Szyrocka et al., 2022). A small number of contributions begin to link institutional-level sustainability experience to individual outcomes. For instance, the Whole Institution Approach scale is strongly associated with empowerment, sustainable behaviour, and mental well-being (Luna-Krauletz et al., 2021), while community engagement and service-learning reviews acknowledge potential benefits but highlight weak impact designs and limited longitudinal evidence (Rodríguez-Zurita et al., 2025). Taken together, this supports treating human well-being as an explicit outcome of the conceptual model, rather than an assumed by-product of "doing sustainability."

4.2. Conceptual model specification

In this study, the conceptual model is specified from a systems theory perspective, structured along the CIPO logic (Context/Input–Process/Operation–Output) (Scheerens, 1991) and oriented

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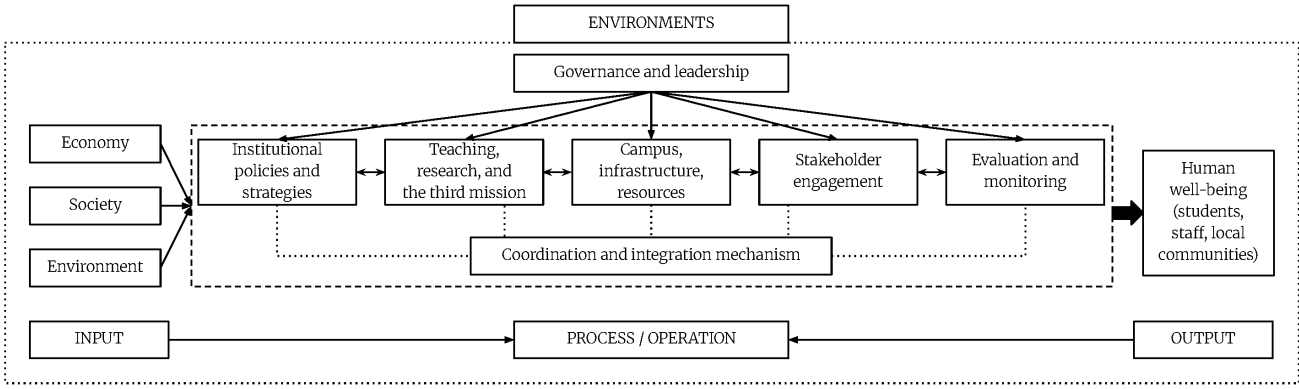

Figure 2. Systems theory model of Sustainable Development.
Source: Elaborated by the authors and based on the CIPO framework (Scheerens, 1991).

toward the sustainability of human well-being. The Input side represents the external conditions and pressures that universities continuously negotiate: economic, social, and environmental factors, which shape both constraints and opportunities for SDG action within a given spatial and temporal environment.

A core assumption is that the main challenge in many higher education institutions is not a shortage of sustainability-related activities, but fragmented integration, weak, discontinuous linkages across domains and disciplines. Accordingly, the model treats coordination and integration mechanisms as the connective "glue" that binds and stabilises the system, linking the core components: governance and leadership, institutional policies and strategies, SDG integration into teaching, research, and the third mission, university operations (campus, infrastructure, resources), stakeholder engagement, and the evaluation and monitoring system.

Crucially, governance/leadership is the "coordinating brain," thus influencing the branches of activity below. Evaluation and monitoring are positioned within the Process/Activity (rather than as outputs) because they serve as a continuous internal adjustment mechanism. It establishes feedback loops that track progress and unforeseen consequences, detect misalignments between strategic intent and operational practice, and feed evidence back into governance, policy, and day-to-day decisions. Thereby enabling iterative refinement and organisational learning over time, while also assessing the extent to which SDG-related goals are being met and whether the university's trajectory remains sustainable across the economic, social, and environmental dimensions.

Finally, the Output of the system is conceptualised as human well-being for students, academic and administrative staff, and local communities within defined spatial and temporal ENVIRONMENTS. Understood as the intended sustainability-relevant outcome of integrated SDG implementation. In this model, well-being is not treated as an automatic by-product of "doing sustainability"; rather, it is the outcome that should be made visible, tracked, and continuously improved through the system's coordination and evaluation loops within its broader economic, social, and environmental environment.

4.3. Theoretical contribution of the model

The proposed model contributes theoretically in three ways. Firstly, it provides a common framework that brings together research currently spread across several loosely connected streams. Rather than treating governance, policy, teaching, research, third mission, operations, stakeholder engagement, and evaluation as separate "topics," the model positions them as interdependent subsystems within one university-wide transformation process. This shifts the analytical focus from mapping what universities do to explaining how the configuration and coupling of these domains produce different trajectories of SDG integration.

Secondly, the model advances the field by making human well-being a core outcome variable conceptually explicit rather than assumed. While SDG integration is often justified as socially beneficial, empirical studies typically stop at intermediate proxies (e.g., competencies, reputation, performance indicators) or environmental metrics. By specifying well-being (of students, staff, and surrounding communities) as the intended output of SDG integration, the model reframes "success" as a question of human development and lived outcomes, and it opens space for more rigorous theorising about trade-offs, distributional effects, and unforeseen consequences.

Thirdly, the model defines integration as a mechanism rather than a portfolio of initiatives. In line with a systems-theory/CIPO logic, SDG-related activities are treated as necessary but insufficient: what matters is the continuity of linkages coordination, feedback loops, and institutionalisation processes through which strategy is translated into routines, learning, and resource allocation across the institution. Positioning evaluation and monitoring inside the process emphasises integration as an iterative, self-adjusting dynamic: evidence from implementation feeds back into governance, leadership, and policy, enabling adaptation over time. In this way, the model conceptualises SDG integration as a patterned process of alignment and reinforcement across domains, not as the accumulation of isolated projects.

5. CONCLUSION

This article synthesises the literature on SDG integration in higher education and highlights a central weakness: universities are undertaking many sustainability-related actions, yet these efforts often remain poorly connected across core functions, limiting system-wide transformation. A further limitation is the thin treatment of outcomes: although SDGs are human-centred, most studies do not directly examine how integration affects the well-being of students, staff, surrounding communities.

The review indicates that universities integrate the SDGs mainly through their core functions. In teaching and curricula, SDG content is introduced via ESD-oriented modules, programme adjustments, competency-focused designs, and pedagogical innovation. In research and the third mission, universities align research agendas with SDG themes, promote transdisciplinary projects, and translate knowledge into practical solutions. In operations, SDG integration appears through green-campus actions and the management of resources and infrastructure (e.g., energy, waste, water, mobility). Finally, in external engagement, institutions extend SDG-related work beyond campus boundaries through outreach and place-based initiatives. Importantly, governance/leadership emerge as cross-cutting conditions that shape whether these functional efforts become connected and durable by influencing priorities, resource allocation, coordination across units, and the legitimacy and continuity of SDG work. Across these functions, integration tends to be selective and unevenoften concentrated in specific disciplines or SDG topics and is frequently implemented as separate activities rather than as a coherently connected institutional approach. (RQ1)

The literature draws on diverse lenses, systems, whole-institution approaches, complexity thinking, organisational and transformative learning, stakeholder perspectives, and enabler-oriented frameworks, but remains limited in mechanism specification. Many contributions describe drivers, barriers, and initiatives, while fewer explain how integration stabilises over time through concrete institutional mechanisms such as coordination routines, incentive and accountability alignment, decision-rights design, and feedback loops that translate strategy into everyday practice. (RQ2)

Research addressing the impacts on well-being is sparse and typically indirect. Empirical work most often relies on intermediate proxies (e.g., competencies, engagement, institutional performance, environmental indicators) rather than measuring well-being outcomes or distributional effects across stakeholder groups. This leaves major unanswered questions about which integration pathways improve well-being, under what conditions, for whom, and with what unintended consequences. (RQ3)

The article's theoretical contribution is a systems-theory conceptual model (CIPO logic) that reframes SDG integration as a mechanism of institutional coupling linking governance/leadership, policies/strategy, teaching–research–third mission, operations, stakeholder engagement, and evaluation/monitoring rather than a portfolio of standalone initiatives. It also makes human well-being the explicit output of SDG integration, thereby shifting the criterion of effectiveness toward lived outcomes.

Practically, the model can guide universities to diagnose where integration breaks down (e.g., gaps between strategy and implementation, missing coordination structures, weak monitoring), and to redesign governance, policies, incentives, and feedback processes so that sustainability activities reinforce each other and remain oriented toward well-being outcomes.

Future research should prioritise empirical validation of the model, including operationalising each component, specifying measurable indicators for coordination and integration mechanisms, and testing the proposed feedback loops longitudinally. Comparative cross-country studies are also needed to examine how different institutional, cultural, and policy contexts shape integration pathways and well-being outcomes, and to identify which configurations of governance, policy instruments, stakeholder coordination, and monitoring systems are most robust under varying resource conditions (especially across Global North–South contexts).

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