



Sustainability Performance in Higher Education Institutions (HEIs): A Concept Analysis

Awatif Ghunaim Almutaiti¹; [Alyaa Afifah Abu Talib](#)²

¹PhD candidate, Graduate School of Management, Management & Science University, Malaysia. E-mail: (awatifalmutaiti828@gmail.com)

²Senior Lecturer, Graduate School of Management, Management & Science University, Malaysia. E-mail: (alyaa_afifah@msu.edu.my)

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ABSTRACT

Sustainability performance in higher education lacks a clear definition, especially in relation to the SDGs, leading to fragmented approaches. This study fills the gap by using Walker and Avant's method, alongside the Triple Bottom Line and Dynamic Capabilities View, to define sustainability performance as a balance of environmental, social, and economic factors. It provides a practical, consistent way for universities to measure and integrate sustainability into governance and operations. Key indicators like energy use, diversity data, and ESG-aligned financial tools help track progress, making sustainability performance distinct from reputation or financial stability. This model offers universities a flexible, empirical framework for mainstreaming sustainability.

1. Introduction

Interest in sustainability performance in universities is growing, as are calls for universities to consider their fulfillment of the broader context of the role of higher education institutions (HEIs) in SDG reporting. This has led to increasing pressure on HEIs as they are increasingly recognized as a major player in the global sustainability agenda with heightened expectations for action around environmental, social, and economic issues. Despite the fact that most universities are now incorporating sustainability performance in their mission and policy statements and that one can now access a tremendous amount of data on the environmental performance of any institution, good or bad, there remains no one accepted or uniform definition of what sustainability performance means, and the term continues to be bandied about in an often cavalier, if not contradictory, fashion. This lack of definition constrains the work of researchers and decision makers, especially when they want to embed sustainability performance in governance, curriculum, or digital transformation strategies (Gutierrez-Mijares et al., 2023; Núñez Chicharro et al., 2024). As a result, policies remain fragmented, and institutions struggle to connect their goals with evaluation systems such as sustainability performance rankings and international frameworks. A significant gap therefore exists between institutional pledges and actual achievements. This gap is widened by the fact that sustainability performance is often shaped by local context or politics, rather than by standardized measures, leading to uneven interpretations across institutions (Basheer et al., 2024; AlAli & Aboud, 2024). Furthermore, as HEIs increasingly adopt new technologies and become more digital, tracking and managing sustainability performance has grown more complex.

Recent studies highlight that this strategic shift demands integrated frameworks able to connect varied indicators across teaching, research, operations, and governance to drive institutional change (Oliveira & Proença, 2025; Reisch et al., 2025). As a result, sustainability performance should be viewed not as symbolic recognition but as an institutional practice firmly embedded in everyday operations. Examples include curriculum transformation, sustainable procurement, green campus operations, and stakeholder engagement that demonstrate real-world implementation of sustainability performance in higher education (Machado & Davim, 2023; Singh & Sihmar, 2025). Such efforts illustrate how big-picture pledges can be translated into concrete results. They can subsequently be tracked and evaluated through instruments such as university rankings and sustainability performance audits, which provide accountability and transparency for stakeholders (Irungu & Liu, 2024; Leal Filho et al., 2022). Sustainability performance in this sense reflects a set of repeatable actions that are institutionally embedded and aligned with broader systemic commitments.

Sustainability performance still lacks clear definitions in theory or practice, and there is an urgent demand for a thorough examination and a more precise conceptual framing. To meet this challenge, our study employs Walker and Avant's (2005) concept analysis as a method that is particularly suited to the deconstruction of complicated or emergent constructs. Utilizing this method helps to define the dimension of sustainability performance, antecedent and the outcome in an effort to establish better ground in theory that considers circumstances of the specific institution; higher education (Umar et al., 2024; Basheer et al., 2024). Not only to sharpen the meaning of the word itself but also to make it workable and measurable, helping to narrow the continuing divide between aspirational rhetoric and actual results. This allows benchmarking, institutional learning, and cross-university comparison. In this cycle, technological innovation serves as a

critical factor. Digital dashboards, monitoring systems, and reporting tools are increasingly utilized by universities to track achievements and support sustainability performance initiatives (Régent et al., 2024; Oliveira & Proença, 2025). When higher education institutions infuse sustainability performance goals into their strategic plans and match those goals with the United Nations' Sustainable Development Goals, they achieve measurable results while meeting accreditation standards and related expenses and increasing their global standing. At the same time, sustainability performance is not always something that's set in stone or irreversible. It expands through new regulations, compliance requirements, and technological advancements. Definitions and indicators must be reevaluated during such transitions to ensure both analytical accuracy and practical relevance (Žalėnienė & Pereira, 2021; Vien & Galik, 2024). For that reason, the framework advanced in this study is presented not as a fixed or universal formula but as a flexible model able to respond to institutional diversity and global transformation. By linking high-level commitments with measurable action, it offers academic and policy communities structured tools for turning pledges into accountable, verifiable, and lasting results.

2. Methodology

2.1 Justification for Concept Analysis Methodology

To reduce the continuing ambiguity surrounding the meaning of sustainability performance in higher education institutions, this study employs Walker and Avant's (2005) eight-step concept analysis method. This structured approach presents sustainability performance as a collection of repeatable institutional practices aimed at balancing environmental, social, and economic responsibilities. It proves especially valuable for clarifying constructs that are complex and context-dependent, and it has already been applied with success in fields such as health sciences and organizational research. It enables the systematic identification of defining features, antecedent conditions, resulting outcomes, and measurable indicators of the concept (Umar et al., 2024; Núñez Chicharro et al., 2024). Current scholarship shows that sustainability performance in higher education covers curriculum design, teaching methods, campus operations, and evaluation systems, yet its conceptual boundaries remain blurred and require sharper examination (Umar et al., 2024). Further evidence from Núñez Chicharro et al. (2024) underscores how governance, resources, and stakeholder expectations shape outcomes. These factors point to the value of concept analysis for clarifying the ways institutional dynamics shape outcomes. Within higher education, this method provides a theoretically grounded framework that separates aspirational commitments stated in policy from the concrete practices that produce sustainability through daily operations. The resulting conceptualization delivers both rigor and practical value, supporting academic inquiry alongside institutional decision-making. Framing sustainability performance as an ongoing process, rather than a fixed result or abstract claim, illustrates how universities can achieve measurable progress, enhance accountability, and foster a culture of continuous improvement. An unrelenting emphasis on the repetition of daily practice situates a performance of sustainability at the core of an organizations institutional transformation. Doing so also more firmly grounds the Sustainable Development Goals in higher education systems.

2.2 Selection of the Concept and Purpose of Analysis

Sustainability performance in higher education incorporates environmental, social, and economic practices, whereby curriculum innovation, management of sustainable campuses, and governance structures are involved in the implementation of these practices that indicate an institution's readiness to achieve sustainability in the long run (Oliveira & Proença, 2025; Umar et al., 2024). Its importance arises from the increasing awareness that universities hold a central role in promoting the Sustainable Development Goals, while definitions and approaches to measuring sustainability performance continue to differ and remain inconsistent across diverse institutional and regional settings (Vien & Galik, 2024; Žalėnienė & Pereira, 2021). Because of this, it remains difficult to see exactly how sustainability performance is carried out across the different layers of an institution. The aim of this analysis is to build a definition that is standardized, sensitive to context, and supported by theory. This definition should work as both a dependent concept in research and a benchmark for evaluating institutions. Adopting a lens of sustainability as a system of performance, not as overarching strategies, raises awareness of what is being applied in institutional operations and tracked. In this way, the gap between institutional promises and visible results becomes smaller, making commitments easier to track and evaluate. Additionally, the 2020-2025 timeframe for the studies reviewed is chosen to capture the most recent developments in sustainability performance research, reflecting the rapid changes in higher education strategies, technological advancements, and evolving societal expectations surrounding sustainability in that period.

2.3 Literature Synthesis and Theoretical Framing

Developing a strong analytical foundation around the concept involved drawing on perspectives from a range of discipline areas such as sustainability science, organisational theory, performance measurement, and tertiary education research. Reviews of the literature indicate that sustainability in higher education is interpreted across environmental, social, and economic dimensions, which necessitates comprehensive approaches to assessment and benchmarking of institutional practices (Gutierrez-Mijares et al., 2023). Bibliometric studies indicate that research on sustainability performance in higher education institutions has grown considerably, covering areas such as curriculum development, campus operations, governance, and evaluation mechanisms, yet continuing to reveal gaps in standardization and definitional clarity (Umar

et al., 2024). Work on measurement approaches strengthens the case for adopting integrated, evidence-based perspectives. Oliveira and Proença (2025) stress the impact of campus operations, governance practices, and stakeholder participation on sustainability outcomes. Reisch et al. (2025) demonstrate how linking strategic planning with sustainability performance maps can strengthen institutional governance. This have led to the development of both theoretical views and empirical research and to the introduction of context-dependent indicators, benchmarking instruments and implementation models to sustainability. Together, these findings lay down a strong theoretical basis. They also provide hands-on advice on how to enhance sustainability performance in higher education institutions and how to link institutional activities to the globally applicable Sustainable Development Goals (Žalėnienė & Pereira, 2021; Núñez Chicharro et al., 2024).

2.4 Construction of Model, Borderline, and Contrary Cases

This model utilizes Walker and Avant procedure with the utilisation of three category of cases, namely model, borderline and contrary being at different proximity towards the main element of sustainability performance. These two examples show how higher education institutions integrate sustainability into ‘business as usual’ and also fail to do so. The model case represents an ideal example in which governance, campus management, and curricula are aligned with sustainability goals, achieving balance among environmental protection, social equity, and economic efficiency (Oliveira & Proença, 2025). Such institutions frequently implement structured sustainability maps and reporting mechanisms that integrate strategic planning with daily operations, creating benchmarks that facilitate comparison across contexts (Reisch et al., 2025). Borderline cases, by contrast, demonstrate partial or inconsistent commitment. For instance, a university might emphasize environmental measures such as cutting energy use or expanding green spaces while overlooking areas like inclusive governance or social equity, creating gaps in its overall sustainability profile (AlAli & Aboud, 2024). Contrary cases show the weakest alignment, where no structured system exists to track or report sustainability practices, leaving institutional performance vague and uncertain. Gutierrez-Mijares et al. (2023) mention the absence of consistent indicators and methodologies, which can lead to very large evaluation voids thus making it difficult to assess whether sustainable policies are actually implemented. Examining the different case types underscores this issue by distinguishing between symbolic commitments and substantive practices, thus offering deeper insight into how sustainability performance is put into practice within higher education institutions.

2.5 Identification of Antecedents and Consequences

The concept analysis reveals two primary antecedents as the foundation for achieving sustainability performance. This stuff is volatile and depends on institutional arrangements which enable feedback, self-correction, and involvement. One of the antecedents is governance capacity with the decision-making, stakeholder power, and financial resources serving as the basis for sustainability integration (Núñez Chicharro et al., 2024). A second antecedent is found in campus systems and operational practices, ranging from sustainable infrastructure to digital platforms and reporting mechanisms that fold sustainability into daily activity (Oliveira & Proença, 2025; Reisch et al., 2025). Taken together, these forces equip higher education institutions with the ability to move from broad principles to regular and repeatable action, adjusted as needed over time. The outcomes of robust sustainability performance reach widely: institutions achieve stronger visibility, earn deeper stakeholder confidence, and operate with greater efficiency. Sustainability Practices and Their Impact on Global Rankings Irungu and Liu (2024) illustrate that sustainability practices enhance global ranking placements. Alfirević et al. (2024) demonstrate that structured reporting procedures raise transparency and the perception from the outside. Hamdan et al. (2024) demonstrate that sustainability initiatives enhance knowledge, influence behavioral patterns, and heighten awareness among students and staff, thereby reinforcing the foundations of long-term institutional resilience. Taken together, these impacts accentuate the strategic role of integrating sustainability performance with governance systems while now reinforcing the critical role of regular, routine behaviors for sustained progress in higher education.

2.6 Operationalization Through Empirical Referents

So that the concept is not just theoretical but also operational, Empirical referents used to guide measurement are provided. With these measures, one may move toward concrete meanings for sustainability performance in higher education. Examples might include environmental indicators such as campus energy consumption and greenhouse gas emissions (Schiavon et al., 2024), social measures such as faculty and student engagement with sustainability practices (Filho et al., 2023), or governance data collected through faculty and stakeholder surveys (AlAli & Aboud, 2024). Economic-issue referents are also stressed, taking into account the economic studies that emphasize the need for an efficient allocation of resources, and the integration of sustainability reporting in the strategy framework of an organisation (Alfirević et al., 2024). Index-based systems including sustainability indices such as global sustainability indexes and bespoke performance measurement tools facilitate an integrated approach to benchmarking institutional performance across environmental, social, and economic dimensions. For instance, Perović et al. (2025) assess responsible consumption and climate action applying SDG-aligned indicators. Academic prestige concerns are tied to rankings in sustainability. Irungu and Liu (2024) suggest that sustainability rankings are associated with academic competitiveness. These tools allow sustainability audits. They allow us to compare performance across institutions. As well, they bridge routines to

observable results. In this way, they support a clearer and more consistent process for evaluating how sustainability is embedded into institutional performance.

2.7 Addressing Methodological Challenges

The major challenge for this feature of concept analysis is achieving an appropriate degree of theoretical abstraction and still being close enough to operational meaning. The challenge for sustainability performance is even greater given its range of institutional behaviors and strategies that are covered and that make consistent interpretation difficult. The openness and breadth of the concept can possibly diffuse or fragment its meaning. To address these challenges, scholars stress that sustainability assessment in higher education requires standardized indicators and classification systems that reduce heterogeneity and improve comparability across institutions (Gutierrez-Mijares et al., 2023). Basheer et al. (2024) contend, most tools aimed at assessing sustainability performance work independently or without integration. This being fragmented make very difficult assess the performance of the institution in a holistic way. Doing this, sustainability performance can no longer be reported as being a matter of abstraction but as tangible units of measure that may be interpreted at the organizational level. At the same time, research acknowledges that sustainability remains dynamic and continues to evolve, meaning that frameworks must remain flexible enough to adapt to changing institutional, policy, and technological contexts (Žalėnienė & Pereira, 2021). The design brings more transparency, makes replication possible, and adds to the strength of the analysis, which makes it a valuable part of the research on sustainability performance and institutional assessment. By tying the analysis again and again to real and practical contexts, it also underlines why sustainability performance matters so much in today's academic and policy discussions.

2.8 Data Collection

Methods A systematic literature search for empirical studies of higher education sustainability performance is performed using three open-access repositories: Google Scholar, OpenAlex, and PubMed Central. The search strategy used Boolean operators and truncation to combine the terms "sustainability performance," "higher education institutions," and "digital transformation." Of these, 301 records were retrieved (Google Scholar: 92; OpenAlex: 127; PubMed Central: 82), imported into a reference manager, and 63 duplicates removed. Titles and abstracts of the remaining 238 records were independently screened by two reviewers against predefined inclusion criteria: open-access, English-language full text, publication date 2020–2025, and empirical focus on institutional sustainability performance. Discrepancies were resolved through discussion, and inter-rater reliability achieved a Cohen's κ of 0.82. This led to the exclusion of 210 records based on off-topic nature or insufficient methodological description and 28 articles for full-text review. Clear operational definitions were used to review full text articles; i.e. "empirical referents" were dependent on operationalizable institutional performance, and "case-study methodology" demanded reported data collection. Results Data extraction was done on a predefined proforma, extracting study design, context, antecedents, defining attributes, consequences, and operational indicators. The PRISMA 2020 flow diagram framework was used to enforce transparency and reproducibility, and the protocol was stored in the Open Science Framework. In parallel, conceptual analyses were appraised using the CASP Qualitative Research checklist (clarity of research question, methodological appropriateness, rigor of analytic process, reflexivity). Eligible studies are assessed against multiple categories of the PRISMA–CASP, which reinforces methodological rigor, reduces bias, and increases the reliability of the resulting concept analysis.

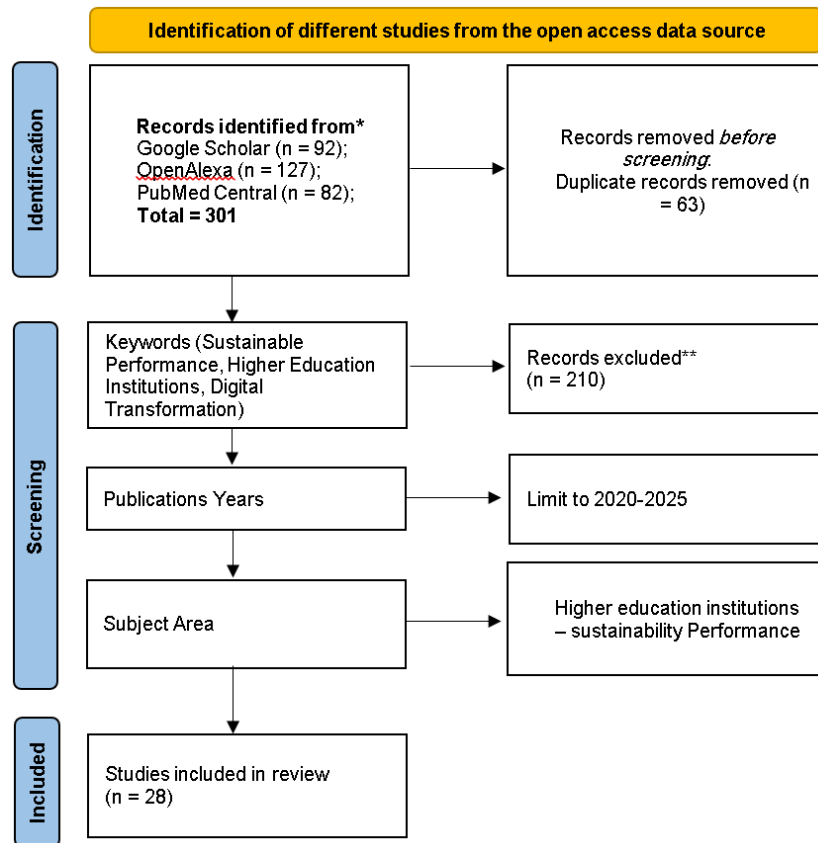


Figure:1 Presents the PRISMA flow diagram of the studies included for analysis.

3. Results Of Concept Analysis

3.1 Defining Attributes of Sustainability Performance

In this context, the study started with a review of twenty-eight studies conducted during the period of 2020 to 2025 to identify five defining attributes of sustainability performance measurement (see Table 1). First, multi-dimensional models designed for higher education institutions bring attention to economic, environmental, social, and institutional aspects, underscoring that campus sustainability defies reduction to a single metric (Gutierrez-Mijares et al., 2023). Second, incorporating sustainability indicators into institutional management systems via rankings, accreditation standards, and assessment tools shows how tightly sustainability performance has become woven into governance structures and formal reporting routines (Alfirević et al., 2023; Alfirević et al., 2024). Third, research tracking methods such as bibliometric mapping and systematic reviews, employing instruments like PRISMA and content analysis, reveal patterns of scholarly attention and bring key sustainability dimensions in higher education into clearer focus (Umar et al., 2024; Basheer et al., 2024). Fourth, empirical studies connect sustainability measures to conceptual foundations such as stakeholder theory, resource allocation, and SDG alignment, strengthening both credibility and applicability (Núñez Chicharro et al., 2024; Perović et al., 2025). Last, cross-institutional assessment tools and benchmarking frameworks allow the refinement of sustainability constructs across universities, providing evidence of how sustainability performance evolves and diffuses across higher education contexts (Caeiro et al., 2020; Leal Filho et al., 2022).

Table: 1 presents descriptive data regarding the research studies focused on frameworks for measuring sustainability performance.

No.	Citation	Setting (Domain)	Key Attributes (Conceptual/Methodological)
1	Umar et al. (2024)	Higher education institutes (global bibliometric review)	- Bibliometric and network analysis of the sustainability performance in HEIs. - Implementation of PRISMA screening and visualization aids (Biblioshiny, VOSviewer) to visualize trends, gaps and thematic networks.

No.	Citation	Setting (Domain)	Key Attributes (Conceptual/Methodological)
2	Núñez Chicharro et al. (2024)	UK higher education institutions	• Extension of Ullmann's stakeholder model in the HEI sustainability context. • Observed-based modeling of Green League data with generalized estimating equations.
3	Singh & Sihmar (2025)	Higher education institutions (HRM domain)	• Examination of how green HRM practices serve as sustainability enablers in universities. • Combining the HRM role in environmental management and EMS development.
4	Alfirević et al. (2023)	Croatian higher education (business schools)	• Constructing a scale for measuring sustainability in higher education (Higher Education Sustainability Measurement Scale – HESMS). • Validation and clustering of student perceptions on the sustainability work of HEIs – based on survey.
5	Reisch et al. (2025)	Brazilian higher education institution (campus operations)	• Case study of campus level sustainability strategy integration. • A map of strategic performance that fuses planning, process, and sustainability consequences.
6	Oliveira & Proença (2025)	Systematic literature review of HEI campus operations	• In-depth review of 130 studies on sustainable campus operations. • Key themes: carbon neutrality, energy use, waste management, circular economy. • Stressed leadership, governance, stakeholder engagement and innovation as underpinnings of sustainability.
7	Vien & Galik (2024)	US metropolitan areas and HEI sustainability performance	• Linear regression and principal component analysis to assess the correlation between HEI actions and metro SDG index. • Heterogeneous positive/negative relationships depending on economic, social and socio-environmental SDGs. • Provides approaches to intelligence design implementation from the institutional to territory scales, identifying similarities and differences not previously shown in the literature on local territorial management.
8	Hamdan et al. (2024)	UAE higher education institution	• Utilized DMAIC process (Define, Measure, Analyze, Improve, Control) to evaluate university sustainability standings. • Five variables were measured in the survey: knowledge, behavior, concern, awareness and attitude. • Enrollment in UI GreenMetric for longitudinal monitoring (2018–2020).
9	Basheer et al. (2024)	Global HEI sustainability assessment (bibliometric + content review)	• A PRISMA-guided review of 83 articles on the sustainability assessment of HEI practices. • Conducted multi-method analyse (both bibliometric and content) to develop six themes. • Stressed the importance of cross institutional aerial assessment instruments and flexible assessment practices.
10	Liu & Curtin (2025)	Higher education leadership, policy, and teaching (global perspective)	• Explores how sustainability becomes an inspiration for leadership, governance, and pedagogy. • Captures the synergy between leadership, policy and teaching for sustainable institutional change.
11	Faitani (2024)	Buenos Aires Metropolitan Area, Argentina (single HEI case)	• Constructed an Environmental Sustainability Trend Index to evaluate HEI performance (2015–2022). • Emphasized teaching and research as high contributors; governance and operations as low contributors.

No.	Citation	Setting (Domain)	Key Attributes (Conceptual/Methodological)
12	AlAli & Aboud (2024)	Saudi higher education institutions	- Teachers' questionnaire about sustainability embedding in teaching, research, society and environment. - Employed descriptive and inferential statistical methods to analyze strengths, limitations, and policy implications.
13	Machado & Davim (2023)	Literature review on HEI modernization and sustainability	- Analysis on the HEI practices which integrate curriculum transformation and sustainable campus. - Metrics measured in behavioral change (energy/water saving, recycling, waste reduction).
14	Gutierrez-Mijares et al. (2023)	Global HEIs (review of assessment methods)	- A sustainability performance evaluation methods in HEIs: a literature review. - Classified methods along seven dimensions: data characteristics, scale, spatial scale, implementation, pillars, and role of institution.
15	Žalėnienė & Pereira (2021)	Global higher education perspective	- HEIs contribution to UN SDGs: Perspective view. - Emphasizes the transformational nature of HEIs in influencing student behaviours, curricula and organizational culture. - Highlights obstacles such as political limitations and stakeholder pressures.
16	Alfirević et al. (2024)	University of Split, Croatia (case study)	- Case analysis of sustainability reporting and rankings at HEIs. - When strategic planning and quality management is integrated into sustainability. - Suggested that CRIS (Current Research Information System) be used to automate reporting.
17	Filho et al. (2023)	Global HEIs (academic community perceptions)	- Designed approach for the alignment of academic community opinion to institutional sustainability practices. - Methods can be considered by perceptions and technical assessments simultaneously. - Detects discrepancy for managerial decision making and relational engagement.
18	Régent et al. (2024)	EU higher education ecosystems (GET-AHED project)	- Created digital platform that connects sustainability self-assessment and training with energy saving tools. - Offers a comprehensive approach (HEIF-funded GREP, Green Champions, Green Zero). - Promotes mainstreaming sustainability into missions, operations and performance measurement.
19	Leal Filho et al. (2022)	International HEIs (30 universities, 72 survey respondents)	- Explores global sustainability reporting among HEIs and trends. - Is underutilized given its wide acknowledgement of relevance. - Discusses reporting difficulties and possibilities using institutional case studies and survey data.
20	Lim et al. (2022)	Global HEIs (systematic review of ESD)	- A review of 148 articles related to education for sustainable development (ESD). - Classified response content into six thematic clusters: Production of SD; Sensitizing / Commitment; Assessment; Structural Changes; Course Articulation; and University Management.

No.	Citation	Setting (Domain)	Key Attributes (Conceptual/Methodological)
21	Stanciu & Condrea (2023)	International higher education (conference proceedings)	• Documented studies on sustainability in economic and university education. • Importance of ESD in curricula and lifelong learning highlighted. • The need for methodological/pedagogical instruments for the promotion of sustainable life styles in academia.
22	Perović et al. (2025)	European universities (24 countries)	• Utilised Data Envelopment Analysis (DEA) to evaluate HEIs' impact on SDG 12 (responsible consumption) and SDG 13 (climate action). • Utilized THE Impact Rankings and Sustainable Development Report data. • Exposed variance of efficiencies according to national regulations and contexts.
23	Peca et al. (2024)	Technical University of Moldova (computer science disciplines)	• Post-test pedagogical trial with 259 students of e-learning sustainability. • Demonstrated enhancements in cognitive, affective and behavioral engagement. • Recommended the incorporation of sustainable e-learning approach to HEIs.
24	Bashir et al. (2023)	UAE higher education campuses	• Used Social Network Analysis (SNA), such as MICMAC, to investigate the interrelationships of KPIs for Campus sustainability. • Established three Key Performance Indicators: Green product spend, partners, progress toward LEED certification. • New combination of optimization models with the KPI analyzing.
25	Irungu & Liu (2024)	Global HEIs (QS Sustainability Ranking and world university rankings)	• Evidence on the linkage between sustainability activity and academic achievement. • THEWUR, ARWU, QSWUR and USWUR summed up in comparison to QS Sustainability Ranking. • Demonstrated that sustainability offers competitive advantage in international rankings.
26	Barbosa et al. (2024)	Academic publications linked to HEI management	• Sustainable development of education institutions: A bibliometric and qualitative review of international research in management higher education. • Discovered HEI sustainability role depicted as small and fragmented. • Provides actionable insights to assist managers in their decision making.
27	Schiavon et al. (2024)	Italian universities (environmental performance assessment)	• Summarizes data from universities about energy, GHG emissions, water and waste. • Demonstrates positive energy and emissions results from renewable energy uptake. • Yields benchmarks for a fair comparison among HEIs at different contexts.
28	Caeiro et al. (2020)	Portuguese and Spanish universities (ESD assessment)	• Critical analysis of ESD rating system tools (STARS and Green Metrics). • Used tools in the cases of study of Universidade Aberta (Portugal) and Universidad Autónoma de Madrid (Spain). • Found limitations and the necessity of participatory processes, external impact measures and non-conventional sustainability indicators.

The landscape of sustainability performance in higher education institutions is increasingly defined by a growing body of empirical research that highlights the connections between strategic planning, institutional operations, and digital transformation. Review of 28 studies shows that there is a trend towards programs that are formal, systemic, and integrated into institutional routines. Examples include Reisch et al. (2025) and Oliveira and Proença (2025). Sustainability strategies are much more effective when they stem from governance models and when measures are related to science, teaching and campus. However, studies conducted by Nunez Chicharro et al. (2024) presents measurement instruments. Alfrević et al. (2023) also introduce measurement instruments. These include both models for stakeholder governance and sustainability scales that are HEI specific. Their function is to verbalize a conceptual limit. They also make benchmarking possible. These differing methodological approaches, from bibliometric analysis (Umar et al., 2024; Basheer et al., 2024), to qualitative case studies (Faitani, 2024), suggest that there is no one-size-fits-all evaluation. A pluralistic yet coherent approach is required to capture the multidimensional character of sustainability performance, where environmental, social, and economic indicators converge.

Digital infrastructure and stakeholder engagement appear as critical enabling factors. Régent et al. (2024) and Hamdan et al. (2024) show that dashboards, training platforms, and monitoring systems help institutions embed sustainability practices into routine operations. Dynamic capacities such as the capacity to change, to respond to, and to innovate also feature prominently, especially in studies related to green human resources (Singh & Sihar, 2025) as well as alignment with SDG priorities (Vien & Galik, 2024). The relationship between PS and SD has been empirically examined and established in the context of the UK, EU, Middle Eastern and Latin America PS initiatives. Faculty participation also plays a central role. Indicators like energy consumption, diversity metrics, and ESG-based financial management demonstrate how performance is monitored (Schiavon et al., 2024; Perović et al., 2025). Sustainability performance in this study is conceptualized as a construct or a measure. It also sees it as a strategic necessity. That would be a move from rhetoric to evidence-based action. They exemplify how the universities of the world can lead the way in taking forward the global sustainability challenge.

3.2 Model, Borderline, and Contrary Cases

Following Walker and Avant's steps, this concept analysis uses examples to make clear both the scope and the practical sense of sustainability performance. The prototypical case provides a most favorable institutional context under which such key elements of sustainability performance fully develop. Here, sustainability is embedded through campus operations that achieve carbon neutrality, governance structures that align with SDG targets, and stakeholder engagement supported by transparent reporting and rankings (Oliveira & Proença, 2025; Alfrević et al., 2024). Such efforts are reinforced by curriculum transformation and green human resource management practices, ensuring that environmental, social, and economic outcomes are achieved together (Singh & Sihmar, 2025; Machado & Davim, 2023). A marginal case presents only a partial picture. For example, an organization might be strong in environment, – energy or waste systems – but weak in social equity and long term financial stability, and with “sustainability” spread (Schiavon et al., 2024; Núñez Chicharro et al., 2024). Such cases illustrate that advancing only one pillar of sustainability while neglecting others produces inconsistencies and undermines holistic institutional progress (Gutierrez-Mijares et al., 2023). A contrary case, on the other hand, illustrates lack of significant sustainability performance. Bassett et al., 2024; Caeiro et al., 2020). Organizations in this category do not have written sustainability plans, demonstrate little utilization of sustainability assessments, e.g. STARS or GreenMetric and practice antiquated management techniques neglecting stakeholder engagement (Basheer et al., 2024; Caeiro et al., 2020). In such contexts, sustainability is typically excluded from both strategic planning and daily operations, revealing a conceptual void in which sustainability is either marginalized or entirely neglected (AlAli & Aboud, 2024). These cases play a critical role in the analysis by helping to define the outer limits of sustainability performance. They highlight that sustainability in HEIs cannot just be rhetorical, but it should be demonstrated by quantifiable actions, clear reporting, and a continuous process of improvement (Leal Filho et al., 2022, Irungu & Liu, 2024).

3.3 Antecedents: Dynamic Capabilities and Digital Infrastructure

Dynamic capabilities and digital infrastructure as two predictors of sustainability performance. At the institutional level, they determine the way in which sustainability is integrated in the daily operation, the way in which it permeates the management and how it is embedded in the long term strategy of the institution (Núñez Chicharro et al., 2024). Dynamic capabilities specifically pertain to the capability of an institution to accommodate to changing sustainability requirements and opportunities for environmental innovation. They also involve reorienting internal processes to move the broader aspirations of the Sustainable Development Agenda forward. For instance organisations that “scan” more are “tuned-in” to sustainability trends, incorporate stakeholder power and adapt governance mechanisms, achieve more transformation of sustainability commitments into practice (Singh & Sihmar, 2025; Núñez Chicharro, 2024). A second antecedent is digital infrastructure, encompassing the technological systems and tools necessary to implement, monitor, and evaluate sustainability performance within institutional settings. These even extend to sustainability reporting system, digital learning platforms and tech designed to track energy usage and resource consumption in real time. It also covers digital dashboards that support institutions in monitoring their progress toward environmental, social, and governance (ESG) goals (Régent et al., 2024; Oliveira & Proença, 2025). These tools offer the technical capacity to expand sustainability

initiatives, facilitate real-time data collection, support informed decision-making across institutional units, and strengthen transparency for internal and external stakeholders. When dynamic capabilities are paired with robust digital systems, higher education institutions establish a foundation in which sustainability evolves from fragmented efforts into a systematic, institutionalized, and repeatable practice (Umar et al., 2024; Basheer et al., 2024).

3.4 Consequences: Strategic Impact and Institutional Outcomes

Sustainability performance functions at a macro-level in higher education. Research shows that embedding sustainability into university operations creates measurable efficiencies and enhances institutional legitimacy (Irungu & Liu, 2024; Alfirević et al., 2024). Assuming sustainability integration is evidence of an effective driving force for the sector's transition to sustainability, the empirical evidence clearly favours that there is a direct positive relationship between this phenomenon and better institutional outcomes, such as higher positioning in international sustainability rankings, greater visibility, and increased stakeholder trust (Irungu & Liu, 2024; Leal Filho et al., 2022). These results act as a 'gold standard' as well as drivers for universities to increase and reinforce sustainability measures in the form of incentives. At the operational level, the impacts are reflected in clear advantages such as cost reduction, improved resource efficiency, and reduced institutional risk. For instance, case studies demonstrate that adopting sustainable campus operations, such as smart energy systems and green procurement, significantly lowers energy use and operating costs while improving resilience (Oliveira & Proença, 2025; Schiavon et al., 2024). These outcomes demonstrate that sustainability performance is not an abstract ideal but a set of practical, repeatable actions that deliver concrete results. They underline the practical relevance of this framework by showing how it boosts institutional competitiveness and long-term resilience. More generally, universities succeed in sustainability create stronger capacity to confront 21st-century ecological and policy challenges. Another is that they remain competitive (Vien & Galik, 2024; Umar et al., 2024).

3.5 Empirical Referents: Measurement and Evaluation Tools

To make sustainability performance measurable in performance, the analysis points to a set of referents that cover environmental, social, and economic dimensions. These indicators translate general sustainability pledges into institutional specific performance. Environmental indicators comprise e.g. energy consumption per usable area (kWh/m²) as well as the CO₂ footprint per student (Tzouramani et al., 2020). In turn, social performance can be measured on measures such as the percent of underrepresented groups in faculty leadership or percent of students who have access to inclusive digital technologies (Nowakowski et al., 2019). Economic sustainability can be depicted through returns of investing in digital infrastructure, saving costs from deploying automate system and ESG-based scoring models application (Asiaei et al., 2021; Chmutova et al., 2024). This group of indicators also provide a robust evidence-based guide to check the integration and penetration of performance sustainability among institutions of higher education (Blach et al., 2025). As international approaches such as those of the GRI Standards are a source of inspiration in their development, they are also tailored to the context of higher education. Composite indices that combine environmental, social, and economic measures are particularly valuable for benchmarking and for monitoring progress over time. Their use also provides accountability and transparency to universities in terms of making outputs in sustainability performance clear to the internal and external communities of universities.

3.6 Clarifying Conceptual Boundaries and Avoiding Conflation

The analysis also separates sustainability performance from the ideals of institutional reputation or financial soundness. Although these may overlap with sustainability outcomes, they cannot be equated with sustainability performance unless environmental, social, and economic objectives are purposefully and systematically incorporated. In higher education, sustainability performance must be evidenced through structured actions such as curriculum reform, sustainable campus operations, and governance mechanisms, rather than being conflated with symbolic recognition or prestige rankings alone (Machado & Davim, 2023; AlAli & Aboud, 2024). Sustainability performance is therefore understood through tangible institutional practices that demonstrate a clear and systemic commitment to sustainability. It is therefore important to clarify the concept in order to avoid its confusion with neighboring constructs and to ensure its specific explanatory and evaluative role. Scholars highlight that assessment tools and performance frameworks such as STARS, GreenMetric, or institution-specific indices help differentiate genuine sustainability outcomes from reputation-driven reporting (Basheer et al., 2024; Gutierrez-Mijares et al., 2023). At the same time, sustainability is dynamic and performative, requiring systems that are open and adaptable. Universities operate in constantly shifting environments shaped by regulations, stakeholder expectations, and emerging technologies, which means sustainability performance should be considered as evolving rather than fixed compliance (Žalėnienė & Pereira, 2021; Umar et al., 2024). Concepts and recording takes should thus be updated regularly in order to ensure that the analyst's theoretical edge is not dulled, his or her context sensitivity is finely tuned, and his or her practical advice remains sound.

4. Discussion

4.1 Advancing Conceptual Precision in Sustainability performance

The results of this concept analysis contribute to the theoretical development of sustainability performance and provide a clearer, multidimensional definition that is logically sound and practically significant. It is in this framework that sustainability performance is understood as an array of institutional practices strategically embedded to represent systemic pledges to sustainability. Using Walker and Avant's method, the concept is divided into three main attributes: environmental stewardship, social equity, and economic resilience, each considered within the context of higher education. This tripartite approach of sustainability is in concordance with the wider TBL framework (Elkington, 1997), but it is adjusted to the higher education context, including empirical campuses' operations, governance mechanisms, and stakeholder engagement currently discussed (Oliveira & Proença, 2025; Núñez Chicharro et al., 2024). According to the analysis, universities need to show their sustainability performance to take effective actions in all three sustainability dimensions and should not stop at just rhetorical commitment and lack of verifiable sustainability impacts. By operationalizing the construct in this manner, the paper contributes to the long-standing problem that one does not know what one means by sustainability. Sustainability is frequently discussed by higher education researchers, yet efforts to measure it remain limited (Basheer et al., 2024; Alfirevic et al., 3–2023). This study offers a novel contribution by presenting a systematic, measurable framework for sustainability performance that bridges the gap between aspirational goals and actionable steps, providing concrete methods for tracking progress. The framework connects goals with tangible outcomes, such as reduced energy consumption, curriculum changes, and an enhanced reputation. This approach demonstrates that sustainability in universities is a dynamic and evolving concept. It depends on the specific environment of each institution. It is more than just talk (Gutierrez-Mijares et al., 2023; Žalėnienė & Pereira, 2021).

4.2 Digital Transformation as a Strategic Enabler of Sustainability

One major contribution of this study is the specification of how digital transformation promotes sustainability performance. Purposefully applied, digital transformation can accelerate institutional change by integrating sustainability into the "workings of the day," as well as the long-term strategic horizon. More funding is also being allocated for tools such as AI-based resource management systems and cloud-hosted education platforms, which can provide an entry point for shaping how institutional performance can be brought more in line with sustainability goals. However, it is emphasized that merely having digital tools is insufficient without a coherent strategy to align these tools with sustainability goals. Recent findings emphasize that the HEIs need up-to-date digital solutions and databases, which would help to ensure the use of digital innovations directly tied with the environmental, social, and economic agenda, while also cutting out token projects and activities (Régent et al., 2024; Reisch et al., 2025). In addition, the findings contribute additional testimony to the provisional role of dynamic capabilities. A better initial alignment enhances the ability to sense and seize opportunities. When institutions are better aligned to sense and seize opportunities ("congruence for creativity"), the more this alignment is expected to endure over time. Studies reveal that universities with digitalized governance structures and sustainability dashboards perform more effectively in embedding sustainability actions across teaching, research, and operations (Alfirević et al., 2024; Basheer et al., 2024). These capacities allow organizations to understand changing demands from the external environment, adapt their organizational responses, and allocate resources toward longer-term goals. The digital infrastructure and dynamic capabilities driving each other form a reinforcing path, which helps university to develop and sustain performance-focused sustainability practices. It is this linkage that reduces the possibilities of tokenism or ad hoc digital approaches and places sustainability within the ethos and the daily routine of the institution (Umar et al., 2024; Irungu & Liu, 2024).

4.3 Operationalization Through Empirical Indicators: From Abstraction to Accountability

The empiric referents are summarized in this paper and strengthen the pragmatics of the model by relating sustainability performance to tangible and measurable criteria. This shift from abstract theory to practical application underscores the need for measurable outcomes in sustainability performance. This displacement diverts attention from sterile theory to practical appraisal. Criteria such as energy consumption per m², reduction of waste, diversity of faculty, and responsible procurement demonstrate how sustainability in higher education can be measured beyond mere discourse (Schiavon et al., 2024; Faitani, 2024). These performance measures place sustainability performance as a quantifiable, also comparable, and strategically controllable variable. Equally important is the position of composite tools including ESG indices, sustainability assessment tools, and university-tailored dashboards. Recent studies indicate that the UI GreenMetric World University Ranking and sustainability self-assessment frameworks allow HEIs to track and compare their performance levels across environmental, social, and economic dimensions and to increase institutional accountability (Caeiro et al., 2020; Leal Filho et al., 2022). These tools not only enable transparent reporting but also strengthen accountability systems, feeding information to inform evidence-based decision-making and regulatory compliance. Bulletins of these kinds are not only a way for sustainability performance to become measurable but also serve as a means for improving and refining sustainability performance on a continual basis. The development of sustainability as a useful construct that mediates theory and the immediate concerns of institutional management is here

advanced through this operationalization. It further connects sustainability to ranking systems and policy compliance (Alfirević et al., 2024; Irungu & Liu, 2024).

4.4 Policy and Strategic Implications for Higher Education Governance

Leadership And Policy Implications Of Concept Analysis The concept analysis of the study has implications for higher education leadership and policy. It highlights the role of policy-makers in integrating sustainability into higher education frameworks by offering a clear, actionable model for implementation. They serve as a foundation for building sustainability performance into essential priorities and systems of accountability. At the organizational level, identification of the main precursors can guide capacity development and coordinate resources effectively. The role of governance structures, faculty engagement, and stakeholder power is particularly important in shaping sustainability-driven change, as demonstrated by Núñez Chicharro et al. (2024), who highlight how internal structures and financial slack resources influence institutional outcomes. Further, the tripartite model of sustainability performance provides a useful framework to embed environmental, social, and economic goals into governance structures, curriculum development, policy measures, and community outreach efforts. At the policy level, the framework acts as a template for creating new sustainability assessment instruments. These tools serve as both a diagnostic and evaluative resource to integrate sustainability systematically into academic governance and policy-making. These are some instruments that are intended to be general aspects of HEIs. Studies show that structured reporting frameworks, such as sustainability measurement scales and university rankings, can help accreditation bodies and policymakers integrate sustainability more systematically into evaluation systems (Alfirević et al., 2023; Leal Filho et al., 2022). Accreditation and regulatory organizations can use the referents to construct stronger evaluation measures that are sensitive to institutional differences. Embedding sustainability performance into national and international reporting frameworks also increases comparability of HEIs, thereby aligning institutional practices to global SDG goals (Perović et al., 2025; Irungu & Liu, 2024). Making "sustainability performance" part of policy further more tightly links day-to-day activities with external accountability frameworks, a desirable feature in jurisdictions where actions get influenced by reporting and ranking exercises related to performance-based funding or international leagues.

4.5 Limitations and Directions for Further Research

The model might require modification and testing when applied in other public or private sectors. This means the framework is flexible and fits different situations. It stays important and reliable in many types of institutions. This is also in line with the difficulty introduced by Alfirević et al. (2023), who also stress that tests are usually pre-crafted to match with eccentricities related to higher education and are struggling to be adapted to diverse institutionalities. A further limitation is the reliance on cross-sectional data, which provides a view but not the patterns of how dynamics change over time. This method may not adequately reflect the dynamic nature of sustainability performance and could miss how evolving stakeholder expectations influence institutional outcomes over time. The model may present a static view of a continuously evolving process. Incorporating data over time supports a deeper understanding of how sustainability shifts and responds to external influences. This type of data offers a more accurate picture of the growth and development of sustainability performance. Furthermore, cross-national, regional, and institutional comparisons can enhance the model and extend its applicability across diverse settings. Similarly, Umar et al. (2024) highlight significant concerns regarding regional bibliometric bias, emphasizing the urgent need for increased representation of underrepresented geographies, particularly in the Global South, while also noting cases of overrepresentation in certain regions such as Asia. Although emerging knowledge along these two lines of research offers valuable insights, future studies should place greater emphasis on the mediating role of digital technologies in the relationship between MRPs and sustainability performance. Régent et al. (2024) discuss digital platforms used to embed environmental sustainability in HEI ecosystems. Peca et al. (2024) introduce a pedagogy of e-learning sustainability, presenting an approach capable of challenging established norms and fostering the development of innovative teaching practices. These practices merit deeper investigation. Restricting impact assessments solely to sustainability may result in misalignment, particularly when technologies such as blockchain, predictive analytics, and smart infrastructure offer more precise indicators of where actual impacts arise. Analyzing these technologies can clarify the relationship between underlying factors and resulting outcomes. These innovations offer a more nuanced perspective on how sustainability performance develops and is sustained over time across diverse institutional contexts.

5. Conclusion

This concept analysis builds a multidimensional view of sustainability performance in higher education institutions. It applies Walker and Avant's eight-step method to address the ongoing problem of conceptual ambiguity. Sustainability performance in this study is defined as the interaction of environmental stewardship, social equity, and economic resilience. It is grounded in institutional practices rather than abstract ideals. This anchoring allows for more consistent evaluation. It also supports meaningful integration into long-term strategies. By placing sustainability performance as something more than a symbolic technology target to reach, the framework sets it as a quantifiable and realistic position for an organization. It shows us how important it is that the mode of governance matches the mode of operation and organisational culture. Incorporating dynamic capability and digital infrastructure as macro antecedents acknowledges

the importance of innovation and technology readiness for embedding sustainability in organisational systems. These are the factors that allow the role of sustainability to be institutionalized and to become an integrated and institutionalized part of university operations. They produce tangible outcomes, eg enhanced reputation, greater stakeholder trust and increased operational effectiveness. They also frame sustainability as a moral responsibility. At the same time, they present it as a source of competitive advantage in the demanding landscape of higher education. To make the construct measurable, the study identifies empirical referents in ecological, social, and economic domains. These include indicators of environmental efficiency, measures of diversity, and metrics of financial sustainability. These indicators strengthen transparency, inform policy, and allow meaningful benchmarking and comparison between institutions. By linking conceptual attributes with operational measures, the analysis gives universities practical tools to track progress. It helps them ensure accountability. It also strengthens how they present and communicate achievements. Taken together, the framework contributes to academic scholarship by clarifying conceptual boundaries. It also provides pragmatic advice for higher education leaders, with a structured, adapted and evidence-based process to help embed sustainability in governance and strategic planning. The model should be used in future studies in a variety of institutional contexts to test its generalizability and increase its generalisability. In addition, exploring the impact of "new" digital technologies on sustainability impacts would contribute to the model's continued evolution within contemporary society, underpinning its relevance as a tool for real and enduring institutional change.

References

- AlAli, R., & Aboud, Y. Z. (2024). Sustainability assessment of higher education institutions: Faculty members perspective in saudi universities. *GeoJournal of Tourism & Geosites*, 52(1).
- Alfirević, N., Jerković, I., Jelić, P., Piplica, D., & Rendulić, D. (2024). Sustainability reporting and international rankings in higher education: a case of the University of Split, Croatia. *World*, 5(1), 107-118.
- Alfirević, N., Pavičić, J., Kosor, M. M., & Perović, L. M. (2023). Toward the Development of the Higher Education Sustainability Measurement Scale. *Croatian Journal of Education/Hrvatski Časopis za Odgoj i Obrazovanje*, 25(4).
- Barbosa, A. A. D. S., Cabral, L. C. G., Nobre, F. C., & Perlin, A. P. (2024). Sustainability in higher education institutions: analysis of academic publication linked to management. *Revista de Administração da UFSM*, 17(2), e4.
- Basheer, N., Ahmed, V., Bahroun, Z., & Anane, C. (2024). Exploring sustainability assessment practices in higher education: a comprehensive review through content and bibliometric analyses. *Sustainability*, 16(13), 5799.
- Bashir, H., Araci, Z. C., Obaideen, K., & Alsyoud, I. (2023). An approach for analyzing and visualizing the relationships among key performance indicators for creating sustainable campuses in higher education institutions. *Environmental and Sustainability Indicators*, 19, 100267.
- Caeiro, S., Sandoval Hamón, L. A., Martins, R., & Bayas Aldaz, C. E. (2020). Sustainability assessment and benchmarking in higher education institutions A critical reflection. *Sustainability*, 12(2), 543.
- Elkington, J. (1997). The triple bottom line. *Environmental management: Readings and cases*, 2, 49-66.
- Faitani, N. G. (2024). Índice de tendencia de sustentabilidad ambiental de una institución de educación superior del Conurbano Bonaerense: Environmental sustainability trend index of a higher education institution in the Buenos Aires Metropolitan Area. *Revista estudios ambientales*, 12(2), 81-98.
- Filho, W. L., de Vasconcelos, C. R. P., Ferreira, P., Araújo, M. M., Berenguer, A., Almeida, N., ... & Agostinho, T. L. A. (2023). Perceptions of the academic community on the performance of sustainable development initiatives in higher education. *Sustainable Development*, 31(5), 3896-3912.
- Gutierrez-Mijares, M. E., Josa, I., Casanovas-Rubio, M. D. M., & Aguado, A. (2023). Methods for assessing sustainability performance at higher education institutions: a review. *Studies in Higher Education*, 48(8), 1137-1158.
- Hamdan, A., Hamdan, S., Alsyoud, I., Murad, N., Abdelrazeq, M., Al-Ali, S., & Bettayeb, M. (2024). Enhancing sustainability performance of universities: A DMAIC approach. *Systems Research and Behavioral Science*, 41(1), 153-172.
- Irunge, R. W., & Liu, Z. (2024). Exploring the nexus between university sustainability practices and academic performance: An empirical analysis of the QS sustainability ranking and four world university rankings. *Plos one*, 19(10), e0306286.
- Leal Filho, W., Coronado-Marín, A., Salvia, A. L., Silva, F. F., Wolf, F., LeVasseur, T., ... & Moggi, S. (2022). International trends and practices on sustainability reporting in higher education institutions. *Sustainability*, 14(19), 12238.
- Lim, C. K., Haufiku, M. S., Tan, K. L., Farid Ahmed, M., & Ng, T. F. (2022). Systematic review of education sustainable development in higher education institutions. *Sustainability*, 14(20), 13241.
- Liu, Y., & Curtin, J. (2025). Sustainability in Higher Education: Integrating Leadership, Policy, and Teaching Practices for a Brighter Future. In *Higher Education and Quality Assurance Practices* (pp. 123-158). IGI Global Scientific Publishing.
- Machado, C. F., & Davim, J. P. (2023). Sustainability in the modernization of higher education: curricular transformation and sustainable campus a literature review. *Sustainability*, 15(11), 8615.
- Núñez Chicharro, M., Mangena, M., Alonso Carrillo, M. I., & Priego De La Cruz, A. M. (2024). The effects of stakeholder power, strategic posture and slack financial resources on sustainability performance in UK higher education institutions. *Sustainability Accounting, Management and Policy Journal*, 15(1), 171-206.
- Oliveira, M. C., & Proença, J. (2025). Sustainable Campus Operations in Higher Education Institutions: A Systematic Literature Review. *Sustainability* (2071-1050), 17(2).
- Peca, L., Dumbrăveanu, R., & Tsurcanu, D. (2024). The sustainability of e-learning in higher education. *Journal of Social Sciences*, (3), 111-129.
- Perović, L. M., Mihaljević Kosor, M., & Alfirević, N. (2025). Assessing University Contributions to Sustainability in Europe: A Data-Driven Analysis of SDG 12 (Responsible Consumption) and SDG 13 (Climate Action). *World*, 6(1), 11.
- Régent, V., Gabriel, B. C., Draghi, J., Ecker, B., Figueiredo, C., Pires, S. M., ... & Valente, R. (2024). Developing a Digital Platform to Embed Environmental Sustainability in Higher Education Ecosystems. *Shaping the World of Change: Higher Education as a Key Enabler*, 5, 66.

- Reisch, O. C., Lima, J., Soares, T. C., Tutida, A. Y., Mazon, G., Andrade de Lima, M., ... & Guerra, J. B. S. O. D. A. (2025). Implementing and performing sustainability strategies at campus operations: the case of Instituto Federal de Santa Catarina. *International Journal of Sustainability in Higher Education*, 26(5), 987-1007.
- Schiavon, M., RADA, E. C., & Adami, L. (2024). Assessment Of The Environmental Performance Of Higher Education Institutes: The Case Of Italian Universities. *WIT Transactions on Ecology and the Environment*, 262, 945-955.
- Singh, A., & Sihmar, P. (2025). Higher education institution sustainability: Role of green human resource management. In *Green HRM awareness and training in higher education institutions* (pp. 1-14). IGI Global.
- Stanciu, A. C., & Condrea, E. (2023, June). Sustainability in higher education. In *Proceedings of the 9th BASIQ International Conference on New Trends in Sustainable Business and Consumption*, Constant, a, Romania (pp. 8-10).
- Teece, D. J., Pisano, G., & Shuen, A. (1997). Dynamic capabilities and strategic management. *Strategic management journal*, 18(7), 509-533.
- Umar, S. B., Ahmad, J., Bukhori, M. A. B. M., Mohd Ali, K. A., & Wan Hussain, W. M. H. (2024, September). A decade in review: bibliometric analysis of sustainable performance trends in higher education institutes. In *Frontiers in Education* (Vol. 9, p. 1433525). Frontiers Media SA.
- Vien, H., & Galik, C. S. (2024). Individual and interlinked SDGs: higher education institutions and metro area sustainability performance. *International Journal of Sustainability in Higher Education*, 25(5), 962-987.
- Walker, L. O., & Avant, K. C. (2005). *Strategies for theory construction in nursing* (Vol. 4). Upper Saddle River, NJ: Pearson/Prentice Hall.
- Žalėnienė, I., & Pereira, P. (2021). Higher education for sustainability: A global perspective. *Geography and Sustainability*, 2(2), 99-106.