

Review Article

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Sustainable Universities and Strategic Management: Bibliometric Analysis and Systematic Review

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Abstract

Background/purpose. This study aims to examine the evolution of scientific knowledge and research trends related to the strategic management of sustainable university institutions. Strategic management is of utmost importance for effectively leading any organization, such as a university institution. These are organizations that seek to raise quality standards to improve their mission and achieve organizational objectives. In this sense, strategies play a fundamental role in managing sustainable educational organizations.

Materials/methods. This research employed bibliometric analysis and systematic literature review methods. The articles used were obtained from the Scopus and Web of Science (WoS) databases. The search process was based on the Prisma methodology.

Results. The search revealed 23 articles published between 2015 and 2025 that met the established inclusion criteria. It was evident that although there are many studies on sustainable development in universities, little research focuses on strategic management to achieve a sustainable university; thus, the term “strategic management in universities” is rarely used in the scientific community. The articles were written using various research methods, but they are generally presented as case studies. 2024 was the year with the highest scientific output on the subject, while Portugal, Brazil, and Indonesia stood out as the most productive countries.

Conclusion. Among its many objectives, strategic management seeks to integrate academic, technological, innovation, knowledge management, organizational transformation, and participatory management areas to achieve sustainable university institutions. To do so, it must have a clear vision, strategies, and objectives, to promote the operations of the staff and the organization, allowing it to remain competitive with other universities over time.



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1. Introduction

According to the Environmental Association of Colleges and Universities [EAUC] (2018), sustainability is key to long-term institutional success in the business sector, as it provides enormous opportunities for value creation and risk mitigation. The same is true for higher education institutions (HEIs), as these opportunities arise during the process in which universities seek ways to increase their financial resilience in a global market and a changing political landscape. By adopting the Sustainable Development Goals (SDGs) formulated by the United Nations (UN), universities can reap the benefits of balancing their financial health with social and environmental interests, while also ensuring their long-term viability (EAUC, 2018; González-Campo et al., 2022; Gómez et al., 2024).

As generators of knowledge, universities have become institutions of utmost importance for the development of society, as they can “contribute to the processes of building a democratic knowledge society” (Da Silva & De Montreuil, 2023). However, they currently face several risks that prevent them from sustaining themselves and thus from meeting their established objectives. The permanence of HEIs over time is among the risks that universities must face amid the rapid technological, social, and economic advances that the world is experiencing.

Today, organizations value sustainable development more as a business strategy because of the benefits it brings to their stakeholders and its growing value to the market and society. To do so, they need a strategic orientation that allows them to incorporate sustainability elements into their strategic decisions and includes planning and a strategic plan (Funchs et al., 2020). Strategic initiatives can lead to better performance by higher education institutions and to their continued existence over time; therefore, sustainability-related objectives should be included in universities' strategic plans and visions.

Several studies have focused on the role of higher education in the impact of economic growth on global ecological systems and how elements of sustainability, such as socio-ecological aspects, have been integrated to enable it to become a “sustainable university” (Deleye, 2024). The latter analyzes how universities direct their efforts to function as an environmentally conscious enterprise, formulate principles, and sign declarations to create entirely new institutions or focus the mission and management of an existing university on the pursuit of sustainability. However, few studies have examined the relationship between the variables under study: “sustainable university” and “strategic management.” Furthermore, the scarcity of literature regarding the impact of strategic management on achieving a sustainable university necessitates further research. This research aims to identify and implement the necessary policies to achieve the Sustainable Development Goals in higher education.

Understanding the current state of scientific activity on the subject will help to reaffirm or refute the importance of sustainable development as a strategy for achieving a sustainable HEI based on the trends and challenges outlined in the literature. The research questions posed are as follows: What is the landscape of research on sustainable development in university management, taking into account the number of documents, authors, countries, journals, and methodologies used? And what strategies do universities adopt to achieve sustainable educational management?

The objective of this systematic review is to examine the evolution of scientific knowledge and research trends related to sustainable development strategies for achieving sustainable university institutions.

2. Literature Review

Defining the term “sustainable university” has not been an easy task and in many cases is presented ambiguously (Deleye, 2024); however, authors such as Velasquez et al. (2006) pointed out that it is an institution of higher education that addresses, involves, and promotes the minimization of negative environmental, economic, social, and health impacts generated by the use of its

resources. All of this is aimed at fulfilling its functions of teaching, research, outreach, collaboration, and responsible management, and thus helping society transition to sustainable lifestyles. Subsequently, Lukman and Glavič (2007) added that this concept of "sustainable university" must encompass the three dimensions of sustainable development: environmental protection, economic performance, and social cohesion. That is, it is necessary to include the principles of Education for Sustainable Development (ESD) to establish a sustainable university.

Similarly, Lopes and Vieira (2021) point out that these institutions must abandon traditional models to become leaders in sustainability and chart new directions. To achieve this, they must act proactively, which will enable them to mitigate the negative impacts of their operations while fulfilling their various roles, including teaching, research, outreach, and promoting more sustainable lifestyles. For these authors, the model of a sustainable university is based on transitioning to more sustainable practices, encompassing not only ecological but also social, economic, and political dimensions.

Furthermore, the literature on the definition of strategic management is quite extensive. In most studies, it is considered a dynamic management concept with diverse functions and an appropriate response to each situation. A flexible response to the environment characterizes it; that is, it allows for modifications to the organization's direction, functions, and structure to achieve the desired level of efficiency and quality. The main components of general strategic management theory are goal setting, strategic analysis, strategy development and implementation planning, strategic change, and strategic control (Parakhina et al., 2017).

In the university setting, strategic management is vital, as noted by Watson (2000), as it enables the performance of its primary activities. Higher education institutions worldwide operate in a highly competitive environment. Furthermore, the knowledge society presents modern universities with various challenges that span diverse aspects (management, academic, technological, economic, etc.). The reality of higher education is characterized by new generations of students, technological innovations, budgetary constraints, and economic factors, all of which have necessitated re-evaluating the strategies employed in higher education (Stukalina, 2014). This is supported by Fumasoli and Hladchenko (2023), who assert that strategic management is essential for achieving university strategic positioning, the emergence and early institutionalization of competition in higher education, developing organizational strategies, implementing the university's internationalization strategy, and managing sustainable university quality.

Now, there has been much debate in academic circles about whether it is possible to achieve a sustainable university and whether strategic initiatives grounded in sustainable development enable real university progress. In this regard, studies have yielded a variety of information, ranging from the challenges, drivers, and strategies applied to achieve a sustainable institution over time. Aleixo et al. (2018) assert that challenges and drivers are intrinsically related to the barriers that impede sustainability in universities. A clear example of this is financial resources, which not only constitute barriers but also drivers or challenges for higher education institutions.

At the academic level, transformational learning is incorporated and serves as the basis for sustainable education in HE, i.e., teachers become drivers of this process, remaining open to change and questioning the epistemological background on which institutional management and teaching are based. Thus, the sustainability of HE can be achieved by making organizational changes to the education process itself and by redesigning the curriculum to enhance its sustainability (Daniela et al., 2018; Hays & Reinders, 2020; Viera et al., 2024). On the other hand, Izquierdo-Morán et al. (2024) add an extremely relevant aspect related to institutional change: quality management in universities. This element has become a social challenge in offering better service at the educational level, making it necessary to assess whether the needs and expectations of those involved in managing their

processes are being met (González et al., 2023). In this way, contributing to the achievement of the Sustainable Development Goals (SDGs) becomes a quality requirement for universities.

Other studies have established that aspects such as proactive leadership, clear and consistent communication, the inclusion of sustainability in university strategy, multidisciplinary in research and courses, student and staff participation, and other initiatives that encourage participation in sustainability practices are important in the management of HE sustainability (Aleixo et al., 2018). In this context, Barrett et al. (2019) considered these same aspects more practically, emphasizing the importance of visible support from a rector or vice-rector, a governing body, proactive senior leadership, an empowered senior person responsible for sustainability, and a collaborative approach among senior leaders. In addition, an advisory board of external experts, policies that incorporate sustainability, a stakeholder engagement strategy, and alignment with existing national quality frameworks are required.

Lukman and Glavič (2006) argued that to achieve a sustainable university, it is necessary to consider three areas of sustainable development: environmental protection, economic performance, and social cohesion. Addressing these areas requires an institutional strategy, which is why, among many others, Velásquez et al. (2006) propose a four-phase model that helps university leaders accelerate progress toward sustainability. This model provides a structured framework for visualizing and achieving a sustainable university system. The phases are as follows: developing a vision for sustainability for the university, establishing a mission, creating a sustainability committee to set policies, goals, and objectives, and, finally, establishing sustainability strategies. The proposed model must include the tools to monitor, analyze, and control the performance of the sustainability initiatives. Otherwise, the model becomes a proposal without validity or implementation value (Velásquez et al., 2006).

According to Blasco et al. (2019), sustainability assessment is a fundamental process for achieving sustainable universities; therefore, the development of models can help compare sustainability performance in higher education in different regions. These models should consider the three perspectives identified by Lukman and Glavič (2006). Integrating these three dimensions into university processes has also been considered a useful tool for increasing accountability and improving performance. In this sense, sustainability reports are an effective tool for increasing transparency and involving stakeholders in management.

Likewise, institutional management involving a strategic plan has been another aspect considered in studies on HE sustainability. Research carried out in Spain has analyzed the strategic plans implemented by universities and found that sustainability strategies are underrepresented in Spanish universities. In this regard, Bautista-Puig and Sanz-Casado (2021) underscore the importance of strategic plans for higher education institutions, as they provide information on the level of commitment to comprehensive institutional change.

In the words of Habeeb and Eyupoglu (2024), strategic planning is an essential process for guiding an organization's path. In this process, a series of strategies aligned with a company's mission and objectives is developed and implemented, resulting in more efficient strategic planning and better organizational performance. The same applies to HE institutions, as strategic planning enables universities to anticipate and prepare for future trends and to make informed decisions and allocate resources where necessary. By developing a clear vision and achievable goals, institutions set themselves up for long-term success (Kenno et al., 2020; Chica & Erazo, 2024; Alí, 2025).

To be sustainable, HEIs require innovative tactics and strategies, as well as competent management to adapt to a sustainable environment. The importance of strategic planning in HE has increased due to the need for the ecological formulation and implementation of university planning guidelines amid fierce global competition (Ali, 2024; Habeeb & Eyupoglu, 2024). Furthermore, having

effective strategies will ensure that these institutions not only survive but also thrive in a competitive educational environment.

3. Methodology

This article conducted a bibliometric analysis and systematic review to answer the research questions. The bibliometric research guidelines proposed by Donthu et al. (2021) were followed, and VOSViewer 1.6.19 was used to visualize the co-occurrence networks. In addition, a descriptive analysis of the mapping of research specialties or domains in the existing literature on the subject (Zupic & Čater, 2015; Donthu et al., 2021) is presented.

This type of review allows for structured identification, evaluation, and interpretation of important research that answers research questions. In addition, they enable consistent mapping of existing empirical studies, identifying the most commonly used methodological approaches, knowledge gaps, trends, and future research opportunities (Avenali et al., 2023; Shaheen et al., 2023). The Prisma 2020 (Preferred Reporting Items Systematic Reviews and Meta-Analyses) protocol (Page et al., 2021) guided this study to ensure methodological rigor and transparency in the search process.

3.1. Literature Search Strategy

The scientific databases Scopus and Web of Science (WoS) were considered for the search for studies, due to their multidisciplinary nature and international prestige (Powell & Peterson, 2017; Pranckutė, 2021). The following keywords were used in the literature search: “Sustainable development”, “university”, “management”, “strategies”, “sustainability”, “strategic planning”, “higher education”, “strategic management”, “sustainable development strategies”, and “models”. The search was limited to the period from 2015 to March 2025. Boolean operators were used to avoid potential bias, thus ensuring a comprehensive and balanced review of the literature. The search string used is described in Table 1.

Table 1. Database Search Equations

Database	Search equations
Scopus	(TITLE-ABS-KEY("Sustainable development " OR " university " OR " strategic management OR " management ") AND TITLE-ABS-KEY("higher education " OR " strategic management " OR "sustainable development strategies" OR " models "))
Scielo	(title: (" Sustainable development " OR " university " OR " strategic management AND title: (" management " OR " strategic planning " OR " sustainability "))
WoS	("Sustainable development" OR " higher education " OR " sustainable development strategies ") AND ("management " OR " sustainability " OR " strategic management " OR " university ")

3.2. Selection Process

The authors reviewed 926 titles, abstracts, and keywords from the selected documents and removed duplicate studies. Any discrepancies that arose during this process were resolved through scholarly discussion to reach a consensus, ensuring a thorough and impartial literature review. The titles, abstracts, and keywords of all included articles were then reviewed. This resulted in an improved review process, enhancing the rigor and reliability of the selection. The final phase involved

a comprehensive and independent review of each article to determine whether it was included or excluded from the study.

3.3. Inclusion and Exclusion Criteria

The inclusion criteria were as follows:

- Only articles retrieved from WoS and Scopus were considered.
- Only articles published between January 1, 2015, and March 31, 2025, were extracted.
- Only original and review articles were extracted.
- Articles focusing on sustainable higher education and sustainable development (SD) strategies to achieve it were taken into account.
- Only articles written in English and Spanish were considered.

Likewise, the exclusion criteria were as follows:

- Articles referring to sustainable development in primary and secondary education were omitted.
- Studies published before the established period.
- Studies published in languages other than English or Spanish.
- Editorials, opinions, letters to the editor, or doctoral theses.
- Articles without open access.

Regarding the application of the Prisma methodology, in which the most relevant studies were selected, the following aspects stand out: a total of 926 records were obtained, of which 58 were excluded as duplicates; this process yielded 868 studies. Subsequently, in the screening stage, the titles, abstracts, and keywords of each study were analyzed to determine whether they met the inclusion and exclusion criteria already indicated. Based on this, 316 documents did not meet the eligibility criteria, leaving 552 available documents. Subsequently, each study was thoroughly re-analyzed, and 529 documents were eliminated, mainly because they were editorials, opinions, letters to the editor, doctoral theses (150), they focused on primary and secondary education ($n = 180$), and were in the field of sustainable higher education and sustainable development strategies ($n = 199$). Finally, 23 articles were identified that met the inclusion criteria and will be included in the systematic review (Figure 1).

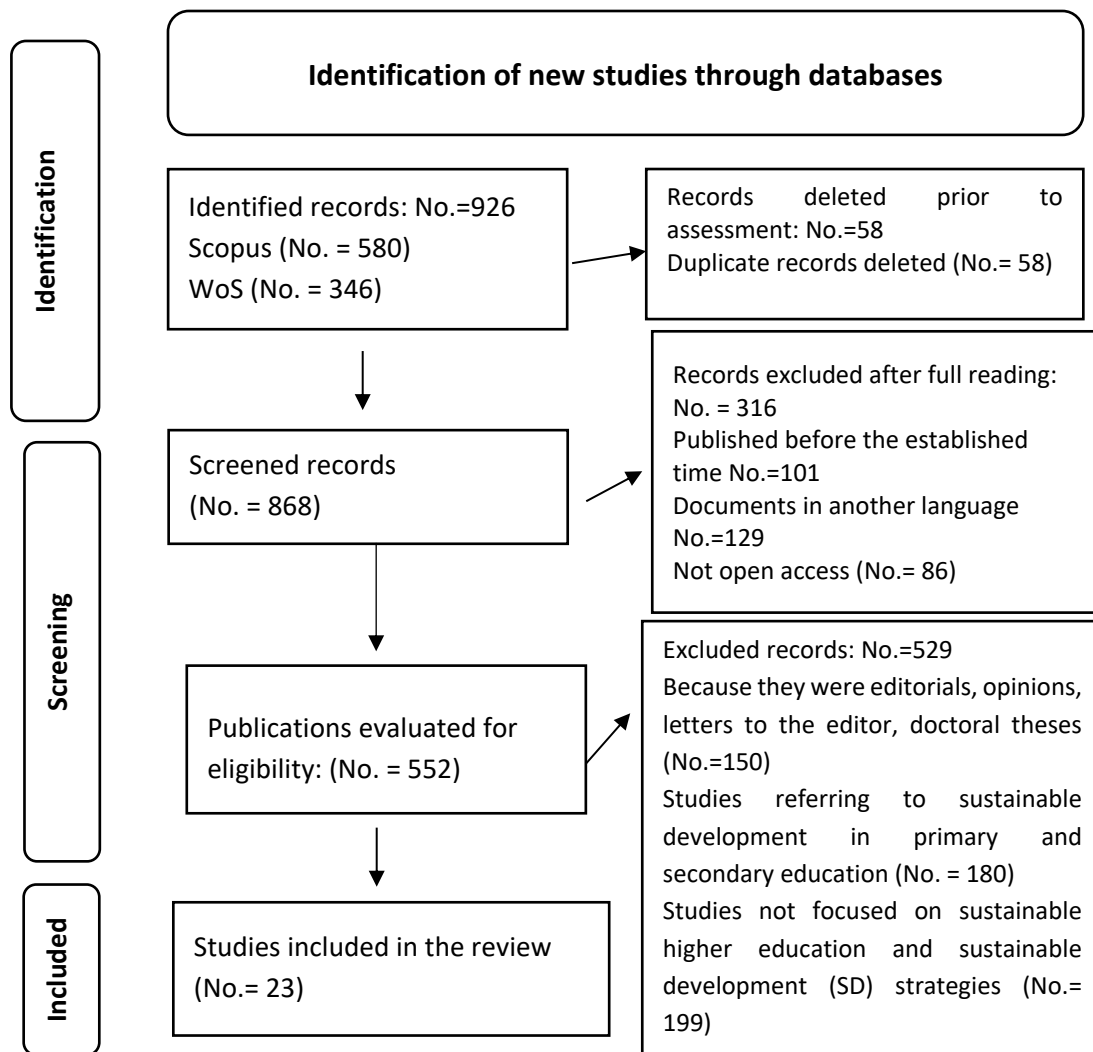


Figure 1. Prisma Flowchart for Study Selection

3.4. Data Analysis

During the data analysis phase, a dual-coding process was conducted in which the team's authors reviewed each article (23 in total). In accordance with the established objective, two analyses were performed using VOSviewer software and Microsoft Excel. These analyses allowed for the identification of authors, countries, journals, and methodologies used, the generation of word co-occurrence maps, and the construction of thematic maps. Thus, the information extracted from each article was stored in an Excel file (data repository) with the following aspects: authors and year of publication, title and objective of the study, the complete abstract of the article, sample and instruments used, language, methods employed, and findings, name of the journal, and type of indexing. VOSviewer was used in the bibliometric analysis, as it allows for the identification of a specific topic, the set of related publications, and the authors of the resulting journals. The analysis provided by VOSviewer uses broad bibliometric maps, which are easier to explain, manage, and visualize.

The ideas and findings reported in each article were extracted, and a qualitative synthesis was conducted to identify trends, patterns, and possible gaps in the research, facilitating a structured analysis of the sustainable development strategies used to achieve a sustainable university. Content analysis was the technique used in the qualitative analysis conducted. This procedure involves examining a large amount of information related to a topic in detail and organizing it according to the most important aspects required. Studying and organizing a large amount of information allows

researchers to identify common themes and patterns within it. In this case, the content analysis focused on sustainable development strategies for higher education institutions. To achieve this, the studies were categorized into themes and subthemes, facilitating the organization of the material and helping researchers understand how strategic management contributes to achieving a sustainable university. Ultimately, this process allowed the researchers to draw conclusions and gain new perspectives from the collected information.

4. Results and Discussion of the Bibliometric Review

4.1. Descriptive Bibliometric Analysis

This section presents a descriptive analysis of the 23 articles reviewed and answers the first question of the review: What is the landscape of research on sustainable development in university management? Specifically, it reports on the number of articles included in the review by year, the journals in which they were published, the databases, the language of publication, and the methodological considerations. Figure 2 shows the number of articles included in the review by year. There was a notable increase in the number of articles, from 3 published in 2015 to 7 in 2024.

The scientific literature in this area of research has been scarce and has maintained a variable trend during the period studied; that is, in the first seven years (2015-2022), there was a decline in the publication of studies on sustainable universities and the management strategies used to achieve sustainability. However, from 2023 onwards, there was growing interest in the subject, which was evident in 2024, when scientific production peaked, although it declined during the first five months of 2025 (Figure 2).

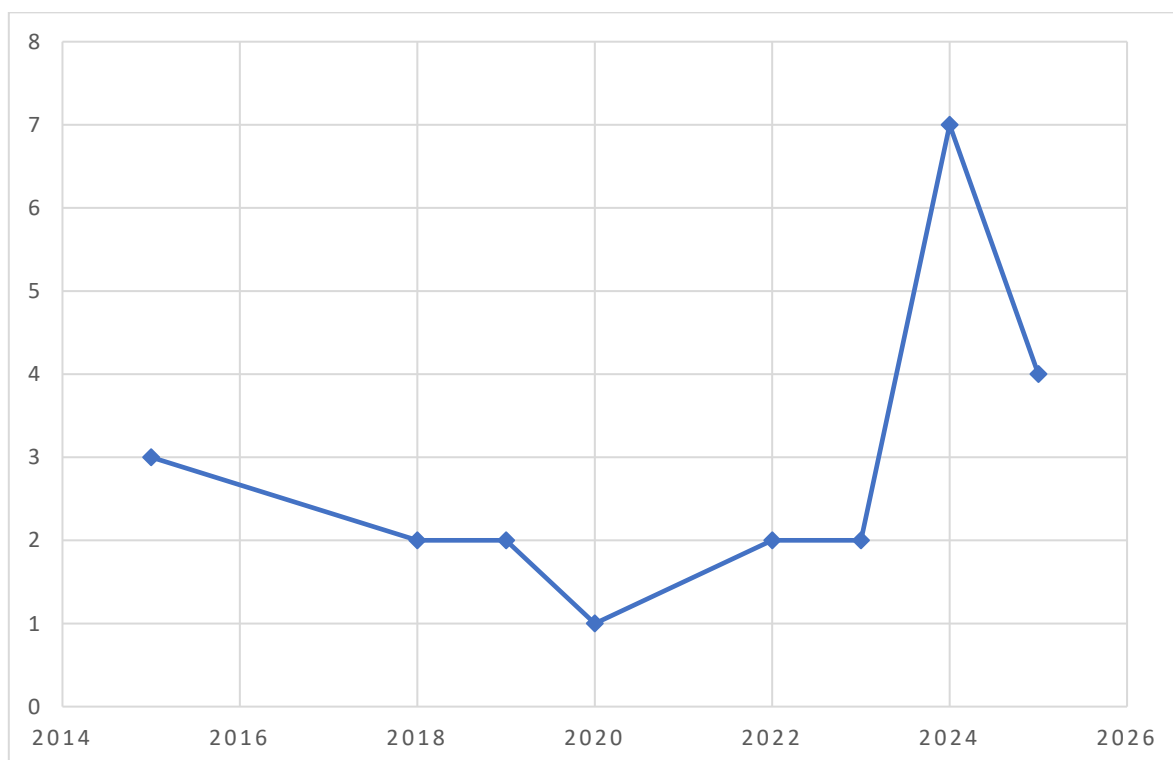


Figure 2. Scientific Output Per Year

4.2. Distribution by Subject Area

By analyzing the disciplines involved in the selected documents, it was possible to establish whether the topic had been studied using a multidisciplinary approach. Figure 3 shows the subject areas (disciplines) of the 23 selected documents, according to the Scopus classification. It is important to note that although the inclusion criteria established that the databases used were Scopus and

WoS, the latter did not present any studies related to the topic on its own; however, ten (10) of the journals where a group of studies was published presented double indexing (Scopus-WoS).

There is a predominance of social sciences (24.60%), followed by environmental sciences (20.20%) and energy (11.80%). Other fields, such as engineering, business management, computer science, and economics, are also represented, though to a lesser extent. In the field of university sustainability, the distribution indicates that a considerable amount of research on this topic is located in the social sciences and environmental sciences. The predominance of studies in these areas underscores the importance of universities' strategic management to ensure sustainability over time and their impact on society.

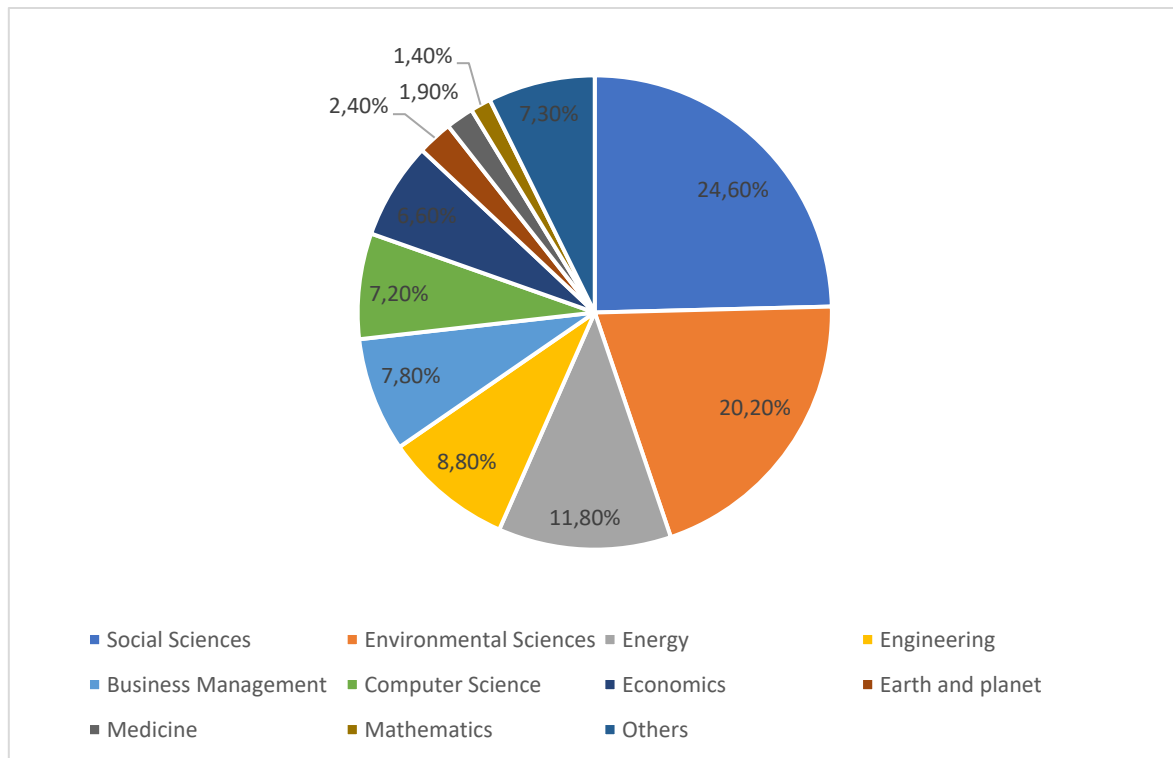


Figure 3. Distribution by Subject Area of the Studies Reviewed

4.3. The Context of Scientific Production (Countries)

The countries with the highest scientific output on university sustainability and its strategic management are three: Portugal, with four articles; Brazil, with two articles; and Indonesia, with two articles. Germany (2), Poland (1), and Ukraine (1) also appear. Nine studies stand out for failing to indicate the country in which they were conducted. Additionally, two other studies were conducted simultaneously at universities across multiple countries: for example, one in the USA and China, and another in Africa, Nigeria, the USA, Brazil, and Germany. Europe accounts for 17.39% of the reviewed articles, and, together with Brazil, represents 26.08% of the total studies analyzed.

Of the 23 studies examined, nine (9) documents presented methodologies based on reviews that did not specify the country in which they were conducted. Six (6) of these were quantitative, three (3) were qualitative, and three (3) were mixed methods. While the rest were case studies (2), a bibliometric analysis (1), and one did not explicitly indicate the type of methodology used. The most commonly used language in the publications was English, with 22 studies (95.65% of the total examined), and only one publication (1) was published in Spanish. In addition, the largest number of journals are indexed by Scopus, representing 56.52% of the total, while 43.47% of all journals were double-indexed (Scopus-WoS) (Table 2).

Table 2. Characteristics of the Studies Analyzed

Author(s). Country	Methodology/sample/instruments	Journal	Language	Database
Munaro y Jonh (2025) It does not indicate	Systematic review of the literature	<i>Sustainable Production and Consumption</i>	English	Scopus
Veres <i>et al.</i> (2025) It does not indicate	Bibliometric analysis	<i>Sustainability</i>	English	Scopus-WoS
De Matos <i>et al.</i> (2025). Portugal	Quantitative: explanatory-predictive. 7 Portuguese universities. Questionnaire with a Likert scale	<i>Environment, Development and Sustainability</i>	English	Scopus
Malinowska <i>et al.</i> (2024). Polonia	Systematic review—university documents from 103 universities	<i>Economics and Environment</i>	English	Scopus
Isea <i>et al.</i> (2024). It does not indicate	Quantitative: descriptive. Peer-reviewed academic sources, doctoral theses, and bibliographic references.	<i>Salud, Ciencia y Tecnología – Serie de Conferencias.</i>	Spanish	Scopus
Akbar <i>et al.</i> (2024a). Indonesia	Quantitative. The 10 largest private universities in Indonesia (379 people). Questionnaire	<i>Cogent Business & Management</i>	English	Scopus-WoS
Akbar <i>et al.</i> (2024b). Indonesia	Quantitative: 140 employees, including teachers and educational staff	<i>Problems and Perspectives in Management,</i>	English	Scopus
Kifor <i>et al.</i> (2023) It does not indicate	Systematic review	<i>Energies</i>	English	Scopus-WoS
Araújo <i>et al.</i> (2023). Portugal	Mixed. Survey	<i>Sustainability</i>	English	Scopus-WoS
De Souza (2022). Brasil	Not indicated	<i>Renewable Energy</i>	English	Scopus
Zou <i>et al.</i> (2015). EE. UU. y China	Literature review	<i>Sustainability</i>	English	Scopus-WoS
Deus <i>et al.</i> (2015). Brasil	Qualitative: case study. Surveys and interviews	<i>Int. J. Business Excellence</i>	English	Scopus
Dumitrascu y Ciudin (2015) It does not indicate	Literature review	<i>Sustainability</i>	English	Scopus-WoS
Karahan (2024). Alemania	Qualitative: multiple case study	<i>Small Bus Econ</i>	English	Scopus
Al-Filali <i>et al.</i> (2024). Arabia Saudita	Mixed: applied type	<i>Journal of Engineering Research</i>	English	Scopus

Author(s). Country	Methodology/sample/instruments	Journal	Language	Database
Oliveira y Proença (2025). It does not indicate	Systematic review	<i>Sustainability</i>	English	Scopus-WoS
Fuchs <i>et al.</i> (2020). It does not indicate	Literature review	<i>International Journal of Sustainability in Higher Education</i>	English	Scopus
Gryshova <i>et al.</i> (2019). Ucrania	Quantitative. 156 students. Survey, personal interviews, and questionnaires	<i>Sustainability</i>	English	Scopus-WoS
Hsieh (2022). Taiwán	Mixed. 250 interviewees. Questionnaires	<i>Sustainability</i>	English	Scopus-WoS
Ramísio <i>et al.</i> (2019). Portugal	Case study	<i>Journal of Cleaner Production</i>	English	Scopus
Leal <i>et al.</i> (2018). Sur África, Nigeria, Estados Unidos, Brasil y Alemania	Case studies	<i>International Journal of Sustainable Development & World Ecology</i>	English	Scopus
Aleixo <i>et al.</i> (2018). Portugal	Qualitative: exploratory. 4 Portuguese HEIs. Semi-structured interviews and content analysis procedures	<i>Journal of Cleaner Production</i>	English	Scopus
De Cristo et al. (2024). It does not indicate	Literature review	<i>Sustainability</i>	English	Scopus-WoS

4.4. Data Visualization

The visualization, interpretation, and reporting of data comprise the final analysis that is performed before the results are discussed. The aim is to identify common trends and main sets of correlated patterns related to a network of keywords. Thus, indicators of the dynamics and evolution of scientific information are then analyzed and identified using the main keywords. The analysis of the results of the bibliometric research with VOSviewer made it possible to identify the main keywords of the research on the strategic management of sustainable universities.

4.4.1. Analysis of Keyword Co-Occurrence

The network visualization provided by VOSviewer highlights concepts related to sustainable universities and their relationships. In this case, the central theme revolves around two broad terms and colors: the first, represented by the color red, corresponds to “sustainable development and higher education institutions.” The second, in green, is “higher education and sustainability.” In addition, other thematic groups emerge from the two main ones: environmental management, sustainable development goals, planning, society and institutions, and the university.

- Red cluster: Linked to sustainable development and higher education institutions, including topics related to education, information management, competitiveness, quality management, the university sector, and students.
- Green cluster: This encompasses higher education and sustainability, including the sustainable campus, students, curriculum, university sector, management practice, university campus, leadership, and energy efficiency, among others.

The presence and connection of these two large clusters highlight the importance of the Sustainable Development Goals in higher education today and the role that sustainability plays in the future projection and success of university institutions.

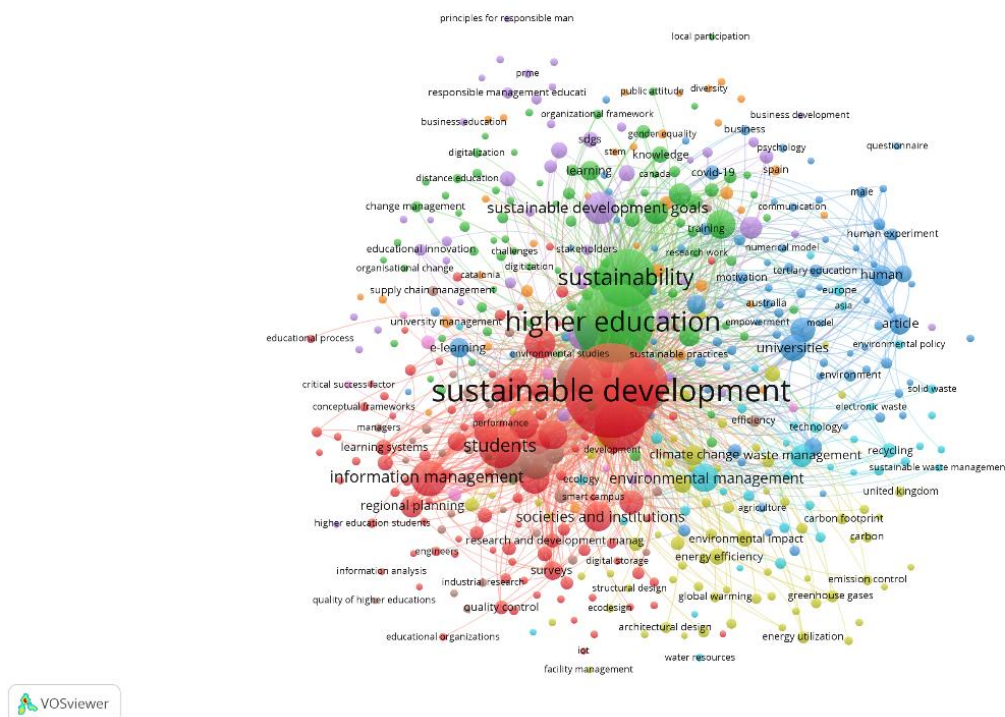


Figure 4. Keyword Co-Occurrence Network of Publications Related to Sustainable Universities

4.4.2. Co-occurrence of Terms Appearing in the Title and Abstract Sections

To better understand the co-occurrence network of keywords, a more detailed visualization is necessary. Based on this, the titles and abstracts of the 926 publications belonging to the clusters identified in Figure 3 were analyzed; thus, the terms that appeared in the titles and abstracts of each publication were identified. Of all the terms found in at least 10 publications, 22 were selected algorithmically.

Two large groups of clusters were visualized, so the relationship between terms present was determined by co-occurrences; however, another very important cluster is observed in yellow, referring to “campus” and “production.” The colors represent groups of terms with a relatively strong relationship between them; in this case, green and red prevailed. Both groups were identified using the clustering technique offered by VOSviewer. In the visualization, the strongest relationships between terms are indicated by curved lines; in the case of the red cluster (economy), a series of subgroups that are strongly related to each other derive from it. On the other hand, the term “methodological approach” stands out in the green cluster, which groups together terms such as “social responsibility,” “education,” “planning strategies,” and “academic community.” However, this cluster, compared to the red cluster, does not include a significant number of terms.

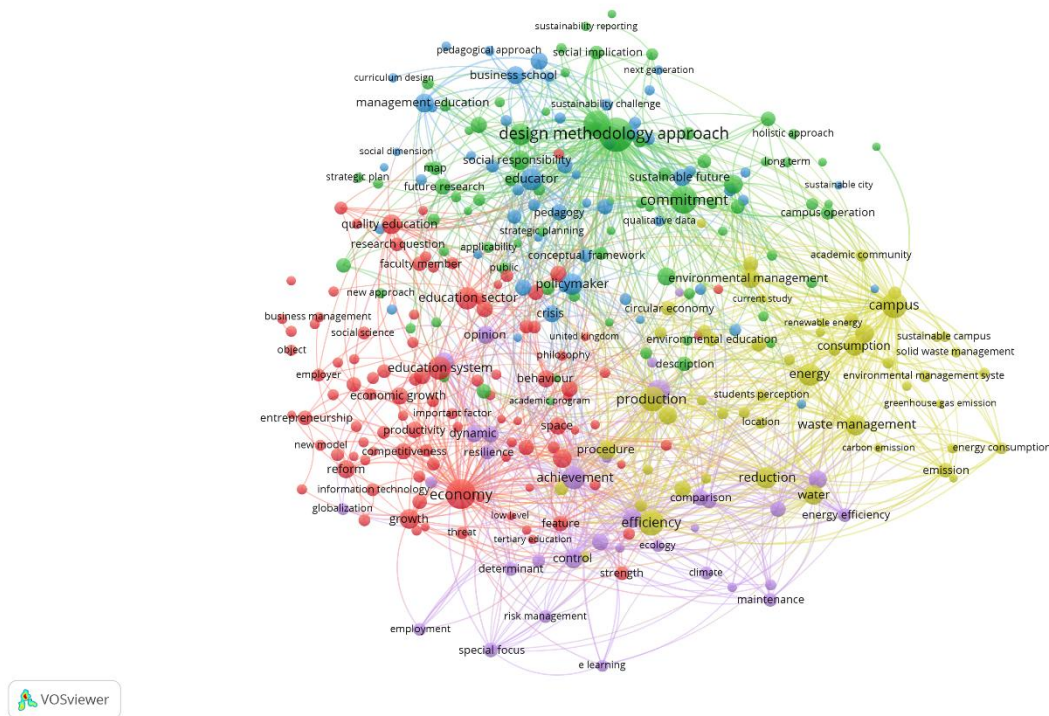


Figure 5. Most Frequently Used Words in the Title and Summary Fields of Educational Studies On Sustainable Universities

The documents analyzed revealed a series of sustainability strategies based on a comprehensive approach. The implementation of these strategies aims to achieve key sustainability objectives and advance sustainable development both within the university institution and in society. However, for this implementation to be effective, all stakeholders must be conceptually committed to the established objectives and strategies. The strategy establishes sustainability objectives for all areas of university activity, so the management structure must provide the framework for the implementation of these objectives in the following areas: research, teaching, student participation, campus operations, digitization, and knowledge transfer. The strategies implemented in the studies examined to achieve a sustainable university are shown in Table 3.

Tabla 3. Strategies Applied in Strategic Management to Achieve Sustainable Universities

Author(s)	Findings	Strategies
Munaro y Jonh (2025)	Management strategies for achieving a sustainable university must include four main dimensions: operational, administrative, performance evaluation, and academic.	Decarbonization strategies for HEIs, carbon-free energy transition, purchasing carbon certificates, passive strategies, optimizing thermal comfort, implementing user-centered control systems, incorporating dynamic lighting solutions, designing flexible spaces, improving thermal zoning, and waste management plans.
Veres et al. (2025)	Digital transformation has become a key driver of sustainability initiatives, with universities increasingly leveraging artificial intelligence, big data, and smart technologies to optimize resource use and reduce environmental impact. In addition, institutional leadership and governance play an important role in the formulation of sustainability policies, but their implementation varies considerably between regions. Stakeholder participation, particularly that of students and faculty, is emerging as a crucial factor in ensuring long-term success.	● Digital transformation, leadership and governance, stakeholder engagement, identification of emerging areas such as digitization, inclusivity, and collaboration
Malinowska et al. (2024).	Sustainability strategies play a key role in integrating sustainable practices into the core functions of universities (UNEP, 2014). The study focused primarily on illustrating the institutional approach of Polish public universities to incorporating the SDGs into the development of their strategic documents. The development and implementation of a sustainable development strategy in universities require considerable time and financial resources.	● General university strategies that include the Sustainable Development Goals, representing only 30 of the 103 universities. ● Strategies dedicated exclusively to the SDGs, included only 10 of the 103 universities.
Akbar et al. (2024a)	In the higher education sector, green human resource management practices influenced faculty and staff perceptions of a green work environment, facilitating workplace innovation. The inclusion and support of faculty and staff generated and enhanced collaborative activities with partner organizations that were socially and environmentally sustainable. The role of the green psychological climate served as a bridge to understanding the implementation of green human resource management practices and promoting awareness among employees.	● Green psychological climate

Author(s)	Findings	Strategies
Akbar <i>et al.</i> (2024b)	There is evidence of a partial influence of human capital on sustainable universities and sustainable human resource management (HRM). In addition, sustainable HRM also acts as a mediator between human capital and sustainable universities. The capacity of human capital (faculty and teaching staff) at universities influences the generation of sustainable university performance that considers the triple bottom line, namely economic, social, and environmental aspects. Likewise, human capital capacity could contribute significantly to the implementation of sustainable HR management practices that promote sustainable university performance.	● Sustainable human resource management
Kifor <i>et al.</i> (2023)	Energy Management Systems (EMS), as part of Environmental Management Systems (EMS), support organizations in managing energy consumption by implementing new energy efficiency technologies, reducing energy waste, and improving current processes to reduce energy costs. To ensure the proper implementation, operation, and evaluation of smart energy systems in institutional buildings, such as universities, it is necessary to develop key performance indicators (KPIs) and use them as required by energy management standards (e.g., ISO 50001) and internal and external evaluation frameworks.	● Energy Management Systems (EMS)
Araújo <i>et al.</i> (2023).	The integration of renewable energy production systems on campuses, specifically photovoltaic systems, is emerging as a popular solution, as it often allows the use of unused spaces, such as building rooftops. These solutions will become increasingly effective if they not only serve as an advanced model of renewable energy integration but also encompass environmental research, electromobility, and energy efficiency.	● Integration of renewable energy production systems on campuses (photovoltaic systems)
De Souza (2022).	Photovoltaic generation accounted for 1.13% of the university's energy consumption due to the campus's large size. In addition, given that UNICAMP is a consumer in the free energy market model, an analysis of potential financial profitability is presented. With an estimated payback period of 7.65 years, considering an average cost of R\$4.64/Wp, the system is viable. Finally, the success of this project aims to raise awareness among other universities about implementing renewable energy sources, contributing to sustainable development and expanding the initiative to other sectors.	● Photovoltaic solar energy
Zou <i>et al.</i> (2015).	The strategies or actions that Indiana University, Bloomington, USA (IUB) adopts to achieve its sustainability goals are designed from three perspectives: education, research, and	● Green education, including a “green curriculum” and “green practice.”

Author(s)	Findings	Strategies
	operations. The green campus consists of three components: strengthening landscape planning and using diverse plantings to keep the campus green throughout the year; creating an economically and energy-efficient campus by promoting the conservation of water, electricity, fuel, and materials in its operations; and reducing pollution by adopting measures to reduce pollutants emitted by the central heating plant and replacing coal with natural gas.	
Deus <i>et al.</i> (2015).	Campus sustainability also includes energy and resource efficiency, waste reduction, and effective environmental management. The ISO 14001 Environmental Management Plan (EMP) is of utmost importance for companies and critical to their survival in the market. Contrary to popular belief, universities are significant sources of pollution and are intensive in energy and resource consumption; however, simple, better choices can minimize this impact, as demonstrated by the environmental management practices of the Polytechnic University of Catalonia.	• The ISO 14001 Environmental Management Plan (EMP)
Karahan (2024).	The university model emphasizes “a business style in which its members (faculty, students, and staff) act entrepreneurially and in turn interact with their external environment (community/region) in an entrepreneurial manner.” This model transformed many universities, giving rise to entrepreneurial education, university business incubators, and technology transfer offices. Its advocates highlight its potential to create new sources of income, institutional innovation, and participation in ecosystems in the modern economy.	• University model
Al-Filali <i>et al.</i> (2024).	The document uses modified versions of three strategic planning tools: a strategy map, the Balanced Scorecard, and a Business Model Canvas, which were applied to support the analysis of financial sustainability planning at King Abdul Aziz University (KAU). These tools improve the planning process and contribute to results. The document also outlines a roadmap with key milestones for financial sustainability at the university, identifying sources and indicators of its financial capacity.	• A strategic map (SM), • Balanced scorecard (BSC), and • Business model canvas (BMC)
Fuchs <i>et al.</i> (2020).	The study shows managers of higher education institutions the importance of incorporating sustainable development actions into their strategic plans. Given stakeholders' interest in the issue (sustainable development), these actions can generate positive consequences, such as improving their image, promoting greater internal and	• Green marketing

Author(s)	Findings	Strategies
	external public participation, and strengthening their positioning as a green university in the eyes of the general public. With the BSC's Adapted Structure for Green Marketing, universities will be able to systematize their green marketing efforts to achieve their objectives, such as educating and training internal and external audiences to foster greater environmental awareness, benefiting the institution, the community, and society in general.	
Gryshova <i>et al.</i> (2019).	The method for the optimal distribution of the university budget was proposed by applying system constraints theory and fuzzy set theory. As a result, the budget distribution by specialty was expressed as percentages. This will allow for an optimal balance between the demand for specialists with specific specialties and their supply. The practical importance of the results lies in implementing the methodological provisions developed to forecast the demand and supply of educational services in higher education institutions.	● Method for optimal distribution of the university budget through the practical application of system constraints theory and fuzzy set theory.
Hsieh (2022).	Higher education management should implement educational mechanisms and policies to establish the technology added in group discussions or teamwork, as well as conduct a fair evaluation of the technological systems of online courses, so that they are the most effective strategic approach for contemporary higher education and sustainable development.	● Learning community: (1) advertising philosophy, (2) democratic philosophy, and (3) eminent philosophy
Ramísio <i>et al.</i> (2019).	The development of UMinho's mission is based on a medium-term strategic plan and short-term action plans. The Strategic Plan, drawn up by the Rector's Office, proposes a comprehensive and inclusive university that offers comprehensive training and excellence in research, interacting with society through participatory and decentralized decision-making processes and through the efficient and effective use of resources, with a view to building a sustainable and internationalized university.	● Mixed bottom-up and top-down approach ● Ensuring the mainstreaming of sustainability values throughout academia.
Leal <i>et al.</i> (2018).	Among its main findings is the fact that many universities wish to promote sustainable development, but their efforts are hampered by a lack of institutional support and planning, as well as a limited emphasis on approaches such as problem-based learning. Planning was shown to be a very useful tool in supporting higher education institutions' efforts to achieve their ambitions, not only to integrate the three components of	North-West University: Environmental education as a compulsory model; Training of teacher training students; Research projects on EMS in educational centers; Awareness-raising among all staff; Green Campus Project. University of Nigeria: University management

Author(s)	Findings	Strategies
	sustainable development into their operations, but also to ensure that sustainability principles are implemented and put into practice.	committed to sustainability; Participation of CEMAC and ACCAI. Sustainability/improvement of academic standards in terms of curriculum, academic staff... Allegheny College: Initiatives for a green campus; Converging bottom-up and top-down leadership efforts. University of Brasilia: Initiatives to promote sustainable actions; Interaction between research, teaching, and outreach. Hamburg University of Applied Sciences: Various research and transfer centers, one of which focuses on sustainability.
Christou et al. (2024).	Several approaches related to a systemic sustainability approach were identified, including integrated systems management, comprehensive institutional management, transformation management, and evaluation methods. With these tools, higher education institutions (HEIs) can cultivate a sustainable mindset, implement environmentally responsible practices, and foster a culture of sustainability on their campuses. All of this contributes significantly to a more sustainable future for the institution. Systemic approaches to sustainability in HEIs link the institution to teaching, research, campus operations, and community engagement. Working with this approach recognizes that sustainability is not just about changing one or two areas of the institution but about transforming it entirely into a more sustainable one. These institutional approaches require the active participation of students, faculty, and administrative and support staff.	Self-assessment tools can help higher education institutions evaluate their sustainability performance and identify areas for improvement. They also allow institutions to track their progress over time. When used together, systemic, institutional, and self-assessment tools provide higher education institutions with the framework and support needed to plan and develop strategies for transitioning to more sustainable operations, development, and education.

5. Discussion

The bibliometric analysis showed that the term “sustainable university,” related to strategic management, has been little studied. This is evident in the limited existing literature analyzing the methods or strategies universities use to achieve sustainability over time. In contrast, a significant amount of research was found on the promotion of sustainable development through higher education, with efforts to prepare students for a sustainable future by developing knowledge, attitudes, skills, and values that enable them to face social, economic, and environmental challenges.

The literature examined and referred to on the subject reached its peak in 2024 with only seven (7) studies and a specific focus on Europe. On this continent, studies have focused on measuring sustainable development practices implemented in seven Portuguese universities (De Matos et al., 2025) and on investigating energy consumption on university campuses to integrate renewable energy production systems (Araújo et al., 2023). Similarly, the study by Ramísio et al. (2019) presented, analyzed, and evaluated the UMinho model as a sustainability strategy. This model was based on a medium-term strategic plan and short-term action plans. With this strategic plan, the university administration aimed to create a comprehensive, inclusive, sustainable, and internationalized university.

In addition, the analysis of keyword occurrence in the bibliometric analysis highlights the interconnection between sustainable development and sustainability in higher education. It should be noted that keywords such as “sustainable campus,” “university campus,” and “energy efficiency” are linked to sustainable universities and strategic management, as implementing effective plans and strategies can help sustain university institutions.

According to Christou et al. (2024), the lack of approaches that encompass comprehensive system management largely hinders the achievement of a sustainable university. Therefore, it is essential to have an approach that encompasses comprehensive institutional management, transformation management, and evaluation methods. These authors argue that when higher education institutions integrate and adopt these tools, they can cultivate a sustainable mindset, implement environmentally responsible practices, and foster a culture of sustainability on their campuses. This proposed approach focuses on the interconnection of teaching, research, the institution's operations, and community engagement.

Munaro and John (2025) note an underappreciated aspect of university practice: institutional evaluation. They also consider the administrative, operational, and academic performance dimensions. In this regard, Christou et al. (2024) note that self-assessment tools are necessary, as they enable these institutions to evaluate their sustainability performance and identify areas for improvement. Furthermore, they enable monitoring of progress over time. The systemic evaluation tools proposed by these authors provide higher education institutions with a framework for planning and designing strategies that will allow them to achieve more sustainable education.

The main obstacles that current strategies encounter in practice are related to a lack of planning (Leal et al., 2018), finances, a lack of human resources for developing sustainability initiatives, a lack of sustainability instruments, resistance to change, and the organizational structure of universities (Aleixo et al., 2018). Similarly, Akbar et al. (2024b) established the influence of human capital on the sustainable university and sustainable HR management, and how this aspect is often neglected in higher education institutions. They demonstrated the role of HR management in sustainability as a mediator between human capital and a sustainable university. The capacity of university faculty influences the generation of sustainable university performance that includes consideration of economic, social, and environmental aspects.

Institutions must formulate strategies that allow them to remain up-to-date and competitive in a highly diverse market, which is why they need to incorporate sustainability principles into their academic, management, and governance practices (Munaro and John, 2025). Management includes those actions carried out by the institution to direct and plan academic development, based on its vision and mission, and in which all stakeholders are involved (Veres et al., 2025). In this sense, the work carried out in Portugal by Araújo et al. (2023) suggests that user participation is a crucial factor in guaranteeing the sustainability of university campuses.

Managers of higher education institutions must recognize the importance of adopting actions related to sustainable development in their strategic plan; these actions can generate positive results, such as improving the institution's image, promoting greater internal and external public participation, and contributing to the perception of its social positioning (Fuchs et al., 2020). In this regard, Malinowska et al. (2024), in their work conducted in Poland, argue that universities aspiring to become or remain important and successful academic institutions must focus their efforts on transforming themselves into sustainable entities. These changes will not only allow them to maintain their competitive advantage but also align with global trends in higher education.

At the business level, good strategic planning is extremely important; the same is true throughout higher education. Therefore, universities and higher education institutions understand the need to clearly define their mission and objectives, their priorities and goals, and the actions to be taken to achieve them. Monitoring the achievement of objectives within strategies is a crucial factor for effective implementation (management). This monitoring will enable necessary adjustments in the face of emerging challenges and ensure systematic monitoring of progress at the institutional level (Malinowska et al., 2024). This process is crucial, as it provides the information necessary to make timely corrections and ensures that the strategy remains on track to achieve its objectives.

Studies conducted in China, the USA, Portugal, and Indonesia have demonstrated that sustainable development in universities is based on four dimensions: economic, organizational, environmental, and social. The economic dimension includes economic viability and the identification of economic needs. The organizational aspect concerns how university institutions define their behavior and values and how stakeholders understand the approach and objectives linked to sustainable development practices. The environmental issue calls for incorporating environmental concerns into the university's strategy. Finally, the social area involves the sociocultural dimension, which encompasses human resources activities within universities and among various stakeholders (Dumitrascu and Ciudin, 2015; Zou et al., 2015; Ramísio et al., 2019; Akbar et al., 2024b; De Matos et al., 2025).

This review identified strategies from the university strategic planning studied that are implemented through the management each institution carries out in its own way to achieve sustainability. Munaro and John (2025) conducted a systematic review to identify the most sustainable universities worldwide, focusing on the most discussed and implemented sustainable practices and debates on university campuses. They found that university decarbonization strategies generally do not align with broader electrification and carbon-free energy transition goals. Therefore, in addition to purchasing carbon certificates, they recommend applying them correctly to achieve low carbon emissions or carbon neutrality. In addition, they identified passive strategies that help balance energy consumption and improve natural lighting in classrooms. Optimizing thermal comfort, implementing user-centered control systems, and waste management plans, among others, were identified as effective strategies on university campuses.

The study conducted by Ramísio et al. (2019) in Portugal through a case study and based on lessons learned from the implementation of a sustainability strategy at the University of Miño,

established some principles in accordance with that implementation. The first is the definition and establishment of a mixed, bottom-up and top-down management model. The second principle is to ensure the mainstreaming of sustainability values throughout the academy. The third principle is to implement a set of programs dedicated to the efficient use of resources in universities, such as water, energy, paper, and ink cartridges. The last principle refers to the use of a monitoring and communication tool, such as an annual institutional sustainability report. The authors believe that, to implement these projects effectively, a single, comprehensive framework is required that spans the entire community from a top-down perspective.

Finally, despite the increase in 2024 in the number of studies on strategic management and sustainable universities, this review identified several significant research gaps in the studies examined. These gaps are linked to understudied and underexplored spatial areas, insufficient research in terms of the language of publication, a scarce or nonexistent proportion of theoretical material linking strategic management and the achievement of sustainable universities, and a limited evaluation of the institutional reality in Latin American countries, as well as the establishment of long-term impacts on higher education.

6. Conclusion

Achieving a sustainable university is not easy, which is why sustainable development represents the greatest challenge and the best strategy for the sustainability of higher education institutions. Universities worldwide have different strategic approaches to becoming sustainable institutions. These approaches incorporate sustainability into their visions, missions, and objectives; many universities are showing real progress in implementing strategies that will enable them to become sustainable over time.

Sustainable development in university education goes beyond adopting a series of strategies based on their objectives, as a sustainable university must be an example of strategic sustainability planning, integrating it into the daily management of the organization. A review of theoretical and empirical research articles confirmed the importance of sustainable development in the university environment and the relevance of strategic management to this process. All components of sustainable development must be involved in this process: environmental protection, economic performance, the organizational element, and social cohesion.

Taking these components into account in their strategic management will allow universities to seek a competitive advantage and position themselves among other universities. In pursuit of this goal, universities must practice and model sustainability by incorporating SDGs into their operations, planning, facility design, resource management, and academic activities. In addition, they must work together with external actors to establish partnerships that promote social vitality, economic security, and environmental sustainability.

7. Implications for Future Research

This review contributes to the literature with a series of findings related to SD strategies for the sustainability of higher education institutions, a process grounded in strategic management. This evidence offers an opportunity to understand how universities achieve sustainability through effective strategic management. This type of study draws the attention of higher education institutions to the need to focus on environmental protection, economic performance, organizational elements, and social cohesion to achieve solid sustainability.

Based on the above, it is suggested that future research focuses on conducting empirical studies in underexplored contexts with limited resources, where the sustainability challenges faced by universities have been scarcely documented. Similarly, mixed-methods and longitudinal studies are recommended to assess the impact of the Sustainable Development Goals on institutional

transformation through effective strategic management. Furthermore, it is necessary to develop and validate sustainability indicators specific to higher education; these are currently presented ambiguously in the reviewed literature. Finally, it is essential to investigate how institutional governance structures limit the implementation of sustainability, to design and implement strategies best suited to the institution's reality. All of this should be based on strategic planning that leads to a sustainable university.

Further studies are needed to investigate university staff's opinions on the implementation of an institutional framework aimed at achieving true SD. To this end, it is recommended that interviews be conducted with university managers or senior staff involved in the design and implementation of sustainable development plans for their institutions. In these interviews, the key points to be addressed will be the need to improve educational activities, integrate sustainability into curricula, raise student awareness, adapt to local realities, practice value management and long-term financing, and improve the effectiveness of sustainable initiatives, among others.

Declarations

Author Contributions. N.D.M.Ch. and C.E.V.M: Literature review, conceptualization. V.M.Z. and M.A.F: methodology, data analysis. O.M.L.: review-editing and writing, original manuscript preparation. All authors have read and approved the published version of the article.

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Data Availability Statement. All data supporting the findings of this study are derived from published, openly accessible literature and are properly cited in the References section.

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