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Review

Sustainable Entrepreneurship Education: A Systematic Bibliometric Literature Review

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Abstract: The importance of shifting to a sustainable economy, based on new capabilities that would enable us to cope with the current turbulent changes is paramount. Entrepreneurs with sustainable concerns are considered to play a key role in the process by creating innovative, proactive, and risk assumption solutions, with both environmental and economic value. To date, there is no consensus on what capabilities education should provide so to create sustainable entrepreneurs able to cope with sustainability challenges. This piece of literature aimed to identify relevant factors for sustainable entrepreneurship education. Bibliographic databases were searched for documents published between 2012 and June 2023 to categorize central issues discussed in the literature on sustainable entrepreneurship education. The review process identified 61 empirical and non-empirical papers on sustainable entrepreneurship education (SEE). Data analysis revealed diverse models for sustainable entrepreneurship education (SEE) developed for use in both higher education institutions and secondary schools. Future research directions are underscored.

Keywords: entrepreneurship; sustainability; education

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1. Introduction

The transition to a sustainable economy is crucial to recover from the recent catastrophic events, such as the COVID-19 pandemic, climate change, and the current conflict in Eastern Europe [1]. The importance of entrepreneurship in addressing social, environmental, and economic hurdles is central to achieving the Sustainable Development Goals (SDGs) [2]. Entrepreneurship makes a central contribution to sustainable development by creating jobs in SMEs, with poor access to resources, while driving inclusive economic growth and innovation, improving social conditions, and dealing with economic environmental shocks such as the uncertainties of the current food, energy, and financial crises. Also, entrepreneurship remains the last resort for self-employment in the face of the aforementioned crises [3]. Therefore, it urges effective government support by inclusive and sustainable policies for innovation and business-friendly contexts. In the light of sustainability, entrepreneurship policies should thus be coherently carried out, bearing in mind both the sustainability of the results and the benefits to entrepreneurs. Sustainable entrepreneurship (SE) is thus considered central to solving challenges through innovative, proactive, and risk-taking solutions [3].

Despite the growing debate about it, there is still no consensus on the definition of SE [4]. Different disciplines have agreed on different concepts of sustainable development and entrepreneurship [5]. However, SE represents an evolution of entrepreneurship that differs from other concepts of entrepreneurship in that it combines both sustainable and economic goals [6]. While the concept of conventional entrepreneurship focuses on economic value creation [7,8], the literature on SE assumes that SE is a process of seizing opportunities to develop and effectively introduce innovations that simultaneously address

environmental/social concerns and economic value [9–12]. In this vein, an educational framework that brings together the different components of people, environment, and profit, is worthwhile [13].

On the one hand, the recognition that SE is a valuable tool to address issues beyond profit, such as social problems, has fueled the growing interest in educating entrepreneurs about sustainability [3]. On the other hand, higher education institutions play a central role in promoting SE by supporting an SE network and the students working in it [14]. Thus, the main objective of sustainable entrepreneurship education (SEE) is to provide entrepreneurs with the capabilities to seize business opportunities considering sustainability issues [13].

Accordingly, the goal of SEE is to promote capabilities that would enable it to survive in turbulent contexts [4,15], taking into account the specificities of each country [16]. Adopting sustainable behaviors is challenging because it involves culture in terms of values and attitudes [3,17] and also ensuing capabilities, in terms of [18,19] dealing differently with novel situations for which the previous recipe simply no longer works in terms of learning output, which requires education in light of sustainability [18,19].

Despite the increasing interest in SEE, the lack of integration of sustainability aspects in entrepreneurship education is often criticized [20,21]. Therefore, specific learning environments need to be developed to educate sustainable entrepreneurs [22]. The previous literature needs to be explained in terms of the requirements for sustainable entrepreneurship to be considered in SEE. As a result, this study aimed to review the literature on SEE to identify noteworthy and innovative features of SEE. A systematic review was conducted and guided by the research question:

What is known in the literature about education for sustainable entrepreneurship?

The published literature reviews on SEE focused on three areas: learning mechanisms for SEE with respect to innovation [15], the extent to which research on education for sustainable entrepreneurship has addressed the international SDGs in the context of developing countries, social entrepreneurship for sustainable development [23], and research in the academic field on SEE, where advances in higher education for entrepreneurship and sustainable development need to be gathered [24–28]. Some of the literature focuses on sustainable entrepreneurial projects [29], whilst other works focus on the circular economy [30–32]. These strands of literature emphasize the approaches and methods currently used for collaborative and experiential learning [33,34] and case study-based learning for entrepreneurship [35], thus underscoring the interplay of entrepreneurship education processes.

This study is organized into the following sections: (Section 1) introduction; and theoretical background; (Section 2) method, data collection, data analysis and data visualization; (Section 3) discussion; (Section 4) results; (Section 5) conclusion.

Theoretical Background

Nowadays, access to information on differences in people's production and consumption habits has become easier, and new production practices are emerging [1]. In this process, the development of the individual's ability to recognize opportunities for critical thinking and learning by doing turned out to be key [4]. Entrepreneurship is considered to focus on the social environment, analyze needs, recognize opportunities, and produce new ideas by taking risks [9]. Likewise, entrepreneurs need to be aware of these capabilities to be ready for sustainable innovation [10]. Therefore, it is central to accurately evaluate the interaction between sustainability and entrepreneurship [11].

Entrepreneurs are instrumental in sustainable development, to start new businesses, to augment product supply and cope with unemployment, or to provide new products and services, thus building new knowledge and ensuing longer-term disruptive change and profitability [2]. Entrepreneurship provides a unique input to sustainability by strengthening local capabilities towards development and sustainable economic growth. Undoubtedly, several entrepreneurs have demonstrated their role in sustainable development, as seen in developing contexts [3]. Entrepreneurship has the potential to move forward in economic, social, and environmental sustainability as in the case of female entrepreneurship and of

migrant and refugee entrepreneurship that builds integration, employment, quality of life, and economic growth [2].

However, these days, it needs to take into account social and environmental responsibilities, beyond business, as to say, sustainability [2]. Sustainability refers to how the resources that individuals use today should be consumed in a balanced way so that future generations can also use them [3]. In this context, sustainability means keeping the existing economic, social, and environmental functioning of the individual and mitigating environmental depletion. Sustainability can also be expressed as protecting the ecological balance and increasing people's quality of life whilst keeping in mind the available resources [2].

It is therefore paramount to transfer both entrepreneurship and sustainability to future generations through education. Higher levels of knowledge and capabilities are currently correlated with productivity, underlining the weight of investment in people to overenhance economic growth [3]. Thus, education means building the capacity to develop by supporting potential entrepreneurs in understanding the importance of sustainability [3].

Education is central to shaping knowledge and behavior on sustainability; sustainability came up with a new dimension in learning programs, and sustainable education principles can be deemed as key in tackling challenges. Despite traditional education practices not comprehending all sustainability fundamentals, they remain a central mean to promote sustainable values [13]. Likewise, it is posited that the right education at secondary and post-secondary levels increases the number of creative people with entrepreneurial capabilities [7].

This central idea is confirmed by studies on entrepreneurial education (EE), in which it positively enhances entrepreneurial knowledge and capabilities, entrepreneurial attitude, outcomes, and performance [18], mostly in developed contexts [21]. While EE effectiveness can vary depending on the context, EE must be adapted and delivered to distinct environs at different development levels to prompt entrepreneurial behavior and ensuing capabilities [22].

The literature also posits that entrepreneurial education positively influences business performance, aiding in achieving resources [21]. In this way, there is a need to provide EE, mainly in intermediate, developing contexts [16].

Notwithstanding, delivering EE alone, without bearing in mind how it is delivered, cannot by its own accomplish its goals [2]. While traditional education comprehends standardized and widely available knowledge dissemination, from an active teacher to passive students, entrepreneurship education embraces the learner's knowledge and capabilities of high entrepreneurial intentions [3] and critical thinking [13], while centered on individual experimental learning.

Sustainable entrepreneurship education requires, therefore, the summoning of the existing entrepreneurial culture and sustainability, while interplaying with different disciplines (environmental, economic, and social). From this point of view, it is a substantial step to adapt existing educational practices in such a way that they would be able to effectively deliver SEE in varying contexts [16].

The existing literature on education for sustainable entrepreneurship thus provides valuable insights into the intersection of education, sustainability, and entrepreneurship. The literature has explored various aspects of this multidimensional field, shedding light on the integration of sustainable practices within entrepreneurial education. This research intends to delve into the role of educational systems in highlighting the development of skills and competencies crucial for sustainable entrepreneurship—e.g., innovative pedagogical approaches—while fostering a mindset that combines business acumen with a commitment to environmental and social responsibility. The underlying importance of the theme is developed below in detail, following the main aim of this piece of literature to find out what is known in the literature about education for sustainable entrepreneurship.

2. Method

For our research approach, we carried out an SBLR analysis of resources in the Scopus database. The research comprehended the following phases: research design, data collection, data analysis, and visualization of the results. The study was conducted to identify relevant pieces of literature, gathering data for a final report on the relevant factors for sustainable entrepreneurship education, while synthesizing existing knowledge related to the research problem. Increasing emphasis on the SEE has led also to growing research on sustainable development. As mentioned above, the purpose of this paper was to provide an SBLR on the central research question, namely, which issues are principal for sustainable entrepreneurship education. This methodology ensured that the review would be thorough, verifiable, and replicable, while providing answers to specific research questions [36–39] (Table 1). To identify potential issues, bibliometric analysis can be used to understand how organizations have adopted the methodology and how they identify potential challenges. It is deemed that bibliometric analyses of citations and co-citations rely on quantitative frequency, considering that citations embody a reliable interaction between scientific researchers and research institutions. The SBLR process is divided into three phases and six steps (Table 1), as proposed by Rosário et al. [38] and Rosário and Dias [39].

Table 1. SBLR process.

Phase	Step	Description
Exploration	Step 1	formulating the research problem
	Step 2	searching for the appropriate literature
	Step 3	critical appraisal of the selected studies
	Step 4	data synthesis from individual sources
Interpretation	Step 5	reporting findings and recommendations
Communication	Step 6	presentation of the SBLR report

Source: own elaboration.

Such a path is pursued to identify a particular theme, the related set of publications, and the authors of the ensuing journals. Concerning the building and visualization of bibliometric maps, the analysis means we adopted was the VOSviewer, which, in contrast with other bibliometric software tools (e.g., Biblioshiny and CiteSpace), relies upon wide bibliometric maps that are easier to explain, manage, and display. Those characteristics, in addition to its open-source access, turn VOSviewer into one of the most widely used software for this kind of bibliometric analysis.

Hence, in a more disaggregated way, the research model we posited to attain the proposed research goal, already stated above, is illustrated in detail in Figure 1:

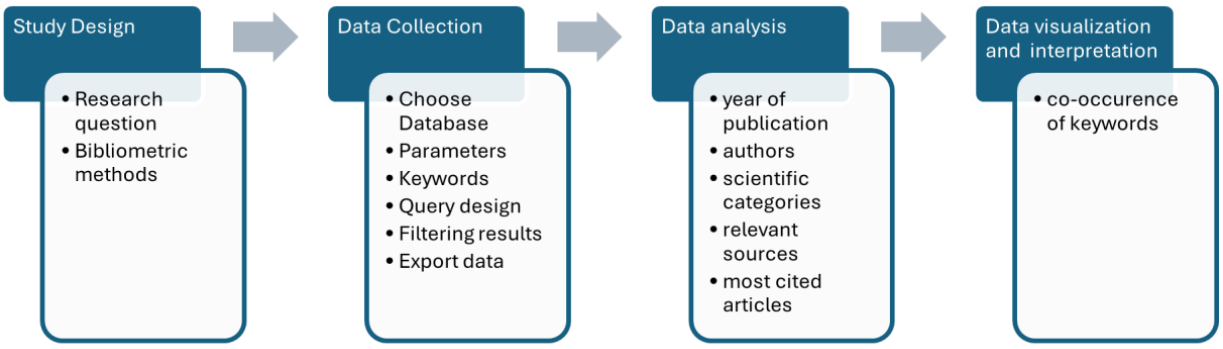

Figure 1. The research model of literature mapping. Source: own elaboration.

2.1. Data Collection

We chose to select a relevant academic database, set the bibliometric search parameters, select the keywords, design the bibliometric database queries, and establish the criteria for filtering the results (Figure 1). It was assumed that the ensuing results would be exported to be analyzed, interpreted, and displayed.

2.1.1. Setting the Academic Database and Other Sources of Documentation

The literature search process began with identifying the appropriate database, which in this case was Scopus. Scopus, the most encompassing and extensive peer-reviewed article database of academia serves as a database for indexed scientific and/or academic documents and, thus, was chosen to carry out this SBLR. It is known for its broad coverage of journals across diverse disciplines, offering a comprehensive view of academic output beyond traditional journal articles, while being suitable for interdisciplinary research, which is the case. On the other hand, Scopus provides robust bibliometric analysis tools, which makes it valuable for researchers interested in citation analysis, H-index calculation, and other bibliometric indicators. Finally, despite a bias towards English, Scopus indexes publications from around the world, providing a more global perspective than other databases and representing the most important indexing database for academic/scientific documents. Ultimately, the choice of this database depended upon the specific global and interdisciplinary needs of this research.

Nevertheless, we believe that this study is limited in this sense, as it was anchored in such methodological criteria while excluding other academic and scientific sources.

2.1.2. Setting the Search Parameters

The search parameters employed embraced the thematic area, the language of publication, the geographical area, the period of publication, and the type of literature used. We principally searched for literature in English on the topic, with economic, educational, and environmental nuances. Concerning the time scope of the publications, it ranged from 2012 to 2023. Peer-reviewed academic and/or scientific publications through June 2023 were included in the literature search.

2.1.3. Setting Keywords and Designing the Queries

The selection of the keywords implies a paramount phase in the process of a bibliometric analysis of a research theme, which in the case, was sustainable entrepreneurship education. The drive underlying the selection of words relied upon the specific conceptualization of sustainable entrepreneurship education, that is, 'to provide entrepreneurs with capabilities to seize business opportunities considering sustainability issues' [13], in which people, environment, and education interplay, along with innovation and economic value [9–12]. Such conceptualization drove to the identification of the following keywords: "education", "Business, Management and Accounting", and "Sustainability".

The initial keyword "education" was used, providing 2,460,170 document results. We included the first inclusion criterion "entrepreneurship" and obtained 12,395 documents; the search was also limited to the subject area "Business, Management and Accounting" to further narrow down the documents to 5609 documents, and finally the exact keyword "Sustainability" provided 59 documents. Such criteria were based on the assumption that an entrepreneur manages a business, such as a startup, with ensuing risks, and accounting can help them to create and manage detailed budgets to better plan strategies and act.

As a result, we designed and generated the queries, and 59 documentary results were identified (n = 59), which are summarized in Table 2.

Table 2. Screening methodology.

Database Scopus	Screening	Publications
Meta-Search	Keyword: education	2,460,170
First Inclusion Criterion	Keywords: education, entrepreneurship	12,395
Second Inclusion Criterion	Keywords: education, entrepreneurship Subject area: business, management and accounting	5609
Screening	Keywords: education, entrepreneurship Subject area: business, management and accounting Exact keyword: sustainability Published until June 2023	59

Source: own elaboration.

2.1.4. Refining by Filtering the Initial Results

To identify, collect, analyze, and report on the different documents, as proposed by Rosário and Raimundo [37], Rosário et al. [38], and Rosário and Dias [39], content and thematic analysis techniques were used. To maintain an accurate mapping, filtering the articles selected above, the aforementioned results from the generated queries were segmented into distinct types of literature. The 59 academic and/or scientific documents included in the Scopus index were then examined in a narrative and bibliometric way to scrutinize the content and possibly derive common themes that directly addressed the research question [36–39].

2.2. Data Analysis

In the light of the initial research question, this phase embraced the analysis of the evolution of the research interest in the subject over time, the principal research areas in which the topic has been researched, the countries where the theme has been more broadly discussed, the principal publications on the subject, and the central papers and their authors on the theme of sustainable entrepreneurship education. We set the analysis of the data from the above data collection outcomes till this point into the following sections: year of publication, scientific category, authors' countries, most relevant sources, and most cited authors and articles.

2.2.1. Year of Publication

This section intends to offer an overview of the evolution of research on the examined topic between 2012 and 2023. It is worthwhile, as it will allow us to replicate the research further, from 2023 on. Peer-reviewed articles on the subject were screened between 2012 and 2023. Over the period under review, 2021 was the year with the largest number of peer-reviewed articles on the subject, with 11 publications. Figure 2 shows the number of peer-reviewed publications published in the period 2012–2023. We can say that between 2012 and June 2023, there was a growing interest in research on sustainability education and entrepreneurship.

2.2.2. Scientific Categories

The publications were sorted out as follows: Emerald *Emerging Markets Case Studies* (7 publications); *Proceedings of the European Conference on Innovation and Entrepreneurship*, Ecie (4 publications); *Education and Training*; *Entrepreneurship Education and Pedagogy*; *International Journal of Innovation And Learning*; *Journal of Cleaner Production*; *Journal of Entrepreneurship in Emerging Economies* (2 publications each); and the rest of the journals, with 1 publication each. Of the 59 selected documents, 44 were articles; 7 were conference papers; 5 were book chapters; and 3 were reviews. Moreover, we filtered the results from this refining phase in the light of the language of publication, which was English.

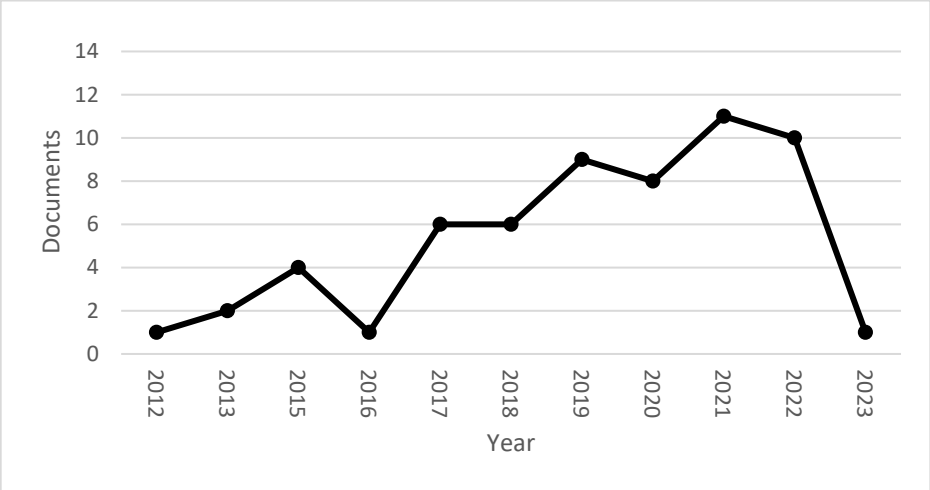

Figure 2. Documents by year. Source: own elaboration.

2.2.3. Corresponding Authors' Countries

Figure 3 shows that among the countries with the highest levels of scientific output in related fields, India and the USA had the most publications.

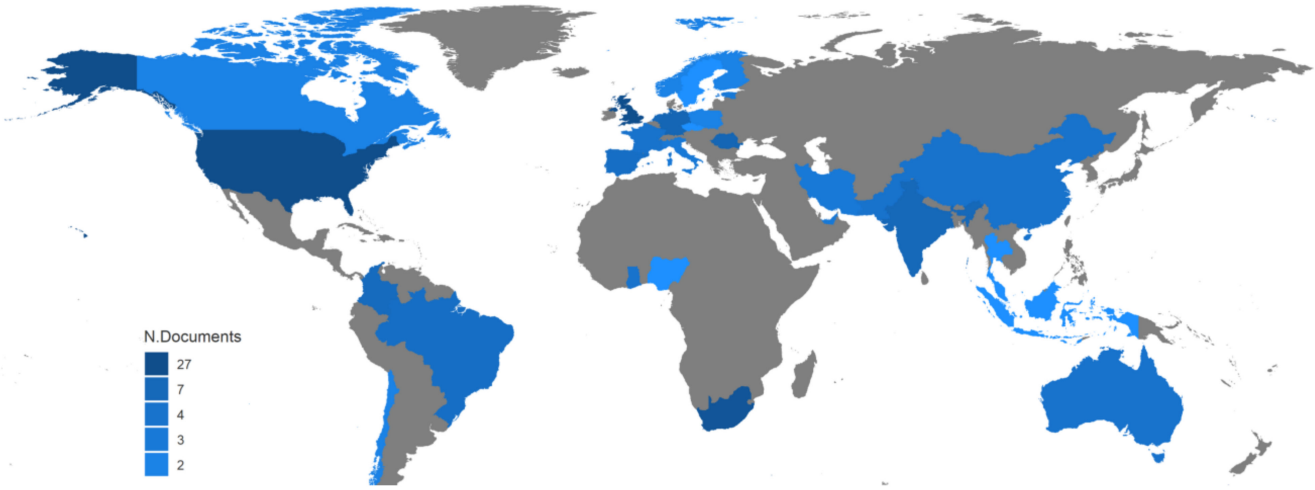

Figure 3. Scientific production by country. Source: own elaboration.

The 10 countries depicted above provided the highest scientific output on sustainable entrepreneurship education, as follows: India (35); USA (35); Germany (26); UK (14); Australia (8); Portugal (8); China (5); Malaysia (5); South Africa (5); and Austria (4).

2.2.4. The Most Relevant Sources

As explained, throughout the reading of this SBLR, the chosen criteria of selection and filtering of the results contributed to identifying the most significant journals in which articles on the subject of sustainable entrepreneurship education were published. To provide an outlook of the journals according to their involvement in the topic, we compiled a list of the journals in Scopus with more publications on the subject, combined with country ranking, quartile, and H-index. The Scimago Journal and Country Rank (SJR), the top quartile, and the H-index by publication are reported in Table 3.

The *Journal of Technological Forecasting and Social Change* reported an SJR value of 2.340, was placed in Q1, and had an H-index of 134. There was a total of 14 journals in Q1, 10 journals in Q2, 5 journals in Q3, and 1 journal in Q4. The journals in the best quartile, Q1, represented 42% of the 33 journal titles, those in the quartile Q2 represented 30%, those in

Q3 represented 15%, those in Q4 represented 3%, and finally, 14 publications without data represented 42% of the 33 journal titles.

As shown in Table 3, the vast majority of articles on education entrepreneurship sustainability ranked in the best quartile Q1.

Table 3. Scimago journal and country rank impact factor.

Title	SJR	Best Quartile	H-Index
Technological Forecasting and Social Change	2.340	Q1	134
Business Strategy and The Environment	2.240	Q1	115
Journal of Cleaner Production	1.920	Q1	232
Entrepreneurship and Regional Development	1.770	Q1	96
Organization and Environment	1.620	Q1	64
Accounting Auditing and Accountability Journal	1.470	Q1	105
Labour Economics	1.200	Q1	79
Global Journal of Flexible Systems Management	1.180	Q1	37
Management Decision	1.160	Q1	106
Journal of Competitiveness	0.930	Q1	12
Corporate Governance Bingley	0.850	Q1	64
International Journal of Management Education	0.820	Q1	34
Journal of Management Education	0.640	Q2	51
Education and Training	0.610	Q2	71
British Food Journal	0.610	Q2	86
Journal of Entrepreneurship in Emerging Economies	0.580	Q1	21
International Journal of Entrepreneurial Venturing	0.510	Q2	20
Journal of Small Business and Entrepreneurship	0.510	Q2	33
Journal of Business Economics and Management	0.490	Q2	41
Journal of Management History	0.490	Q1	22
Administrative Sciences	0.480	Q2	23
Worldwide Hospitality and Tourism Themes	0.390	Q2	24
International Journal of Innovation and Sustainable Development	0.280	Q3	23
International Journal of Innovation and Learning	0.240	Q3	27
Journal of Technology Management and Innovation	0.240	Q3	30
Problems and Perspectives in Management	0.240	Q2	23
Springer Proceedings in Business and Economics	0.240	Q2	23
Emerald Emerging Markets Case Studies	0.230	Q3	7
Transylvanian Review of Administrative Sciences	0.220	Q3	18
Universidad Y Sociedad	0.130	Q4	4
Proceedings of the European Conference on Innovation and Entrepreneurship, Ecie	0	- *	6
2021 IEEE International Conference on Engineering Technology and Innovation ICE, Itmc 2021 Proceedings	0	- *	7
Contemporary Issues in Entrepreneurship Research	0	- *	8
Corporate Ownership and Control	0	- *	21
Entrepreneurship and Sustainability Issues	0	- *	30
Entrepreneurship Education and Pedagogy	- *	- *	- *

Table 3. *Cont.*

Title	SJR	Best Quartile	H-Index
Entrepreneurship Education Opportunities Challenges and Future Directions	- *	- *	- *
Green Behavior and Corporate Social Responsibility in Asia	- *	- *	- *
Humanistic Management Journal	- *	- *	- *
Journal of the International Council for Small Business	- *	- *	- *
New England Journal of Entrepreneurship	- *	- *	- *
Oxford Handbook of Business and the Natural Environment	- *	- *	- *
Strategies and Best Practices in Social Innovation an Institutional Perspective	- *	- *	- *
Triple Helix	- *	- *	- *

Note: * data not available. Source: own elaboration.

2.2.5. Most Cited Articles and Authors

The subject areas covered by the 59 scientific articles were: Business, Management, and Accounting (59); Social Sciences (24); Economics, Econometrics, and Finance (22); Environmental Science (6); Energy (4); Decision Sciences (3); Engineering (3); and Agricultural and Biological Sciences; Arts and Humanities; Computer Science; Mathematics; and Psychology (1).

The most quoted article was "Unlocking value for a circular economy through 3D printing: A research agenda" by Despeisse et al. [30] with 249 citations, published in the *Journal of the Academy of Marketing Science*, with a value of 2.340 for SJR, being placed in the best quartile (Q1), and with an H-index of 134. This article "proposes a research agenda to determine enablers and barriers for 3DP to achieve a CE" [30].

Figure 4 allows us to examine the development of the number of citations of articles published between 2017 and 2023. The number of citations showed a net positive growth with an R2 of 31% for the 2017–2023 period, with a peak of 231 citations in 2022.

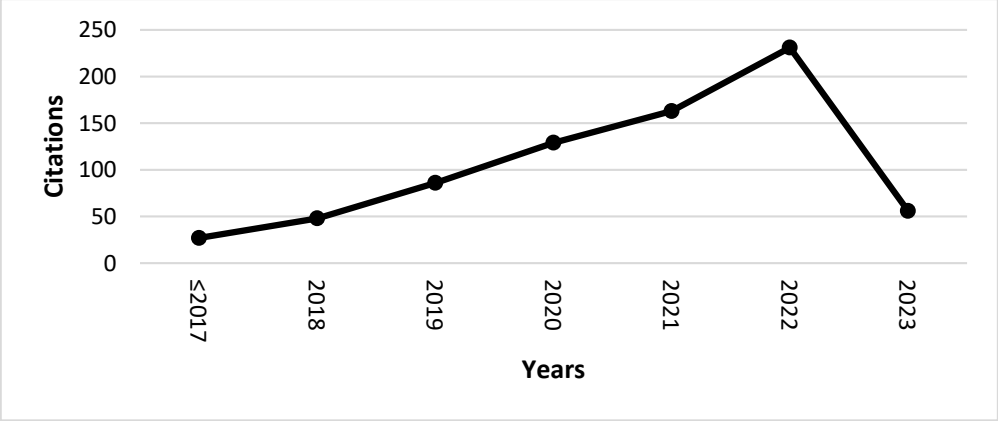

Figure 4. Evolution of the number of citations between 2017 and 2023. Source: own elaboration.

Based on the largest number of included articles having at least the same number of citations, the H-index was used to determine the authors' productivity and influence of the published work. Eleven of the papers considered for the H-index received at least 11 citations.

The citations of all academic and/or scientific papers from 2017 to June 2023 are listed in Appendix A, Table A1, reporting a total of 740 citations. Of the 59 papers, 10 were not cited. From 2017 to June 2023, 2022 documents were self-cited 231 times. Appendix B, Table A2, reports the self-quotation of documents until 2023. For the 59 articles, there were 56 self-quotations. "Theorizing the Triple Helix Model: Past, Present, and. . ." was self-cited 12 times.

2.3. Data Visualization

In the vein of the research model suggested for this piece of literature [37,38], data visualization, interpretation, and reporting represented the final phase of data analysis, before the discussion of the results. This step intended to identify common trends and principal sets of co-related patterns concerning a network of keywords. Therefore, in Figure 5, a bibliometric analysis was carried out to analyze and identify indicators of the dynamics and evolution of scientific information using the main keywords. The analysis of the bibliometric research results using the scientific software VOSviewer aimed to identify the main keywords of research in sustainable entrepreneurial education.

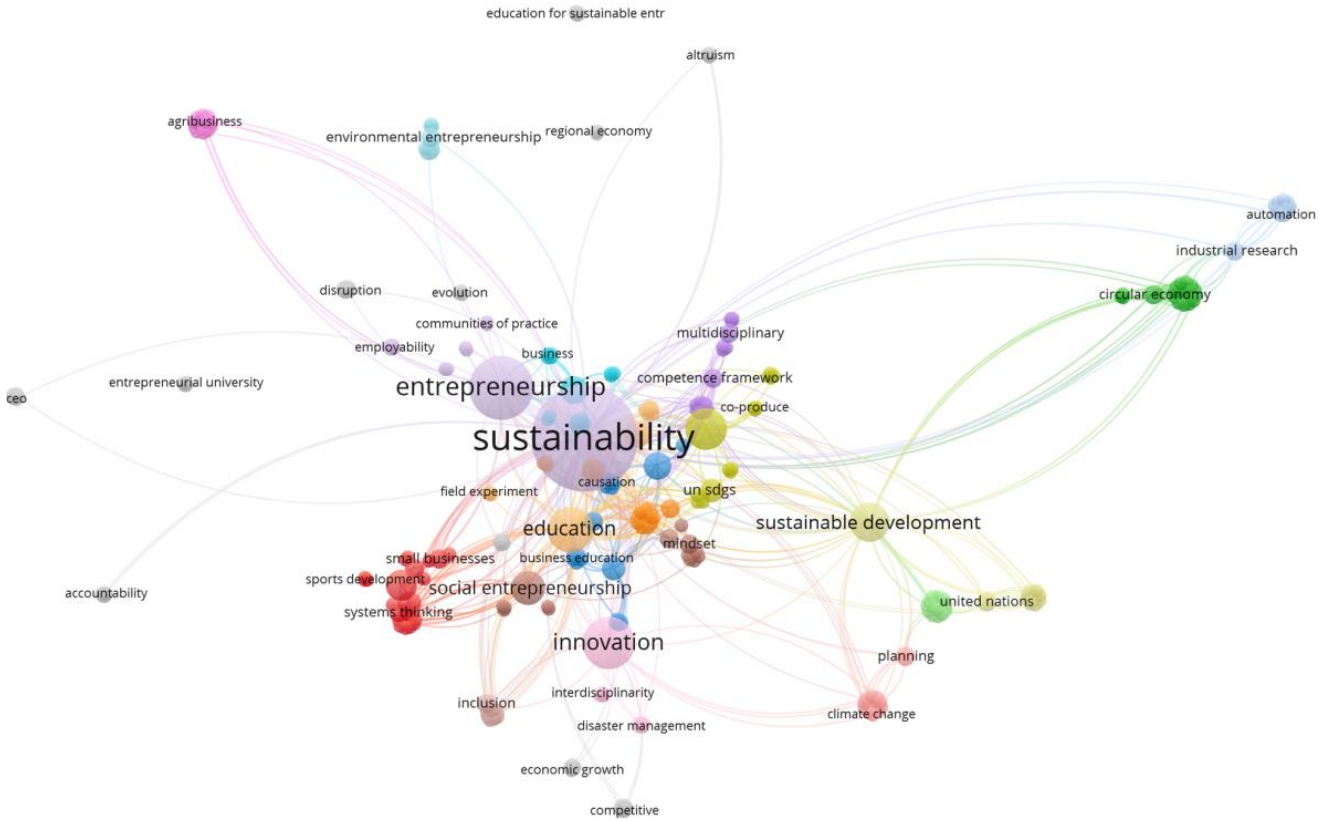

Figure 5. Network of all keywords.

The linked keywords are shown in Figure 5, which makes it possible to clarify the network of keywords that appeared together/linked in each scientific article, to know the topics analyzed by research, and to identify future research trends. This figure shows clearly most of the network nodes. The size of a node represents the occurrence of that keyword, that is, the number of occurrences of that keyword. The connections between the nodes indicate the co-occurrence of keywords, and the thickness of each connection indicates the frequency of the co-occurrence of those keywords. Hence, the larger the node, the more frequent the occurrence of that keyword, whilst the thicker the connection between nodes, the more frequent the simultaneous occurrence of those keywords. Each color represents a thematic cluster, and both the nodes and the links in a given cluster can be used to explain its subject (nodes). In addition, it also displays the relationships (links) between the topics (nodes).

The Vosviewer Keyword Development Map outcomes were therefore divided into four main clusters under the umbrella theme of sustainable entrepreneurship: education, sustainable development, innovation, and social entrepreneurship.

In sum, the rationale of the methodology applied here was crucial to ensure the reliability and validity of the review process. Following, are key fundamentals that contributed to the coherence of the methodology:

(a) The objectives and research questions that the SBLR intended to address were clearly defined as 'What is known in the literature about education for sustainable entrepreneurship?', providing a structure for the entire review process.
(b) The criteria used for study inclusion were indicated, focusing on Scopus, the most embracing peer-reviewed article database for academic publications.
(c) The search strategy to identify important studies was explained in detail, beginning with a search of Scopus to identify correlated pieces of literature from the keywords "education", "entrepreneurship", "Business, Management and Accounting", and "Sustainability".

Such search strategy was exhaustively described, with full transparency, which is central for the reproducibility of this review.

The process of data extraction from the selected studies is displayed in Table 2. A screening methodology was adopted to display the synthesized results.

The limitations of this study are discussed below and include the exclusion of other academic and scientific sources. Concerning this, Scopus may not cover all journals and publications, especially those in niche areas or from smaller publishers, which may result in relevant research being omitted. Also, the selection criteria for indexing in Scopus may introduce a bias by favoring more established or commercially successful journals over others; the likely delay between publication and inclusion in Scopus should also be considered.

To summarize, the hereby chosen methodology ensured transparency and the availability of sufficient details for other researchers wishing to reproduce this review. In addition, by addressing these elements, the methodology achieved coherence and increased the overall reliability and validity of the results. We consider, therefore, that the guidelines established for systematic reviews and meta-analyses were followed, resulting in a high methodological standard, further discussed below.

3. Discussion

From the above-mentioned analysis, diverse, major interesting points that should be discussed emerged. Entrepreneurship, implying starting up and running a business, involves business administration and management capabilities, ranging from accounting to strategy and leadership skills [40]. Often, entrepreneurs and business executives have overlapping competencies in both innovating and making a profit, and in this way, those distinct entrepreneurial competencies need to be addressed through a sustainable lens, as shown below.

3.1. Education

There is a vast array of academic approaches to entrepreneurship. The increasing number of academic courses, faculties, and journals on entrepreneurship shows that this is a growing educational subject and scientific branch related to sustainable entrepreneurial practices [40]. Educational efforts to promote entrepreneurship now exist in educational institutions ranging from elementary school to the third cycle of study [41]. This widespread acceptance is fueled by the notion that entrepreneurship is an engine for the economic and social development [42].

To date, there is no single definition of entrepreneurship [4]. This heterogeneity is also reflected in research on entrepreneurship education, a discipline that spans several fields [4] and encompasses different definitions. On one side of the continuum stands European research, which is guided by a broader definition of entrepreneurship, according to which, entrepreneurship is about the personal development of an entrepreneurial mindset and of life skills [7]. On the other side of the continuum stands North American research, which is oriented toward a narrower definition of entrepreneurship that only embraces business creation [22]. Considering these different perspectives, the term "entrepreneurship education" was used in this paper in a broader sense [24].

Also, current research on entrepreneurship education is moving away from the narrow startup perspective [41], which focuses on a target group of students interested in

entrepreneurial careers [7], to a broader perspective that targets all students to foster their entrepreneurial skills, regardless of the type of their future employment (self-employment or employment by others) [41]. In the context of the broader entrepreneurial perspective, entrepreneurial education is not limited to business programs and can be integrated across a curriculum [7].

Furthermore, pedagogy in entrepreneurial education, like pedagogy in general, has evolved from traditional teacher-directed instructional approaches to learner-centered, constructivist approaches [22]. According to some works in the literature, today, pedagogy in entrepreneurial education research is mainly influenced by six theories and approaches: constructivist philosophy of education [22], experiential learning theory [35], situated learning [22], action learning [35], and problem-based learning [15]. Consequently, the theoretical framework of modern entrepreneurial education is experiential. The use of these modern experiential approaches enables the promotion of learners' innovativeness and creativity [35], whereas empirical findings on entrepreneurial education also depend on the age and gender of the learners [43].

The content of entrepreneurship education has therefore evolved from learning about entrepreneurship to learning in or through the experience of entrepreneurship [22,23,35]. Traditional entrepreneurship education content related to the different stages of the entrepreneurial process ranges from developing ideas or discovering opportunities to writing business plans, to starting a business and managing the associated activities [44], whilst the current methodological contributions to the design of entrepreneurial education include, for example, effectuation [3] or startup processes [22]. Moreover, the global homogeneity of the methods used, such as business models [1,13,32] and startup pitches [44], has been referred to as a trivialization of entrepreneurship education and criticized as a lack of variation, considering aspects such as gender or cultural background [43].

Current research on entrepreneurship education increasingly focuses not only on the individual but also on the environment and on the individual's interaction with it [15,40,42]. In the current context of successive crises (e.g., the pandemic), the question of the ethical responsibility of entrepreneurs and entrepreneurial education [35] is gaining significance. Several streams of literature have emerged in this regard.

First, several problem-solving case studies were developed to identify the driving factors for developing a sustainability-focused entrepreneurial intent and to promote the adoption of sustainable practices by entrepreneurs [40] and to identify the characteristics of a social entrepreneur and to determine the leadership skills needed by a social entrepreneur during the life cycle of a social enterprise, while developing insights to examine the unique challenges in the startup phase of a social enterprise and to improve the understanding of the interrelationship between mission focus and challenges in achieving financial sustainability [22]. Students are introduced to the key characteristics of social entrepreneurship through case studies that allow them to move from understanding and applying entrepreneurship to exploring how it works, gaining insights into the complexities of working in a complex environment [27]. Business models of innovation for sustainability are also introduced, which expand the value proposition to include social, environmental, and multi-stakeholder partnerships in times of crisis, expecting students to analyze concepts through multiple lenses [1]. Entrepreneurship education can therefore contribute to social and economic prosperity by supporting the building of new skills, which requires a shift from teaching as explaining to teaching as doing, from imparting knowledge to building knowledge, from teacher-centered to learner-centered learning, and from didactic instruction to project- and problem-based learning in authentic scientific, social, and technological contexts [15].

Second, active innovation methods, such as the use of the aforementioned case studies and design thinking, enable the formulation of different alternative business models, for instance, bottled water, while simultaneously achieving financial outcomes and good environmental and social outcomes, which is in line with the ultimate purpose of the business, combined with the concepts of sustainability, entrepreneurship, and innovative educa-

tion [22]. Moreover, by emphasizing sustainability, ethics, and social entrepreneurship in education through both experiential learning and cross-national student collaboration, students are encouraged to address social and environmental issues in complex business situations [35], shifting from the traditional for-profit perspective to sustainable entrepreneurship. This allows the incorporation of sustainability into academic curricula and consulting activities [24], which triggers a wide-open systemic thinking that is particularly fruitful for students for developing their complex problem-solving skills, thereby strengthening management education [18]. Lastly, children's education becomes also invigorated by field experimenting, while participating in entrepreneurship education programs and finding that monetary rewards are associated with sustainable behaviors [45].

Third, the institutional design of business courses enables students to shape skills and help students develop a sense of self-efficacy, convincing them that they can make a difference through entrepreneurship, while enabling them to understand that business can be a way to practice collaborative innovation [34]. Including the topic of sustainability in the entrepreneurship curricula, allows us to keep in mind that entrepreneurs can help solve sustainability problems [7]. Likewise, the curricula should include economic, social, and environmental sustainability for the community to demonstrate the importance of an entrepreneurial mindset, while integrating multidisciplinary knowledge. Developing relevant entrepreneurship modules in the education ecosystem focused on soft skills addresses the challenges for both educators and policymakers [41]. Furthermore, design thinking principles are particularly useful for educators to facilitate student learning in the development of social ventures, i.e., innovation, impact, and sustainability [21].

Fourth, it is paramount to promote a sustainable entrepreneurial vision by incorporating new values in teaching/learning from potential entrepreneurs. Once the idea to create a for-profit, non-profit, or hybrid organization is born, it is crucial to include respect for the environment and social problems [23]. In this way, social entrepreneurship, the need for social enterprise management, the interplay with governance decisions, and the application of theory-based frameworks to make optimal decisions are enhanced [33]. Moreover, the diversity of the social contexts will enrich the individual experiences related to sustainability, in which SEE is proposed as a whole-society response through participatory sustainability [42] from either nascent entrepreneurs or established entrepreneurs [20].

Fifth, those teaching methods should be tested in different contexts, for instance, combining the interplay between the constructs of innovation, environmental sustainability, and entrepreneurship, by students of higher educational institutions in developing countries. It is commonly accepted that teaching innovation is key to promoting entrepreneurship among college students [28], either by incorporating innovation into real-life business constraints, or by an understanding of the informal trade-offs involved [45,46]. Moreover, such innovation can be disseminated through communities of practice, as SEE can positively impact the behaviors and practices of sustainability educators, turning them into agents of collaboration and interaction [17].

Finally, to over-enhance sustainability, some authors suggest adopting key strategies from technology companies that could be replicated at the college level. For instance, continued investment in faculty development that might lead to a culture of entrepreneurship [11], entrepreneurial leadership in tech startups [11,44], startup's matrix of strengths, weaknesses, threats, and resulting opportunities, a competitive advantage through the application of Porter's five forces model, and target market analysis using segmentation, targeting, and positioning principles [4].

In sum, in terms of education, an integrated interdisciplinary tool is required to develop an active, responsible, and at the same time sustainable, citizen orientation in the educational system [12], although large gaps remain in skills and knowledge related to ethics and creative problem solving [26]. Sustainable entrepreneurship education should combine distinct learning approaches, pedagogical methods, and teaching tools for sustainable entrepreneurship education that would enable students to act entrepreneurially in a sustainable way [47].

3.2. Innovation

These days, it is clear that higher economic prosperity and lower pollution are associated with innovation, underscoring the importance of innovation for sustainability. Some of the literature papers highlight the positive impact of demographic trends on pollution reduction and economic expansion toward sustainable development, while emphasizing the need for all people to contribute to economic prosperity and to actively participate in countries' environmental plans [9]. These studies thus address the interplay of innovation with education for sustainable entrepreneurship in a variety of areas, from smart cities, entrepreneurial skills, and behaviors, for instance, to a knowledge society, socioeconomic ecosystems, and innovative educational frameworks.

First, some studies address education on smart cities by summarizing the different essential dimensions in different educational programs, projects, and initiatives that cities around the world have implemented, focusing on varying issues that range from sustainable social innovation to economic growth, environmental protection, quality of life, participatory governance, community development, urban mobility, and tourism services [48].

Second, in the vein of smart cities, the triple helix of interactions between academia, industry, and government has been widened beyond cities, underscoring the enhanced role of academia in the transition from an industrial to an innovative entrepreneurial society as a whole, through a model that is at once analytical and normative, theoretical and practical, whilst incorporating diverse social concepts, e.g., Schumpeter's organizational entrepreneurship and social networks, into its framework [14]. Therefore, an attempt has been made to develop innovation-oriented courses that integrate these elements of sustainability into an innovation-driven ecosystem, while promoting a roadmap for an innovative and sustainable society [49].

Third, the literature also explores the impact of causal and effective behaviors on the sustainability orientation of established companies, as, if it negatively impacts sustainability orientation, it could affect as well a company's ability to create sustainability value. Effective behaviors could thus encourage sustainable entrepreneurs/educators to contend that those behaviors are key elements of sustainable entrepreneurship education [3]. Likewise, it is appropriate for students to reflect on their entrepreneurial attitudes, such as whether they possess the 'empathy' associated with green entrepreneurship or, conversely, whether they need to develop it through entrepreneurial education [50].

Fourth, to support those behaviors, innovation is needed in terms of new methods related to online and offline education, which can be achieved through new sustainable solutions for faculty and students in the markets and the presentation of innovative combinations of digital artifacts and infrastructures [51]. Innovative combinations related to accounting and sustainability, for instance, can also be achieved to bring about sustainable change both in business and in academia [44,52]. For example, improving owner/manager education and training would impact the integration of accounting practices in an innovative and sustainable strategy for SMEs, along with technology adoption [8,53].

Finally, transformative enterprise education (TrEE) is proposed to better enable students to produce ethical change and to improve innovative teaching and learning. It emphasizes the time needed to challenge the prevailing ideas while creating room for experimentation. Additionally, it places entrepreneurship in a broader context through collaborative learning among students, teachers, entrepreneurs, and various other stakeholders [10]. As a result, innovative solutions will lead to an innovative framework for higher education institutions to become competitive by developing their products and services while providing high value to their customers [25]. Ensuing entrepreneurs and correspondent startups will present innovative technological, learning, and development capabilities and, as a result, will pursue as well sustainable development with innovative competitive advantage.

3.3. SDG

The key issues of sustainable entrepreneurship education are fundamental issues for sustainable development at the local and global levels. In turn, the 17 SDGs relevant to sustainable development were grouped by UNESCO into four key areas: climate change, sustainable consumption and production, biodiversity, and disaster risk reduction [2]. Almost all students in OECD member countries attend schools where these and other issues such as pollution and environmental degradation are part of the curriculum [29]. The Sustainable Development Goals (SDGs) include a total of 169 interrelated environmental, social, and economic goals that address sustainability concerns such as natural resource depletion, pollution, and social injustice. Entrepreneurship and Sustainable Development have now been included in Goal 4, "Quality Education", which is considered an essential element to achieve all goals [16]. The importance of entrepreneurship education addressing climate change or the reduction of inequalities, while contributing to the implementation of the SDGs, is therefore internationally recognized [2].

Subsequently, the literature on sustainable entrepreneurial education (SEE) has focused on three areas: teaching and learning methods and approaches used in tertiary education for sustainable entrepreneurship, the extent to which entrepreneurship education research is focused on the international SDGs, and the structure of ongoing research in the academic field of SEE. In this regard, the extent to which entrepreneurial education research addresses multiple SDGs, such as responsible consumption and production, is key. In this case, the entrepreneurial education impact has been hindered, for example, by unemployment, a critical condition to the overcoming of the cycle of poverty, the unavailability of entrepreneurial education, the lack of experiential teaching and learning approaches, or the limited use of educational technology [16].

First, SDGs in Africa and developing countries is an emerging field of study that is divided into two areas of SDG promotion: (1) business growth, entrepreneurship, and poverty alleviation, (2) renewable energy, tourism, and ICT [2]. These studies also focus primarily on new, necessary measures of environmental and social thinking towards creative and innovative solutions needed to achieve the SDGs (UN), global trends in addressing social and environmental problems through SDG projects (UN), and examining these projects for 'innovation' and scalability [29]

Second, another stream of the literature on what constitutes a "social purpose" reflects on the 17 SDGs, the global social entrepreneurship and social innovation movement, ensuing impacts, and indigenous wisdom to develop an improved version of the course content. Also, the issues of social responsibility, social innovation, and social entrepreneurship are emphasized [35]. Such a stream of the literature enhances the need to expand collaborative networks between countries and institutions, regarding entrepreneurship and sustainability. At the same time, guidelines for teaching business and management concerning the SDGs are proposed, particularly for college–business relations, job creation, and entrepreneurship, while considering the impact of universities on society. This highlights the role that higher education and business education play in achieving the SDGs by mobilizing their leaders, professors, and students through integrated participation [16].

Third, some of the studies in the literature aim to gain insights into the extent to which entrepreneurs are committed to the United Nations (UN) SDGs by analyzing the core values of entrepreneurs, comparing them to the UN values, showing that entrepreneurs are committed to sustainability and that the values of education and health are paramount [14]. Similarly, they explore the extent to which the current wave of entrepreneurship can contribute to achieving the SDGs, showing that improving life expectancy and reducing inequality have influenced entrepreneurial outcomes. It is also shown that higher education promotes income rather than innovation, while investment in research and development promotes entrepreneurship [20].

In summary, these studies examining the entrepreneurial behaviors of sustainable entrepreneurs underscore the importance of early exposure to the United Nations Sustainable Development Goals (SDGs), the positive role of an entrepreneurial education program,

and the critical role of a supportive entrepreneurial ecosystem that includes diverse and engaged students as well as supportive faculty and mentors committed to meeting the SDGs [21].

3.4. Sustainable Context of Social Entrepreneurship

Despite the universal characteristics of the SDGs, the entrepreneurship environment varies with the context, whereas each context has its idiosyncrasies. In disadvantaged contexts, the interest in concepts such as social entrepreneurship (SE), which is increasingly part of entrepreneurship education, is mounting [21,54]. Likewise, social entrepreneurship is a factor of innovation and change that drives human development [5], which makes it a central issue for different strands of the literature that address the context of social entrepreneurship in different ways.

First, some of the studies conclude that entrepreneurship has failed to address the social sustainability issue because its focus is on "making as much money as possible" and because it fails to recognize that the planet is a system. The successful solution should integrate the traditional approaches to entrepreneurship to create a triple-bottom-line sustainable business model that balances profit, planet, and people [13]. This approach should also be tested through education and training in different environments [13].

Second, the literature suggests that there are three main categories of drivers for entrepreneurial action, i.e., economic incentives, personal motivations, and institutional context, with a positive relationship between sustainability orientation and entrepreneurial action that decreases as the participants gain more entrepreneurial education. This suggests the need to reflect on the social environment when studying sustainable entrepreneurship [12,55]. Concerning green entrepreneurship, for example, the two moderating roles of collectivism and altruism are studied in the distinct contexts of developing countries [40].

Third, other studies overstate the challenges posed by diverse contexts, especially the varying marketing challenges faced by incubators in some countries. Identifying and highlighting the potential disadvantages for 'incubators" can help them succeed or face competitive challenges once they leave their education programs. Some of the required skills are explored, i.e., strategic marketing intelligence, to overcome the business challenges and remain sustainable [46].

Fourth, part of the literature focuses on specific learning contexts of human and social capital that influence students' entrepreneurial attitude (EA), while the establishment of academic college teams, groups, networks, and associations could foster opportunities to develop networking between students and entrepreneurs [5]. Equally, the relevance of various CEO context characteristics, such as age and tenure, are explored as important elements influencing leaders in sustainable business models [43]. Also, the context interplay between entrepreneurial education and family business impacts the ensuing competitive advantages [18].

In summary, both the sustainability perspective and the economic–cultural mediations determine potential factors for a model to promote entrepreneurship, in the light of the social economy and a territorial approach [12]. It is therefore crucial to develop the entrepreneurial skills demanded by the labor market through the education offered by universities and thus improve training and increase employment opportunities in a given context [30].

3.5. Circular Economy

The circular economy can be seen as key to a new approach to improving the sustainability of entrepreneurship. Three factors, which are closely related, can significantly influence the development of a new circular enterprise [30,56–58].

First, there is principally a purpose-driven motivation for the circular economy as a solution, which should focus on the environmental education of various market players, through the achievement of entrepreneurial education and experience [56]. Enhancing

social and environmental issues through a variety of educational opportunities enables the concerned players to highlight and develop effective solutions [31,45,59].

Second, it is central to enhance social and environmental problems, while emphasizing existing policies related to entrepreneurship and ensuing entrepreneurial skills, so to develop an entrepreneurial mindset. This, therefore, will maximize the impact of entrepreneurship on society, the environment, and the circular economy [48,60,61].

Third, it is paramount to understand the purpose of innovation concerning business in terms of circular economy, along with offering incentives that could comprise, for example, monetary rewards linked to sustainable outcome measures, to encourage sustainable behavior [60]. Some even suggest a research agenda to identify the incentives for a circular economy in terms of better educated and employed people in a more decentralized production system, able to optimize the full potential of a circular economy [62–64].

Finally, the CE should create a more sustainable model, thus promoting sustainable entrepreneurial behavior that could be disseminated through education programs focused, for example, on the circular economy business model, green supply chain management, technology entrepreneurship and innovation, and public policies and institutional frameworks [65].

4. Results

As discussed above and illustrated in Figure 5, entrepreneurship is heading towards a path that emphasizes sustainability in terms of education, innovation, SDGs, the sustainable context of social entrepreneurship, and the circular economy. The sustainable orientation of entrepreneurship in the production of goods and services will also contribute to the achievement of the Sustainable Development Goals (SDGs) and prevent the overexploitation of the environment. In this respect, on the one hand, the circular economy is central to achieving various SDGs, such as renewable energy, on the other hand, achieving this level of sustainability requires a new combination of resources and innovation, in the sense of introducing new things.

Nonetheless, innovation requires education accordingly, with likewise innovative educational models and novel pedagogy that has evolved towards a new and more experimental paradigm, about local idiosyncrasies, allowing one to act both entrepreneurially and in a sustainable way. Afterward, the education process will enable the academia to meet the SDGs, though adapted to the social contexts, at varying development levels.

In short, education for sustainable entrepreneurship can be viewed as developing the mindset, skills, and abilities required to start new businesses, through adult education [66] and in context, because context is critical to how the effectiveness of real entrepreneurs impacts entrepreneurship education [67]. The theoretical trends discussed above therefore coalesce into a distinctive combination of models of entrepreneurship education in a specific context of sustainable business creation (see Figure 5) that answer the initial question "What is known in the literature on education for sustainable entrepreneurship?"

5. Conclusions

This literature review provides an overview of the state of the art in sustainable entrepreneurship education to contribute to the development of sustainable entrepreneurial behaviors. It discusses the key categories of sustainable entrepreneurship education to provide a holistic picture of how those themes interplay. SEE is thus an opportune and timely discussion topic in the literature, which has already produced several innovative educational approaches that, together with the SDGs, clearly demonstrate the evolution of sustainable entrepreneurship.

This study was pursued starting from the initial research question of what is known in the literature about education for sustainable entrepreneurship. The selected literature focused on the main themes of SEE related to innovation and different implementation contexts and concluded that the earlier the learning process in SEE starts, the better the

behavior related to entrepreneurial and sustainable awareness. It is therefore strongly recommended that SEE be extended to all levels of education.

The study presents also limitations and future research avenues. SEE varies with the context, as commitment to the SDGs is greater in the developed regions here studied than in developing countries, which exacerbates the inequality in sustainability, as the latter countries are particularly affected by environmental problems and poverty that contribute to social conflict. Therefore, research on SEE in these countries should be strengthened.

This review enhances key thematic debates and emerging issues that can be further explored, such issues in developing regions, with ensuing disadvantaged innovation systems, distinct contextual entrepreneurial skills, and less engagement with the global SDGs.

Those regional idiosyncrasies also demand diverse theoretical and practical approaches to address environmental, social, and economic challenges. Sustainable entrepreneurship education should thus emphasize the integration of sustainability principles and practices into the core entrepreneurial thinking and advance knowledge on sustainable innovation. This implies a shift in the way we understand and teach entrepreneurship, moving beyond profit-centric models to include social and environmental concerns.

It is also important to have an interdisciplinary approach, as sustainable entrepreneurship often requires knowledge from various fields, including environmental science, social sciences, and business management, thus demanding collaboration among different academic disciplines.

Furthermore, sustainable entrepreneurship education encourages students to adopt a system-thinking perspective, which involves understanding how entrepreneurial activity interplays with ecosystems, communities, and supply chains. It puts the accent on teaching students to recognize their social and environmental responsibilities while developing their businesses.

Also, practical implications include teaching students how to measure and report on sustainability performance. This includes understanding and using tools like sustainability indices, environmental impact assessments, and social responsibility reporting in the context of circular economy, which emphasizes reducing waste and reusing resources.

Sustainable entrepreneurship education has therefore both theoretical and practical implications that foster a holistic understanding of entrepreneurship that considers environmental and social factors alongside economic goals.

Finally, sustainable entrepreneurship education is an evolving field that seeks to equip individuals with the knowledge and skills to create businesses that prioritize both economic success and environmental and social sustainability. This can be achieved by exploring how distinct sources of knowledge from various disciplines, such as environmental science, social sciences, and business, can enhance sustainable entrepreneurship education.

Research might focus on the effectiveness of interdisciplinary curricula and teaching methods and investigate methodologies for assessing the impact of sustainable entrepreneurship education in broader geographical areas. This could involve the development of key performance indicators (KPIs) specific to sustainability and social impact. In addition, research into innovative teaching methods, technologies, and experiential learning approaches that can be used to effectively convey the principles of sustainable entrepreneurship should be performed. Finally, online and blended learning should be developed. In fact, with the rise of online education, research could examine the effectiveness of online and blended learning models for sustainable entrepreneurship education, including their impact on accessibility and scalability.

Research in these areas can help shape the future of sustainable entrepreneurship education and contribute to the development of entrepreneurs who can address the complex challenges of sustainability in the 21st century.

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Appendix A

Table A1. Overview of document citations in the period from 2017 to 2023.

Documents	Year of Publication	≤2017	2018	2019	2020	2021	2022	2023	Total
The role of innovation and tourism in sustainability: wh…	2022	-	-	-	-	-	-	4	4
Examining the enablers of sustainable entrepreneurship…	2022	-	-	-	-	-	-	1	1
Harmonious entrepreneurship: evolution from wealth…	2022	-	-	-	-	-	2	-	2
Determinants of entrepreneurial alertness: towards…	2022	-	-	-	-	-	2	-	2
Reinforcing or counterproductive behaviors for…	2022	-	-	-	-	-	-	1	1
A disruptive model for delivering higher education…	2022	-	-	-	-	-	3	1	4
Transforming enterprise education: sustainable…	2022	-	-	-	-	-	-	1	1
Sustainability and entrepreneurship: emerging opportunity…	2022	-	-	-	-	-	2	1	3
Towards a study model for the promotion of associative…	2021	-	-	-	-	-	1	-	1
Exploring the core values of entrepreneurs:…	2021	-	-	-	-	1	-	-	1
Innovation framework for excellence in higher…	2021	-	-	-	-	2	3	1	6
A resource-efficient modular course design for…	2021	-	-	-	-	1	4	-	5
Circular start-up development: the case of positive imp…	2021	-	-	-	-	1	2	3	6
Corporate entrepreneurship education's impact on family…	2021	-	-	-	-	1	3	2	6
GrowBox: the reality of growth challenges for a social…	2021	-	-	-	-	-	1	-	1
Entrepreneurship channels and sustainable development…	2021	-	-	-	-	-	2	-	2
Beyond making a profit: using the UN SDGs in entrep…	2021	-	-	-	-	2	1	-	3
Entrepreneurship education challenges for green transfer…	2021	-	-	-	-	2	5	-	7
CEO characteristics and sustainability business model in …	2020	-	-	-	1	6	6	1	14
Systems thinking as a tool for teaching undergraduate…	2020	-	-	-	1	1	-	-	2
The integration of management accounting practices as…	2020	-	-	-	-	1	1	-	2
Discovery digital health strategy: COVID-19 accelerates …	2020	-	-	-	-	3	2	2	7
Theorizing the triple helix model: past, present, and…	2020	-	-	-	2	13	36	11	62
From NPO to social enterprise: the story of Schwab…	2019	-	-	-	-	-	1	-	1
Boundary crossing ahead: perspectives of entrep…	2019	-	-	-	1	5	1	-	7
Innovation-centric courses in hospitality management…	2019	-	-	1	-	-	-	-	1
Silulo Ulutho Technologies: African social enterprise…	2019	-	-	-	-	-	1	-	1
The mindset of eco and social entrepreneurs: piloting…	2019	-	-	-	-	1	1	-	2
Environmental orientation among nascent and established…	2019	-	-	-	2	6	1	-	9

Table A1. *Cont.*

Documents	Year of Publication	≤2017	2018	2019	2020	2021	2022	2023	Total
The teaching of innovation and environmental sustainable...	2019	-	-	1	2	3	5	2	13
Intentions to adopt ecopreneurship: the moderating role of...	2018	-	3	7	2	4	2	1	19
Sustainable social innovations in smart cities: expl...	2018	-	-	-	2	1	-	-	3
Toward a validated competence framework for Sust...	2018	-	8	27	12	24	37	3	111
Designing with purpose: advocating innovation, imp...	2018	-	2	3	3	9	17	4	38
Contributions to the SDGs through social and eco entrep...	2018	-	-	1	4	3	1	1	10
Sustainable entrepreneurship education: a challenging...	2018	-	-	-	-	-	1	-	1
Marketing challenges for the South African public sector...	2017	-	-	2	-	-	-	-	2
Business not as usual: developing socially conscious...	2017	-	-	4	5	8	5	2	24
The effect of incentives on sustainable behavior: evidence...	2017	2	1	-	-	2	-	-	5
Unlocking value for a circular economy through 3D prin...	2017	6	23	28	68	43	71	10	249
100 global innovative sustainability projects: Evaluation.	2017	-	3	1	1	1	-	-	6
OSCAR Foundation: empowering lives through football	2016	-	-	-	-	1	-	-	1
Sustainability: what the entrepreneurship educators think	2015	6	5	6	7	7	5	1	37
A case on a case: embedding sustainable entrepreneurship int ...	2015	-	-	-	-	-	1	-	1
A mindset of entrepreneurship for sustainability	2015	-	-	-	-	1	-	1	2
Responsible management education: active learning appr...	2015	1	-	-	1	1	1	1	5
Sustainability: a paradigmatic shift: in entrepreneurship edu ...	2013	2	-	2	2	1	3	-	10
Exploring the incorporation of values for sustainable entrep ...	2013	6	1	2	6	2	1	1	19
Environmental entrepreneurship	2012	4	2	1	7	6	-	-	20
	Total	27	48	86	129	163	231	56	740

Appendix B

Table A2. Overview of document self-citations in the period from 2017 to 2023.

Documents		≤2017	2018	2019	2020	2021	2022	2023	Total
The role of innovation and tourism in sustainability: wh...	2022	-	-	-	-	-	-	1	1
Corporate entrepreneurship education's impact on famil...	2021	-	-	-	-	-	2	-	2
Theorizing the triple helix model: past, present, and...	2020	-	-	-	-	2	8	2	12
Boundary crossing ahead: perspectives of entrep...	2019	-	-	-	-	1	-	-	1
Environmental orientation among nascent and establ...	2019	-	-	-	-	1	4	-	5
The teaching of innovation and environmental sustainab...	2019	-	-	-	-	1	-	1	2
Intentions to adopt ecopreneurship: the moderating role of...	2018	-	-	-	-	-	1	-	1
Toward a validated competence framework for sust...	2018	-	4	1	1	1	1	-	8
Designing with purpose: advocating innovation, imp...	2018	-	-	-	1	-	2	-	3
Business not as usual: developing socially conscious...	2017	-	-	-	-	-	-	1	1
Unlocking value for a circular economy through 3D prin...	2017	1	1	4	-	-	1	-	7
100 global innovative sustainability projects: evaluation..	2017	-	3	-	-	-	-	-	3
OSCAR Foundation: empowering lives through football	2016	1	1	1	1	1	-	1	6
Exploring the incorporation of values for sustainable entrep ...	2013	-	-	-	1	-	-	-	1
Environmental entrepreneurship	2012	2	-	1	-	-	-	-	3
	Total	4	9	7	4	7	19	6	56

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