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Review

Sustainable Entrepreneurship Education: A Literature Review

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Abstract: The importance of transforming to a sustainable economy to protect against global crises such as climate change is widely recognized. Sustainable entrepreneurs are seen as playing a key role in this transformation process by creating innovative market solutions with environmental, social, and economic value. To date, there is no consensus on the skills education should deliver to create sustainable entrepreneurs to solve sustainability challenges. The goal of this article is to identify sustainable entrepreneurship education factors that enable effective education of future sustainable entrepreneurs. An academic search engine and bibliographic database were searched for documents written in English and published between 2012 and April 2023 to identify existing educational models discussed in the current literature in sustainable entrepreneurship education (SEE). The review process resulted in a set of 59 empirical and non-empirical papers on SEE. The data analysis revealed different educational frameworks for sustainable entrepreneurship (SE), both developed for use in higher education institutions and secondary schools.

Keywords: entrepreneurship; sustainability; education

1. Introduction

Shifting to a sustainable economy is critical to recovering from the consequences of the pandemic COVID and protecting against further crises such as climate change [1]. The importance of entrepreneurship to address climate change or reduce inequalities and contribute to the implementation of the Sustainable Development Goals (SDGs) is widely recognized [2]. Sustainable entrepreneurship (SE) is considered to play a key role in the transformation process by solving sustainability challenges with innovative market solutions [3].

In spite of the growing interest of the last decade in the young research field, there is no unified definition of SE yet [4]. Research from different disciplines has led to different terms describing the link between the concept of sustainable development and entrepreneurship, such as ecological or social entrepreneurship [5]. However, SE represents a particular form of entrepreneurship that is distinguished from these and other forms of entrepreneurship by a sustainable founding motive and business objective [6]. While the concept of conventional entrepreneurship focuses on economic value creation [7,8], some literature at SE posit that SE is a process of discovering or creating and exploiting business opportunities to develop and successfully implement innovative goods and services with environmental, social, and economic value in the marketplace [9–12]. In this context, is relevant a framework that, aims at the holistic evaluation of companies based on the factors of people, profit and planet [13].

The recognition that SE is a promising tool to address biodiversity loss or, for example, resource depletion, as well as social problems such as poverty and hunger, may have contributed to the growing interest in educating sustainable entrepreneurs [3]. Higher education institutions are believed to play an important role in promoting SE by supporting a SE ecosystem and the faculty and students working within it [14]. The main goal of sustainable entrepreneurship education (SEE) is to provide entrepreneurs with skills and attitudes to evaluate business opportunities considering

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environmental and social needs [13]. The goal of SEE is therefore to promote competencies (In general, competencies are described as a combination of key components-knowledge, skills, and attitudes-that are required in specific contexts [4,15] and enable individuals to act responsibly and self-organize to mature and achieve goals [16]. Assessing sustainable behaviors is challenging because it implies knowledge, skills, values, and attitudes [3,17] and comprehends cognitive and socio-emotional elements depicted as capabilities [18,19]. In contrast to context-independent concepts such as intelligence, the concept of capability is characterized as complex problem-solving skills needed to act successfully in various complex contexts and situations, integrating skills from entrepreneurship and sustainable development [18]. Capabilities cannot be taught as predefined solutions, as they are developed by the acting learners themselves through experience and reflection [19], which are necessary to enable learners to solve sustainability problems with innovative market solutions.

Despite the growing interest in sustainable entrepreneurship education, the lack of integration of sustainability aspects into entrepreneurship education is often criticized [20,21]. In order for students to become change agents for sustainability, specific learning environments need to be developed that foster the capabilities of SE [22]. In order to contribute to the development and evaluation of SEE interventions, previous research findings need to be presented and clarity on relevant sustainable entrepreneurial needs to be established. Therefore, the aim of this study is to analyze the literature on SEE to identify relevant SEE interventions. A systematic review was conducted to systematically map research in SEE and identify existing research gaps. The literature review was guided by the research question: What is known in the literature about Sustainable Entrepreneurship Education?

Published systematic literature reviews of the SEE research domain have focused on three areas: Teaching and learning methods and approaches used in sustainable entrepreneurship in education, in terms of innovation [15], the extent to which entrepreneurship education research has addressed the international SDGs in the context of developing countries, as sustainable development and social entrepreneurship [23], and the structure of ongoing research in the academic field of sustainable entrepreneurship education, in which higher education approaches and methods for entrepreneurship and sustainable development need to be brought together [24–28]. Some strand of literature introduces the issue of UN related projects upon sustainable entrepreneurship [29] while others emphasize the theme of circular economy [30–32]. Those strings of literature focus on the approaches and methods currently used, with regard to collaborative and experiential learning [33,34], but also active learning in higher education or more practice-based learning in higher education for entrepreneurship [35]. In short, this article intends to underscore the limitations of entrepreneurial education, in terms of the lack of experiential teaching, learning approaches and the limited use of educational technology. This review analyzes and synthesizes previous findings on SEE to contribute to its development.

2. Materials and Methods

A systematic bibliometric literature review (LRSB) was conducted to identify relevant sources and synthesize data for final reporting on the opportunities and challenges of education entrepreneurship sustainability, gathering and synthesizing existing knowledge linked to the research problem. The increased concerns about education entrepreneurship sustainability have led to increased research on sustainable development education and sustainable entrepreneurship.

As stated before, this work's purpose is to get an exploratory review of the vast literature on the overarching research question at hand, particularly in relation to answering the inquiry on how education entrepreneurship sustainable throughout the decades.

The study continues as follows: (i) definition of the research question; (ii) study location; (iii) selection and evaluation of studies; (iv) analysis and synthesis; (v) presentation of results; and (vi) discussion and concussion of the results. This methodology ensures the review is comprehensive, auditable, and replicable, and answers specific research questions [36–39] (Table 1).

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Thus, the use of bibliometric analysis can help understand its development and adoption in businesses to identify potential challenges. The use of LRSB review process is divided into 3 phases and 6 steps (Table 1), as proposed by Raimundo and Rosário [37], Rosário et al. [38], and Rosário and Dias [39].

Table 1. Process of systematic LRSB.

Fase	Step	Description
Exploration	Step 1	formulating the research problem
	Step 2	searching for 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 LRSB report

Source: own elaboration.

The database of indexed scientific and/or academic documents used was Scopus, the most important peer review in the scientific and academic world. However, we consider that the study has the limitation of considering only the Scopus decomposition database, excluding other scientific and academic bases. The literature search includes peer-reviewed scientific and/or academic documents published up to April 2023.

The literature search process began with identifying the appropriate database, which in this case was Scopus. The initial keyword "education" was used, resulting in 2,460,170 document results. We included the first inclusion criterion "entrepreneurship" we obtained 12,395 documents, the search was also limited to the subject area "Business, Management and Accounting" to narrow down the documents further to 5,609 documents and finally exact keyword "Sustainability" with 59 documents

As a result, 59 documentary results were identified (N=59), which are summarized in the final report Table 2.

Table 2. Screening Methodology.

Database Scopus	Screening	Publications
Meta-search	keyword: education	2,460,170
First Inclusion Criterion	keyword: education, entrepreneurship	12,395
Second Inclusion Criterion	keyword: education, entrepreneurship Subject area: business, management and accounting	5,609
Screening	keyword: education, entrepreneurship Subject area: business, management and accounting Exact keyword: sustainability Published until April 2023	59

Source: own elaboration.

Finally, content and theme analysis techniques were used to identify, analyze and report the various documents as proposed by Raimundo and Rosário [37], Rosário et al. [38], and Rosário and Dias [39].

The 55 scientific and/or academic documents indexed in Scopus are later analyzed in a narrative and bibliometric way to deepen the content and possible derivation of common themes that directly

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respond to the research question [36–39]. Of the 59 selected documents, 44 Articles; 7 are Conference; 5 are Book Chapter; and 3 are Reviews.

3. Literature analysis: themes and trends

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 1 analysis the peer-reviewed publications published for the period 2012-2023. The publications were sorted out as follows: Emerald Emerging Markets Case Studies (7); Proceedings Of The European Conference On Innovation And Entrepreneurship Ecie (4); with 2 (Education And Training; Entrepreneurship Education And Pedagogy; International Journal Of Innovation And Learning; Journal Of Cleaner Production; Journal Of Entrepreneurship In Emerging Economies); and the rest with 1 publication.

We can say that between 2012 and 2023 there was a growing interest in research on sustainability education and entrepreneurship.

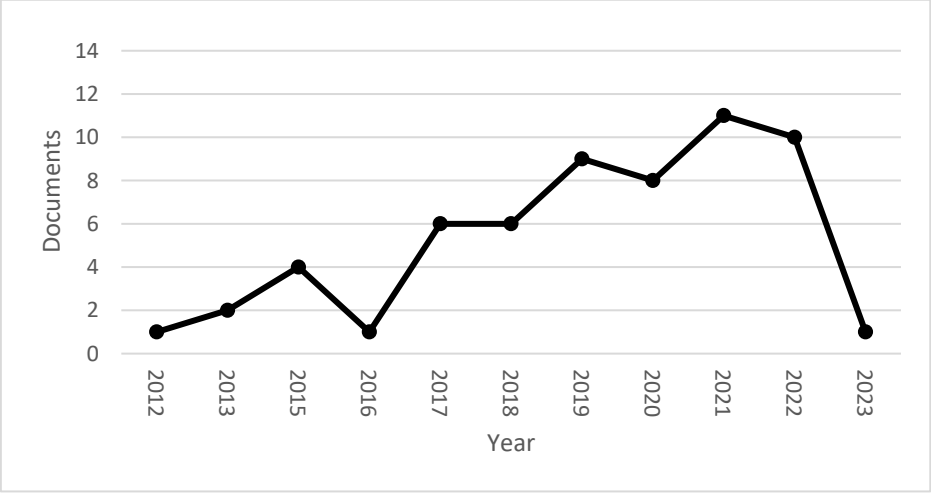

Figure 1. Documents by year. Source: own elaboration.

In Table 1 we analyze the Scimago Journal & Country Rank (SJR), the best quartile and the H index by publication.

The Journal of the Technological Forecasting And Social Change with 2,340 (SJR), Q1 and H index 134. There is a total of 14 journals in Q1, 10 journals in Q2 and Journals in 5 journals in Q3 and 1 journal in Q1, from the best quartile Q1, represents 42% of the 33 journals titles; the best quartile Q2 represents 30%, Q3 represent 15%, best quartile Q4 represents 3% of the 33 journal titles, and finally, 14 publications without data representing 42%.

As evident from Table 1, the significant majority of articles on Education entrepreneurship Sustainability rank on the Q1 best quartile index.

Table 1. Scimago journal & 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

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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	-*	-*	-*
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	-*	-*	-*

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Strategies And Best Practices In Social Innovation An Institutional Perspective	-*	-*	-*
Triple Helix	-*	-*	-*

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

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), with 1 (Agricultural and Biological Sciences; Arts and Humanities; Computer Science; Mathematics; and Psychology).

The most quoted article was "Unlocking value for a circular economy through 3D printing: A research agenda" from Despeisse et al. with 249 quotes published in the Journal of the Academy of Marketing Science with 2,340 (SJR), the best quartile (Q1) and with H index (134). The published "proposes a research agenda to determine enablers and barriers for 3DP to achieve a CE".

In Figure 2 we can analyze the evolution of citations of articles published between ≤2017–2023 period. The number of citations shows a net positive growth with an R2 of 31% for the ≤2017–2023 period, with 2022 peaking at 231 citations.

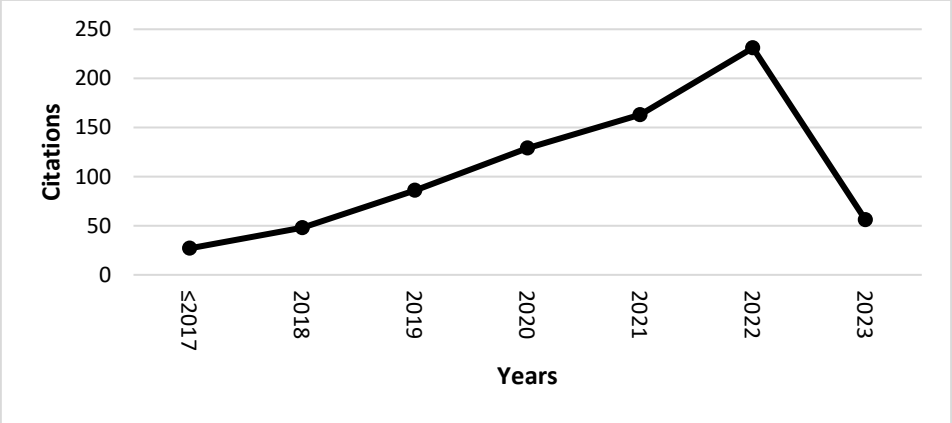

Figure 2. Evolution of citations between ≤2017–2023 period. Source: own elaboration.

The h-index was used to ascertain the productivity and impact of the published work, based on the largest number of articles included that had at least the same number of citations. Of the documents considered for the h-index, 11 have been cited at least 11 times.

In Appendix A, Table A1, citations of all scientific and/or academic documents from the period ≤2017 to April 2023, with a total of 740 citations, of the 59 documents 10 were not cited. The self-citation of documents in the period ≤2017 to April 2023, 2022 was self-cited 231 times.

Appendix B, Table B1, examines the self-quotation of documents until 2023, of articles 59 were self-quotation for a total of 56 self-quotation "Theorizing the Tripie Helix model: Past, present, and..." were self-cited 12 times.

In Figure 3 a bibliometric analysis was carried out to analyse and identify indicators on the dynamics and evolution of scientific information using the main keywords. The analysis of the bibliometric research results using the scientific software VOSviewer, aims to identify the main keywords of research in sustainability as a marketing strategy.

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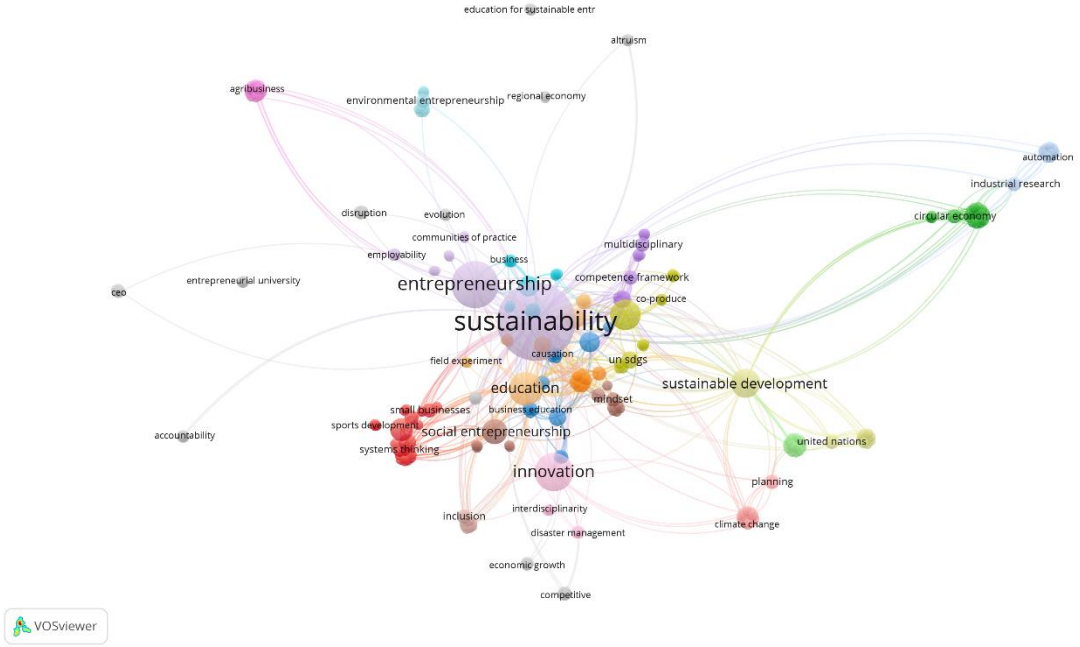

Figure 3. Network of all keywords.

The linked keywords can be analysed in Figure 4, which makes it possible to clarify the network of keywords that appear together/linked in each scientific article, which makes it possible to know the topics analysed by the research and identify future research trends. This figure shows us more clearly most of the network nodes, where the size of the node represents the occurrence of the keyword, that is, the number of occurrences of the keyword. The connectivity between the nodes indicates the co-occurrence of the keywords, and the thickness of the node indicates the frequency of co-occurrence of the keywords. Thus, the larger the node, the more frequently the keyword occurs, and the thicker the connection between the nodes, the more frequently the keywords occur together. Each colour represents a thematic cluster, and the nodes and links in that cluster can be used to explain the topic coverage (nodes) of the topic (cluster) and the relationships (links) between the topics (nodes) that occur under that topic (cluster).

The Vosviewer Keyword Development Map results are divided into three clusters. Cluster 1 is blue and refers to sustainable development, cluster 2 is light blue and refers to innovation, and cluster 3 is red and refers to social entrepreneurship, finally, cluster 4 is brown and refers to social entrepreneurship

In Figure 5 is a wealth of networks bibliographic coupling of publications researchers.

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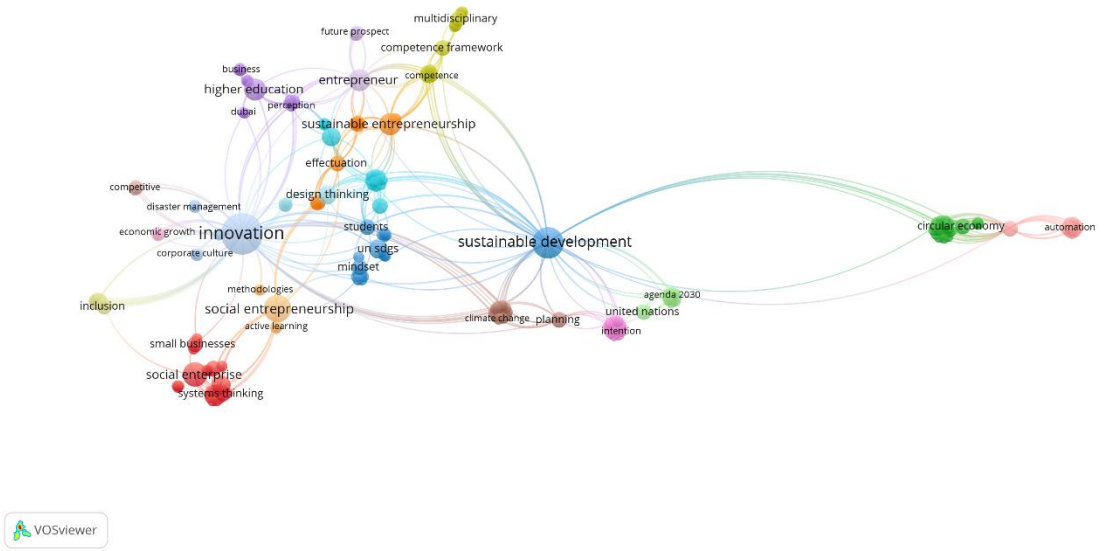

Figure 4. Network of Linked Keywords.

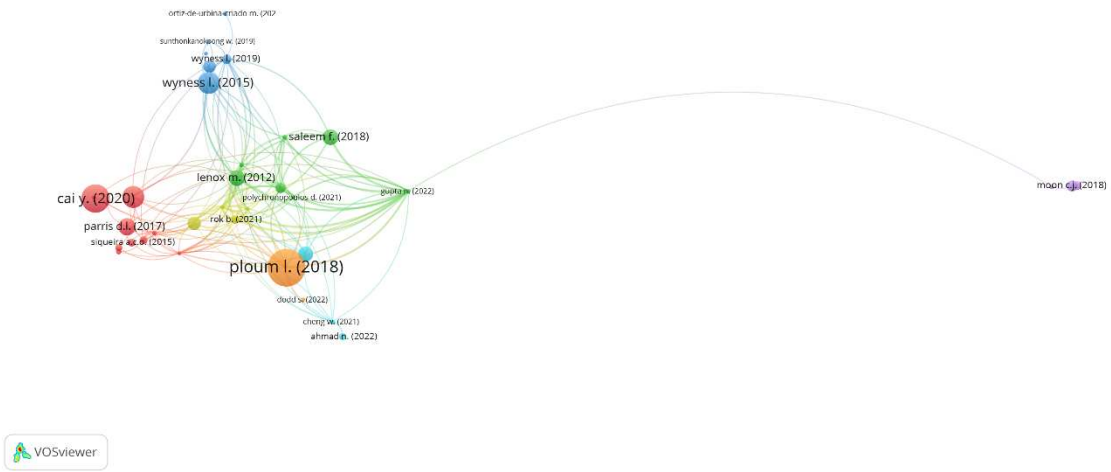

Figure 5. Networks bibliographic coupling.

4. Theoretical perspectives

Authors should discuss the results and how they can be interpreted from the perspective of previous studies and of the working hypotheses. The findings and their implications should be discussed in the broadest context possible. Future research directions may also be highlighted

4.1. Educational Approaches

The increasing number of academic courses, faculties or journals on entrepreneurship shows that it is a growing educational subject and scientific branch related to sustainable entrepreneurial

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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 of 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 is "entrepreneurship education," which encompasses European research and is guided by a broader definition of entrepreneurship, according to which it is about the personal development of an entrepreneurial mindset and life skills [7]. On the other side of the continuum is "entrepreneurship education," which encompasses North American research and is oriented toward the narrower definition of entrepreneurship, which is about business creation [22]. Considering the narrower and the broader perspectives, the term "entrepreneurship education" is used in this paper as in [24] to refer to entrepreneurship education.

Current research on entrepreneurship education is moving away from the narrow start-up 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 entrepreneurial skills regardless of future self-employment or employment [41]. In the context of the broader entrepreneurial perspective, entrepreneurial education is not limited to business programs and can be integrated across the curriculum [7].

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 of the literature, pedagogy in entrepreneurial education research today 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]. Thus, 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]. The empirical findings on entrepreneurial education also depend on the age and gender of learners [43]

The content of entrepreneurship education has evolved from learning about entrepreneurship to learning in or through the experience of entrepreneurship [22,23,35]. Typical 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]. Current methodological contributions to the design of entrepreneurial education include, for example, Effectuation [3] or Start-up [22]. The global homogeneity of methods used, such as business model [1,13,32] and start-up pitches [44], has been referred to as trivialization of entrepreneurship education and criticized as lack of variation considering aspects such as gender or cultural background [43].

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

First, several problem-solving case studies have been developed to identify the driving factors for developing sustainability-focused entrepreneurial intent and to promote the adoption of sustainable practices by entrepreneurs [40]; 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 start-up phase of a social enterprise and to improve understanding of the interrelationship between passion, mission focus, and challenges in achieving financial sustainability of a social enterprise [22]. Introduce students to the key characteristics of social entrepreneurship through a case study that allows them to move from understanding and applying what social entrepreneurship is to how it works and gain insight into the complexities of working in an environment of unending need [27]. Introduce business models of innovation for sustainability that expand the value proposition to include social,

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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, an active learning approach in terms of using active innovation methods, such as teaching through case studies and design thinking, to formulate different alternative business models for bottled water to simultaneously achieve financial outcomes and good environmental and social outcomes, in line with the ultimate purpose of the business, through the combined use of concepts such as sustainability, entrepreneurship, and innovation education [22]. Also, emphasizing sustainability, ethics, and social entrepreneurship in management education through experiential learning methods, such as graduate competitions and global MBA case studies, and action learning methods, such as live consulting projects and cross-national student collaboration, helps students to address ethical, social, and environmental issues in complex business situations [35], shifting the focus from the traditional for-profit perspective to sustainable entrepreneurship to incorporate sustainability into academic curricula and consulting activities [24]. Systems thinking is therefore a particularly fruitful way to ground business students in the sciences and liberal arts, develop their complex problem-solving skills, and thereby invigorate management education in a way that prepares students to "serve humanity." [18] The same is true for students who conducted a field experiment with teams of children (aged 11 or 12) participating in an entrepreneurship education program in the last grade of elementary school, and found that monetary rewards are associated with sustainable outcomes and a significant positive effect on sustainable behavior [45].

Third, institutional design of business courses to shape the mindsets and skills of the next generation of socially conscious practitioners and help students develop a sense of self-efficacy based on confidence that they can make a positive impact on the world through entrepreneurship, while developing business courses that encourage and enable students to understand that business can be a force for good and to practice collaborative innovation [34]. It is always important to keep in mind that entrepreneurs can help solve sustainability problems, a topic that should be integrated into existing entrepreneurship curricula [7]. Curricula should include economic, social, and environmental sustainability for the community and leadership levels to demonstrate the importance of an entrepreneurial mindset and the opportunities for integrating multidisciplinary knowledge to develop entrepreneurship, and to address the challenges for both educators and policy makers to not only respond to the entrepreneurship education ecosystem, but also to develop relevant and meaningful entrepreneurship modules focused on soft skills development [41]. Design thinking principles are particularly appropriate and useful for educators to facilitate student learning in the creation and development of social ventures in terms of social entrepreneurship education, i.e., innovation, impact, sustainability, and scale to accelerate the process of social enterprise creation [21].

Fourth, promote a sustainable entrepreneurial vision by incorporating new values for teaching/learning potential entrepreneurs from the moment the idea to create a for-profit, non-profit or hybrid organization is born, whereas promoting the emergence of organizations that are not only profitable but also respectful of the environment and responsible in dealing with social problems [23]. It introduces the topic of social entrepreneurship and emphasizes the necessities of social enterprise management, the interplay of governance decisions and tradeoffs, and the application of theory-based frameworks to make optimal decisions [33]. Moreover, the diversity of corporate identity due to different social contexts will enrich the individual value pattern related to sustainability. SEE is therefore proposed as a whole-society response with reference to regulated sustainability and participatory sustainability [42]. Nevertheless, the average environmental orientation of budding entrepreneurs is significantly higher than that of established entrepreneurs [20].

Fifth, these methods were tested in different contexts by analyzing the relationship between the constructs of teaching innovation, teaching environmental sustainability, and teaching entrepreneurship as perceived by students of higher educational institutions in developing countries.

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In doing so, it was concluded that teaching innovation is an important way to promote entrepreneurship among college students [28], through the incorporation of innovation into the real-life difficulties of businesses in the informal economy and the development of an understanding of the trade-offs involved [45,46]. Along these lines, others have looked at entrepreneurship through the theoretical lens of communities of practice, gaining important insights into how entrepreneurship education can positively impact the behaviors and practices of sustainability educators, and noting the need for greater collaboration and interaction [17].

Finally, as a solution to sustainability, some authors suggest adopting key strategies from technology companies that could be replicated at the college level. Key drivers in the pursuit of sustainability include continued investment in faculty development that can lead to a culture of entrepreneurship and ecology [11], entrepreneurial leadership in tech startups, and succession planning [11,44], although large gaps remain in skills and knowledge related to ethics and creative problem solving, both key competencies for addressing the challenges of building a more sustainable world [26], which requires more than corporate strategy tools such as a startup's matrix of strengths, weaknesses, threats, and resulting opportunities; competitive advantage through application of Porter's five forces model; and target market analysis using segmentation, targeting, and positioning principles [4]. It requires an integrated transdisciplinary tool to develop an active, informed, responsible, and at the same time sustainable, ecosystem-oriented, and green citizen orientation in the educational system [12].

4.2. Innovation

These days, it is clear that higher economic prosperity and lower pollution are associated with innovation, as measured by scientific publications and patents, underscoring the importance of innovation for sustainability. Some of the literature highlights the positive impact of demographic trends on pollution reduction and economic expansion, which are steps toward sustainable development, while emphasizing the need for all people to contribute positively to economic prosperity and to actively participate in countries' environmental plans [9]. The literature addresses the issue of innovation in relation to education for sustainable entrepreneurship in a variety of areas, from smart cities, entrepreneurial skills and behaviors, to the knowledge society, socioeconomic ecosystems, and innovative educational frameworks.

In this way, some studies improve education on smart cities by summarizing the different essential definitions and dimensions described in recent literature in different educational programs, projects and initiatives that cities around the world have implemented, focusing on sustainable social innovation, economic growth, environmental protection, quality of life, participatory governance, social and community development, civic education, efficient urban mobility, tourism services, health and safety [47]. On the other hand, sustainable entrepreneurship in these contexts has also been studied in terms of its capability framework and combination [6]

Second, the triple helix of interactions between academia, industry, and government has been highlighted, underscoring the enhanced role of academia in the transition from an industrial to a knowledge-based, innovative, and entrepreneurial society. In particular, through a model that is simultaneously analytical and normative, theoretical, practical, and policy-relevant, and also incorporates various social science concepts, e.g., Schumpeter's organizational entrepreneurship, institutional logic, and social networks, into its framework [14]. In this sense, an attempt has been made to develop innovation-oriented courses and assessments that integrate these elements of sustainability into an innovation-driven ecosystem, while proposing a roadmap for stakeholders to promote an innovation-driven and sustainable socioeconomic ecosystem [48].

Third, the literature also explores the impact of causal and effective behaviors on the sustainability orientation of established companies, because if corporate behaviors negatively impact sustainability orientation, it could affect the company's ability to create lasting sustainability value. Similarly, effective behaviors are not detrimental to sustainability orientation, which could encourage sustainable entrepreneurs and educators to strive for both behaviors and emphasize that causal and effective behaviors are equally important elements of sustainable entrepreneurship education [3]. In

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addition, it is appropriate for students to reflect on their entrepreneurial attitudes, such as whether they possess the 'empathy' and 'compassion' associated with green entrepreneurship or, conversely, whether they need to develop them through entrepreneurial education [49].

Fourth, innovation is evident 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 through the presentation of innovative combinations of digital artifacts, platforms, and infrastructures [50]. In addition, innovative combinations related to accounting and sustainability can also be achieved to bring about much-needed sustainable change in business and society [44,51].Improving owner/manager education and training that impact the integration of management accounting practices is an innovative strategy for SME sustainability, along with years of business, lack of government business support, and technology adoption [8,52].

Finally, transformative enterprise education (TrEE) is proposed to better enable students to bring about ethical change and to improve teaching, learning, and innovation. TrEE allows emphasizing the time needed to challenge prevailing ideas and creating the space for experimentation, while considering the ecosystem in its entirety and placing entrepreneurship in a broader context through collaborative learning among students, teachers, entrepreneurs, and various other stakeholders [10]. Therefore, innovative solutions will be the new lead currency of the future, leading to an innovative framework for higher education institutions to become competitive by developing their own products, services, and related processes that provide high value to their customers [25]. With regard to enterprises, on the other hand, innovation in technological capabilities, networking, social capabilities, and learning and development capabilities should be the priorities for sustainable enterprise development and competitive advantage, with entrepreneurs being the key actors for the growth of industrial innovation, digital entrepreneurship, and global competitiveness [19].

4.3. SDG

The key issues of entrepreneurship and sustainable education are the fundamental issues for sustainable development at the local and global levels. In turn, the 17 SDGs relevant to sustainable development are 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. ESD has now been included in goal four, "Quality Education," and is considered an essential element in achieving all of the goals [16]. The importance of entrepreneurship to address climate change or reduce inequalities to contribute to the implementation of the SDGs is internationally recognized [2].

Literature on the research area of sustainable entrepreneurial education (SEE) have therefore 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. The extent to which entrepreneurial education research addresses multiple SDGs, such as responsible consumption and production, is key, for example the extent by which employment is critical to overcoming the cycle of poverty in which the unavailability of entrepreneurial education, the lack of experiential teaching and learning approaches, or the limited use of educational technology limit the overall impact of entrepreneurial education [16]. Evidence steams principally from both qualitative case studies and quantitative surveys.

First, the results show that the literature on 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 and (2) renewable energy, tourism, and ICT [2]. This literature focuses primarily on new, necessary measures of environmental and social thinking to support the development of creative and innovative solutions needed to achieve the SDGs (UN), examining global trends in addressing pressing social and environmental problems through projects

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mapped to the SDGs (UN), and examining them for 'innovation' and scalability to consider in more detail [29]

Second, another stream of literature on what constitutes a "social purpose" reflects on the 17 Sustainable Development Goals, the global social entrepreneurship and social innovation movement, impact investing and harvesting, and indigenous wisdom to develop an improved version of the course content and a comparative framework for social responsibility, social innovation, and social entrepreneurship [35]. Finally, the need to expand collaborative networks between countries and institutions is highlighted, with two key themes: Entrepreneurship and Sustainability. At the same time, guidelines for teaching business and management in relation to the SDGs are proposed, particularly in relation to college-business relations, job creation and entrepreneurship, and the impact of universities on society, incorporating sustainability principles and strategies into higher education. Therefore, it highlights the important role that both higher education and business and management education play in achieving the SDGs by mobilizing their leaders, professors, and students through coordinated and integrated participation [16].

Third, some of the literature aims to gain insights into the extent to which entrepreneurs are committed to the United Nations Sustainable Development Goals (UN) by analyzing the core values of entrepreneurs to understand their current status and then comparing them to the UN values, showing that entrepreneurs are committed to sustainability and that some values, such as education and health, are particularly important [14]. Similarly, it explores the extent to which the current wave of entrepreneurship can contribute to achieving global development goals, showing in particular that improving life expectancy and reducing inequality have influenced entrepreneurial outcomes through the basic needs channel. It is also shown that higher education, which is an efficiency channel, promotes income rather than innovation, indicating the need for further investment in training the next generation of workers, while investment in research and development is an institutional channel that promotes entrepreneurial outcomes [20]

In summary, both quantitative and qualitative studies conclude that when examining the entrepreneurial behaviors of sustainable entrepreneurs, they underscore the importance of early exposure to sustainability and 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 in order to meet the SDGs to varying degrees depending on the context [21].

4.4. Sustainable Context of Social Entrepreneurship

In entrepreneurship, context matters because entrepreneurship is learning in context, and each context has its own idiosyncrasies. In disadvantaged contexts, the importance and interest in concepts such as social entrepreneurship or SE are increasing, also in terms of entrepreneurship education [21,53]. Similarly, social entrepreneurship is a factor of innovation and change that drives human development [5]. Thus, different strands of the literature address the context of social entrepreneurship in different ways.

First, some of the literature concludes that entrepreneurship has failed to address the sustainability challenge 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 must be based on systems thinking and should integrate or harmonize the traditional approaches to entrepreneurship applied separately to create a triple bottom line sustainable business model that balances profit, planet, and people, which needs to be tested in different political economy contexts and industry sectors, including for entrepreneurship education and training [13].

Second, the literature suggests that there are three main categories of drivers for entrepreneurial action: economic incentives, personal motivations, and institutional context, with a positive relationship between sustainability orientation and entrepreneurial action that disappears as participants gain more entrepreneurial education and experience. This indicates the need to consider the regulatory and social environment when studying green entrepreneurship [12,54]. 59In particular, with regard to green entrepreneurship, for example, the model of the theory of planned

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behavior is extended to include the two moderating roles of collectivism and altruism, and the context of developing countries is used as a field of analysis [40].

Third, other studies overstate the challenges posed by different contexts, especially the marketing challenges faced by incubators in some sectors and countries. Identifying and highlighting the potential disadvantages for 'incubators" can help them succeed or face competitive challenges as they leave the safety of their respective programs. Some of the required skills, knowledge, and attributes are explored, such as strategic marketing intelligence, acumen, and knowledge to overcome the business and marketing challenges and remain sustainable [46].

Fourth, part of the literature focuses on specific contexts related to entrepreneurship education and analyzes the factors such as human and social capital that influence students' entrepreneurial readiness (EA), while the establishment of academic college teams, groups, networks, and associations can foster opportunities to create and develop relationships and communication between students and entrepreneurs [5]. Similarly, the relevance of various CEO demographic characteristics, such as age, tenure, and MBA degree, are explored as important elements influencing leaders in internal governance and sustainable business models [43]. It also analyzes the interplay between entrepreneurial education and family business and the resulting competitive advantages [18].

In conclusion, both the sustainability perspective and the economic-cultural mediations determine potential factors for a model to promote entrepreneurship from the social economy with a territorial approach [12]. It is crucial to develop skills to become attractive in the labor market, through the actions and services offered by universities to improve training and increase employment opportunities. [30]

4.6. Circular Economy

The circular economy can be seen as the main component of 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 [30,55–57].

The first factor is the purpose-driven motivation for the circular economy as a solution, which mainly focuses on the environmental education of the various market participants, which tends to disappear as participants gain more entrepreneurial education and experience [56]. In addition, pressing social and environmental issues are addressed through a range of applications, resources, and educational opportunities to identify and highlight the main challenges in developing and implementing the solutions [31,45,58].

The second factor is based on the goal of enhancing the positive impact by addressing the most pressing social and environmental problems along with the existing policies and modules related to entrepreneurship as well as entrepreneurial skills to identify the importance of an entrepreneurial mindset. It determines the impact on society and the environment and the extent to which the model can be scaled [47,59,60].

The third factor is determined by understanding the purpose of the innovation and focuses on business model innovations related to the circular economy, which should include monetary rewards linked to sustainable outcome measures to encourage sustainable behavior among various stakeholders [58]. Some suggest a comprehensive research agenda to identify the requirements and barriers for a circular economy in terms of a more decentralized production system to realize the full potential of a circular economy to better educate people and increase their employment opportunities [61–63].

In summary, the circular economy creates a more sustainable production and consumption model where, for example, raw materials can remain in the production cycle longer and be used repeatedly, creating and communicating much less waste, thus promoting sustainable behavior.

5. Conclusions

This literature review provides an overview of the current state of research in sustainable entrepreneurship education to contribute to the development of sustainable entrepreneurial behavior. Discussion is provided on the key categories of Entrepreneurial Education, Innovation, Sustainable Development Goals - SDG, Sustainable Context of Social Entrepreneurship and Circular

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Economy to facilitate a comprehensive and straightforward discussion. SEE is thus a very lively research field that has already produced several innovative educational approaches that, together with the SDGs, clearly demonstrate the progress of the field and thus the maturity of the interdisciplinary concept of sustainable entrepreneurship.

The literature review was guided by the research question: What is known about sustainable entrepreneurship education in the current literature? The research question did not limit the selection of literature to a specific topic such as education. Despite the open nature of the research question, the selection of literature shows a clear research focus on SEE in relation to innovation and different implementation contexts, concluding that the earlier the learning process starts at SEE, the better the behavior in terms of entrepreneurial and sustainable awareness. It is therefore strongly recommended that SEE be extended to all educational levels.

SEE varies by context, as commitment to the SDGs is greater in developed regions than in developing countries, which exacerbates 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, as well as their partnership with developed regions, should be strengthened.

The review sheds light on existing research gaps that can be addressed in the future, such as more research on developing regions, disadvantaged innovation systems, and less engagement on global SDGs. In addition, future research should target different contextual entrepreneurial skills, which should necessarily fit into different and contextual educational frameworks.

Author Contributions: For research articles with several authors, a short paragraph specifying their individual contributions must be provided. The following statements should be used "Conceptualization, A.R. and R.R.; methodology, A.R. and R.R.; software, A.R. and R.R.; validation, A.R. and R.R.; formal analysis, A.R. and R.R.; investigation, A.R. and R.R.; resources, A.R. and R.R.; data curation, A.R. and R.R.; writing—original draft preparation, A.R. and R.R.; writing—review and editing, A.R. and R.R.; visualization, A.R. and R.R.; supervision, A.R. and R.R.; project administration, A.R. and R.R.; funding acquisition, A.R. and R.R.. All authors have read and agreed to the published version of the manuscript." Please turn to the CRediT taxonomy for the term explanation. Authorship must be limited to those who have contributed substantially to the work reported.

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Appendix A

Table A1. Overview of document citations period 2017 to 2022.

Documents		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

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A disruptive model for delivering higher education…	2022	-	-	-	-	-	3	1	4
Transforming enterprise education: sustainable…	2022	-	-	-	-	-	-	1	1
Sustainability and entrepreneurship: emerging opportun...	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
lnnovation Framework for Excellence in Higher...	2021	-	-	-	-	2	3	1	6
A Resource-EfFcient 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 famil...	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 transf...	2021	-	-	-	-	2	5	-	7
CEO characteristics and sustainability business model in...	2020	-	-	-	1	6	6	1	14
Systems Thinking as a Tool forTeaching 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 Tripie 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
lnnovation-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 establ...	2019	-	-	-	2	6	1	-	9
The teaching of innovation and environmental sustainab...	2019	-	-	1	2	3	5	2	13

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lntentions to adopt ecopreneurship: 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
DesigningWith Purpose: Advocating lnnovation, lmp...	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 south african public sector...	2017	-	-	2	-	-	-	-	2
Business Notas 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: Aclive learning appr...	2015	1	-	-	1	1	1	1	5
Sustainability: A paradigmatic shifl: 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

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 Tripie 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

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The teaching of innovation and environmental sustainab...	2019	-	-	-	-	1	-	1	2
lntentions to adopt ecopreneurship: Moderating role of...	2018	-	-	-	-	-	1	-	1
Toward a Validated Competence Framework for Sust...	2018	-	4	1	1	1	1	-	8
DesigningWith Purpose: Advocating lnnovation, lmp...	2018	-	-	-	1	-	2	-	3
Business Notas 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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