



**BMT21**  
3rd International Conference  
Business Meets Technology.  
Valencia, 23rd & 24th September 2021

# SUSTAINABLE ENTREPRENEURSHIP IN EDUCATION THROUGH SCIENCE MAPS

Vásquez-Peñañiel, Maria-Stefanie <sup>ORCID</sup><sup>a, b</sup> and Perello-Marín, María-Rosario <sup>ORCID</sup><sup>c</sup>

<sup>a</sup> Occasional Professor, Escuela Politécnica Nacional. DESODEH – SIGTI. Ecuador.  
(maria.vasquez@epn.edu.es)

<sup>b</sup> PhD Candidate. Universitat Politècnica de València. Dept. Organizacion de Empresas. Spain.

<sup>c</sup> Associate Professor. Universitat Politècnica de València. Dept. Organizacion de Empresas. Spain.  
(rperell@upvnet.upv.es)

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**ABSTRACT:** The promotion of innovation and entrepreneurship is part of the major national and global goals since Agenda 2030 in 193 countries. Additionally, with global warming and the pandemic caused by COVID-19, these goals became strategies for global reactivation, prioritizing the environment, social and economic aspects to create resilient and conscious organizations. Educational institutions, for their part, must assume the role of articulating in a multidisciplinary way the requirements of society through their knowledge to achieve generational changes giving solutions to existing problems. This article's main objective is to show the different research fronts related to sustainable entrepreneurship in education and their relationships before and after the pandemic to identify the different areas in which research is being conducted, their interconnections, and their evolution. For this purpose, a bibliometric analysis was carried out through science maps, covering three timeframes: (2006–2014), no relevant data before 2004, (2015-2019) Agenda 2030 was signed, (2020-today) COVID-19 pandemic. The results show profound changes in traditional trends, as well as the emergence of emerging trends.

**KEY WORDS:** Sustainable entrepreneurship; Science maps; Education.

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## 1. PURPOSE OF THE PAPER

Sustainable entrepreneurship has been gaining more relevance in recent years; however, this term was already coined since the end of the 20th century, when companies started to contribute substantially to the improvement of environmental quality. Initially, the private enterprise learned to handle ecological legislation on the cleaning up of pollution. It then cooperated in implementing policies to ensure pollution prevention by improving the eco-efficiency and resource-productivity of its operations.

**How to cite:** Vásquez-Peñañiel, M. S., and Perello-Marín, M. R. 2021. Sustainable entrepreneurship in education through Science Maps. In Proc.: 3rd International Conference Business Meets Technology. Valencia, 23rd & 24th September 2021. 97-110. <https://doi.org/10.4995/BMT2021.2021.13668>

From an academic perspective, Keijzers (2002) already foreshadowed a new shift in sustainable enterprises. They moved from environmentally friendly production methods towards truly sustainable entrepreneurship by complying with co-operation and assuming their responsibilities. Governments, for instance, started to create new agendas for this transformation considering that energy-related issues, resource stocks dissipation, encroachment on scarce land are still unresolved issues.

Thus, sustainable entrepreneurship went from being considered solely economic to considering aspects such as the environment and society without neglecting the prosperity of companies in financial terms. However, the effects of sustainable development on entrepreneurship and investments are still discussed. (Aravossis, 2004).

Over the years, several authors have emphasized the diversification of the studies that have emerged in recent times; however, these are found in various specialized topics such as politics, environmental sciences, sociology, economics, education, among others (Muñoz & Cohen, 2018; Schaefer et al., 2015). Here the main question arises: What are universities doing to promote sustainable entrepreneurship? What are they planning to do? It is well known from studies that entrepreneurship, especially innovation-based entrepreneurship, is a vital strategy for economic growth (Decker et al., 2014; Haltiwanger et al., 2013; Santillán Salgado et al., 2015; Zamora-Boza, 2018).

Thus, sustainable entrepreneurship must be included in national and local agendas of government, industry, and academia, given the current situation in the face of COVID-19, global warming, and the recession that will accompany these events that have devastated economies and business. (Hanaoka et al., 2018).

The main purpose of this article is to learn about the evolution of studies on sustainable entrepreneurship in the educational field, identifying the different trends, especially emerging ones, that have appeared over time. In other words, we intend to carry out a temporal analysis of the evolution of sustainable entrepreneurship in education. The time horizon for this analysis will be from 2006 until the year 2021.

## 2. RELATED WORK

Sustainable development was defined for the first time by the World Commission on Environment and Development in 1987 as “development that meets the needs of the present without compromising the ability of future generations to meet their own needs” (p. 41). From there, several branches have been developed around this definition.

On the other hand, sustainable entrepreneurship was defined based on the idea that this type of entrepreneurship was basically focused on environmental problems and solutions. (Hall et al., 2010). This concept evolved to a broader approach that led to a new conceptualization. It was no longer conceived only as a solution to problems but as a form of “building back better” (Shepherd & Williams, 2019), reconsidering processes, strategic planning, products, and the business itself. This reconsideration, from a self-reflective point of view, aware of the impact of its activity from an environmental and

social point of view, and not only with an economic lean (Sarango-Lalangui et al., n.d.), receiving a lot of attention from different fields of research, leading to a wide range of definitions as well.

Sarango-Lalangui (2018) identified 15 keywords related to the term: ecological entrepreneurial and entrepreneur, green entrepreneur, environmental entrepreneur, and entrepreneurial standout. In this sense, it is pertinent to review the different notions of sustainable entrepreneurship of authors most cited in the field of study to create a sense of orientation, considering the possible variants for this term. Table 1 shows the diversity of concepts and notions about sustainable entrepreneurship where the presence of the three key factors: economic, social, and environmental, is emphasized.

**Table 1.** Most cited authors (own elaboration).

Authors	Cited by	Definition	page.
1 Dean, T.J., McMullen, J.S. (2007)	619	“The process of discovering, evaluating, and exploiting economic opportunities those are present in market failures which detract from sustainability, including those that are environmentally relevant.”	58
2 Schaltegger, S., Wagner, M.(2011)	603	“Sustainable entrepreneurship (or ecopreneurship) deals with entrepreneurial companies that develop and successfully spread sustainability orientated innovations primarily in niche markets, but subsequently also in the mass market.”	222
3 Cohen, B., Winn, M.I. (2007)	596	“The examination of how opportunities to bring into existence future goods and services are discovered, created, and exploited, by whom, and with what economic, psychological, social, and environmental consequences.”	35
4 Hockerts, K., Wüstenhagen, R. (2010)	477	“The discovery and exploitation of economic opportunities through the generation of market disequilibria that initiate the transformation of a sector towards an environmentally and socially more sustainable state”	482
5 Klewitz, J., Hansen, E.G. (2014)	476	“Their entire business model is based on combining ecological and social issues with economic success (e.g., organic and fair-trade products), meaning that social and/or environmental goals can have the same, sometimes even higher priority than economic goals. “	63
6 Shepherd, D.A., Patzelt, H. (2011)	379	“A focus on the preservation of nature, life support, and community in the pursuit of perceived opportunities to bring into existence future products, processes, and services for gain, where the gain is broadly construed to include economic and non-economic gains to individuals, the economy, and society”	142
7 Kuckertz, A., Wagner, M. (2010)	278	“Sustainable entrepreneurs manage to the “triple bottom line by balancing economic health, social equity, and environmental resilience through their entrepreneurial behavior. “	524
8 Pacheco, D.F., Dean, T.J., Payne, D.S. (2010)	223	“We view sustainable entrepreneurship as the discovery, creation, evaluation, and exploitation of opportunities to create future goods and services that are consistent with sustainable development goals.”	58
9 Young, W., Tilley, F. (2006)	214	“An innovative, market-oriented and personality-driven form of creating economic and societal value by means of break-through environmentally or socially beneficial market or institutional innovations.”	226
10 Lans, T., Blok, V., Wesselink, R. (2014)	159	“Those who proactively facilitate latent demands for sustainable development”	37

Sustainable entrepreneurship is a multidisciplinary sub-discipline in the organizational field that has been considered trendy in recent years. The most studied topics were related to social and economic development (Cabeza Ramírez et al., n.d.). However, related work regarding the evolution of sustainable entrepreneurship has been developed (Anand et al., 2021; Huertas González-Serrano et al., n.d.; Iqbal & Kousar, 2019; Moya-Clemente et al., 2021; Sarango-Lalangui et al., n.d.; Stefan Schaltegger et al., 2016; Song et al., 2009; Terán-Yépez et al., 2020; Thananusak, n.d.) but keeping it from a social and business perspective, discarding education in their analysis.

The university in society plays a more profound role than just transmitting knowledge; it must help communities grow and achieve common goals for its improvement, which is part of a larger academic conversation that is currently taking place worldwide (González-Pernía et al., 2015). Traditionally, however, education scholars focus on business education through business schools or environmental sustainability through other faculties, leaving aside the relationship across these two disciplines (Lans et al., 2014).

It is then intended to address those issues from which research on sustainable entrepreneurship has been conducted from the field of education to highlight patterns and trends in the study of this field.

### 3. METHODOLOGY

For the temporal analysis, bibliometric techniques were used to map sustainable entrepreneurship to identify the different topics through nodes, and trends through clusters, considering the evolution of research in different periods (Robledo-Fernández et al., 2020).

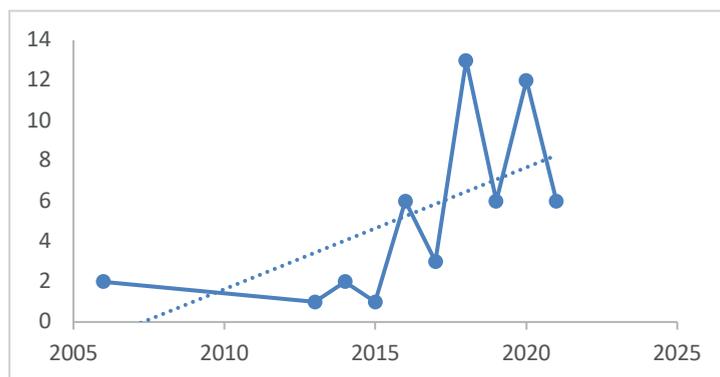
To carry out the present study, we started by determining a database to collect articles, where Scopus database was used as a reference, as it is a robust database that provides access to a higher number of indexed journals, allowing sorting in different ways (Anand et al., 2021; Robledo-Fernández et al., 2020).

In this paper, as our focus was on ‘sustainable entrepreneurship,’ we decided to omit other keywords such as social, environmental, and ecological entrepreneurship, as we assume sustainability deals with all three areas. We limited the selection of articles by using Boolean signs to only those related to the educational field. The search string used in Scopus was narrowed down as: “sustainable entrepreneurship” OR “sustainable entrepreneur” OR “sustainable entrepreneurial” AND education.” Finally, only scientific production of articles and book chapters was selected, which resulted in 52 articles.

Data preprocessing was performed with VOSviewer once the information had been extracted from the database; the detection of duplicates and errors in the spelling of keywords, authors, and reviews were taken into account (Garfield, 1994).

Accordingly, Figure 1 shows the evolution of the number of articles on sustainable entrepreneurship in the field of education. As we can see, scientific production has

had several highs and lows, but we consider two important milestones to be taken into account. In 2015 the international agreement of the 2030 Agenda was signed, which includes 17 Sustainable Development Goals (SDG). On the other hand, at the beginning of 2020, World Health Organization declared a pandemic due to the situation generated by Covid-19. Thus, we will section the temporal study to mark the trends from 2006 to 2014, 2015 to 2019, and 2020 to 2021.



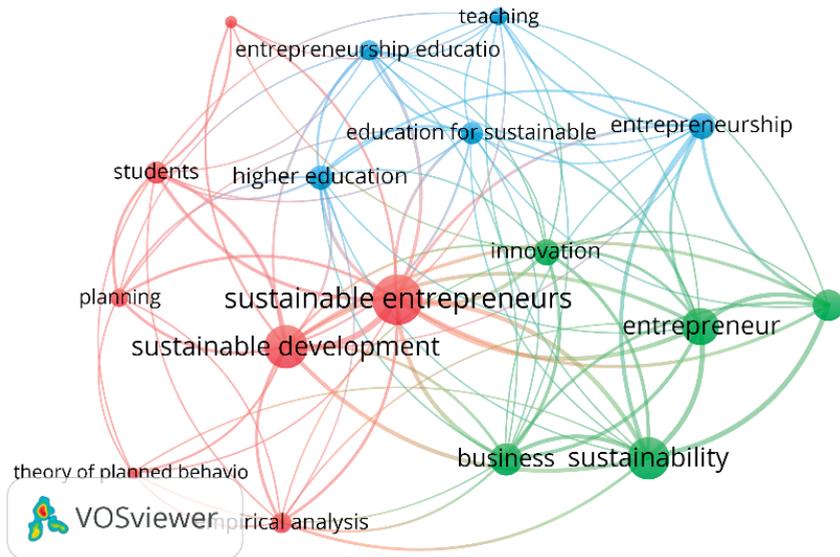
**Figure 1.** Articles by year (Own elaboration).

For identifying the most relevant nodes and their associations, the associative strength method was used (Robledo-Fernández et al., 2020), resulting in the clusters generated by the program. The types of analysis used in the research were those of co-occurrence for all keywords considering network and overlay visualization, citation by authors, and co-authorship between countries.

#### 4. FINDINGS

In the bibliometric network generated, similarity measures were applied to normalize the co-occurrence values of keywords. Multivariate clustering techniques were used to identify homogeneous groups. The data obtained in science maps were presented in links and distributed as nearby points in a multidimensional space (Galvez, 2018). The results of using VOSviewer software showed three trends based on the clusters.

According to Figure 2, the red cluster represents studies on aspects concerning students and planning; the blue cluster corresponds to teachers and higher education. Finally, the green cluster corresponds to business and innovation. It could be affirmed that the trends have been constant since there are no distances between the clusters nor few connections, so there is no evidence of emerging trends.



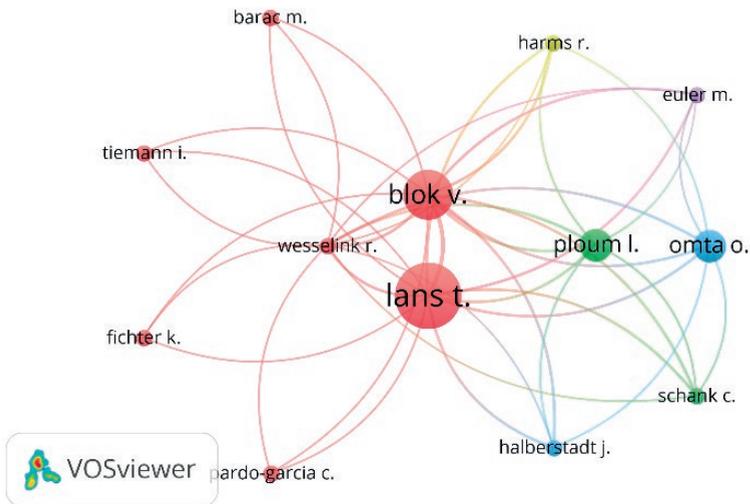
**Figure 2.** Trends in sustainable entrepreneurship.

Co-authorship has been studied to investigate the structure of scientific collaborations (Liu et al., 2005); in this particular case, we considered the analysis between countries to determine possible collaboration networks between the different countries researched in this field. Following the limited number of articles, Figure 3 shows the likely research groups working in this area, forming four clusters since a minimum of two papers are considered to generate the link.



**Figure 3.** Collaborative networks between countries.

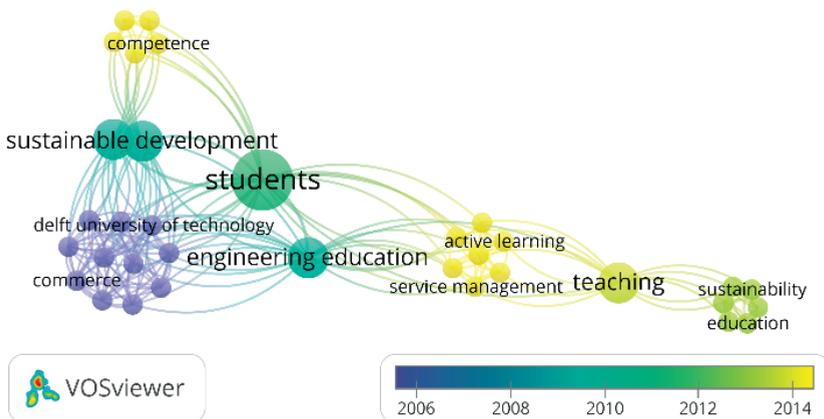
On the other hand, Figure 4 uses citation to identify the intellectual structure of scientific disciplines, which is given when two items are cited (Patricio & Mario, 2015). For the present study, all the documents in the database with at least ten citations were considered, with Lans, Blok, Ploum, and Omta being the most representative.



**Figure 4.** Most cited authors.

Finally, following the objective of this research, a temporal analysis is presented, segmented into three time periods, considering as milestones the signing of Agenda 2030 and the pandemic caused by Covid-19.

**A. Timeframe: 2006-2014**

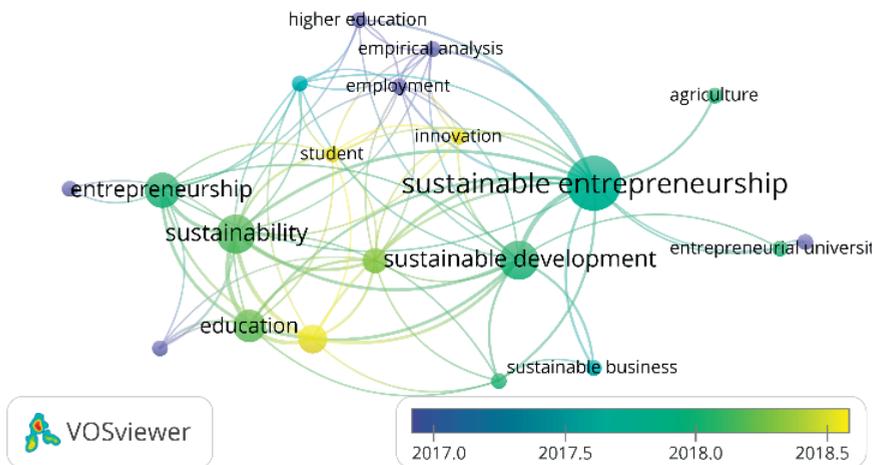


**Figure 5.** Temporal Analysis from 2006 to 2014.

In this period, students are relevant in identifying a trend in education in sustainable entrepreneurship (SE), but they are primarily focused on sustainable development and engineering education. Education for sustainability is an emerging trend that appears in this period. Its evolution is clearly defined since it can be observed that in 2006 SE studies in education were based on economic-commercial and social aspects (purple nodes). Subsequently, studies focused on higher education institutions in engineering careers (light blue nodes), and as a new trend (in yellow), we find teaching-learning methodologies and entrepreneurship education.

The research that stands out in these topics is (Lans et al., 2014) and (Bonnet et al., 2006).

### B. Timeframe: 2015-2019



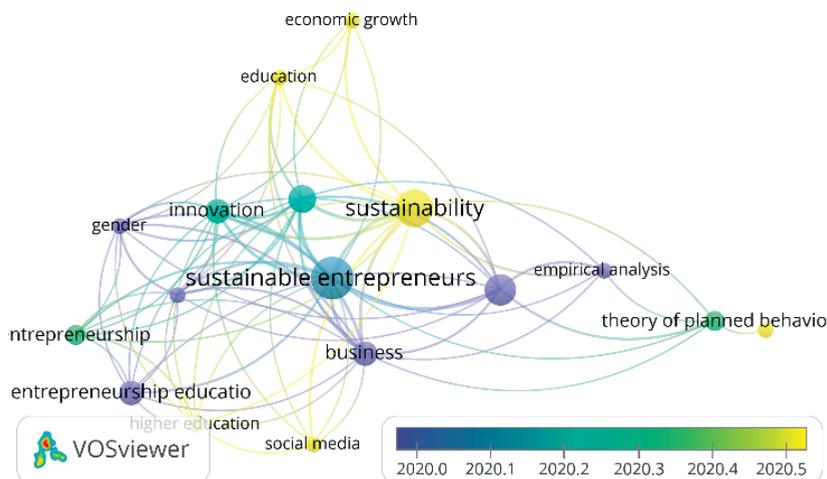
**Figure 6.** Temporal Analysis from 2015 to 2019.

In the second time frame, we can already consider new interactions in the educational SE field of action. Human resources, innovation, and the United Nations are terms that begin to be studied. However, since we do not have a defined item as in the previous period, trends have stabilized in items “students” and “higher education.” On the other hand, new emerging trends appeared, such as “agriculture” and the “entrepreneurial university.” Finally, shown in Figure 6, the evolution of this period marks a change from the fields related to higher education and sustainable development as a sequence of studies of the previous timeframe towards studies focused on entrepreneurship and innovation.

Relevant research in this cluster in this cluster are: (Anderson et al., 2017; Fichter & Tiemann, 2018; Halberstadt et al., 2019; Hosseininia & Ramezani, 2016; Kucharčíková et al., 2018; Ploum et al., 2018)

### C. Timeframe: 2020-2021

These years are marked by the pandemic caused by Covid-19, which affected all fields of study. Although the time is short considering the rest of the time frames, a considerable increase in the number of papers can be noted, taking into account that the time elapsed is only one and a half years for publications.



**Figure 7.** Temporal Analysis from 2020 to 2021.

However, unlike other years, sustainable entrepreneurship has evolved towards topics that were not previously referenced, such as social media, gender, and economic growth, which we can attribute to the pandemic. Also, the change in the map shows the existing centrality between the clusters that have traditionally remained. Nodes such as sustainable entrepreneurship, empirical analysis, business, entrepreneurship education, and higher education, with their respective links, are shown in Figure 7.

In this time frame, the following studies are important: (Butkouskaya et al., 2020; Pardo-Garcia & Barac, 2020; Sher et al., 2020).

## 5. RESEARCH LIMITATIONS AND IMPLICATIONS

The limitations of this study are the use of just one database. While it is a robust database, it merely represents a part of the scientific production on the topic. Additionally, it only considers articles in English, so publications in other languages are not considered.

On the other hand, the limited number of articles does not allow for an exhaustive search of related terms, implying more accurate processing in relation to word co-occurrence.

Future research can include all documents from another database and other languages to better understand which of them are crucial to sustainable entrepreneurship research development. Furthermore, having a compressive state of the art of sustainable entrepreneurship in education can lead to the development of a model in which educators could achieve SDGs and create a real opportunity to build back better economies considering social, environmental, and economic insights.

## 6. PRACTICAL IMPLICATIONS

Having a clearer understanding of how academia could help reach SDGs and reconsidering how we prepare students may also help us review what we want HEIs or other educational institutions to do and be in the 21st century.

## 7. VALUE OF THE PAPER

The lack of published papers in this multidisciplinary field indicates a knowledge gap that still needs to be investigated. There are reviews of literature regarding sustainable entrepreneurship. Still, it is only limited to the economic and business sphere, leaving aside education, which is essential for the growth of a society.

The goals of the 2030 Agenda are set, and COVID-19 has generated profound changes in all areas of knowledge. It is crucial to make fundamental reconsiderations to create resilient and profitable economies in accordance with the natural and social resources available. Educational institutions, having an essential role in the generation of knowledge, are the best suited to start integrating these fields in people's minds and achieve long-term generational changes.

This study can contribute to future work in entrepreneurship, business administration, education, and sustainable development as there are several studies of each field but very few in this multidisciplinary field. On the other hand, this research is highly valued by policymakers, authorities, and academic entities. This information sets a precedent for the later construction of programs and policies for preparing and maintaining high-quality education, including sustainable entrepreneurship.

## CONFLICT OF INTERESTS

The authors declare no conflict of interest

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