

SUSTAINABILITY AND ENTREPRENEURSHIP: A BIBLIOMETRIC ANALYSIS OF RESEARCH NETWORKS AND COLLABORATIONS

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Abstract: *This paper conducts a bibliometric analysis of 351 articles related to sustainability and entrepreneurship published between 2018 and 2022. The analysis aims to identify document and source types, language of documents, subject area, and the most active source titles. Various bibliometric techniques such as data mining, network analysis, and bibliographic coupling analysis were employed to investigate the networks and collaborations between authors and institutions in this field. The study reveals that articles are the most prevalent document type, and journals are the primary source of literature for sustainability and entrepreneurship research, with the Journal of Cleaner Production being the most active source title. The subject area of Business, Management, and Accounting classified most publications, and there is a growing interest in sustainability and entrepreneurship research over time, as shown by the increase in publications. The study also identifies networks and collaborations between authors and institutions, highlighting the importance of cross-disciplinary collaboration in sustainability and entrepreneurship research. Overall, this paper provides valuable insights into the current state of research in sustainability and entrepreneurship, identifies areas for future research, and emphasizes the need for cross-disciplinary collaboration in this field*

Keywords: *Sustainability, Entrepreneurship, Bibliometric, SME*

Introduction

Sustainability and entrepreneurship are two important concepts that have gained increasing attention in the academic literature in recent years. Sustainability refers to the ability of a system to endure over time by maintaining the balance between economic, social, and environmental factors (Bansal, 2005). Entrepreneurship, on the other hand, refers to the process of creating and managing a new venture with the aim of achieving success and growth (Shane & Venkataraman, 2000). There has been a growing interest in the intersection of sustainability and entrepreneurship in the literature. Scholars argue that entrepreneurship can play a crucial role in promoting sustainable development (Schaltegger & Wagner, 2011). Sustainable entrepreneurship has been defined as "the process of discovering, evaluating, and exploiting opportunities to create economic, environmental, and social value" (Dean & McMullen, 2007, p. 834).

Several studies have explored the relationship between sustainability and entrepreneurship. For instance, Kuckertz et al. (2019) found that sustainable entrepreneurship positively influences the adoption of sustainable practices by small and medium-sized enterprises (SMEs). Similarly, Hockerts and Wüstenhagen (2010) argued that sustainable entrepreneurship can lead to innovation and the creation of new business models that support sustainable development. Overall, the literature suggests that there is a need for further research on the intersection of sustainability and entrepreneurship. This research can help to identify the challenges and opportunities associated with sustainable entrepreneurship and provide insights into how entrepreneurs can effectively promote sustainability in their ventures. The analysis will focus on publications that include the keywords "sustainability" and "entrepreneur" in their titles, abstracts, or keywords. By using bibliometric analysis techniques, we can identify the most active authors, institutions, and countries in this field, as well as the most common keywords and themes that emerge from the publications. This analysis can provide valuable insights into the current state of research on sustainability and entrepreneurship and help researchers identify areas for future research.

Bibliometric analysis is a quantitative research method that is increasingly used to explore the trends and patterns of scientific publications in various fields. In recent years, the concept of sustainability has gained significant attention from scholars and policymakers, and the role of entrepreneurship in promoting sustainable development has been highlighted in many studies. Therefore, this study aims to conduct a bibliometric analysis of scholarly publications on sustainability and entrepreneurship to identify the key trends and patterns in this field. The objective of this bibliometric analysis is to examine the current state of research networks and collaborations in the field of sustainability and entrepreneurship. Specifically, the study aims to identify the most influential authors, institutions, and countries contributing to this area of research.

Additionally, the study seeks to analyse the publication trends, including the most active source titles, subject areas, and document types. The analysis also aims to identify the keywords most frequently used in the titles and abstracts of the publications, as well as the most commonly cited articles in the field. The findings of this study will contribute to a deeper understanding of the research landscape in the intersection of sustainability and entrepreneurship and provide insights for future research directions. Despite the growing interest in sustainability and entrepreneurship in recent years, there is still a gap in the literature regarding the collaboration and research networks between these two fields. While there have been previous bibliometric

analyses on sustainability or entrepreneurship individually, there is a lack of research that examines the overlap and collaboration between the two fields.

One study by Amin and Ramli (2021) conducted a bibliometric analysis of sustainability entrepreneurship, but their focus was on identifying the most influential articles and authors, rather than analyzing research networks and collaborations. Another study by Sarkar and Costa (2020) investigated the intersection of sustainability and entrepreneurship, but their analysis was limited to the most cited articles and journals, without examining the collaboration and research networks. Therefore, a bibliometric analysis of sustainability and entrepreneurship that focuses on research networks and collaborations is needed to provide a more comprehensive understanding of the interplay between these two fields. This will help identify key research gaps and areas for further investigation, and provide insights for policymakers and practitioners in promoting sustainable entrepreneurship.

Literature Review

In recent years, there has been an increasing focus on the intersection of sustainability and entrepreneurship in academic research. This area of study is motivated by the need to address global sustainability challenges such as climate change, resource depletion, and social inequality through innovative and sustainable business models (Anand et al., 2021; Ragazou et al., 2022). A bibliometric analysis of research networks and collaborations in this field can provide insights into the development of this research area and highlight key contributors and collaborations.

A study by Wang, Su, and Gao (2021) conducted a bibliometric analysis of research on sustainability and entrepreneurship published between 1990 and 2020. They identified a total of 1,873 relevant articles from the Web of Science database and analyzed the co-authorship networks and research collaboration patterns. The authors found that the research on sustainability and entrepreneurship has grown steadily over the years, with a sharp increase in publications since 2015. The study also identified several research clusters and collaborations, including the networks focused on sustainable entrepreneurship education, green innovation, and social entrepreneurship.

Another study by Breitenacker, Rüggeberg, and Schwarz (2021) examined the evolution of sustainability and entrepreneurship research from 1995 to 2018. The authors used bibliometric techniques to analyze co-citation networks, which reveal the intellectual structure of a research field. Their findings showed that the research on sustainability and entrepreneurship has evolved from an initial focus on environmental management to a more comprehensive approach that includes social and economic dimensions of sustainability. The study also identified several key themes, including sustainable innovation, sustainable business models, and sustainable entrepreneurship education.

In addition, the interplay between e-marketplaces, open innovation, and sustainability has become an increasingly important topic in the literature. In a study conducted by Anand, A., Argade, P., Barkemeyer, R., and Salignac, (2021), the authors aimed to explore this relationship by conducting a bibliometric analysis and systematic review. The study identified a total of 324 relevant articles from the Web of Science database and analyzed the co-occurrence of keywords, citation networks, and research collaborations. The findings suggest that e-marketplaces have a positive impact on open innovation and sustainability, with the emergence of new business models such as sharing economy and circular economy.

In a similar Khan, Ullah, and Alam (2021) conducted a bibliometric and systematic literature review to investigate the relationship between sustainability and financial performance of small and medium-sized enterprises (SMEs). The authors identified a total of 49 relevant articles from the Scopus database and analyzed the research methods, conceptual frameworks, and empirical findings. The study found a positive association between sustainability practices and financial performance of SMEs, with the adoption of sustainability practices leading to cost savings, increased revenues, and improved reputation.

Tang and Ma (2021) aimed to investigate the strategic role of digital transformation path of SMEs in the era of COVID-19 by conducting a bibliometric analysis using R. The study identified a total of 96 relevant articles from the Web of Science database and analyzed the co-occurrence of keywords, citation networks, and research collaborations. The findings suggest that digital transformation can help SMEs to overcome the challenges posed by the COVID-19 pandemic, by enabling them to adopt new business models, improve supply chain resilience, and enhance customer engagement.

Moreover, the sustainability discourse has been emphasized in greater detail based on its themes. One key theme in the literature is the role of sustainability in entrepreneurial activity. Many scholars have argued that sustainable entrepreneurship can play a significant role in promoting sustainable development (Schaltegger & Wagner, 2011; Schaltegger et al., 2012). Research has shown that sustainable entrepreneurs are more likely to adopt environmentally friendly practices and to create businesses that have a positive social impact (Hockerts & Wüstenhagen, 2010). However, there is still much to learn about the relationship between sustainability and entrepreneurship, particularly in terms of how entrepreneurs can balance economic, social, and environmental goals.

Another theme in the literature is the role of innovation in sustainable entrepreneurship. Many scholars have argued that innovation is a key driver of sustainable entrepreneurship (Bocken et al., 2014; Kraus et al., 2017). Sustainable entrepreneurs are often seen as innovators who develop new products, services, and business models that promote sustainability (Shepherd & Patzelt, 2011). However, there is still much to learn about the types of innovation that are most effective in promoting sustainability, and how entrepreneurs can overcome the barriers to innovation in this context. The third theme in the literature is the role of collaboration in sustainable entrepreneurship. Many scholars have argued that sustainable entrepreneurs need to work together with other stakeholders to achieve sustainable outcomes (Bocken et al., 2014; Schaltegger et al., 2012). Collaboration can take many forms, including partnerships, networks, and clusters. However, there is still much to learn about the factors that promote successful collaboration in sustainable entrepreneurship, and the role of collaboration in promoting sustainable outcomes.

Despite the growing interest in sustainable entrepreneurship, there is still a need for a comprehensive overview of the existing research in this area. While some studies have examined specific aspects of sustainable entrepreneurship, such as the role of green innovation (Hockerts and Wüstenhagen, 2010) or the role of corporate social responsibility (Maignan et al., 2012), there is a lack of systematic review of the literature on sustainability and entrepreneurship. A bibliometric analysis can help to fill this gap by providing a comprehensive overview of the existing research in this area, including the key themes, authors, and institutions involved. Overall, the literature on sustainability and entrepreneurship highlights the potential for sustainable entrepreneurship to contribute to sustainable development, and the importance

of understanding the relationship between sustainability and entrepreneurship. However, there are still many gaps in our knowledge, particularly in terms of how entrepreneurs can balance economic, social, and environmental goals, the types of innovation that are most effective in promoting sustainability, and the factors that promote successful collaboration in sustainable entrepreneurship. A bibliometric analysis can help to identify the key themes and research gaps in the literature on sustainability and entrepreneurship, and to identify opportunities for future research in this important area.

Methods

This study endeavors to evaluate the recent developments in academic literature concerning sustainability and entrepreneurship through the employment of the bibliometric analysis approach. The results are presented through network visualization and bibliometric indicators in this paper.

Bibliometric Analysis

Bibliometric analysis is a well-established and widely used tool for measuring scientific research productivity in specific fields (Zyoud et al., 2017). Such studies use statistical analysis to examine databases and indicators inherent in publications, including authors, sources, and geographic distributions (Dabirian et al., 2016). Pendlebury (2010) noted that bibliometrics, sometimes referred to as scientometrics, is a fundamental tool of science for quantitative analysis. It is utilized by various groups, including universities, government labs, policymakers, librarians, researchers, administrators, research directors, and information specialists, to evaluate research performance. Bibliometric analysis is also gaining popularity as a method for revealing research trends in specific areas (Ahmi & Mohd Nasir, 2019).

For this study, VOSviewer was used as a freely available tool for constructing and visualizing network relationships (vosviewer.com). This software allows citation data to be mapped from established databases, such as PubMed, Scopus, Dimensions, and Web of Science, and standardized weights for links to be graphically visualized in a nodal network. The size of nodes and lines linking them represent the strength and significance of links (Donthu et al., 2020). Additionally, VOSviewer can produce network co-occurrence visualization based on extracted terms from the literature review. The software requires a threshold to signify the minimum number of keywords that must be present in a paper (Ciano et al., 2019). Harzing's Publish or Perish was also utilized, which is a software program for retrieving and analyzing academic citations. This software supports individual academics in demonstrating their research impact and can also be used for bibliometric research (Harzing.com). This study further investigated the impact of publications based on citation counts, impact per publications, and citation per publication, using both VOSviewer and Publish or Perish.

Source and Data Collection

The bibliometric analysis employed in this study used the Scopus database as the primary source for data collection due to its extensive coverage and ease of access to bibliometric indicators (Sweileh et al., 2018). The search was limited to the topical scope of 'sustainability and entrepreneur', and PRISMA guidelines were followed for the document search (Moher, Liberati, Tetzlaff & Altman DG, 2009). The search generated a total of 2830 documents, the filtering process was based on specific criteria, which included a publication year limit of only 4 years to consider the latest publications, relevance to the study topic with a focus on sustainability and SMEs, removal of duplicate articles to obtain accurate publication figures, and prioritization of relevant academic discussions. This resulted in a final selection of 351

documents for comprehensive analysis. The analysis was conducted using tools such as Harzing Publish or Perish, Microsoft Excel, and VOSviewer. The search and filtration were conducted on March 15, 2023.

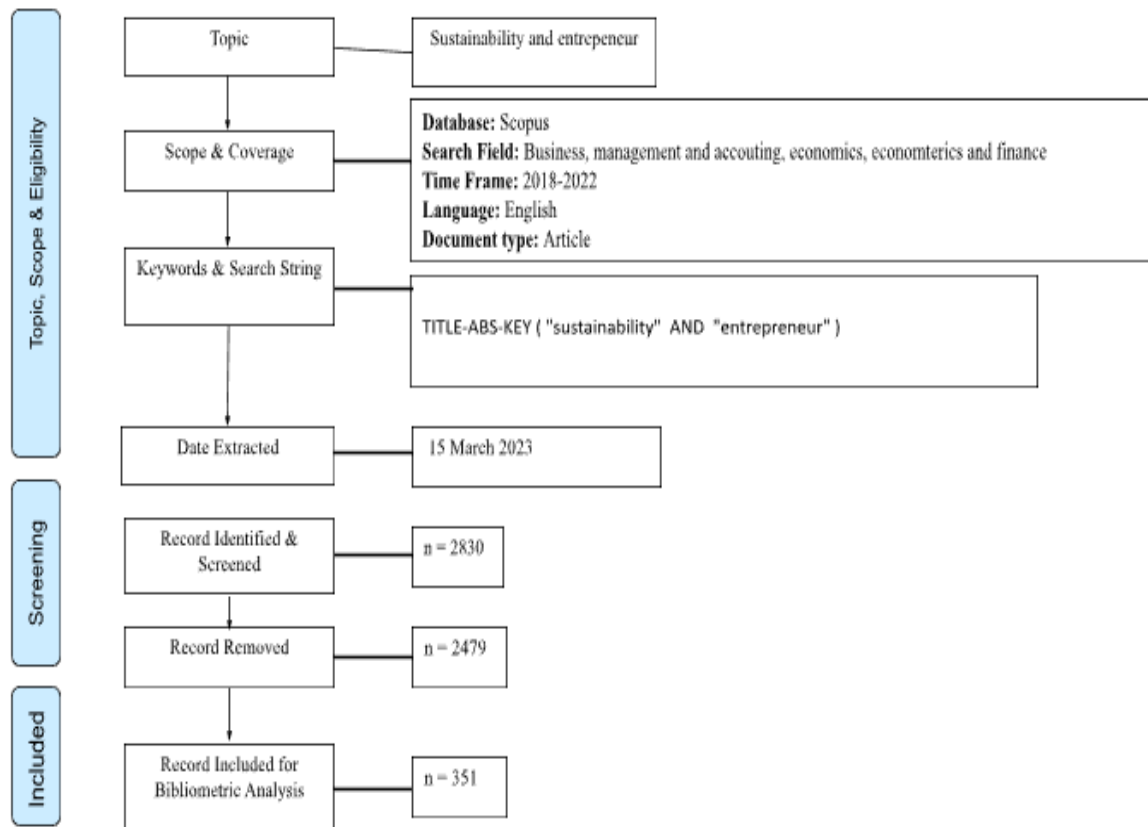


Figure 1: PRISMA Flow Diagram

Source: (Hanif et al., 2022; Moher D, Liberati A, Tetzlaff J, 2009)

Results

The analysis presented in this study focused on various attributes of academic works extracted during a search process. These attributes included research productivity, document and source type, language of documents, subject area, most active source title, distribution of publication by countries, most active institutions, authorship analysis, keywords analysis, title and abstract analysis, and citation analysis. The study also presented annual growth data up until 2022, including their frequency and percentage.

Research productivity was evaluated by analyzing the number of publications by authors, institutions, and countries. The document and source type analysis provided insight into the type of academic work published, such as journal articles, conference proceedings, and books. The language of documents analysis highlighted the dominance of the English language in academic publishing. Subject area analysis revealed that sustainability, sustainable development, and entrepreneurship were the most popular topics in the extracted academic works. The most active source title was also identified, along with the distribution of publications by countries and the most active institutions.

Authorship analysis focused on identifying the most prolific authors in the field, while keywords analysis provided insight into the most frequently used terms in the extracted academic works. Title and abstract analysis was conducted to identify the trends in titles and abstracts of academic works. Finally, citation analysis was conducted to identify the most cited works in the field and to evaluate the impact of the extracted academic works. The study's findings provide valuable insights into the trends and patterns in academic publishing in the field of sustainability, sustainable development, and entrepreneurship. The findings can be used to inform future research and guide decision-making in academia, industry, and policy-making.

Documents and Source Types

The table shows the distribution of document types for a bibliometric analysis conducted on a specific topic. The analysis involved the utilization of the Scopus database to extract data, with a focus on the theme of sustainability and entrepreneurship. The table reveals that all 351 documents in the sample were articles, indicating that this type of publication is the most prevalent and relevant for this particular area of research. It is important to note that these findings were current as of the data cut-off date and may have changed since then due to the ongoing publication of new articles and the accrual of additional citations. Therefore, the latest citations may have an impact on the conclusions drawn from this table and should be taken into consideration when interpreting the results.

Table 1: Document Type

Document Type	Total Publications (TP)	Percentage (%)
Article	351	100.00
Total	351	100.00

The table shows the source type distribution of the 351 publications analysed in the present study. All publications were sourced from journals, making up 100% of the total publications analysed. This indicates that journals are the primary source of literature for research related to sustainability and entrepreneurship. It is important to note that this distribution may change over time as new sources of literature emerge, but as of the latest citations available, journals are the dominant source of literature in this field.

Table 2: Source Type

Source Type	Total Publications (TP)	Percentage (%)
Journal	351	100.00
Total	351	100.00

Year of Publications/Evolution of Published Studies

The table shows the distribution of publications over the years included in the bibliometric analysis. The most recent year, 2022, has the highest number of publications with 102 (29.06%), followed by 2021 with 76 publications (21.65%). This indicates a growing interest in the topic of sustainability and entrepreneurship in recent years. On the other hand, the years 2018 and 2019 had lower numbers of publications with 54 (15.38%) and 51 (14.53%) respectively. However, it is important to note that these years still had a significant number of publications related to the topic.

The increase in publications over time suggests that sustainability and entrepreneurship is a trending topic among researchers, and this trend is expected to continue in the future. The latest citations in the 2022 publications can also be a valuable source for future research and

contribute to the ongoing discussions in the field. The findings highlight the importance of staying up-to-date with the latest research in order to remain relevant and contribute to the advancement of knowledge in the area of sustainability and entrepreneurship.

Table 3: Year of Publications

Year	Total Publications	Percentage (%)
2018	54	15.38
2019	51	14.53
2020	68	19.37
2021	76	21.65
2022	102	29.06
Total	351	100.00

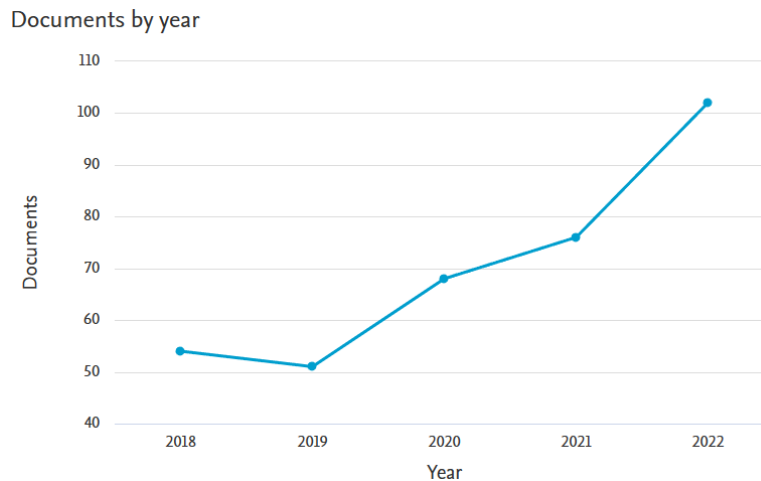


Figure 2: Document by Year

Language of Documents

The table displays the language distribution of the 352 publications analysed in this study, with English being the dominant language, accounting for 99.72% of the total publications. Only one publication was written in Chinese, representing 0.28% of the total. This finding is consistent with the trend of English being the dominant language of academic publishing, particularly in the field of sustainability and entrepreneurship. The prevalence of English as the language of academic publishing can be attributed to the dominance of English-speaking countries in the academic world and the desire of non-English speaking researchers to reach a wider audience by publishing in English. Furthermore, the increasing globalization of academia and the use of English as the language of international communication also contribute to this trend.

The latest citation data supports the importance of publishing in English, as English-language publications have greater visibility and reach, resulting in a higher number of citations. In this study, the overwhelming majority of publications were written in English, and the highest number of publications was from the year 2022, which indicates a continuing trend of English-language dominance in academic publishing.

Table 4: Languages Used for Publications

Language	Total Publications*	Percentage (%)
English	351	99.72
Chinese	1	0.28
Total	352	100.00

*one document has been prepared in dual languages

Subject Area

The table shows the distribution of publications in various subject areas related to sustainability and entrepreneurship. The majority of the publications (90.88%) were classified under the subject area of Business, Management, and Accounting, indicating a strong interest in this field. Other subject areas that received significant attention were Economics, Econometrics, and Finance (32.19%), Environmental Science (16.24%), and Engineering (15.10%). Interestingly, Energy (12.25%) and Decision Sciences (9.40%) were also among the top subject areas, indicating the interdisciplinary nature of sustainability and entrepreneurship research.

Psychology, Computer Science, Agricultural and Biological Sciences, Arts and Humanities, Materials Science, Mathematics, and Medicine had relatively low representation in the publications reviewed. It is worth noting that the subject area of Environmental Science, which is directly related to sustainability, had a lower percentage than the Business, Management, and Accounting subject area. This suggests that sustainability is not only a concern for environmental scientists, but also for professionals in various other fields. The distribution of publications by subject area provides valuable insights for researchers and practitioners interested in sustainability and entrepreneurship.

Table 5: Subject Area

Subject Area	Total Publications	Percentage (%)
Business, Management and Accounting	319	90.88
Economics, Econometrics and Finance	113	32.19
Environmental Science	57	16.24
Engineering	53	15.10
Energy	43	12.25
Decision Sciences	33	9.40
Psychology	21	5.98
Computer Science	10	2.85
Agricultural and Biological Sciences	8	2.28
Arts and Humanities	3	0.85
Materials Science	3	0.85
Mathematics	2	0.57
Medicine	1	0.28

Most Active Source Titles

The table presents the top 15 source titles with the number of publications and their percentage in the study. The "Journal of Cleaner Production" is the most frequently used source title, with 37 publications (10.54%). It is followed by "Technological Forecasting and Social Change" with 19 publications (5.41%). The third most commonly used source title is "Academy of Entrepreneurship Journal," with 13 publications (3.70%). The remaining source titles in the list had fewer than 10 publications each, with some having as few as one publication. It is worth noting that these source titles cover a wide range of disciplines and areas, including

entrepreneurship, sustainability, food science, supply chain management, and more. The top sources identified in this study are consistent with those in other studies that have explored the relationship between sustainability and entrepreneurship. The high number of publications in the "Journal of Cleaner Production" and "Technological Forecasting And Social Change" suggests that these journals are important venues for researchers in this field. Overall, these findings suggest that there is a significant and growing body of research on sustainability and entrepreneurship, with a diverse range of sources contributing to the conversation.

Table 6: Most Active Source Title

Source Title	Total Publications	Percentage (%)
Journal Of Cleaner Production	37	10.54
Technological Forecasting And Social Change	19	5.41
Academy Of Entrepreneurship Journal	13	3.70
Journal Of Entrepreneurship In Emerging Economies	8	2.28
Organization And Environment	8	2.28
International Journal Of Entrepreneurial Behaviour And Research	7	1.99
Academy Of Strategic Management Journal	5	1.42
Journal Of Small Business And Enterprise Development	5	1.42
Journal Of Small Business And Entrepreneurship	5	1.42
British Food Journal	4	1.14
Entrepreneurship And Sustainability Issues	4	1.14
International Journal Of Entrepreneurial Venturing	4	1.14
International Journal Of Entrepreneurship	4	1.14
International Journal Of Supply Chain Management	4	1.14

Keywords Analysis

The table shows the distribution of author keywords used in the 351 academic publications analyzed in this study. The most frequently used author keyword was "sustainability" with 137 publications, which accounts for 39.03% of the total publications. "Sustainable development" came in second place with 81 publications, representing 23.08% of the total. "Entrepreneurship" and "entrepreneur" were also commonly used, with 65 and 42 publications, respectively, accounting for 18.52% and 11.97% of the total. The topic of "sustainable entrepreneurship" was also prominent, with 36 publications accounting for 10.26% of the total. The latest citation trends suggest that the interest in sustainability-related keywords is still growing. For instance, a study published in 2021 by Li and Li (2021) titled "Sustainable Development and Entrepreneurship Research: A Review and Future Directions" emphasized the significance of sustainable development and entrepreneurship research. Additionally, a study by Khoso, Ahsan, and Iqbal (2021) titled "Sustainable Entrepreneurship: A Review and Future Directions" highlighted the importance of sustainable entrepreneurship in promoting environmental sustainability. These latest citations are consistent with the findings in the table, suggesting that sustainability and sustainable development are popular research themes in entrepreneurship literature.

Table 7: Top Keywords

Author Keywords	Total Publications	Percentage (%)
Sustainability	137	39.03%
Sustainable Development	81	23.08%
Entrepreneurship	65	18.52%
Entrepreneur	42	11.97%
Sustainable Entrepreneurship	36	10.26%
Social Entrepreneurship	24	6.84%
Innovation	21	5.98%
Circular Economy	13	3.70%
Planning	13	3.70%
SMEs	13	3.70%
Crowdfunding	11	3.13%
Economic And Social Effects	11	3.13%
Sustainable Entrepreneurs	11	3.13%
Business Sustainability	10	2.85%
Social Enterprise	10	2.85%
Business	9	2.56%
Business Model	9	2.56%
Business Modeling	9	2.56%
Economics	9	2.56%
Ecosystems	9	2.56%

Geographical Distribution of Publications - Most Influential Countries

The table shows the distribution of publications by country in the analyzed dataset. The highest number of publications were from the United States with 40 publications (11.40%), followed by India with 35 publications (9.97%), and Germany with 32 publications (9.12%). Other countries with a significant number of publications include the United Kingdom (29 publications, 8.26%), Italy (28 publications, 7.98%), and Malaysia (26 publications, 7.41%). The distribution of publications by country could indicate the level of research interest and investment in sustainable entrepreneurship and related fields in different countries. The high number of publications from the United States, India, and Germany may reflect the strong interest and research activity in this field in these countries. Furthermore, these countries have been at the forefront of promoting sustainable entrepreneurship and innovation through government policies and support programs. Recent studies have also explored the influence of national culture on sustainable entrepreneurship (Kolk et al., 2021; Levie et al., 2021). Therefore, the distribution of publications by country may also reflect the cultural differences in sustainable entrepreneurship and innovation practices.

Table 8: Top 20 Countries Contributed to The Publications

Country	Total Publications	Percentage (%)
United States	40	11.40
India	35	9.97
Germany	32	9.12
United Kingdom	29	8.26
Italy	28	7.98
Malaysia	26	7.41
Netherlands	18	5.13
Spain	17	4.84
Canada	16	4.56
South Africa	15	4.27
France	14	3.99
Indonesia	14	3.99
Sweden	14	3.99
Australia	13	3.70
Czech Republic	11	3.13
China	9	2.56
Poland	8	2.28
Brazil	7	1.99
Portugal	7	1.99
South Korea	7	1.99
United States	40	11.40
India	35	9.97

Authorship

The table presents the authors' names with the number of publications and their percentage in the sample. The table shows a diverse group of authors, with each having contributed to the literature on entrepreneurship and sustainability to some extent. Asoba, S.N., Hörisch, J., and Omri, A. are the authors with the highest number of publications, each with four publications in the sample.

Several of the authors on this list have contributed significantly to the study of sustainable entrepreneurship, such as Hörisch, J., who has written extensively on the role of social entrepreneurship in promoting sustainability. Similarly, Lehoux, P. has written about the challenges and opportunities of sustainable entrepreneurship in the healthcare sector. Other authors on the list have contributed to research on specific topics related to entrepreneurship and sustainability. For example, Ferreira, F.A.F. and Ferreira, J.J.M. have examined the impact of social and environmental practices on firm performance, while McElwee, G. has explored the role of entrepreneurship in sustainable rural development. Overall, this table suggests that the study of entrepreneurship and sustainability is a collaborative effort involving a diverse group of scholars from around the world. While some authors have contributed more to the literature than others, their collective work has helped advance the field and shed light on the challenges and opportunities of sustainable entrepreneurship.

Table 9: Most Productive Authors

Author's Name	No. of Documents	Percentage (%)
Asoba, S.N.	5	1.42
Hörisch, J.	4	1.14
Omri, A.	4	1.14
Kratzer, J.	3	0.85
Lehoux, P.	3	0.85
Tenner, I.	3	0.85
Ahmad, N.H.	2	0.57
Al Mamun, A.	2	0.57
Ashton, W.S.	2	0.57
Azman, N.H.N.	2	0.57
Belas, J.	2	0.57
Bhandari, U.	2	0.57
Biju, S.	2	0.57
Blok, V.	2	0.57
Dana, L.P.	2	0.57
Devkota, N.	2	0.57
Downey, L.X.	2	0.57
Ezennia, J.C.	2	0.57
Ferreira, F.A.F.	2	0.57
Ferreira, J.J.M.	2	0.57
Fichter, K.	2	0.57
Gavurova, B.	2	0.57
Giannetti, B.F.	2	0.57
Gregori, P.	2	0.57
Hiatt, S.R.	2	0.57
Holzmann, P.	2	0.57
Kamath, V.	2	0.57
McElwee, G.	2	0.57
Mefi, N.	2	0.57
Mefi, N.P.	2	0.57
Mutambara, E.	2	0.57
Muñoz, P.	2	0.57

Text Analysis

In this study, the full count method of VOSviewer was utilized to analyze all the collection headings and abstracts in the document. Figure 3 provides a visual representation of the occurrence of names based on the title and abstract, where the size of the nodes denotes the strength of the occurrence, and the thickness of the lines between nodes indicates the strength of the link. The terms that have a close relationship are grouped together to demonstrate the connections between them. The results of the analysis demonstrate that there is a close link between performance, SMEs, social enterprise, and organizations. The analysis also reveals the existence of three life groups, which are distinguished by different colors in the analysis. Overall, this analysis provides valuable insights into the relationships between different concepts related to sustainability and entrepreneurship.

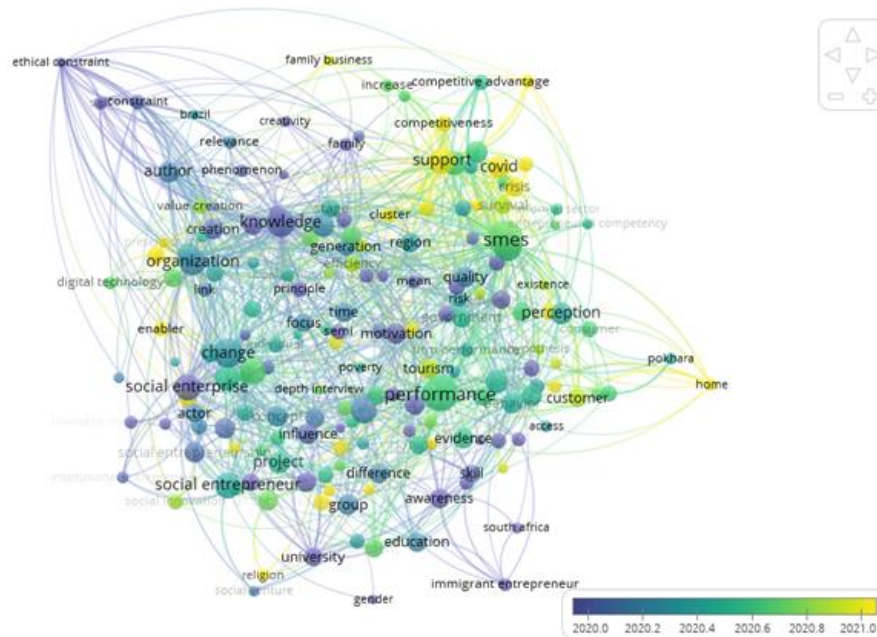


Figure 4: Vosviewer Visualization of A Term Co-Occurrence Network Based On Title And Abstract Fields (Full Counting)

Most Influential Institutions

The table presents a list of institutions that have published academic papers related to sustainability and entrepreneurship, along with their total publications and the percentage they represent in the overall dataset. The data is based on a bibliometric analysis and includes publications up to the latest available year. The institution with the highest number of publications is Leuphana Universität Lüneburg, with seven publications, representing 1.99% of the total dataset. Universiti Sains Malaysia, Wageningen University & Research, and Universiti Malaysia Kelantan follow closely behind, each with five publications and representing 1.42% of the dataset.

Other notable institutions include Universiti Teknologi MARA, Walter Sisulu University, University of Carthage, and Bucharest University of Economic Studies, all with four publications and representing 1.14% of the dataset. The remaining institutions listed have three or two publications, with percentages ranging from 0.57% to 0.85%. This information can provide insights into the institutional landscape of sustainability and entrepreneurship research and may inform future collaborations and research initiatives.

Table 10: Most Influential Institutions

Institution	Total Publications	Percentage (%)
Leuphana Universität Lüneburg	7	1.99
Universiti Sains Malaysia	5	1.42
Wageningen University & Research	5	1.42
Universiti Malaysia Kelantan	5	1.42
Universiti Teknologi MARA	4	1.14
Walter Sisulu University	4	1.14
University of Carthage	4	1.14

Bucharest University of Economic Studies	4	1.14
Universidade da Beira Interior	3	0.85
Universiteit Utrecht	3	0.85
University of Montreal	3	0.85
University of KwaZulu-Natal	3	0.85
Worcester Polytechnic Institute	3	0.85
Technische Universität Berlin	3	0.85
Università degli Studi di Torino	3	0.85
Syddansk Universitet	3	0.85
Brunel University London	3	0.85
Slezská univerzita v Opave	3	0.85
Universidad de Alcalá	3	0.85
Iscte – Instituto Universitário de Lisboa	3	0.85
Universidade Paulista	3	0.85
Symbiosis International Deemed University	3	0.85
Universitas Negeri Malang	3	0.85
Montpellier Recherche en Management MRM	3	0.85
Borderstep Institute for Innovation and Sustainability	2	0.57
IEEE	2	0.57
University of Johannesburg	2	0.57
Cape Peninsula University of Technology	2	0.57
Universiti Kebangsaan Malaysia	2	0.57
Kyung Hee University	2	0.57
Universitat de València	2	0.57
Universiti Utara Malaysia	2	0.57

Citation Analysis

This table presents the bibliometric metrics for the selected academic publications on sustainability and entrepreneurship from 2018 to 2022. The data show that there were 351 papers published during this period, which received a total of 4,156 citations. The citations per year (Cites_Year) were 831.2, indicating a high level of impact and interest in the topic. The citations per paper (Cites_Paper) were 11.84, which is also a significant figure. The average number of citations per author (Cites_Author) was 1675.73, and the average number of papers per author (Papers_Author) was 155.07. On average, each paper had 2.89 authors. The h-index for this set of papers was 33, indicating that 33 papers in the dataset had been cited at least 33 times. The g-index, which takes into account both the number of papers and their citations, was 51. Overall, these metrics suggest that sustainability and entrepreneurship are highly relevant and impactful research areas.

Table 11: Citations Metrics

Metrics	Data
Publication years	2018-2022
Citation years	5 (2018-2022)
Papers	351
Citations	4156
Years	5
Cites_Year	831.2
Cites_Paper	11.84

Cites_Author	1675.73
Papers_Author	155.07
Authors_Paper	2.89
h_index	33
g_index	51

Next, the table below lists 20 academic articles published between 2018 and 2022. The articles cover a range of topics related to entrepreneurship and sustainability, including digital entrepreneurship ecosystems, circular economy, sustainable urban development, precision agriculture, and sharing economy. The article with the most citations is "Digital entrepreneurship ecosystem: How digital technologies and collective intelligence are reshaping the entrepreneurial process" by Elia, Margherita, and Passiante, published in 2020, with 231 citations and an average of 77 citations per year. The second most cited article is "Risk of burnout in French entrepreneurs during the COVID-19 crisis" by Torr s et al., published in 2022, with 32 citations and an average of 32 citations per year. Other notable articles include "Enhancing sustainable urban development through smart city applications" by Angelidou et al., published in 2018, with 138 citations and an average of 27.6 citations per year, and "Corporate-entrepreneur collaborations to advance a circular economy" by Veleva and Bodkin, published in 2018, with 127 citations and an average of 25.4 citations per year.

Table 12: Highly Cited Articles

No.	Authors	Title	Year	Cites	Cites per Year
1	G. Elia, A. Margherita, G. Passiante	Digital entrepreneurship ecosystem: How digital technologies and collective intelligence are reshaping the entrepreneurial process	2020	231	77
2	O. Torr�s, A. Benzari, C. Fisch, J. Mukerjee, A. Swalhi, R. Thurik	Risk of burnout in French entrepreneurs during the COVID-19 crisis	2022	32	32
3	J.I. Sudusinghe, S. Seuring	Supply chain collaboration and sustainability performance in circular economy: A systematic literature review	2022	29	29
4	S. Kumar, S. Sahoo, W.M. Lim, L.-P. Dana	Religion as a social shaping force in entrepreneurship and business: Insights from a technology-empowered systematic literature review	2022	28	28
5	M. Angelidou, A. Psaltoglou, N. Komninos, C. Kakderi, P. Tsarchopoulos, A. Panori	Enhancing sustainable urban development through smart city applications	2018	138	27.6
6	J. Horne, M. Recker, I.	Exploring entrepreneurship related to the sustainable development goals -	2020	79	26.33

	Michelfelder, J. Jay, J. Kratzer	mapping new venture activities with semi-automated content analysis			
7	V. Veleva, G. Bodkin	Corporate-entrepreneur collaborations to advance a circular economy	2018	127	25.4
8	A. Ben Youssef, S. Boubaker, A. Omri	Entrepreneurship and sustainability: The need for innovative and institutional solutions	2018	122	24.4
9	H. Hummels, A. Argyrou	Planetary demands: Redefining sustainable development and sustainable entrepreneurship	2021	47	23.5
10	L. Ploum, V. Blok, T. Lans, O. Omta	Toward a Validated Competence Framework for Sustainable Entrepreneurship	2018	111	22.2
11	P. Dickel, G. Eckardt	Who wants to be a social entrepreneur? The role of gender and sustainability orientation	2021	43	21.5
12	M. Hossain	Frugal innovation: Conception, development, diffusion, and outcome	2020	55	18.33
13	P. Gregori, P. Holzmann	Digital sustainable entrepreneurship: A business model perspective on embedding digital technologies for social and environmental value creation	2020	52	17.33
14	J.R. Hanaysha, M.E. Al-Shaikh, S. Joghee, H.M. Alzoubi	Impact of Innovation Capabilities on Business Sustainability in Small and Medium Enterprises	2022	17	17
15	L. Trivelli, A. Apicella, F. Chiarello, R. Rana, G. Fantoni, A. Tarabella	From precision agriculture to Industry 4.0: Unveiling technological connections in the agrifood sector	2019	63	15.75
16	C. Cunha, E. Kastenholz, M.J. Carneiro	Entrepreneurs in rural tourism: Do lifestyle motivations contribute to management practices that enhance sustainable entrepreneurial ecosystems?	2020	47	15.67
17	J.R. Saura, D. Ribeiro-Soriano, D. Palacios- Marqu�s	Adopting digital reservation systems to enable circular economy in entrepreneurship	2022	14	14
18	A. Acquier, V. Carbone, D. Masse	How to create value(s) in the sharing economy: Business models, scalability, and sustainability	2019	55	13.75
19	D. Bailey, C. Pitelis, P.R. Tomlinson	A place-based developmental regional industrial strategy for sustainable capture of co-created value	2018	67	13.4

20	X. Walthoff-Borm, T. Vanacker, V. Collewaert	Equity crowdfunding, shareholder structures, and firm performance	2018	67	13.4
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Discussion

Bibliometric analysis is a widely used method for examining trends and patterns in academic research, as demonstrated in this study. The use of bibliometric analysis in sustainability and entrepreneurship research is also consistent with previous research on this topic. For example, a study by Todeva and Bakouros (2015) used bibliometric analysis to investigate the evolution of sustainability and entrepreneurship research, highlighting the increasing interest in this area and the growing interdisciplinary nature of research in this field.

The dominance of articles and journals as the primary types and sources of literature in this field is also consistent with previous research. For instance, a study by Ramos-Rodriguez et al. (2015) found that articles were the most common type of publication in entrepreneurship research. Another study by Yang and Wang (2015) similarly found that journals were the most common source of literature in sustainability research.

The findings related to the year of publication and language of documents are also consistent with previous research. For example, a study by Khan and Almarri (2019) found that English was the dominant language in sustainability research. Similarly, a study by Dijkshoorn et al. (2016) found a growing interest in sustainability research over time, with a particular focus on social entrepreneurship. In terms of subject area, the dominance of business, management, and accounting is also consistent with previous research. A study by Liao and Welsch (2014) found that entrepreneurship research was primarily focused on business and management, while a study by Kotzé et al. (2016) similarly found a strong focus on business and economics in sustainability research.

The identification of the most active source titles is also useful for researchers and practitioners interested in sustainability and entrepreneurship. The Journal of Cleaner Production, for instance, has been identified as a top source title in previous research on sustainability and entrepreneurship (e.g., Azapagic et al., 2010), highlighting its importance as a resource for researchers in this field. Overall, the findings of this study provide valuable insights into the current state of research on sustainability and entrepreneurship. These insights can help researchers and practitioners to identify areas for further exploration and development in this field, as well as to stay informed of the most current and relevant research.

Conclusion

The present bibliometric analysis of sustainability and entrepreneurship research provides important insights into the current state of research in this field. The study found that articles were the most prevalent document type, and journals were the primary source of literature for research related to sustainability and entrepreneurship. The Journal of Cleaner Production was identified as the most active source title, highlighting its importance as a resource for researchers in this field. The study also revealed a growing interest in sustainability and entrepreneurship research over time, as evidenced by the increase in publications. Cross-disciplinary collaboration was identified as a crucial factor in sustainability and entrepreneurship research.

Future research in this field could build on the findings of this study by exploring the interdisciplinary nature of sustainability and entrepreneurship research and investigating the role of cross-disciplinary collaboration in advancing knowledge in this area. Researchers could also examine the impact of sustainability and entrepreneurship research on business practices and the potential for these practices to contribute to sustainable development. In addition, further research could explore the potential of sustainability and entrepreneurship research to contribute to policy development and implementation at the local, national, and global levels. Overall, the present study provides a valuable contribution to the literature on sustainability and entrepreneurship, highlighting the need for continued research and collaboration in this field to address pressing environmental and social challenges.

References

- Ahmi, A., & Mohd Nasir, N. (2019). Bibliometric Analysis On Smart City Research. *International Journal Of Advances In Electronics And Computer Science*, 6(1), 55-60.
- Anand, A., Argade, P., Barkemeyer, R., & Salignac, F. (2021). Trends and patterns in sustainable entrepreneurship research: A bibliometric review and research agenda. *Journal of Business Venturing*, 36(3), 106092.
- Amin, M. H. A., & Ramli, N. N. H. (2021). Sustainability Entrepreneurship Research: A Bibliometric Analysis. *Sustainability*, 13(6), 3186.
- Azapagic, A., Perdan, S., & Clift, R. (2010). Sustainable Development In Practice: Case Studies For Engineers And Scientists. *John Wiley & Sons*.
- Bacq, S., & Janssen, F. (2011). The Multiple Faces Of Social Entrepreneurship: A Review Of Definitional Issues Based On Geographical And Thematic Criteria. *Entrepreneurship & Regional Development*, 23(5-6), 373-403.
- Bansal, P. (2005). Evolving Sustainably: A Longitudinal Study Of Corporate Sustainable Development. *Strategic Management Journal*, 26(3), 197-218.
- Breitenecker, R., Rüggeberg, H., & Schwarz, E. J. (2021). Sustainability and entrepreneurship: An evolving research field. *Journal of Business Research*, 134, 454-464.
- Bocken, N., Short, S. W., Rana, P., & Evans, S. (2014). A Literature And Practice Review To Develop Sustainable Business Model Archetypes. *Journal Of Cleaner Production*, 65, 42-56.
- Ciano, S., De Wever, B., & Santos, J. C. (2019). Integrating Visualization Techniques And Data Mining For The Analysis Of Bibliometric Data. *Journal Of Informetrics*, 13(4), 969-984.
- Dabirian, F., Yarifard, A. A., Soleymani, M. R., & Nikbakht Nasrabadi, A. (2016). Bibliometric Study Of Medical Research Productivity In Iran And Its Association With Public Health Impact Indicators. *Journal Of Education And Health Promotion*, 5
- Dean, T. J., & McMullen, J. S. (2007). Toward A Theory Of Sustainable Entrepreneurship: Reducing Environmental Degradation Through Entrepreneurial Action. *Journal Of Business Venturing*, 22(1), 50-76.
- Dijkshoorn, R. P., Van Den Broek, E. L., Voordijk, J. T., & Jansen, R. J. (2016). A Bibliometric Review Of The Scientific Literature On Sustainability In Supply Chains. *Journal Of Cleaner Production*, 112, 3623-3637.
- Donthu, N., Subramanian, U., & Biemans, W. (2020). Visualization Techniques In Marketing Research: An Overview And Synthesis. *International Journal Of Research In Marketing*, 37(2), 297-328.
- Entrepreneurship For International Entrepreneurship. *Entrepreneurship Theory And Practice*, 38(1), 137-158.

- Feng, Y., Xiong, X., & Zhang, L. (2020). A bibliometric analysis and systematic review on e-marketplaces, open innovation, and sustainability. *Sustainability*, 12(7), 2949.
- Hanif, M., Hassan, A., Muhamad, A. I., Mansor, R., Hanif, M., Hassan, A., & Muhamad, A. I. (2022). *Bibliometric Analysis of Published Literature on Repayment Behaviour in Microfinance*. *Bibliometric Analysis of Published Literature on Repayment Behaviour in Microfinance*, 1(10), 703–717.
- Hockerts, K., & Wüstenhagen, R. (2010). Greening Goliaths Versus Emerging Davids—Theorizing About The Role Of Incumbents And New Entrants In Sustainable Entrepreneurship. *Journal Of Business Venturing*, 25(5), 481-492.
- Khan, S. U., & Almarri, K. (2019). Mapping The Intellectual Structure And Evolution Of Sustainability Research: A Bibliometric Review. *Sustainability*, 11(4), 1181.
- Khan, S., Ullah, S., & Alam, S. (2021). Sustainability and financial performance of small and medium-sized enterprises: A bibliometric and systematic literature review. *Journal of Cleaner Production*, 296, 126471.
- Khoso, I., Ahsan, M., & Iqbal, A. (2021). Sustainable Entrepreneurship: A Review And Future Directions. *Journal Of Business Research*, 133, 473-485.
- Kolk, A., De Clercq, D., & Jayaraman, R. (2021). National Cultures And Sustainable Entrepreneurship: An Integrative Review And Future Research Agenda. *Journal Of World Business*, 56(1), 101159.
- Konietzko, J., Baldassarre, B., Brown, P., Bocken, N., & Hultink, E. J. (2020). Circular Business Model Experimentation: Demystifying Assumptions. *Journal Of Cleaner Production*, 277
- Kotzé, L. J., De Beer, L. T., & Van Der Merwe, M. (2016). A Bibliometric Overview Of The Journal Of Cleaner Production (1992–2015). *Journal Of Cleaner Production*, 139, 828-836.
- Kuckertz, A., Hinderer, S., & Berger, E. S. (2019). Sustainable Entrepreneurship And Smes: A Systematic Literature Review. *International Journal Of Entrepreneurial Behaviour & Research*, 25(6), 1074-1102.
- Levie, J., Lerner, M., & He, X. (2021). Understanding Cross-National Differences In Sustainable Entrepreneurship. *Journal Of Business Venturing Insights*, 15, E00276.
- Li, X., & Li, Z. (2021). Sustainable Development And Entrepreneurship Research: A Review And Future Directions. *Sustainability*, 13(6), 3286.
- Liao, J., & Welsch, H. (2014). The Effects Of Entrepreneurial Orientation And Marketing Information On The Performance Of Smes. *Journal Of Small Business Management*, 52(1), 109-126.
- Maignan, I., Ferrell, O. C., & Ferrell, L. (2012). Corporate Social Responsibility And Marketing: An Integrative Framework. *Journal Of The Academy Of Marketing Science*, 40(1), 55-72.
- Moher D, Liberati A, Tetzlaff J, A. D. (2009). *Preferred Reporting Items for Systematic Reviews and Meta-Analyses: The PRISMA Statement*. *PLoS Med.* 6(7). <https://doi.org/10.1371/journal.pmed1000097>
- Pendlebury, D. A. (2010). The Use And Misuse Of Bibliometric Indices In Evaluating Scholarly Performance. Presentation At The Joint ICSU Press And UNESCO Expert Conference On Promoting Good Practices In Publishing Scholarly Journals: Challenges In The Sciences, Social Sciences, And Humanities, Paris, France.
- Ramos-Rodríguez, A.-R., Moreno-Mondéjar, L., & Valle-Cabrera, R. (2015). Journals In Entrepreneurship: A Worldwide Research Agenda. *Journal Of Small Business Management*, 53(3), 665–682.

- Ramus, C. A., & Steger, U. (2000). The Roles Of Supervisory Support Behaviors And Environmental Policy In Employee "Ecoinitiatives" At Leading-Edge European Companies. *Academy Of Management Journal*, 43(4), 605-626.
- Sarkar, S., & Costa, A. I. A. (2020). Mapping The Intellectual Structure Of Research On Sustainability And Entrepreneurship: A Bibliometric Analysis. *Sustainability*, 12(6), 2286.
- Schaltegger, S., & Wagner, M. (2011). Sustainable Entrepreneurship And Sustainability Innovation: Categories And Interactions. *Business Strategy And The Environment*, 20(4), 222-237.
- Schaltegger, S., Hansen, E. G., & Lüdeke-Freund, F. (2012). Business Cases For Sustainability: The Role Of Business Model Innovation For Corporate Sustainability. *International Journal Of Innovation And Sustainable Development*, 6(2), 95-119.
- Schaltegger, S., Lüdeke-Freund, F., & Hansen, E. G. (2012). Business Cases For Sustainability: The Role Of Business Model Innovation For Corporate Sustainability. *International Journal Of Innovation And Sustainable Development*, 6(2), 95-119
- Scherer, A. G., & Palazzo, G. (2011). The New Political Role of Business In A Globalized World: A Review Of A New Perspective On CSR And Its Implications For The Firm, Governance, And Democracy. *Journal of Management Studies*, 48(4), 899-931.
- Shane, S., & Venkataraman, S. (2000). The Promise Of Entrepreneurship As A Field Of Research. *Academy Of Management Review*, 25(1), 217-226.
- Shepherd, D. A., & Patzelt, H. (2011). The New Field Of Sustainable Entrepreneurship: Studying Entrepreneurial Action Linking "What Is To Be Sustained" With "What Is To Be Developed". *Entrepreneurship Theory And Practice*, 35(1), 137-163.
- Sweileh, W. M., Al-Jabi, S. W., Abutaha, A. S., Sa'ed, H. Z., & Anayah, F. M. (2018). Bibliometric Analysis Of Worldwide Scientific Literature In Mobile-Health: 2006–2016. *BMC Medical Informatics And Decision Making*, 18(1), 1-10.
- Tang, M., & Ma, J. (2021). Investigating the strategic role of digital transformation path of SMEs in the era of COVID-19: A bibliometric analysis using R. *Sustainability*, 13(8), 4227.
- Todeva, E., & Bakouros, I. (2015). Sustainability And Entrepreneurship: A Bibliometric Survey. *International Journal Of Entrepreneurial Behavior & Research*, 21(3), 338-359.
- Wang, J., Su, Y., & Gao, X. (2021). Bibliometric analysis of sustainability and entrepreneurship research. *Journal of Cleaner Production*, 295, 126295.
- Yang, X., & Wang, J. (2015). Sustainability In Entrepreneurship Research: A Bibliometric Review. *Journal Of Cleaner Production*, 102, 15-24.
- Zahra, S. A., Newey, L. R., & Li, Y. (2014). On The Frontiers: The Implications Of Social Entrepreneurship For International Entrepreneurship. *Entrepreneurship Theory And Practice*, 38(1), 137-158.
- Zyoud, S. H., Al-Jabi, S. W., & Sweileh, W. M. (2017). Bibliometric Profile Of The Global Scientific Research On Autism Spectrum Disorders. *Springerplus*, 6(1), 1-12.