

Entrepreneurial intention and sustainability: an analysis through bibliometric networks

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Abstract

The aim of this paper was to analyze international scientific production on entrepreneurial intention and sustainability. Bibliometric research was carried out according to bibliometric laws (Lotka, Bradford and Zipf). In addition, content analysis was used to identify the main methodological approaches adopted. From the 76 documents analyzed, emerging topics related to entrepreneurial intention and sustainability were found: entrepreneurial education and gender; sustainable practices; innovation and personality traits; intention, sustainable entrepreneurship, and social entrepreneurship. These results suggest the development of research that addresses the context of social, economic and sustainable entrepreneurship. This research is relevant for providing reflections and knowledge for future research in the field of entrepreneurship, especially in relation to the alignment of entrepreneurial intention and sustainability.

Keywords: entrepreneurial intention; scientific production; sustainability.

Intención emprendedora y sostenibilidad: un análisis a través de redes bibliométricas

Resumen

El objetivo fue investigar la producción científica internacional sobre intención emprendedora y sostenibilidad. Se realizó una investigación bibliométrica, según las leyes bibliométricas (Lotka, Bradford y Zipf). Además, se adoptó el análisis de contenido para identificar los principales enfoques metodológicos adoptados. De los 76 documentos analizados, se encontraron temas emergentes relacionados con la intención emprendedora y la sostenibilidad: educación emprendedora y género; prácticas sostenibles; innovación y rasgos de personalidad; intención, emprendimiento sostenible y emprendimiento social. Estos resultados sugieren el desarrollo de investigaciones que aborden el contexto del emprendimiento social, económico y sostenible. Esta investigación es relevante por aportar reflexiones y conocimientos para futuras investigaciones en el campo del emprendimiento, especialmente en relación a la alineación de la intención emprendedora y la sustentabilidad.

Palabras clave: Digitalización; revisión sistemática de literatura; servicios de consultoría.

Intenção empreendedora e sustentabilidade: uma análise mediante redes bibliométricas

Resumo

O objetivo foi investigar a produção científica internacional sobre intenção empreendedora e sustentabilidade. Foi realizada uma pesquisa bibliométrica, de acordo com as leis da bibliometria (Lotka, Bradford e Zipf). Adicionalmente, foi adotada a análise de conteúdo para identificar as principais abordagens metodológicas adotadas. Dos 76 artigos analisados, foram encontrados temas emergentes relacionados à intenção empreendedora e à sustentabilidade: educação empreendedora e gênero; práticas sustentáveis; inovação e traços de personalidade; intenção, empreendedorismo sustentável e empreendedorismo social. Estes resultados sugerem o desenvolvimento de investigações que abordem o contexto do empreendedorismo social, econômico e sustentável. Esta pesquisa é relevante por fornecer reflexões e conhecimentos para futuras pesquisas no campo do empreendedorismo, especialmente em relação ao alinhamento da intenção empreendedora e da sustentabilidade.

Palavras-chave: intenção empreendedora; produção científica; sustentabilidade.

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1. Introduction

Since the 1980s, several changes have taken place in the world, mainly from the productive restructuring process, the patterns of international competition through multinationals and the precariousness of work. These changes caused scenarios of economic and social uncertainties and imbalances, which significantly contributed to the growth of researchers' interest in the field of academic-scientific knowledge of entrepreneurship (Paiva et al., 2019). In addition, individuals tend to pay more attention to market offers to identify demands for products, services and skills in order to become potential entrepreneurs (Nunes de Souza Alencar Vasconcelos et al., 2020).

Entrepreneurship is a complex phenomenon and the object of multiple discussions and understandings in the academic and professional spheres (Borges-Júnior et al., 2017). In this context, a field of scientific knowledge widely addressed in entrepreneurship is that of entrepreneurial intention, which refers to an individual's predisposition to direct their efforts toward starting a new business, which directly precedes entrepreneurial behavior (Thompson, 2009), seeking to understand what drives people to entrepreneurial activities (Liñán & Chen, 2009). This field is composed of phases and has its origin through attitudes and beliefs related to entrepreneurial intention (Liñán & Fayolle, 2015) – the main way to understand and explain possible future behaviors of entrepreneurs (Barba-Sánchez et al., 2022).

In addition to this approach to entrepreneurial intention, sustainability is also related to the field of entrepreneurship, which refers to the commitment of entrepreneurs to behave ethically and contribute to the economic development while improving the quality of life of the workforce (Crals & Vereeck, 2004). In addition, sustainability considers aspects related to environmental protection, concern for natural resources and consumption, as well as poverty reduction – with the aim of the entrepreneur, when sustainability is integrated with entrepreneurship, to incorporate sustainable practices in business creation (Brandão Paiva et al., 2018; Raufflet et al., 2014) to drive and impact sustainable development. This has impacts on the economy, society and the environment (Abdelwahed et al., 2022; Vuorio et al., 2018).

From this perspective, entrepreneurship with a sustainable focus is a way of impacting sustainable development beyond the economic scope (Tilley & Young, 2009), but with social and environmental impacts (Schaltegger & Wagner, 2011) through the process of discovering new innovative and sustainable business opportunities with their distinct approaches (Abdelwahed et al., 2022). Entrepreneurship with a sustainable focus is essential to broaden understandings that align the field of entrepreneurship with sustainability (Parrish, 2010), which focuses on enhancing the development of a society, due to the impact of these themes on economic, social and

environmental indicators (Contreras-Pacheco et al., 2017). Therefore, it is important to highlight the importance and the gaps in the literature that make it possible to expand discussions and investigations on the alignment between entrepreneurial intention and sustainability (e.g., Kuckertz & Wagner, 2010; Vuorio et al., 2018; Paiva et al., 2019) to strengthen research on future entrepreneurs (Marulanda-Valencia & Valencia-Arias, 2019).

In view of these discussions about entrepreneurial intention and sustainability, it is worth mentioning what Morin (1996) stated about what science is since he states that science is considered a community that presents the essence of the relationships between scientists of a friendly and hostile nature, as well as collaboration and rivalry, concurrently and constantly. Based on the construction of scientific knowledge, Knutas et al. (2015) emphasize that scientific research can be an essential agent in changing and expanding knowledge, showing how investigations are structured – to provide a vision of broad information on the dataset found in the empirical and conceptual literature on all levels of the scientific process. Furthermore, Peña Ramírez et al. (2021) highlight the contribution of scientific research to science when investigating bibliometric indicators, also considering the most valuable researchers who share the characteristic of publishing in journals on a given topic.

In this approach to science and scientific knowledge, discussions on a given field of knowledge can be found in the analysis of bibliometric networks, for example, documents, authors, keywords, or journals. Mapping and clustering techniques are frequently used to study such networks, considering the bibliometric laws (Lotka, Bradford and Zipf). Therefore, it is possible to determine research topics and how publications are structured (Klavans & Boyack, 2006) and understand the alignments between the networks of researchers (Van Eck & Waltman, 2009). In this research, entrepreneurial intention and sustainability are considered due to the scarcity of research that seeks the relationship between these topics, and this can contribute directly to further structure these fields of scientific knowledge, especially when identifying and relating research involving these phenomena.

Scientific publications show trends and influences in the most diverse areas of knowledge since they are agents of change in science and, consequently, in scientific understanding. Faced with the need to research how the fields of knowledge on entrepreneurial intention and sustainability are being structured in the academic sphere, especially considering the analysis of bibliometric networks, as well as content analysis (Knutas et al., 2015), the question is: How are scientific researches that jointly address entrepreneurial intention and sustainability structured? From this research question, the aim of the study is to investigate the international scientific production on entrepreneurial intention and sustainability.

Faced with systemic searches in research portals in the field of scientific knowledge of entrepreneurship as a

whole, such as Spell, Scielo, Scopus and Web of Science, no studies were found on the topics "entrepreneurial intention" and "sustainability" concomitantly through networks bibliometrics, which is why it is understood that this research can overcome a gap in scientific production and, from there, contribute directly to the development and systematization of these investigated topics.

This article begins with this introduction that presents a brief contextualization, the gaps in the literature, the research problem and the aim of the study. Then, it addresses the bibliometric laws (Lotka, Bradford and Zipf) and networks and, after that, the method. The analysis and discussion of the results are presented and, finally, the conclusions of the study with contributions and recommendations for future research.

2. Bibliometric Laws and Networks

Bibliometric analysis aimed at investigations on literature review seeks to map a certain field of scientific knowledge (Bufrem & Prates, 2005), considering, for the most part, analysis of networks such as co-authorship, co-citation, co-occurrence of keywords, among others (Laudano et al., 2018). Tague-Sutcliffe (1992) reinforce the empirical laws related to bibliometric investigations in the literature: (i) the law of researchers' productivity or Lotka's law; (ii) the law of dispersion of scientific knowledge or Bradford's law; and (iii) the law of distribution and frequency of words in a text or Zipf's law, elaborated in 1926, 1934 and 1949, respectively (Araújo, 2006). Lotka's law was formulated in 1926 and consists of the study of scientific productivity based on the proportion produced by scientific literature by the number of authors (Lotka, 1926).

Lotka's law measures authors' productivity and considers how much authors produce in a given period, making comparisons with other authors who work in the same area of scientific knowledge (Peres Vanti, 2002). This law establishes that, supposedly, few researchers with greater prestige produce much on a given subject while many researchers, considered to be less prestigious, produce less on a given subject (Guedes & Borschiver, 2005).

Bradford's law, known as the law of dispersion of scientific knowledge, measures the productivity of journals and seeks to establish nuclei and areas of dispersion on a specific subject in the same journal (Araújo, 2006). This law makes it possible to estimate the degree of relevance of a journal, considering that journals that produce a greater number of articles on a given subject tend to form a core of journals, and this confers greater quality and relevance to the journal in its area of scientific knowledge – with a core of "productive" journals on a given topic (Guedes & Borschiver, 2005). However, journals that do not fit into this nucleus are more dispersed in a given area of scientific knowledge (Araújo, 2006).

Zipf's law is known as least effort – the law of frequency and distribution of words in a text – measures the appearance of words in various documents and presents a list with the ordered terms of a given subject (Peres Vanti, 2002), which allows showing correlations between the different words and the frequency of their uses (Guedes & Borschiver, 2005). This analysis can occur using words concentrated in parts of the document, such as the title, abstract, keywords or even the whole document (Araújo, 2006).

These laws can consist of sophisticated analyses to map a given scientific field, considering bibliometric analyses, such as co-citation networks, and co-occurrence of keywords, among others (Bufrem & Prates, 2005). Bulgacov and Verdu (2001) reveal that inter-institutional relationship networks tend to take advantage of opportunities in the development of areas of activity. Participation in research groups increases the researcher's visibility and the possibilities of scientific production (Lopes et al., 2012). Therefore, Bordin et al. (2014) reinforce that scientific collaboration is one of the main characteristics of modern science since the most evident indicator adopted in this collaboration refers to co-authorship (who composes or produces "something intellectual" and with method together with another person).

For Van Raan (2005), all production in science, in any field of knowledge, is premised on the fact that the scientist builds research from previous studies and shows this by mentioning other research in the references, which contribute to the construction and interconnection of knowledge. Therefore, in the act of citing other authors, the researcher directly identifies researchers who research certain fields of scientific knowledge, whose concepts, methods or theories may have served as a reference for the development of the research (Cabrini Grácio et al., 2009).

Citation analysis contributes to the understanding of a scientific community, identifying the researchers who have the most impact on an area of knowledge, and this gives visibility to the theoretical references that support that area, as well as its concepts, objects and methods (Cabrini Grácio et al., 2009). Co-citation is defined by the frequency in which two documents are cited together, showing the degree of association between them according to how they are cited (Small, 1973). This facilitates understanding the associations between authors, noting changes and intellectual currents over time (Van Eck & Waltman, 2017).

In addition to what has been discussed, it is important to highlight that the bibliometric study makes it possible to know the evolution of scientific production and emerging themes on a given topic that constitute a measurement of the advances of science (Marulanda-Valencia & Valencia-Arias, 2019), in this study, entrepreneurial intention and sustainability, concomitantly, thus having greater support for the development of research. This is possible to identify

and explore gaps for future researchers interested in developing studies in these fields of knowledge.

After these approaches to bibliometric laws and network analysis and in the face of gaps in the literature on the research of scientific production on entrepreneurial intention and sustainability concomitantly, this paper seeks to contribute to the expansion of this field of scientific knowledge through the analysis of bibliometric networks of co-citation and co-occurrence of keywords, methodological approaches adopted in studies and use of other descriptive variables that may impact the production of scientific knowledge – making connections with bibliometric laws – Lotka, Bradford and Zipf.

3. Method

This study has a bibliometric character with the use of network analysis, as they are the main metrics to measure academic activity in the most diverse areas of scientific knowledge. Some of the metrics adopted are co-citations of articles, analysis of co-authorship and co-occurrence of words, which consist of quantifying scientific production. In the field of scientific knowledge, bibliometric studies seek to investigate the production of scientific articles in a specific field of knowledge by mapping the academic community, which seeks to identify and characterize a network of researchers [Chueke & Amatucci, 2015].

For Hassan et al. (2014), mapping scientific productivity from metrics such as authors, networks between researchers, journals, and recurring themes becomes relevant to describe relations (similarities) of production on certain scientific knowledge. The scope of this study includes entrepreneurial intention and sustainability, according to bibliometric laws (Lotka, Bradford and Zipf) and descriptive and relational analyses of the data. To complement this, a content analysis is carried out (by reading all the articles) – to identify the main methodological approaches adopted.

The Scopus database from Elsevier made available through the Capes Periodicals Portal [Elsevier, 2015] was adopted to study the scientific production on entrepreneurial intention and sustainability. According to Hasper Tabares et al. (2017), the Scopus database

addresses multiple fields of scientific knowledge that have a high impact on academia, in addition to allowing the management of the retrieved information. This database was chosen due to its importance for the understanding of scientific knowledge and its representativeness in the world, being able to overcome the gap that is intended to be filled in the literature through research involving the two themes investigated herein. Furthermore, Elsevier (2015) contributes with institutions and professionals to the progress of science, improving its performance in favor of humanity. Furthermore, the Scopus database is the largest abstract and citation database of peer-reviewed literature, containing over 22,000 titles from over 5,000 publishers worldwide.

To indicate a time for the investigation in the Scopus database, emphasis was placed on the following criterion: from the first article published on the topics “entrepreneurial intention” and “sustainability”, concomitantly, until the last one that was published on the date of data extraction (06/02/2020), totaling 76 documents. To identify trends in the international literature on the topics, the terms “Entrepr* Intent*” and “Sust*” were adopted. The asterisk (*) was chosen as it represents any group of characters pertaining to entrepreneurial intention and sustainability, including all synonyms in the topics: title, abstract and keywords. Second, some criteria were established for the delimitation of the theme: (a) “Article”, which considers only the category of scientific articles; (b) all thematic areas; and (c) all countries/territories and in all languages.

A document preprocessing step was carried out to reduce possible noise, duplicates and missing values in the articles' metadata in the Scopus database. The information was exported in .csv format and the Microsoft Excel® software was used to tabulate and organize the descriptive data, using approaches such as the evolution of research on themes, authors, affiliation (university) and demographic region. This software allowed the creation of tables and graphs. In addition, content analysis was used to identify the methodological approaches of each paper after reading each sample article by the authors, identifying whether the methodology was quantitative, qualitative, qualitative-quantitative, theoretical test or bibliometric.

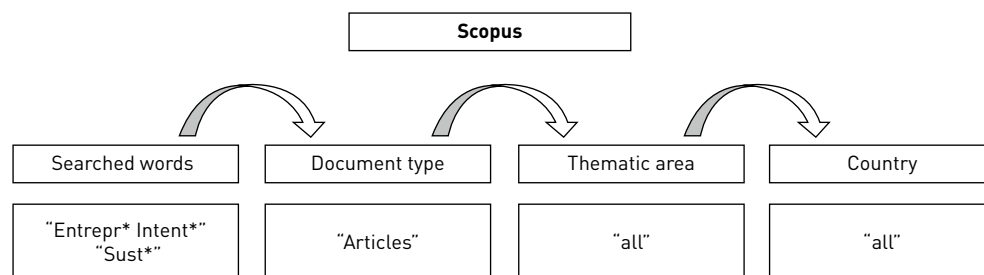


Figure 1. Systemic search design.

Source: Own elaboration based on the Scopus database.

Then, the data were processed using the VOSViewer® software (version 1.6.15.0), which was developed by Nees Jan Van Eck and Ludo Waltman from Leiden University in the Netherlands. The software offers a graphical interface focused on data processing, which allows easy visualization and analysis through bibliometric networks. The software was adopted to explore maps from different perspectives through similarity visualizations. It is based on the distance between the nodes of the analyzed network; thus, the smaller the distance between a pair of objects, the greater the relationship of similarity between them (Van Eck & Waltman, 2009; 2014). Therefore, the strength of the relationship between the elements of a network is indicated by the distance between them.

4. Analysis and Discussion of Results

4.1 Evolution of the production in the field of scientific knowledge

The 76 documents analyzed are included in 47 journals, which brought together 203 authors affiliated with 104 institutions from 34 countries. Considering the temporal evolution of articles on entrepreneurial intention and sustainability, the year 2008 stands out with the first article authored by Wu, S., Wu, L., entitled “The impact of higher education on entrepreneurial intentions of university students in China”, published in the Journal of Small Business and Enterprise Development. Figure 2 shows an increase in the number of international surveys on the topics over the years.

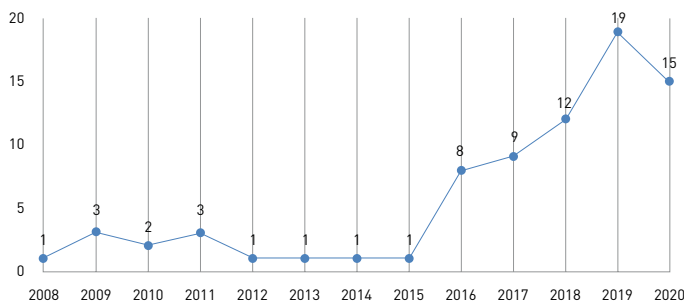


Figure 2. Growth of scientific research on entrepreneurial intention and sustainability.

Source: Own elaboration based on the Scopus database.

These fields of scientific knowledge grew only 8 years after the first publication in the Scopus base, more precisely, from 2016, with 8 documents; in 2017 with 9; 2018 with 12; and reaching its peak in 2019 with 19 documents. This makes it possible to identify gaps in the literature that can be greatly explored and debated in the most diverse areas of knowledge, presenting delimitations, deductions and reflections for the expansion and consolidation of research involving entrepreneurial intention and sustainability, as well as related and emerging themes related to these areas of scientific knowledge.

4.2 Journals with the most publications (Bradford's law)

The 76 documents were published in 47 journals. Table 1 presents the main journals in terms of the number of papers. However, the journal with the most citations has only one document indexed in the Scopus database: “The influence of sustainability orientation on entrepreneurial intentions – Investigating the role of business experience”, authored by Kuckertz, A., Wagner, M., published in the Journal of Business Venturing (218 citations at the time of data extraction).

Table 1. Publication sources with the largest number of documents.

Journals	Number of documents
Sustainability (Switzerland)	16
Entrepreneurship and Sustainability Issues	5
International Journal of Entrepreneurial Behaviour and Research	3
International Journal of Gender and Entrepreneurship	3
Advanced Science Letters	3
Environment, Development and Sustainability	2
Journal of Entrepreneurship in Emerging Economies	2
International Journal of Entrepreneurship and Small Business	2
Academy of Entrepreneurship Journal	2
Others	38
Total	76

Source: Own elaboration based on the Scopus database.

Nine journals published two or more articles in the analysis period, which corresponds to 38 papers or half of the sample. In addition, five journals published three or more articles, the following being worth mentioning: Sustainability (Switzerland) with 16 papers and Entrepreneurship and Sustainability Issues with 5. The most evident finding is that there is still a high concentration of papers on these topics in a few journals, as two of them concentrate 21 papers (therefore 27.6%). This may be because the alignment between these phenomena is relatively recent in the field of applied social sciences, especially in the great field of entrepreneurship, highlighting a process of further maturation and consolidation of research on these topics.

There is an increase in the dispersion of scientific production in the following areas, in which 42 journals were responsible for 60.5% of all publications, showing more dispersion for the alignment of these fields of knowledge. The dispersion reflects the assumptions of Bradford's law, given that journals that produce a greater number of articles on a given subject tend to form a core of journals, and this confers greater quality and relevance to the journal for a given area of scientific knowledge, which forms the nucleus of periodicals considered more “productive” on the themes.

4.3 Most frequent authors (Lotka's law)

The dispersion of scientific production on entrepreneurial intention and sustainability can be considered in view of the productivity of the 203 authors that make up the sample. Thus, about 91% of these authors published only one paper, while 14 authors (6.9%) published two papers. Regarding the production of 3 or more papers, there are only 3 authors with 3 published papers; and a single author with four documents: Chaoyun Liang (Liang C.), a professor at the Department of Communication and Bioindustry Development at National Taiwan University, with research related to entrepreneurship approaches: imagination and creativity, social entrepreneurship, communication and rural marketing (Table 2).

It is worth mentioning Wagner M., with 3 papers indexed in this database, affiliated with the University of Augsburg, which strongly integrates the field of thematic research related to entrepreneurship,

innovation, international business management and sustainability of organizations. His research focuses on the areas of innovation, entrepreneurship and corporate sustainability, and specifically at their intersection, and this provides theoretical, conceptual and methodological frameworks for investigations involving entrepreneurial intention and sustainability.

According to Lotka's law, supposedly, few researchers with greater "prestige" have a greater production, while many researchers with less "prestige" have a low production, and this assumption was observed because of the 203 authors investigated, only five authors have published more than two articles in the field of studies that align entrepreneurial intention and sustainability. Given the small sample, one should not reflect that they have a high publication rate, but when comparing with authors who have only one published paper, which corresponds to 184 authors (90.6%) of the sample, the assumption of this law is clearly met.

Table 2. Authors with more published papers.

Authors	Frequency	Affiliation	Country	Department	Position
Liang C.	4	National Taiwan University	Taiwan	Department of Bio-industry Communication and Development	Full Professor
Mamun A.A.	3	UCSI University	Kuala Lumpur, Malaysia	Faculty of Business and Information Science	Associate Professor
Nawi N.B.C.	3	University of Malaysia, Kelantan	Kota Bharu, Malaysia	Faculty of Entrepreneurship and Business	Vice-Rector (Innovation in Research and Graduate Studies)
Shamsudin S.F.F.B.	3	University of Malaysia, Kelantan	Kota Bharu, Malaysia	Faculty of Entrepreneurship and Business	Bachelor of Education
Wagner M.	3	Universität Augsburg	Germany	Faculty of Business and Economics	Full Professor
Badulescu A.	2	University of Oradea	Romania	Department of Economics and Business	Rector
Badulescu D.	2	University of Oradea	Romania	Department of Economics	Full Professor
Bao H.	2	Zhejiang University of Finance and Economics	China	School of Urban-rural Planning & Management	Professor
Dinis A.	2	University of Beira Interior	Covilhã, Portugal	Research Centre in Business Science (NECE)	Assistant Professor
Do Paço A.M.F.	2	University of Beira Interior	Covilhã, Portugal	Department of Management and Economics	Assistant Professor
Feder E.S.	2	West University of Timisoara	Timișoara, Romania	Department of Marketing and International Business Relations	Lecturer
Ferreira J.M.	2	University of Beira Interior	Covilhã, Portugal	Research Centre in Business Science (NECE)	Assistant Professor
Naushad M.	2	Prince Sattam bin Abdulaziz University	Riyadh, Saudi Arabia	Department of Management	Assistant Professor
Nitu-Antonie R.D.	2	West University of Timisoara	Timișoara, Romania	Department of International Economics and Business	Associate Professor
Peng Y.	2	Zhejiang University of Finance and Economics	Hangzhou, China	Department of Construction Engineering Management	Associate Professor
Raposo M.	2	University of Beira Interior	Covilhã, Portugal	Department of Management and Economics	Full Professor
Rodrigues R.G.	2	University of Beira Interior	Covilhã, Portugal	Department of Management and Economics	Assistant Professor
Wang J.H.	2	Sichuan University	Chengdu, China	Department of Construction Engineering Management	Visiting Student
Zakaria M.N.B.	2	University of Malaysia, Kelantan	Kota Bharu, Malaysia	Faculty of Entrepreneurship and Business	Senior Professor

Source: Own elaboration based on the Scopus database.

4.4 Intellectual production with greater impact

The articles with the most citations show the impact of these papers on the field of scientific knowledge of entrepreneurship. This makes it possible to demonstrate the strength of the alignment of these topics for the systematization of information and the development of future research on entrepreneurial intention and sustainability. It is worth highlighting the importance of the most cited authors for scientific production in these areas of scientific knowledge and their journals and the number of citations up to the time of data extraction (Table 3).

Based on the 76 papers, 13 (17.1%) had at least 16 citations. However, 42 papers, representing 55.3%, had between 15 and one citation. A total of 21 papers (27.6%) were not cited until the data extraction. These are still emerging approaches in the field of entrepreneurship studies. The field that combines entrepreneurial intention and sustainability is incipient and can be further explored by researchers from the most diverse areas of scientific knowledge.

Among the most cited publications in these fields, the following deserve mention: "The influence of sustainability orientation on entrepreneurial intentions - Investigating the role of business experience", by Kuckertz, A., Wagner, M. (2010), published in the Journal of Business Venturing, with an Impact Factor of 6.333, a 5-Year Impact Factor of 10.790 and a Source Normalized Impact per Paper (SNIP) of 3.310, with 218 citations; and "The impact of higher education on entrepreneurial intentions of university students in China", authored by Wu, S., Wu, L. (2008), published in the Journal of Small Business and Enterprise Development, with Impact Factor of 0.500 and

Source Normalized Impact per Paper (SNIP) of 0.89, with 150 citations.

The first article addresses how the numerous opportunities for entrepreneurship are connected to sustainable development, also adding people's sustainability guidelines to models of entrepreneurial intention. The article highlights that the positive impact of orientation towards sustainability disappears with the business experience, which makes it possible to indicate the development of research to encourage practices aimed at sustainable entrepreneurship based on entrepreneurial intention. The second research addresses why higher education institutions should develop more flexible approaches, depending on their different educational backgrounds and practical implications. This study addressed that the diversity of educational background explains the difference in entrepreneurial intentions of university students from China and provided evidence on the impact of higher education on entrepreneurial intentions, demonstrating gaps for future researchers.

4.5 Methodological approaches

The identification of methodological approaches in research contributes to the field of knowledge of bibliometric research, especially due to the possibility of verifying the most and least adopted methodologies on entrepreneurial intention and sustainability. Therefore, content analysis was evidenced in all articles to identify the methodological approaches of the documents, segmenting into the following approaches: quantitative, qualitative, quantitative-qualitative, theoretical test and bibliometric (Table 4).

Table 3. Papers with the greatest impact.

Authors	Titles	Journals	Citations
Kuckertz, A., Wagner, M. (2010)	The influence of sustainability orientation on entrepreneurial intentions - Investigating the role of business experience	Journal of Business Venturing	218
Wu, S., Wu, L. (2008)	The impact of higher education on entrepreneurial intentions of university students in China	Journal of Small Business and Enterprise Development	150
do Paço, A.M.F., Ferreira, J.M., Raposo, M., Rodrigues, R.G., Dinis, A. (2011)	Behaviours and entrepreneurial intention: Empirical findings about secondary students	Journal of International Entrepreneurship	96
Kirkwood, J. (2009)	Is a lack of self-confidence hindering women entrepreneurs?	International Journal of Gender and Entrepreneurship	55
Bao, H., Peng, Y. (2016)	Effect of land expropriation on land-lost farmers' entrepreneurial action: A case study of Zhejiang Province	Habitat International	46
Wang, J.-H., Chang, C.-C., Yao, S.-N., Liang, C. (2016)	The contribution of self-efficacy to the relationship between personality traits and entrepreneurial intention	Higher Education	35
Lourenço, F., Jones, O., Jayawarna, D. (2013)	Promoting sustainable development: The role of entrepreneurship education	International Small Business Journal	35
Arrighetti, A., Caricati, L., Landini, F., Monacelli, N. (2016)	Entrepreneurial intention in the time of crisis: a field study	International Journal of Entrepreneurial Behaviour and Research	29
Vuorio, A.M., Puumalainen, K., Fellnhofer, K. (2018)	Drivers of entrepreneurial intentions in sustainable entrepreneurship	International Journal of Entrepreneurial Behaviour and Research	23

Source: Own elaboration based on the Scopus database.

There is a predominance of studies that used quantitative approaches, totaling 66 of the 76 investigated (86.8%). Only 5 papers adopted qualitative approaches, and 3 adopted both quantitative and qualitative approaches. There is only one theoretical test, which addressed the literature on entrepreneurship and critical theory; and another bibliometric test, which studied social entrepreneurship and its scientific impact in publications in the Web of Science Core database. However, directly related to the field of scientific knowledge of entrepreneurship with sustainability, such as sustainable entrepreneurship or entrepreneurial intention and sustainability, no study in this database was found until the moment of data extraction.

The stratification and discussions addressed confirm that the topics of entrepreneurial intention and sustainability are emerging in scientific research, as most of these studies resorted to a unique and exclusively quantitative approach, which shows that research of this nature can be explored in the most diverse approaches, such as bibliometrics, qualitative and in the alignment of quantitative and qualitative research. This gap allows

deductions and reflections for future research, aligning other approaches that reflect emerging and related themes of entrepreneurial intention and sustainability.

4.6 Co-citation networks

The co-citation network addresses the co-citation relationships of references, which considers the intellectual affinity between the authors, consequently, their due scientific contributions. This analysis is fundamental in the occurrence of citation of two papers or authors in scientific production to evidence the structure of knowledge in a certain area. Figure 3 shows the reference citation relationship network, given that it was adopted as a cut-off parameter to have at least 4 citations, and this led to a network of 22 interactions, which formed 3 clusters. Circles are identified by the name of the first author. The color highlights the space with which the paper is associated and the size of the circles, and the volume of citations that each researcher obtained through his paper.

Table 4. Research approaches.

Year	Quantitative	Qualitative	Qualitative - Quantitative	Theoretical Test	Bibliometric	Total
2008-2010	3	3	0	0	0	6
2011-2012	4	0	0	0	0	4
2013-2014	2	0	0	0	0	2
2015-2016	9	0	0	0	0	9
2017-2018	18	1	1	1	0	21
2019-2020	30	1	2	0	1	34
Total	66	5	3	1	1	76

Source: Own elaboration based on the Scopus database.

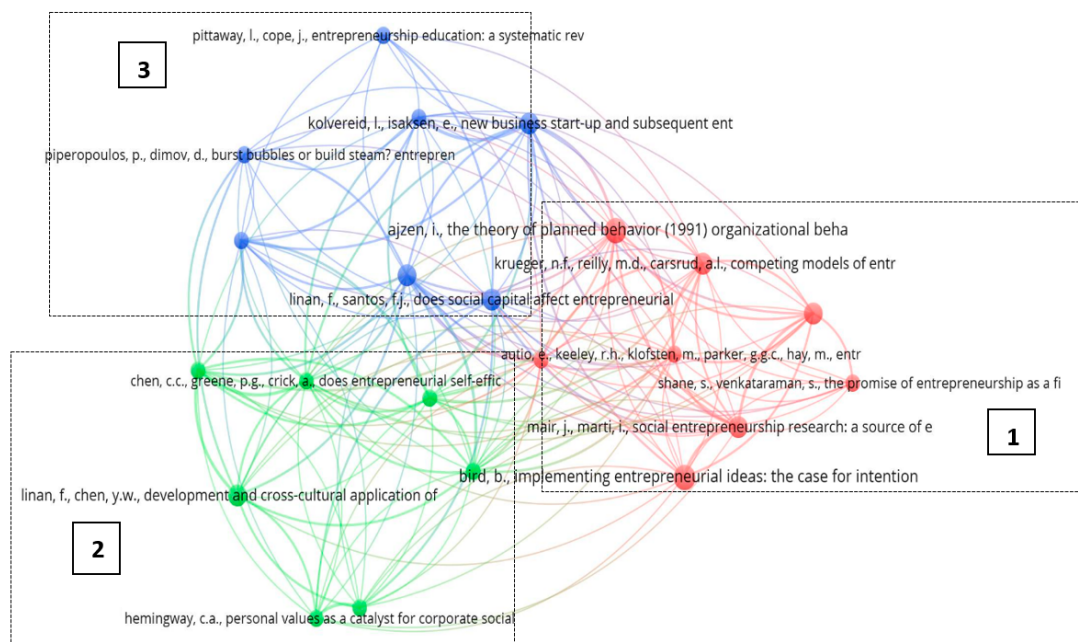


Figure 3. Co-citation Networks.

Source: Own elaboration based on the VOSviewer database.

The analysis of co-citation networks resulted in three clusters that consider the colors with the following numbers: red (1), green (2) and blue (3). Cluster 1 (red) is generated by 8 papers, the most cited and with the most strength of the co-authorship links of a given researcher with others: Ajzen, I. (1991) "The theory of planned behavior". *Organizational behavior and human decision processes*, 50 (2), pp. 179-211; Schlaegel, C., Koenig, M. (2014) "Determinants of entrepreneurial intent: a meta-analytic test and integration of competing models". *Entrepreneurship theory and practice*, 38 (2), pp. 291-332; and Mair, J., Marti, I. (2006) *Social entrepreneurship research: a source of explanation, prediction, and delight*. *Journal of world business*, 41 (1), pp. 36-44. This cluster apparently has a more conceptual approach to behavioral theories and social entrepreneurship, such as the Theory of Planned Behavior (TPB) (Ajzen, 1991), a theory widely discussed in the field of entrepreneurship, especially for the study of the intention-entrepreneurial behavior link and its antecedents, investigating future entrepreneurs (Liñán & Fayolle, 2015).

Cluster 1 (green) groups 7 references, which were more prominent: Fitzsimmons, J.R., Douglas, E.J. (2011) "Interaction between feasibility and desirability in the formation of entrepreneurial intentions". *Journal of business venturing*, 26 (4), pp. 431-440; Chen, C.C., Greene, P.G., Crick, A. (1998) "Does entrepreneurial self-efficacy distinguish entrepreneurs from managers?" *Journal of Business Venturing*, 13 (4), pp. 295-316; and Van Gelderen, M., Brand, M., Van Praag, M., Bodewes, W., Poutsma, E., Van Gils, A. (2008) "Explaining entrepreneurial intentions by means of the theory of planned behavior". *Career development international*, 13 (6), pp. 538-559. This cluster is directed to research related to behavioral psychology in the context of entrepreneurial intentions, addressing self-efficacy, perceived feasibility and desirability, entrepreneurial alertness and financial security as antecedents of entrepreneurial intention.

Cluster 3 (blue), formed by 7 documents, is based on some papers, being the ones with the most connections between the co-authorships: Kolvereid, L., Isaksen, E. (2006) "New business start-up and subsequent entry into self-employment". *Journal of Business Venturing*, 21 (6), pp. 866-885; Liñán, F., Santos, F. J. (2007) "Does social capital affect entrepreneurial intentions?". *International advances in economic research*, 13 (4), pp. 443-453; and Carr, J.C., Sequeira, J. M. (2007) "Prior family business exposure as intergenerational influence and entrepreneurial intent: a theory of planned behavior approach". *Journal of business research*, 60 (10), pp. 1090-1098. This cluster addresses behavioral research within the scope of entrepreneurial intention, in which two adopted the Theory of Planned Behavior (Ajzen, 1991) as a framework, including one addressing the influence of family members on the impact of entrepreneurial intention.

4.7 Co-occurrence networks of keywords and their appearance (Zipf's law)

Studies on entrepreneurial intention and sustainability, through bibliometric metrics, apply keyword counting. Thus, to facilitate visualization and provide more robustness, the formation of the network was built based on the appearance of terms in keywords, titles and abstracts, resulting in 368 terms. A co-occurrence criterion of at least 3 terms was adopted, resulting in 36 keywords, and the total strength of the co-occurrence links with other keywords was calculated, which gave rise to 5 clusters for the analysis (Figure 4).

Cluster 1 (red) grouped 10 keywords and presented the following as the most relevant: entrepreneur, entrepreneurship, education and theory of planned behavior. However, there is less recurrence of the following terms: women, university sector and entrepreneurial education. This analysis allows us to infer that the Theory of Planned Behavior (Ajzen, 1991) has a strong influence in the field of scientific knowledge of entrepreneurship, especially in the context of the figure of the entrepreneur or in the prediction of potential entrepreneurs. Furthermore, it is pertinent to expand research relating entrepreneurship education to the context of university students, especially considering the differences between men and women.

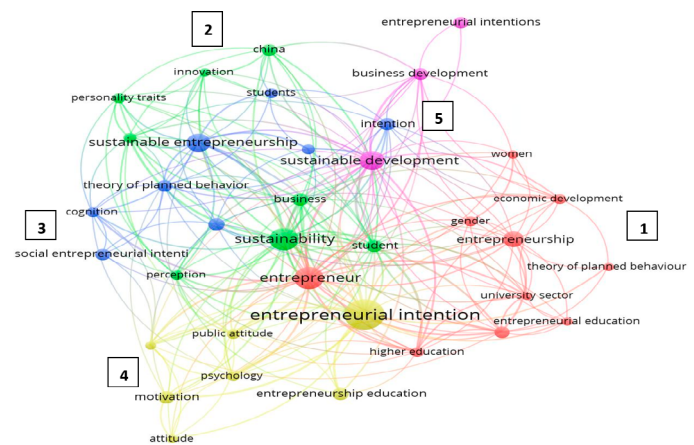


Figure 4. Co-occurrence of keywords.

Source: Own elaboration based on the VOSviewer database..

Cluster 2 (green), with 8 items, has the following as the most recurrent terms: sustainability, business, China and Perception. From this perspective, there is a greater incidence of investigations focused on sustainability within the scope of entrepreneurship, considering research on people's perception, both entrepreneurs and those who are willing to undertake. The term China was also evident in this cluster, as several surveys were carried out in this country in the context of university students (measuring entrepreneurial intentions and attitudes). However, the least recurrent were innovation, students

and personality traits, and this allows us to highlight that this field of scientific knowledge, aligning personality traits and innovation from the perspective of students to understand entrepreneurship and future entrepreneurs, can still be widely explored by researchers from different areas of science.

Cluster 3 (blue) comprises 8 papers and has the most frequent terms: sustainable entrepreneurship, intention, social entrepreneurship, which demonstrates the possibility of research that associate intention, sustainable entrepreneurship and social entrepreneurship, the latter two that have been gaining prominence in the literature, mainly from de 2010. Some terms that had less occurrence were: TPB, sustainability orientation and cognition, and this suggests the development of more research that aligns with the TPB (Ajzen, 1991), recurrent in research of an intentional attitudinal in the field of entrepreneurship, in the context of sustainability orientation, highlighting, for example, the perceived advantages and facilities of sustainability; and this relates to the areas of environmental psychology, social and environmental entrepreneurship, as well as management.

Cluster 4 (yellow) represents 7 items and presents the most evident terms: entrepreneurial intention, entrepreneurial education and motivation. This allows delimiting this relationship in the field of knowledge of entrepreneurship, relating the entrepreneurial intention through entrepreneurial education and considering the motivational aspects of individuals. These areas of knowledge can still be widely explored from multidimensional and longitudinal perspectives. However, the less frequent terms are entrepreneurial education, attitude and psychology, providing insights to expand investigations in order to analyze the entrepreneurial attitude through the impacts of entrepreneurial education on people.

Cluster 5 (purple) is formed by only 3 items and presents, in the order of appearance of the keywords, the following: sustainable development, business development and entrepreneurial intentions. From this, it is possible to highlight the need to expand reflections, debates and academic investigations on the impacts of entrepreneurship on the sustainable development of countries, regions, cities and places. The line of research of such words also suggests the effort to understand the field of what can lead people to undertake and what are their social and environmental impacts. This provides reflections, multifaceted and emerging themes to combine with entrepreneurship, such as understanding the possible economic, social and environmental impacts of future entrepreneurs.

The findings addressed in the cluster analysis with the appearance of keywords meet the assumptions of Zipf's law, since it measures the appearance of words in various papers, presenting an order of terms that are related to the alignment in the field of knowledge of entrepreneurial intention and sustainability. Thus, it was possible

to systematize the themes addressed in the analyzed articles, comprising fields of knowledge and emerging and complementary terms to foster the understanding and structuring of scientific knowledge of these themes. This highlights reflections on the construction and development of research and theoretical essays with alignments between emerging themes related to entrepreneurial intention and sustainability.

These results suggest the need to develop research that addresses social, economic and sustainable entrepreneurship in the world, as science is not disconnected from these issues, as is the case of this study – which studied scientific production through descriptive, methodological networks and supported by the assumptions of bibliometric laws for the fields of scientific knowledge of entrepreneurial intention and sustainability. Analyzing scientific publications on entrepreneurial intention and sustainability is a way of showing trends and influences in the most diverse areas of knowledge on these topics since scientific research is an agent of change in science and with impacts and reflections for academic debates and for society.

5. Conclusion

This paper emerged from the research question that highlighted the possibility of expanding the understanding of how scientific research that jointly addresses entrepreneurial intention and sustainability is structured. These themes are individually recurrent in scientific research, whether empirical, conceptual or bibliometric. However, the gaps identified in the literature regarding the combination of these topics made this research possible.

Based on the 76 documents, 13 were cited at least 16 times. A total of 21 papers were not cited until data extraction. It is a still emerging approach in the field of entrepreneurship studies. The scientific knowledge that aligns entrepreneurial intention and sustainability is incipient and can be further explored by researchers from the most diverse areas of science. The analysis of the most common research approaches used contributed to reviewing the emergent character, given that quantitative research predominates, representing 86.6% of the sample. The analysis of the co-citation networks highlighted the formation of three clusters, which highlighted with more emphasis the Theory of Planned Behavior and social entrepreneurship – which are included in emerging and complementary themes in the alignment of entrepreneurial intention and sustainability.

From the bibliometric metrics adopted for the count of terms in the sample texts, 36 keywords were obtained. This analysis made it possible to make deductions and reflections for research in the context of some emerging themes related to entrepreneurship and sustainability, for example: entrepreneurial education and gender; innovation and personality traits; intention, sustainable entrepreneurship and social entrepreneurship,

with an emphasis on intentional-attitudinal research in the field of entrepreneurship, relating to the context of sustainability orientation; entrepreneurial intention through entrepreneurial education, considering motivational aspects of individuals; and also the impacts of entrepreneurship on the sustainable development of countries, regions and cities.

The gap in the research that allowed the development of the research that addressed the terms entrepreneurial intention and sustainability, considering the descriptive, content and bibliometric analyses, made it possible to expand reflections and knowledge for future research in the field of entrepreneurship, especially regarding the alignment of these investigated themes, with the appearance of emerging and complementary themes and the identification of possible gaps in the literature.

In general, the reconstruction of scientific knowledge is formed by the development of conceptual, empirical, theoretical and bibliometric research, among others, as these researches, in addition to interacting with each other, can be disseminated to the academic-scientific community and society. Based on these ideas, researchers, in many cases, work individually or in small local groups. It is pertinent to emphasize more contacts between authors and research groups that relate entrepreneurial intention with sustainability, seeking to broaden the understanding of research on these topics.

This bibliometric study presented some limitations in its development, such as the use of a single database (Scopus) and the fact that the alignment between the themes of entrepreneurial intention and sustainability is still emerging. This meant that the investigated sample did not include more studies, indicating that these themes are not fully established and consolidated in the scientific literature. For future research, it is suggested that new analysis be carried out on these topics using other databases, such as Web of Science, Spell and Scielo. In addition, the categories that were addressed in the results of this study and the less adopted methodologies can be used as research gaps by future researchers.

Conflict of interest

The authors declare no conflict of interest.

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