




Article

Using Bibliometric Methods to Shed Light on the Concept of Sustainable Tourism

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Abstract: The publication of the Brundtland report in 1987 introduced the concept of sustainable development, placing “sustainability” as a unifying idea for all academic disciplines. Consequently, in the tourism sector, sustainable tourism emerged as a new approach to research in the field. Since then, the body of literature on sustainable tourism has only increased, as has the discussion around the conceptual structure of sustainable tourism among academics and professionals. The aim of the study is to complement this theoretical discussion with an inductive approach to the limits of the conceptual structure of sustainable tourism. To do so, we identify the main research topics in the field and their evolution in the past 32 years through bibliometric methods such as evaluative techniques, relational techniques, and visualization of bibliometric data techniques using the VOSviewer program. The results of the study reflect that the sustainable tourism has reached a complexity that is reflected in its current polyhedral content to function as a conceptual umbrella. In addition, it demonstrates that the bibliometric analysis is an adequate and useful methodology for academics and professionals involved in the academic debate around this field of knowledge.

Keywords: sustainable tourism; bibliometric analysis; tourism research; conceptual structure; VOSviewer

1. Introduction

According to the World Travel and Tourism Council (WTTC) report “*Travel and Tourism: Economic Impact 2019*”, the tourism sector accounted for 10.4% of the world GDP and 10% of the global employment in 2018. In addition, money spent by foreign visitors represents 7% of the total world exports as international tourist arrivals grew for the eighth consecutive year to reach the figure of 1.323 million in 2017. In 2018, the travel and tourism industry experienced 3.9% growth, higher than that of the global economy (3.2%) [1]. This uninterrupted growth of the tourism sector has made it one of the main industries of the world economy, thus generating much attention from researchers.

Parallel to the growth of tourism activity as an economic sector, tourism began to develop as a research topic in the academic world [2], until it was finally established as a recognized discipline. Two facts reflected this consolidation: schools of hospitality and tourism management were founded at universities, and the first scientific journals that addressed the subject of tourism as a research discipline were founded [2]: in 1968, the *Journal of Travel Research*; in 1973, *Annals of Tourism Research*; and in 1980, *Tourism Management*. Currently, the number of journals that publish or have published an article related to the subject of tourism exceeds 200 titles [2].

Although the development of the concept of sustainable tourism began in the 1970s [3], it was initially limited to the study of the impacts of tourism in certain geographic areas (13) as a reactive concept [4]. In 1972, *The Limits to Growth* [5], was the first to research guide pertaining to the development of a new concept [2], sustainable development [5]. Despite these early works, the most relevant literature on the subject indicates the origin of the term to be the 1987 publication of the report *Our Common Future*, known as the Brundtland report, produced by the United Nations World Commission on Environment and Development [3,4,6].

The Brundtland report [6] established the four basic principles of the definition of sustainable development [6,7], making it a polyhedral concept by adding the idea of the possibility of achieving a balance between economic development and the sustainable use of natural resources [3]. With the appearance of the still ambiguous concept of sustainable development, sustainability emerged as an idea that transversally crosses all reports and statements, establishing itself as a dominant paradigm [8]. The publication of the Brundtland report in 1987 placed “sustainability” within a political framework [9] that unified the idea of all disciplines.

In the context of tourism, the idea of sustainability emerged as a paradigm [10,11] and consequently produced sustainable tourism as a new approach to the tourism sector [2]. In 1988, Krippendorf et al. [12] published *Für einen ander Tourismus* and in 1993, the *Journal of Sustainable Tourism* was founded as the first peer-reviewed journal specializing in sustainable tourism research, reinforcing the idea of sustainable tourism as a subject of scientific study [13–17].

Since then, theoretical analysis of the conceptual structure of sustainable tourism has been widely developed and discussed by academic researchers and practitioners [18]. During more than three decades of research, there has been a change in the interpretation of sustainable tourism [19,20]. This change in the perspective of the research approach reflects a deep change in the way in which researchers approach the study of sustainable tourism [19]. Although thirty-two years have passed since the publication of the Brundtland report, the sustainability research in the field of tourism has remained immersed in a debate about the meaning of sustainable tourism and the current practical implications of the term. Today, the concept continues to be discussed among academics and professionals of the sector [17].

Reviewing the most current literature, very different approaches to the definition of sustainable tourism can still be found as: “tourism that can maintain its viability in a specific area for an indefinite period” [4], “tourism which is developed and maintained in an area (community, environment) in such a manner and at such a scale that it remains viable over an infinite period and does not degrade or alter the environment (human and physical)” [4]; “a desirable and politically appropriate approach to tourism development” [21]; “reflects a holistic approach for development, which is based on sound economic, ecological and socio-cultural principles” [22]; “actions and developments in the tourism arena that meet the needs of present tourists and host societies without having a negative impact on the environment, ecology, society, landscape, culture, and patrimony, and without compromising the prosperity and well-being of future generations” [11].

This growth in the academic discussion demonstrates the rising interest in sustainable tourism as a field of knowledge [15,16,19,23,24], which is reflected in the expanding literature, with more than 5000 publications in sustainable tourism to date [25]. However, this unfinished debate justifies the need to deepen the study of the evolution of the term; on the one hand, to identify all research papers written in sustainable tourism across all scientific journals, and on the other, to better understand the conceptual structure of this area of knowledge “under construction”.

The aim of this study is to contribute to the academic debate on the conceptual structure of sustainable tourism, offering an inductive approach through the bibliometric analysis of scientific production in the field from the publication of the Brundtland report to today. The term “conceptual structure” refers to the set of words most used by researchers related to sustainable tourism which are used to identify the most important research topics [26]. As Lu and Nepal [16] point out, “although the philosophical discussion of scientific knowledge, paradigmatic and disciplinary debates can provide

hypotheses on the evolution of knowledge of tourism, the empirical study of the content of its literature provides evidence based on the evolution of said knowledge, paradigm or discipline". Such analysis can slow down its conceptual ambiguity, elucidating how different perspectives today constitute sustainable tourism, some of which are in conflict.

The originality of this study resides in the methodology applied, as well as in the findings obtained after its application, cross-analysing two different types of bibliometric techniques to clarify the conceptual map of sustainable tourism. These techniques include: evaluative techniques, as productivity indicators, which are more often developed in traditional bibliometric studies [27]; relational techniques, as co-word analysis, addressing four key characteristics of the keywords (KW): hierarchy, centrality, density, and proximity with the help of visualization techniques provided by VOSviewer, a free software tool intended for creating, visualizing, and exploring maps based on network data [28].

The results of the study based on multidimensional bibliometric techniques reflect the evolution of the conceptual structure of sustainable tourism, the emergence of research topics in the different periods of development of the field since 1987, and the recurrent key terms in the development of research lines. This analysis also identifies gaps for future researchers and practices to address in the sustainable tourism arena, demonstrating bibliometric analysis as an adequate methodology to perform an inductive approach to the semantic limits of the conceptual structure of the sustainable tourism discipline.

The rest of the article is organized as follows. In Section 2, bibliometric analysis is introduced as the method, and data collection and analysis are presented. Section 3 resumes and discusses the main results of the application of bibliometric analysis and its implications for the discussion on sustainable tourism as an academic concept. Section 4 presents the conclusions and some suggestions for developing future works by researchers, and finally, the references close the study.

2. Materials and Methods

2.1. Bibliometric Analysis

Bibliometrics is a methodology that is relatively innovative compared to a traditional systematic literature review [29]. Bibliometric analysis consists of the analysis of the publication patterns of scientific production on a certain discipline in order to quantitatively evaluate, through statistical calculations, the communications published about a certain discipline [27].

The main objective of bibliometric analysis is to facilitate understanding the following issues for present and future researchers: where the lines of research on the matter run; the authors that make up the forefront and the leading research in the field; the journals in which the bulk of scientific research is published; and the problematic, evolution and research trends of scientific publication at the time [30]. In addition, it provides very useful information for academics and professionals to evaluate scientific activity [31,32], acting as a guide to deepen in the state of the art of the research topic addressed with the study [29,33]. Three types of bibliometric techniques have been identified [27], namely review studies, evaluative techniques, and relational techniques. In our study, we use two of them.

Evaluative techniques suppose the first level of complexity of bibliometric methods, as they are constructed by means of statistical calculations on certain units of information retrieved from databases such as Web of Science (WoS). In this study, this type of technique is used to understand the journals that are at the forefront of the discipline through Price's law, Lotka's law, and Bradford's law.

Relational techniques, such as co-word analysis, are among the most interesting techniques from a scientific point of view because they are the least explored. They suppose a higher level of complexity regarding units of information and analysis, as well as emerging concepts such as hierarchy, centrality, density and proximity [34]. This analysis is the most suitable to study the semantic and conceptual structure of a discipline [35–39].

The co-word analysis is the bibliometric relational technique most commonly used to identify the main research themes related in a specific scientific discipline [40]. We complement the co-word analysis with data visualization techniques or bibliometric mapping, which can be used depending on the objective of the study [41]. In the field of bibliometric methodology, mapping is one of the most important research topics, since the graphic representation of bibliometric data helps to visualize the results and draw conclusions after the analysis has been carried out by the software [42]. Mapping the terms also contributes to inductively approach the conceptual structure of a research area and its evolution [43,44], especially when working with large maps for which the simple graphic representation tools that programs such as SPSS provide are insufficient [42].

This study addresses the limitations of the evaluative techniques, which are more descriptive and treat more purely quantitative aspects giving a global view of a discipline scientific, complementing them with the relational techniques, which add more complexity and provide more depth to the analysis of the research of the discipline.

2.2. Bibliometric Analysis in the Field of Sustainable Tourism

The utility of bibliometric analyses has led to them being widely spread across all disciplines. Sustainable tourism has not been alien to the emergence of this method, as bibliometric analyses have only increased in the last few years [11,14,15,23,24,45]. Nevertheless, our contribution differs significantly from previous bibliometric studies in sustainable tourism research, mainly for two reasons.

First, our analysis is not limited to academic production in some journals in particular, but it considers all publications in the field since 1987. This study provides news about the limitations that other studies of a similar nature had identified: the extension of data analysed, traditionally limited to a series of leading journals in the area [14,15,30,46]. This restriction has excluded from the analysis a wide spectrum of academic contributions published in scientific journals that deal with sustainable tourism, even though it is now the main focus [30,46]. This restriction has biased the results and conclusions.

Second, our proposal is not limited to the analysis of existing literature through evaluative techniques. Our study tracks how sustainable tourism has been understood in academic publications by using evaluative techniques such as the co-word analysis and graphic representation of bibliometric data, types of bibliometric techniques few used [43]. In doing so, our study sheds light on the debate over the meaning of the term sustainable tourism by approaching it inductively, tracking the evolution of trends and patterns in scientific production in the discipline under study [43].

By considering all the academic production in the field and by combining evaluative, relational and visual techniques, our bibliometric analysis is intended to give shape to the conceptual structures of the area of knowledge [47]. This approach can contribute better to delimiting the definition of sustainable tourism, a term that has been at the centre of a theoretical debate since its appearance as a research field.

2.3. Data Collection

2.3.1. Database

The first phase of the bibliometric analysis is to choose a suitable database, previously identified by its usefulness for the study [47]. In this study, we use the information available in the Web of Science (WoS) online database. WoS allows researchers to access scientific papers from all areas of expertise, offering data on results, dissemination, collaboration and impact [48].

Journals indexed in the WoS have an associated impact factor in the Journal Citation Report (JCR), so papers retrieved are guaranteed to have passed for a peer review process ensuring “certified knowledge” [27,30,45,49]. In our search strategy, we consider journals ranked in the Social Science Citation Index (SSCI) and Science Citation Index Extended (SCI-E) because there are journals in both indices that are about sustainability and tourism, which allows us to expand the analysis by covering more scientific literature in the field.

2.3.2. Search Vector

A search vector is a key method that avoids both very broad results, which opens the door to literature that is unrelated to the area of knowledge, and too narrow results that leave out important scientific literature in the field [27,30,50–52]. The search vector chosen under these criteria was TS = (sustaina* AND touris*). An asterisk is used with the term “sustaina”, ensuring that the search detects all the variants of the term such as “sustainable” and “sustainability” [15,53]. The search words were considered relevant when they appear in the title, abstract, or the list of keywords.

2.3.3. Period

The sampling framework was from 1987 to 2018, a 32-year period. The theoretical framework itself determined this range: in 1987, the term “sustainable development” was coined after being used for the first time in the Brundtland Report [15], and the search was done to date because it is essential to know the updating of literature in the area of knowledge.

The data collection was conducted on April 2019. Applying the search vector together with all the exclusion criteria retrieved 4574 results from 1987 to the end of 2018.

As our analysis focuses on the evolution of the concept of sustainable tourism, the initial period was divided into sub periods. Statistical adjustment of R^2 identified three changes in the slope of the straight line, though identifying three trends in the pace of publications corresponding to the following periods of time: an emerging period from 1987–2005, a period of consolidation from 2006–2014, and the last period from 2015–2018, when academic production flourished.

2.3.4. Language

Only full articles written in English, the language that dominates the scientific literature production of the most areas of knowledge, were selected. All documents that were not complete articles were excluded, for example, reviews, editorials, books, chapters of books, and conference communications.

2.4. Data Analysis

For each of the three periods, the most cited articles belonging to the highest decile were selected, that is, ten percent of the most cited articles of all the papers that contain journals that make up the core and selected Bradford areas.

Once the articles were selected for each period, the next phase of the quantitative analysis was the selection of the units of analysis or items that would be used for the co-occurrence analysis and its subsequent graphic representation in bibliometric maps. The unit of analysis are the keywords. The keywords were obtained directly from the WoS, SSCI and SCI-Expanded databases, using as many keywords as the authors themselves (AKW) assigned to their research articles, as well as keywords + (KW+), which are the keywords that WoS assigns directly and automatically to each article according to the frequency in which the terms are detected in the titles of the articles cited [54].

Depending on each period, a different frequency was used to filter the keywords and select them. Thus, not all keywords were selected. VOSviewer allows filtering the selection of the units of analysis by applying a restriction called frequency in order that the selected units of analysis are representative of the sample [43].

Finally, VOSviewer is used to calculate and graphically represent the keywords corresponding to each period to plot these units on two types of bibliometric maps: the network visualization map and the density visualization map. VOSviewer groups the keywords by means of a clustering algorithm, thus allowing deeper analyses [28,41].

3. Results and Discussions

The following subsections are the results of the bibliometric analysis: evaluation techniques, relational techniques as co-word analysis and graphical analysis with VOSviewer.

3.1. Evaluation Techniques

The units of analysis studied by the productivity bibliometric indicators used in this study follow in this section.

3.1.1. Number of Documents Published Per Year: Price’s law

The number of research papers on sustainable tourism published between 1987 and 2018 has only increased. The first publication appears in 1990, while in 2018 WoS accounts for a total of 728 research papers. The existence of critical mass in the study of sustainable tourism is based on compliance with the Price Law [55,56]. Figure 1 illustrates the exponential growth of annual publications in sustainable tourism and shows the evolution of the number of documents published each year fulfilling the Price law: productivity increased in terms of the number of publications related to sustainable tourism.

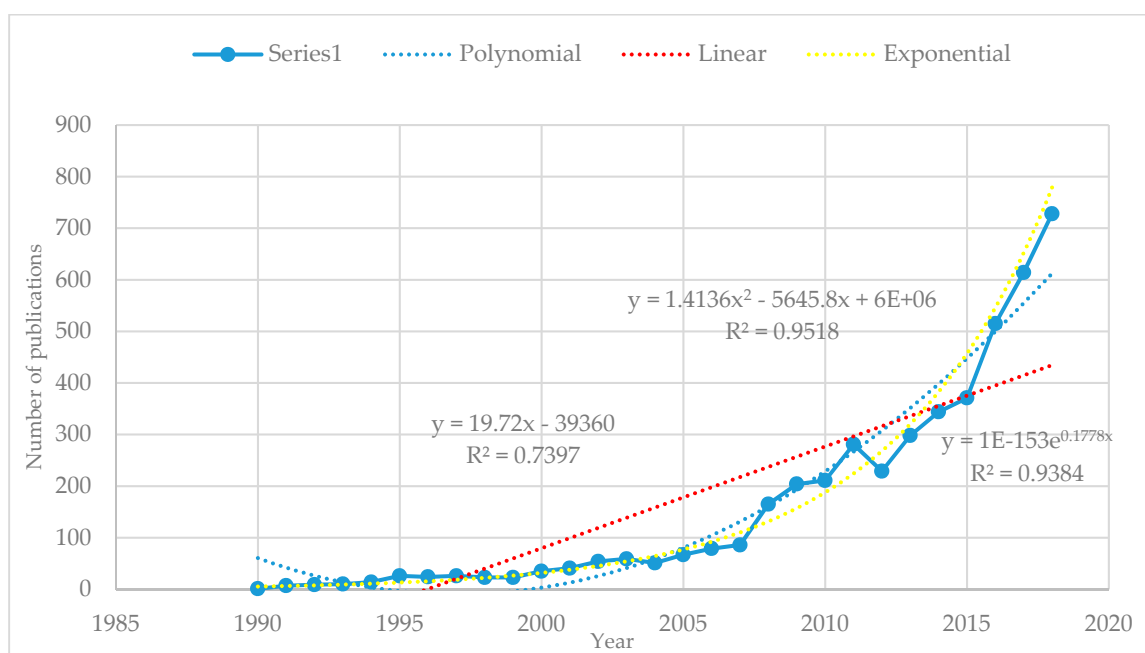


Figure 1. Number of publications per year. Data obtained from WoS (2019).

Different regression models were applied to find the linear, exponential, or polynomial models that best fit the data [30,57]: the independent variable is the years and the dependent variable are the number of publications. Table 1 illustrates the R² calculated of each of the three regression models. It shows how, even though all three models are significant, it is the polynomial model which best fits the data set.

Table 1. The three regression models.

Model	R ²
Linear	0.717
Exponential	0.938
Polynomial	0.951

Source: own elaboration with data obtained from WoS (2019) Price Law (Figure 1).

3.1.2. Authors Who Have Published Research on Sustainable Tourism: Lotka’s Law

Lotka’s law posits that there is an unequal distribution of productivity among authors and that, regardless of the discipline; most authors publish the least number of works, while a few authors publish most of the relevant literature on a given topic, and they form the most prolific group. Figure 2

illustrates Lotka's law, which shows the distribution of the number of publications per number of authors. While two authors have published 22 research papers each, the majority of authors (8651) have only written one in the field of sustainable tourism.

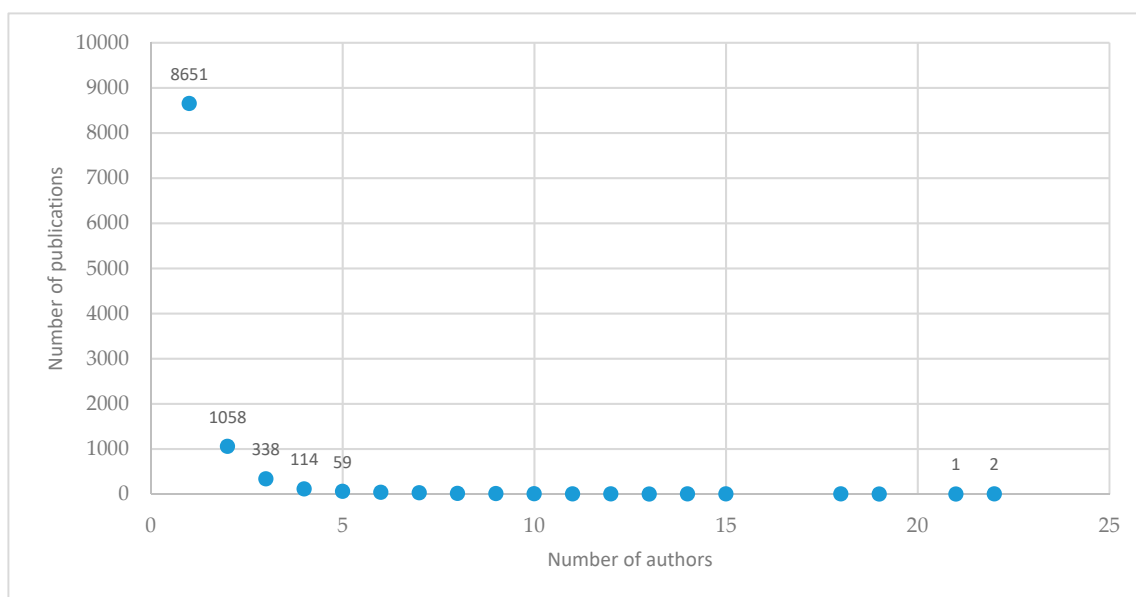


Figure 2. Number of publications per cumulative number of authors. Data obtained from WoS (2019).

3.1.3. Journals in Which the Authors Have Published Research on Sustainable Tourism: Bradford's Law

The most interesting information provided by the analysis of productivity focuses on the calculation of Bradford's law of dispersion. Bradford's law quantitatively relates the number of journals with the number of publications about a given topic [58], establishing that there is a tendency towards a very high unequal distribution in the scientific production in journals: most of the articles published are concentrated in a small number of journals, and a small percentage of publications are dispersed in a high number of articles.

To study Bradford's law, first, it is important to build a table in which the journals are arranged in decreasing order, according to the number of articles on a given subject. These journals can be divided into a core of publications more specifically dedicated to the subject and in several areas that group approximately the same number of articles as the nucleus, while the sets of journals that need to be emptied increase in geometric progression [59].

Bradford's law calculates the dispersion of the literature, determining a nucleus and different zones. The accumulated number of titles in descending order of citations against the number of accumulated citations was plotted on a semi logarithmic scale. In this way, the point where the curve is transformed into a straight line projected on the abscissa axis would determine the number of titles that form the nucleus of concentration [60]. A table was constructed in which the 4574 articles are distributed. The articles in 747 journals presented a high degree of concentration in the nucleus and in zones 2 and 3.

Table 2 illustrates the distribution of Bradford's law. The nucleus, zone 1 and zone 2 constitute 23 journals, which represent 3.07% of the total number of journals that have published articles on sustainable tourism, with this small number of journals publishing 44.6% of the scientific literature on sustainable tourism. There is a great concentration around the nucleus and zones one and two; nevertheless, we find a great dispersion from these areas, since more than 45% of the articles are distributed among 724 journals, and 54% of articles in 404 journals with one article in each magazine.

Table 2. Distribution of scientific production publication according Bradford's law.

Bradford's Zone	Number Journals	% Journals	Articles	% Articles
Core	2	0.26	843	18.431
Zone 1	6	0.80	731	13.8
Zone 2	15	2.00	736	13.19
Zone 3	45	6.02	783	7.31
Zone 4	118	15.79	707	1.07
Zone 5	561	75.1	777	0.13
Total	747	100	4577	100

Source: own elaboration with data obtained from WoS (2019).

While drawing the map of the conceptual structure, it is very interesting to analyse the categories to which the journals that lead the debate over sustainable tourism belong. Table 3 shows that the nucleus is constituted by leading the production and publication of scientific literature on the sub-area of sustainable tourism research; the first belongs to the category "Hospitality, Leisure, Sport & Tourism" of the Social Science Citation Index, *Journal of Sustainable Tourism*. *Sustainability* belongs to the category of "Environmental studies", and the theme in which it is published and discussed is not tourism as a research area. Rather, it is a multidisciplinary journal where research is debated and published from different areas within the context of sustainability.

Table 3. Top Journals with Sustainable Tourism publication.

	Journal	Records	Records Accumulate	% Accumulate	
1	Core	Journal of Sustainable Tourism	498	498	10.888
2		Sustainability	345	843	18.431
3	Zone 1	Tourism Management	266	1109	24.246
4		Annals of Tourism Research	112	1221	26.695
5		Journal of Cleaner Production	96	1317	28.794
6		Ocean Coastal Management	96	1413	30.893
7		Current Issues in Tourism	89	1502	32.839
8		Journal of Coastal Research	72	1574	34.413
9	Zone 2	Journal of Environmental Protection and Ecology	70	1644	35.943
10		International Journal of Tourism Research	65	1709	37.364
11		Tourism Geographies	63	1772	38.741
12		Asia Pacific Journal of Tourism Research	56	1828	39.965
13		Marine Policy	56	1884	41.189
14		Tourism Management Perspectives	55	1939	42.391
15		Journal of Travel Research	52	1991	43.528
16		International Journal of Sustainable Development and World Ecology	50	2041	44.621
17		Amfiteatru Economic	43	2084	44.621
18		Journal of Destination Marketing Management	43	2127	44.621
19		Environmental Management	41	2168	44.621
20		Land Use Policy	39	2207	44.621
21		Tourism Economics	37	2244	44.621
22		Ecological Indicators	33	2277	44.621
23	Environmental Engineering and Management Journal	33	2310	44.621	

Source: own elaboration with data obtained from WoS (2019).

3.2. Relational Techniques: Co-Word Analysis and Graphical Analysis with VOSviewer

In this section of the article, a relational analysis is applied: the content co-word analysis, which assumes that groups of words reveal underlying themes [61]. The analysis uses the keywords of the journals that are in the nucleus, zone 1 and area 2 of Bradford identified in the previous section, where the debate and research in the area of sustainable tourism is concentrated. These journals,

which lead scientific production, are the platform on which the conceptual structure of sustainable tourism research lines is defined; therefore, it is fundamental to know which topics are published more in these journals.

For each period, we use the highest decile of the most cited articles of all the articles contained in the journals comprised in the core and selected Bradford areas. To balance the number of keywords, we select them by applying a specific frequency for each period. This number of keywords is the one used for VOSviewer to represent graphically the network and density maps, where the clustering is reflected. Table 4 resumes the process followed to obtain the keywords to be used in the co-occurrence analysis.

Table 4. Data process to obtain KWs.

	1987–2005	2006–2014	2015–2018
Number most cited articles	50	80	100
Number of journals	13	14	10
KW	113	92	76
Frequency applied	1	2	3
Numbers of clusters	13	12	8

Source: own elaboration with data obtained from WoS (2019).

For each of the three periods analysed, using the keywords obtained from the previous process, the four parameters that will allow us to know the conceptual structure of sustainable tourism will be applied: hierarchy, proximity or clustering, centrality (closeness), and density [62]. This analysis will allow to approximate inductively the conceptual structure of sustainable tourism, observing the evolution of the field of knowledge throughout its existence.

3.2.1. Hierarchy Analysis

The hierarchy analysis refers to the number of times a keyword occurs in each of the three periods, giving us a clear idea of the terms most used by the authors. These data are presented in Table 5, and they are graphically represented in Figure 3 to show better its evolution through the three periods.

Table 5. Top keywords occurrences per period.

KW	1987–2005		2006–2014		2015–2018	
Tourism	0.32	8	0.2	16	0.16	16
Sustainability	0.24	6	0.17	14	0.14	14
Ecotourism	0.2	5	0.11	9	0.03	3
Protected Areas	0.16	4	0.07	6	0.16	16
Sustainable development	0.16	4	0.16	13	0.08	8
Attitudes	0.12	3	0.08	7	0.11	11
Management	0.12	3	0.17	14	0.24	24
Sustainable Tourism	0.12	3	0.23	19	0.34	34
Climate change			0.1	8	0.12	12
China			0.1	8	0.08	8
Policy			0.08	7	0.08	8
Impacts			0.07	6	0.17	17
Governance			0.07	6	0.08	8
Conservation			0.07	6	0.07	7
Model					0.1	10
Perceptions					0.08	8
Industry					0.07	7
Corporate Social Responsibility (CSR)					0.06	6

Source: own Source: elaboration with data obtained from WoS (2019).

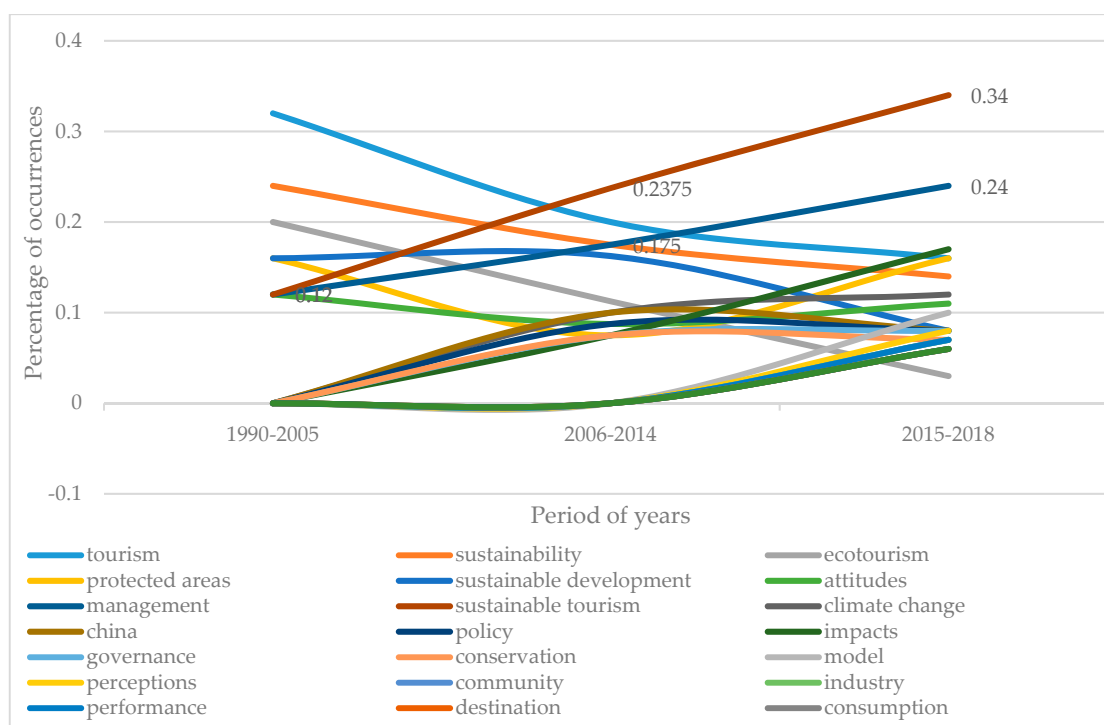


Figure 3. The most keywords (AKW and KW+) used co-occurrences of Sustainable Tourism publications.

In the first period (1987–2005), “tourism” is the keyword with the highest number of occurrences, followed by “sustainability”. These findings show us that in the first years in which sustainable tourism was a new term, the authors who wrote about sustainable tourism did not use the emerging term. They framed the subject of their works under two known terms: tourism and sustainability.

There are other terms that stand out above the rest during this period, such as “ecotourism”, “protected areas”, and “sustainable development”. This fact is linked to what Buckley points out about the research topics that emerged in the area of sustainable tourism: environmental impacts, natural parks, practices in natural environments, which reflects the conceptual construction of sustainable tourism that was taking place [16,25,63,64].

This tendency is reinforced by the observations made by the first bibliometric analyses in the field. In the analyses carried out by Ruhanen [15], Lu and Nepal [16], Qian et al. [14], the topics of “nature tourism, ecotourism and protected areas” [15] were approximately 20% of topics related to sustainable tourism during the entire 25-year period, specially predominant in the first stages in the life of the journal that these three groups of authors analyse.

Even though their analyses were restricted to the documents published by the JoST magazine, a journal indexed in the Journal of Citations Report focused specifically on sustainable tourism, we can conclude with these authors that when the term sustainable tourism was born it was considered almost a synonymous with terms such as ecotourism [14,16].

In the second period (2006–2014), there is a significant change in the subjects on which the studies of sustainable tourism seem to concentrate. Three fundamental facts can be pointed out to understand the evolution of the conceptual structure of the knowledge area.

The first fact is that in this period, the term sustainable tourism became accepted as a topic or subject of study. That is, researchers, when writing about this research subject, self-reference the term “sustainable tourism” as a term with its own entity beyond the individual terms “sustainability” and “tourism”, identifying a transition of the conceptual structure as the area of knowledge developed. Although researchers had been paying attention to environmental and social problems for four decades, research using the term “sustainable tourism” began to be used only recently [25].

Second, the key word “management” emerges among the three most used keywords by the authors that contribute to the studies of the scientific production in this area of knowledge. Management becomes a theme around which research within the sub-area of knowledge revolves. This fact is linked to the evidence of the evolution provided in the statistical analysis of the bibliometric data provided by the WoS database on the categories of journals in which the scientific production of the knowledge area of sustainable tourism is published. In the first period, the categories “environmental studies” and “environmental sciences” lead the scientific production in this subarea of knowledge, only to be surpassed in the next two periods by the category “hospitality leisure sport”, which prevails over all categories.

Third, in the second period, we find that “governance” and “policy” emerge as key areas in this process of implementation of sustainable tourism and are connected with the theme of management, which could play a fundamental role in the implementation of sustainable tourism.

In this third period, the keyword “sustainable tourism” is markedly the keyword with the highest number of occurrences, following the trend that had emerged in the previous period and reflecting the consolidation of the term “sustainable tourism” as one of the study disciplines. In this period, it appears as the second most used term to link the issue of “management” publications, tipping towards one of the two paradigms of the context in which the study discipline emerges: economic development and public management [20]. The future of sustainable tourism lies in it moving away from a philosophical concept debated by professionals and academics, and is definitely transformed into a tourism management model implemented in the reality. [2] For successful implementation of this model, the alliances between the world of business and the world of academic research is the fundamental point on and from which one must work: this path is reflected in the hierarchy list of the most used terms in this last period. First, the term “management” should be mentioned, referring to both its meaning related to the business world and to the meaning related to the public sector, or as an emerging term, among others, we find “industry”, and CSR a term linked to the world of the company.

Additionally, the term “climate change” is consolidated, and new terms emerge that respond to new trends in other research areas that are also addressed from the context of the tourism sector. Thus, terms such as “attitude”, “governance”, “models” or “perceptions” that respond to innovations in the field of social sciences in relation to the modification of attitudes appear [65]. They are the result of socio-economic changes and processes that overflow from a specific area of knowledge and permeate multiple disciplines, such as tourism, interconnecting, and drawing a multi- and interdisciplinary map [66].

There has been much talk about sustainable tourism, and academics have tried to define it. There are many academics and institutions such as the UNWTO (with the initiative of INSTO, International Network of Sustainable Tourism Observatories under the slogan “Measure to better manage”) that have posited in recent times that in addition to theorizing about the concept of sustainable tourism, we must measure it to understand it and to manage it [2]. A term with force emerges in this last period: “indicators”. This term intensifies the publication of research that studies the development of sustainable tourism indicators with the ultimate goal of building tools that help agents involved in the tourism sector to better management and more sustainable management [67–77].

Sustainable tourism was coined by academics. Although it was a very attractive concept for the tourism industry, but it took time to be realized in practice. Its transition to the real world has been and is still, complicated [2]. Sustainable tourism has evolved from a purely reactive concept, under which the negative impacts of tourism and how to mitigate them to protect nature (in the first period) were studied, towards a proactive concept [2,65,66], where the focus is open to implementation. Lane [2] spoke to this proactive approach that management models will develop innovation and competitiveness through management (as the third period reflects).

3.2.2. Proximity or Clustering Analysis

The proximity analysis consists of the construction of clusters or word families. The number of clusters that the resolution parameter has generated are represented by the program [41]. The keywords are classified in the corresponding clusters once the authors have reviewed the semantic coherence of the keywords of each cluster and the weight of the keyword of each cluster [43]. Each cluster of each period is named according to the semantic relationship of the keyword that confirmed them.

Through a qualitative analysis of the different clusters that VOSviewer generates, we can group the two clusters that form the structure in each period into two main categories: environmental areas and management areas. The objective of this classification is to confirm whether there is a trend in the evolution of research on sustainable tourism towards the field of management.

Table 6 illustrates the structure of the clusters with the most occurrences keywords from each period and the classification by area according to the theme of the cluster. According to Table 6, there has been an increase in the number of clusters related to the area of management in the broad sense, as well as management in the sense of managing the impacts of tourism activity.

Table 6. Most occurrences KW per cluster and cluster classified by area of knowledge.

Areas	1987–2005	2006–2014	2015–2018
Environmental area	Cluster 1 “Sustainable Tourism practices related to mass tourism”	Cluster 4 “slow tourism”	Cluster 1 “sustainable planning destination”
	Cluster 2 “ecotourism and sustainability, business, general theory and practices”	Cluster 5 “ecotourism economics impacts”	Cluster 3 “tourism impact destination”
	Cluster 4 “conservation of the natural environment”	Cluster 8 “sustainable development research”	Cluster 8 “management tourism development”
	Cluster 5 “tourism experiences in natural environments”	Cluster 9 “nature based tourism”	
		Cluster 12 “protected areas”	
Management area	Cluster 3 “management of tourism activities”	Cluster 1 “host destination”	Cluster 2 “consumer behaviour”
	Cluster 6 “politics, tourism and governance”	Cluster 2 “management destinations”	Cluster 4 “industry impacts”
	Cluster 7 “evaluation of the impacts of tourism”	Cluster 3 “responsible industries”	Cluster 6 “sustainable business”
		Cluster 7 “tourism management”	Cluster 7 “business tourism responsibility conservation”
Other areas		Cluster 10 “tourism emergent”	
		Cluster 11 “expectations and perceptions in tourism”	

Source: own elaboration with data obtained from WoS (2019).

The network bibliometric map, in which the selected keywords are represented, and in which we can analyse the information that the visualized data gives us, provides the following information: the weight of the keyword, the co-occurrence with other keywords, the similarity of keywords, and whether they belong to corresponding clusters, identified by a colour that the program randomly assigns [28]. The keywords are grouped into different clusters based on these same characteristics: the weight

of the keywords, the similarity between keywords and the frequency value that it has marked in the program [42]. Figures 4–6 illustrate the cluster network map of the conceptual structure of the sustainable tourism discipline in each period studied.

In the visualization of the keywords of this first period by bibliometric network, these data are reflected in a very graphic way. In the network map, the keywords are shaded in different colours according to the cluster to which they belong, having identified seven thematic clusters that bring us closer to the research lines of the “sustainable tourism” area of knowledge. The situation of the different clusters in the network map explains which topics are more widespread and intertwined among the analysed publications of sustainable tourism; thus, the more a cluster is in the centre of the map, the stronger the relationship between the keywords that form it. It is a potential indicator of the importance of a concept within an area of knowledge and brings us closer to understanding the conceptual structure of it. On the map, the central area of the map is occupied by the keywords of three clusters; these keywords are “tourism”, “sustainability” and “ecotourism”. In the first period, the clusters do not appear very connected; they function as independent research subfields connected by these three term nodes.

This provision and poor connectivity between the clusters reveals that the research field is still in an immature phase.

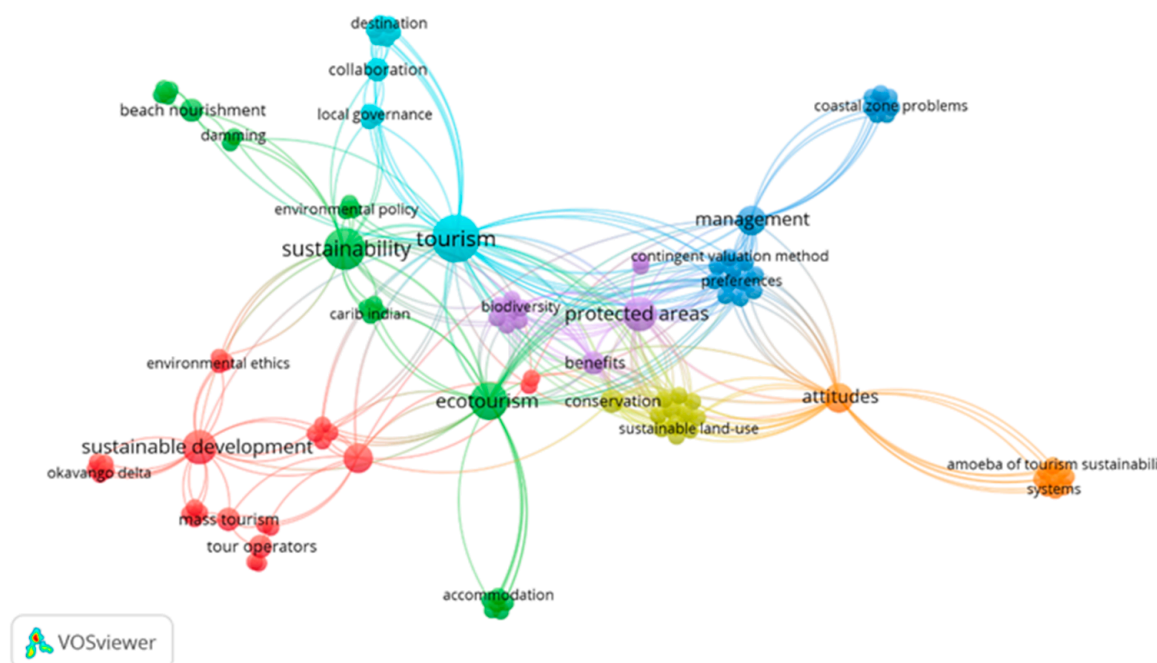


Figure 4. Co-occurrences network map 1987–2005.

In the network map of the second period, 12 thematic clusters are identified that bring us closer to the research lines of the “sustainable tourism” area of knowledge. The map of this second period shows us that the research field is maturing, and the centre of the map is formed with connected terms such as “sustainable tourism”, “management” and “sustainable development”. The structure begins to have more internal coherence. The dispersion of the clusters reveals, on the one hand, that there is still a maturation phase in which research topics emerge that form the clusters. On the other hand, certain issues are relegated or out of fashion in the study of sustainable tourism.

such as ‘green economy’, ‘industry’, ‘impact’, “business” and “performance” are very close to the cluster with the term “sustainable tourism”, so they are very connected.

3.2.3. Centrality Analysis

The centrality parameter [61,78,79] can be described as a structural attribute that measures the contribution of a node according to its location in the network [80].

The degree of closeness is based on counting all the distances of an item to reach others [81], and the calculation of this parameter is based on calculating the sum or the average of the shortest distances from one node to all the others [82].

We calculate with the R program the normalized sum of Euclidian distance for each period to give us the description of the evolution of the network by periods, illustrated in Table 7, it can be affirmed that the results are very similar to each other, and there is no significant variation of the centrality.

Table 7. Evolution of the normalized sum Euclidian distance.

Parameter	1987–2005	2006–2014	2015–2018
Centrality	63.02	69.44	73.99

Source: own elaboration with data obtained from WoS (2019).

The centrality parameter is a fundamental factor in social science network analytics [79]. There is not a single measure of centrality, but there are at least four measures of centrality that are classified into two categories: radial measures and medial measures. In this study, the measure addressed to analyse the co-occurrence is the degree of closeness, which is a radial measure of length. It is the best known and used centrality measures [82]. Table 8 shows the ten terms with the highest degree of closeness centrality of each period; these terms are more effective and more central in the network [79]. This ten terms with the highest degree of closeness centrality by period have been calculated with the R program, which means that these terms have the strongest efficacy and that they have more accessibility than the rest [78]. In the three periods, we find different keywords, which we find in the hierarchy analysis. We must distinguish between two parameters, centrality and hierarchy, which are similar concepts but do not have the same meaning. An item is central when it is involved in all relationships and has hierarchy to the extent in which it is the direct or indirect object of all relationships.

Table 8. Top 10 KW with highest degree closeness centrality.

1987–2005		2006–2014		2015–2018	
Nature-based Tourism	0.01256	Indicators	0.01046	Impacts	0.00976
Flagship Species	0.01256	Sustainable tourism	0.01048	Competitiveness	0.00996
Local Community	0.01258	Communities	0.01052	Indicators	0.01001
Costa Rica	0.01260	Policy	0.01063	Sustainable tourism	0.01001
Biodiversity	0.01260	Climate change	0.01070	Management	0.01010
Galapagos-islands	0.01263	Management	0.01072	City	0.01019
Wildlife	0.01264	Ecotourism	0.01076	Model	0.01029
Australia	0.01275	Delphi survey	0.01087	Mass tourism	0.01045
Ecotourism	0.01281	China	0.01088	Sustainability	0.01058

Source: own elaboration with data obtained from WoS (2019).

Therefore, the first period contains terms such as “nature-based tourism”, “flagship species”, “local community”, “Costa Rica”, “biodiversity”, “Galapagos-islands”, “wildlife”, “Australia” and “ecotourism”, which are the terms with the highest degree of closeness. All these keywords are related to the environmental areas studies and confirm the inertia that was seen in the hierarchy analysis, which concludes that the concept of sustainable tourism emerges as an approach to give answers and identify problematic realities such as the issue of environmental damage and the priority of protecting ecosystems [65,66].

In the second period, the terms with the highest degree of closeness are “indicators”, “sustainable tourism”, “communities”, “policy”, “climate change”, “management”, “ecotourism”, “Delphi survey”, and “China”. To explain the centrality of these terms, again, we take the plot of the hierarchy analysis because although they do not coexist in exact terms, they do indicate the same direction of change and expansion of the thematic borders. Terms such as “China” and “climate change” emerge as responses to Asian countries bursting in as scientific and academic producers and to the concerns about climate change as a transversal paradigm in the academy. The terms “sustainable tourism”, “indicators”, and “management” gain strength as central terms, again confirming the direction of the expansion of the borders towards the field of management.

Finally, in the third period, we can find the following terms with the highest degree closeness of centrality: “impacts”, “competitiveness”, “indicators”, “sustainable tourism”, and “management” continuing the trend started in the previous period and leading to terms such as “city”, “model”, and “mass tourism” as responses to the trend and to concerns about urban tourism in the last time.

Table 9 shows the evolution of the degree of closeness of centrality of the keywords per period. The normalized sum result is put in negative terms to facilitate a more intuitive graphical representation in Figure 7.

Table 9. Evolution of closeness KW.

KW	1987–2005	2006–2014	2015–2018
Indicators	−0.0254	−0.0104	−0.0100
Sustainable Tourism	−0.0148	−0.0104	−0.0100
Management	−0.0160	−0.0107	−0.0101
Ecoturism	−0.0128	−0.0107	−0.0150
Impacts	−0.0150	−0.0112	−0.0097
Climate change		−0.0107	−0.0112
Tourism	−0.0134	−0.0114	−0.0111
Sustainability	−0.0145	−0.0122	−0.0105
Sustainable development	−0.0181	−0.0108	−0.0140
Policy	−0.0163	−0.0106	−0.0110
Protected Areas	−0.0132	−0.0127	−0.0123
Governance	−0.0163	−0.0122	−0.0146
Conservation	−0.0133	−0.0113	−0.0120
Perceptions	−0.0149	−0.0151	−0.0113
Community	−0.0125	−0.0175	−0.0127
Destination	−0.0187	−0.0149	−0.0119

Source: own elaboration with data obtained from WoS (2019).

On the subject of research topics, we see stability and change throughout the three periods in which we have divided the thirty-two years. On the one hand, it should be noted that there are terms that come to be representative of issues, such as “protected areas” and “conservation” that have a stable presence in the three periods. On the other hand, there are issues that emerge as “indicators”, “impacts”, “destination”, “perceptions”, and “management”. The emergence of these new terms can be explained under various circumstances and because of different causes. On the one hand, new topics emerging from the combination of existing issues and their interactions is a natural consequence inherent in the process of the conceptual maturity of a research field. On the other hand, the social, economic and environmental reality that is the object of study of the field of sustainable tourism is changing, so that new research topics that respond to the new realities of this research are emerging. These developments would also explain that there are terms that are disappearing and have less presence in the corpus of academic publications as “ecotourism”.

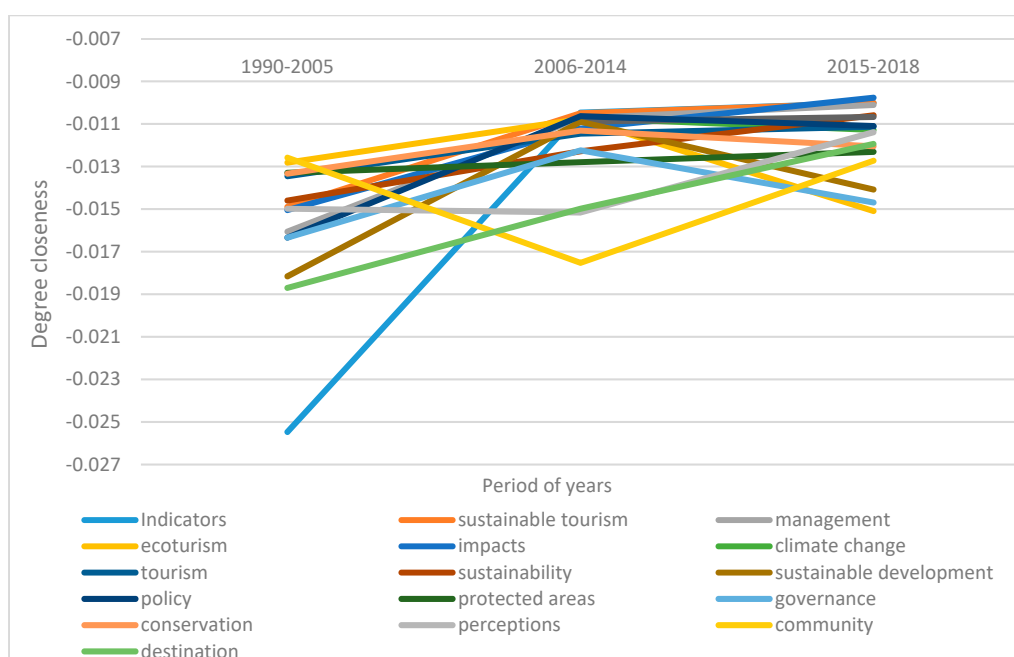


Figure 7. The evolution of degree closeness in the three periods. Source: own elaboration with data obtained from WoS (2019).

3.2.4. Density Analysis

The density of a network can be calculated by dividing the number of relationships by the number of possible ones [81]. Density refers to the number of lines in a network and reflects the internal coherence or strength of the relations among its members [61].

The bibliometric density map created by VOSviewer use a colour range from blue to yellow. The software shades in yellow those areas of the map where the density of the match between keywords is greater and shades in blue those areas of the map where the density of the match is lower [28,42].

In the analysis of the density maps, the most connected and the less connected keywords can be observed more clearly, depending on which colour they are and where they are placed within the map and the visualization program. The density map allows the areas in which a greater frequency of co-occurrence among the keyword is concentrated to be obtained. The keywords positioned in the central zone of the map means that they have a greater degree of connection with the rest of keywords.

The calculation of the density parameter for each period in the R program data gives us the description of the evolution of the network by periods, as illustrate in Table 10. The level of density increased from the first period to the third period, and there is a rapid change between the first and second period. This increased density means that the network of the conceptual structure gains internal coherence as the research field of sustainable tourism gains maturity.

Table 10. Evolution of the density network.

Parameter	1987–2005	2006–2014	2015–2018
Density	0.0154	0.0064	0.0040

Source: own elaboration with data obtained from WoS (2019).

Figure 8 illustrates the density map of the first period. In this first period, scientific production is more heterogeneous in terms of the subject matter covered in its research. In this first period, there is a great dispersion of topics with low connectivity among them, which is explained by being an academic discipline that was in its most recent stage of maturity.

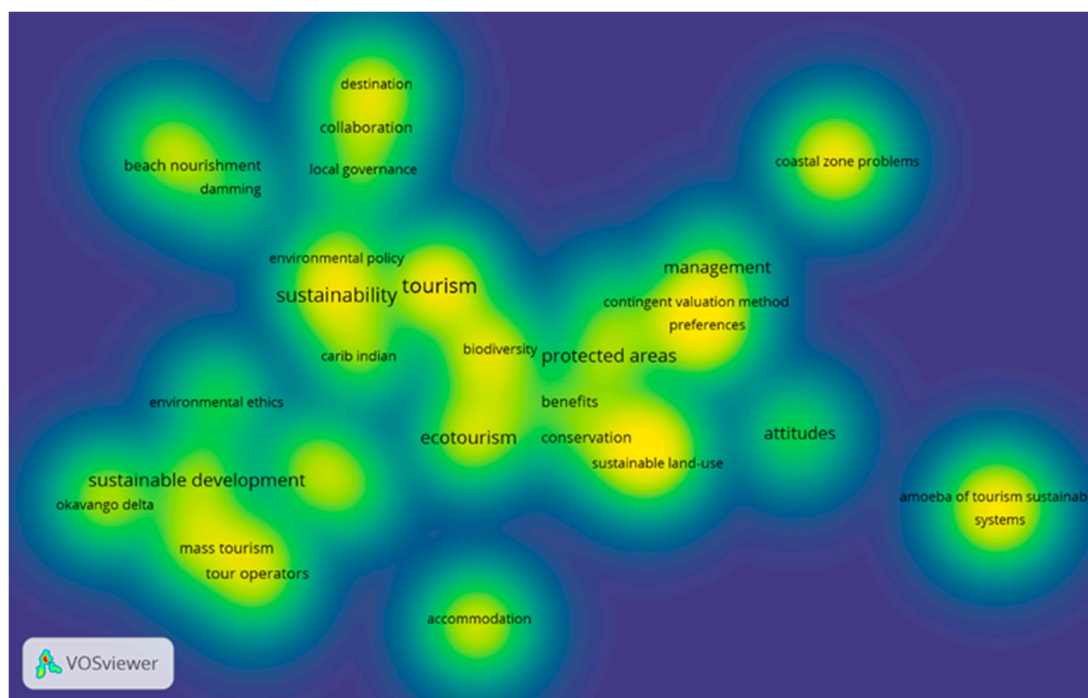


Figure 8. Density map 1987–2005.

Although we find a great dispersion of terms, in the centre of the density map, the software positions the terms with more connectivity with the rest of the network terms. This heterogeneity, fits with the analyses discussed above on the conceptual structure in this period in which the area of knowledge has just appeared as a research sub-area around the concept of “sustainability”, “tourism”, and “protected areas”, and although focusing mainly on the study of the impact of tourism in natural environments, the conceptual structure is being built and defined through the themes of study.

In the following periods, as we will see below in Figure 9, which illustrates the density maps of the intermediate period, and Figure 10, which corresponds to the density map of the last period, a greater concentration is observed around certain keywords and topics. “Sustainable tourism” appeared in both periods as a term with a high degree of concentration. The explanation is that academic discipline is already being defined within conceptual limits, which are established by the authors themselves through their articles and the development of the conceptual debate.

In both the second and third periods, shown in Figures 9 and 10, respectively, the term “sustainable tourism” is strengthened as a research topic of a research subfield, which can be clearly seen in the density maps corresponding to these periods, since a high degree of concentration is observed around the term sustainable tourism. At the same time, we see how as this discipline matures, as new research topics are emerging, and others are losing strength. Such is the case with “management”, which emerges in period two to establish itself as a term that defines the research in this field, as with the emergence in the second period of terms very connected with the management area, “indicators”, “impacts”, and “model”. These terms move towards the centre of the density map in the third period, confirming its establishment as a term that is present and very connected with “sustainable tourism”. “Sustainable tourism” and “management” are the terms that have the highest degree of concentration in the corpus of the academic literature on sustainable tourism.

multi-dimensional and multidisciplinary nature of this area of knowledge. The use of bibliometric can improve our understanding and help researchers to better understand the conceptual structure of sustainable tourism, as in any other scientific field.

This chronological mode of visualization analysis of the different trends and perspectives about this term clarify the degree of complexity and multidisciplinary nature that characterizes the study of sustainable tourism as an interdependent discipline of other research fields. From a more practical perspective, the results can also inform professionals in the field of sustainable tourism to act responsibly and sustainably while remaining competitive by understanding better the market in which they act.

Second, the results of this analysis show that the conceptual structure in the field of sustainable tourism has been changing over the past thirty-two years, which we have divided into three main periods.

In this direction, the study of the different parameters confirm the validity of Hunter's idea that the conceptual structure of sustainable tourism should not be considered a "rigid theoretical framework", but a structure closer to the idea of an "adaptive paradigm", a term coined by Hunter himself [64]. With the idea of an adaptive paradigm, Hunter reveals what comes to describe the analysis of the evolution of the conceptual structure of sustainable tourism: that it is a concept that adapts according to the specific circumstances to legitimize the different approaches that are emerging, as the context it also changes the area of knowledge [64].

Twenty years before, Hunter had already stated what the evolutionary analysis of the most used keywords in sustainable tourism literature has shown that the term "sustainable tourism" had become a term to speak of "a set of principles, policy prescriptions, and management methods that trace a path for the development of tourism" [64] based.

Third, we can confirm that the thematic structure of sustainable tourism has experienced and expanded the semantic boundaries of the conceptual structure. When studying the evolution of the parameters of hierarchy, centrality, proximity or clustering, and the density of the keywords, the results describe a clear direction: citing Lane [83] in the conservation and protection in the future of environmental resources, in their broad sense (natural, cultural) in tourist destinations. Currently, the concept of sustainable tourism has come to represent an open range of terms, from principles to political guidelines and management models, which guide the development of tourism based on environmental sustainability [25].

As already indicated in the theoretical framework, the monograph under the direction of the professor Concepción Román entitled "Sustainable Tourism: a debate still open to discussion". From a selection of works, among which the articles of reference academics in the disciplines of sustainable tourism, such as Bernard Lane, and social tourism, such as Scott McCabe, stand out [84]. Lane [2] anticipated in his article entitled "Sustainable Tourism: its evolution and its future", the idea that clearly informs our analysis of the evolution of the key terms of the publications in high-impact journals. Lane argues, after an analysis of justified discipline in his more than forty years as an academic and consultant, that sustainable tourism has gradually expanded cognitive and semantic boundaries, reaching a global relevance through conceptual development during these decades.

This point is where his conclusions are linked with our analysis of the evolution of the most recurrent terms in each period, as Lane [2] stated that the meaning of the term sustainable tourism has been extended to "become something more than a simple form of ecological tourism", as the analysis of the three periods of the study shows.

This expansion of the cognitive and semantic boundaries of sustainable tourism as a concept is the consequence of the fact that sustainable tourism has reached a complexity over the course of the years that is reflected in its current polyhedral content to function as a conceptual umbrella under which we find very different realities of various kinds and has emerged at the same time a way of approaching the study of the phenomenon of tourism, in a focus on the analysis of tourism from which issues that arise in other wider areas of knowledge from which researchers move social, environmental, economic and political issues are problematized [65].

The theoretical debate on the conceptual structure of sustainable tourism has evolved according to the debate about the concept of sustainability. Thus, if the term “sustainability” emerges as an answer to the problem of the use of natural resources, the approach addresses the impacts that tourist activity produces in the environment. As the discipline has matured, the perspective of the study has been broadened, problematizing not only the use of natural resources but also the management of socio-cultural resources [20], economic and business management of tourism. As Lane [2] explains, alluding to what he and Professor Bramwell anticipated years before, sustainable tourism “has become the consciousness of an activity previously free of conscience, a route towards innovation in the development of products, marketing and hosting, and a source of new types of destination planning. Sustainable tourism and sustainable tourism research became innovative and proactive” [2,66].

Finally, to close the study, it is mandatory to conclude with a series of necessary observations about the limitations and the implications for future research. Of course, as is usual in most articles, this study has limitations, which are understood as a starting point for further future lines of work.

First, an opportunity to continue deepening the knowledge of sustainable tourism as a discipline could be to expand the study, on the one hand, by using other databases, such as SCOPUS and Google Scholar, and on the other hand, by using other types of documents and other languages, which could complement the study so that all scientific production will be considered and the conclusions will be more rigorous and better reflect the evolution of the discipline structures.

In addition, it would be very interesting to address the study of intellectual structure through the study of co-authority, co-citation, bibliographic coupling because it is a part few explored by bibliometric studies in the field of sustainable tourism, and it would be of maximum interest to understand the complete structure of this scientific domain. These three elements, co-authority, co-citation, and bibliographic coupling, help practitioners and academics to study the similarities between documents based on the collaboration relations of institutions and authors and based on bibliographical references. This analysis of the intellectual structure would reflect the internationalization degree of a discipline such as sustainable tourism. Additionally, a comparative analysis of the concurrence of keywords changing and comparing results according to the selection of type of keyword can be suggested. Here, it could be studied whether taking only AKW for the analysis could alter the results.

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