

Article

Tourism and Sustainability: A Bibliometric and Visualization Analysis

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Abstract: Sustainability is a growing research topic in tourism due to the importance of environmental and social issues, and the maintenance of patrimony and other facilities to conserve the potential of tourism destinations. Specifically, sustainability in tourism is crucial in order to guarantee a consistent development of destinations, measured by growth in income and employment. This relevance has been translated into an explosive growth in the sustainability literature regarding tourism, income, and employment. However, there is a lack of bibliometric and visualization research on tourism sustainability (TS), and specifically on its relationship with income and employment. This paper aims to present a bibliometric overview of TS research, and specifically TS related to income and employment. The current work analyzed 2279 references collected from the Web of Science (WoS) Core Collection database and used the visualization of similarities (VOS)viewer program to graphically map the material. The study used co-occurrence of keywords, co-citation, bibliographic coupling, and co-authorship analyses. The results identify the development status and the leading trends in terms of impact, main journals, papers, topics, authors, institutions, and countries. The analysis and graphical presentations are relevant, as they can help researchers and practitioners better understand the state of the art of TS.

Keywords: tourism sustainability; income and employment growth; bibliometric; visualization

1. Introduction

Sustainability, and specifically the need to understand the nature and limits of growth, has developed into an important policy issue in tourism literature in the last decade [1], becoming an “integral component of tourism policy and strategy” [2] (p. XIX). The explanation of the relevance of tourism sustainability in the literature is, essentially, due to the interdependence of tourism pressure and sustainability [3], and at the same time the difficulty of governing sustainable tourism [4], in-depth research is required. This can be explained by the close relationship between sustainable tourism and sustainable development and, in particular, topics related to population, peace, ethics, prosperity, poverty, pollution, protection, and conservation [5]. Consequently, the analysis of sustainability in tourism literature, and specifically its connection with income and employment growth, has become an important topic, and a growing phenomenon. The aim of this paper is to illustrate and described the bibliographic analysis carried out on the tourism sustainability (TS) literature, focusing on its relationship with income and employment. This relationship emphasizes the economic and managerial dimensions of sustainability, mainly represented by the effect of sustainability issues on the growth of income and the generation of employment. In order to accomplish this purpose, this section

explains the concept of TS and the relevance of bibliometrics for analyzing TS research by explaining bibliometrics in sustainable tourism. Then, it will look at the lack of bibliometrics in TS, considering its relationship with income and employment, and, finally, the relevance and contributions of our research.

The concept of TS derives mainly from the broad terms of sustainability and sustainable development, although it has its own peculiarities, “the idea of sustainability in tourism has emerged as a new paradigm” [1] (p. 1123). The definition of sustainability is elusive (it is estimated that there are more than 300 definitions [6]). However, it emphasizes the need to preserve limited resources for future generations. Therefore, one of the most accepted definitions of sustainable development, that of Brundtland [7] (p. 43), defines it as “development which meets the needs of the present without compromising the ability of future generations to meet their own needs”. The concept of sustainable development “has provided a platform on which different stakeholders in tourism can interact, negotiate, and reflect on their actions’ consequences for the environment” and “the basic ideas and principles of sustainable development have been applied to tourism” [1] (p. 1124). However, the more specific concept of sustainable tourism also suffers an ambiguity in its definition [8] and has an integrative and multidimensional character that makes the concept difficult to quantify [9]. This has led to the appearance of conceptual, definitional papers, meaning that the debate about the concept has involved continuous, ongoing, unresolved contradictions [8]. For instance, Saarinen [1] criticizes the relationship between sustainable tourism and sustainable development (highlighting that the concept of sustainable tourism “has aroused harsh criticism” (ibid p. 1124)). He identifies three traditions of research in sustainability (resource-, activity-, and community-based), and explains the differences between “sustainable tourism” and “carrying capacity”. Nevertheless, this author stresses the key position of the latter term in TS, in the sense that “the idea of sustainable tourism involves the recognition of negative impacts and the need to manage them in order to achieve the goals of sustainable development” [1] (p. 1126). Moreover, Buckley [5] emphasizes the relevance of knowledge and the evaluation of the entire global tourism sector and its peculiarities, positing that “If academics can understand what the industry does and why, however, then that information contributes to government policy and regulation which improve sustainability” (ibid, p. 537). Based on previous definitions, we define tourism sustainability as those 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.

Although the relevant incidence of sustainability issues in tourism has resulted in an exponential growth in the literature regarding this topic, very little is known about the extent of TS research in the academic literature. One extended and popular method to analyze this situation is the use of bibliometrics. Bibliometrics was conceived as a cross-disciplinary science focused on analyzing the bibliographic data quantitatively through statistical and mathematical tools [10,11]. This method is valued due to its capability to analyze specific research areas, and draw valuable conclusions [11], using objective information in an easily handled way [12]. As a result, the technique is widely used to identify, among other things, the development of several topics, fields, or areas.

There is some literature that analyzes the structure of sustainability [13–17] using bibliometrics. More specifically, regarding management, marketing, and economic fields, there are bibliometric analyses of particular areas, such as the relationship between sustainability and innovation [18]; green innovation [19]; social innovation [20]; sustainability and information technology [21]; sustainability research in marketing [22]; green and sustainable supply chain management and sustainable logistics [23–25]; resilience thinking in socioecological research [26]; resilience applied to regional development [27], green-, circular-, and bio-economy research [28,29]; and ecological economics [30]. The literature also offers bibliometric studies that analyze: tourism research in general [31,32]; questions, such as statistical methods, in tourism research [33]; psychological research on tourism [34]; tourism gender research [35]; financial research on tourism [36]; tourism “competition” [37]; medical tourism research [38]; business ethics in tourism and hospitality [39,40]; innovation in hospitality

and tourism [41]; strategic management in hospitality and tourism [42]; and social media research on tourism and hospitality [43]. There is even a paper that analyzes 190 bibliometric studies on tourism [39], which stress the significant increase in bibliometric papers in tourism literature after 2008. Combining the bibliometric analyses of sustainability in tourism, we found one paper about the use of grounded theory method in tourism research [44], one bibliometric paper about sustainability in hotel business [45], and some bibliometric papers related to urban sustainability [46] and urban sustainability governance [47], which could be applied to the field of tourism. In addition, some of the previous papers are related to green and bio-economies [29], and other general bibliometric papers are related to sustainability, predominantly using the periodicals in the administration, accounting, and tourism areas.

However, there are few bibliometric or visualization studies that consider TS research in general or its relationship to income and employment. Only one paper that explores trends and patterns in sustainable tourism research [48] was found. Nevertheless, this study was limited to the papers published in four journals in the tourism field (ATR, JOST, TM, and JTR), not offering a broad analysis of all the literature about TS (it reviews only 492 papers). It also lacks the last 5 years of research in the TS literature, its methodology is different, and it does not provide any visualization analysis.

In spite of the lack of bibliometric analyses of TS, an analysis of this kind, together with visualization analysis, is useful for practitioners and researchers. It is important, and can contribute to the knowledge of TS, because it offers an overview of the study of sustainability and visualizes the structure and development of TS research and its main traditions, and can even reveal trends. This is also crucial to improve the management of organizations and destinations. Moreover, when analyzing the factors that influence publication trends, it can offer new key points that can help researchers to plan their future research. Due to the relevance of bibliometric analysis for literature in general, the importance of the analysis of TS, and the lack of appropriate bibliometric and visualization studies, this paper aims to show an in-depth, updated bibliometric analysis of the evolution of TS literature. In addition, this work is the first to concentrate on TS related to income and employment, which have never been studied before. The study used 2279 works, drawing on data from the Web of Science (WoS), and employed visualization of similarities (VOS)viewer software to graphically map the data. Co-occurrence of keywords, co-citation, bibliographic coupling, and co-authorship tools were employed.

The results reveal an explosion in the literature about sustainability, TS, and, more recently, TS related to income and employment. These studies are led by the sources: *Journal of Sustainable Tourism*, *Sustainability*, and *Tourism Management*; by institutions from the USA, Australia, Spain, and England; and by two works by Buhalis and Loumon and Giourga, which are the most cited papers in TS and TS related to income and employment. In addition, the paper reveals that although most of the literature has essentially followed managerial, environmental, and geographical perspectives (following the classical traditions of study), led by authors such as Hall, Gossling, and Butler, there are other dispersed perspectives to analyzing TS, such as mathematical, biological, or applied economic perspectives. Among them, the last one, led by Pulido-Fernandez and Lopez-Sanchez, is closely related to the topic of TS related to income and employment. The paper also provides an analysis of the concept and reveals the complexity of the question, the main perspectives of TS, and their relative importance and progression in the literature. This is essential for practitioners and policy makers in the tourism industry (from both public and private organizations) when facing policies aimed at being sustainable, as they must encompass all the broad and specific characteristics of the question. In addition, the paper offers some specific points to be considered by practitioners and researchers, as it reveals the main differences, correlations, and connections among the diverse traditions. This can help to understand TS better, and to contribute to clarifying the positions and debates among the different perspectives. This knowledge about TS, and its state of the art, is also an essential step to effectively plan further research on TS. In this respect, the article seeks to discover new trends in the

analysis of TS. In addition, it offers some explanations for the progression of these trends, which can open or develop further areas of research.

The following section describes the data sources and bibliometric methods used, Section 3 presents the bibliometric results and graphical analysis of the data, and explores the significance of the main findings, and Section 4 provides the discussion and main conclusions.

2. Materials and Methods

The research data used in this paper were downloaded from the WoS Core Collection database, which comprises several subdatabases. Previous bibliometric analyses were usually based on the two most widely recognized international databases: WoS and Scopus [49] (Google Scholar is questionable as it incorporates unreliable references [50]). We concentrated on data provided by the WoS, which only includes the most influential journals with the highest standards [51], following previous studies [51,52].

In order to select the kind of TS research to be evaluated, we retrieved all the papers that used the keywords “sustainability” and “tourism” simultaneously when concentrating on TS, and, in addition, the keywords “income” and “employment” when focusing on TS related to income and employment. Although various studies focus on only one keyword and analyze only one or various sections in WoS, we opted for using two keywords and all the sections in the WoS [53]. This praxis provided us with more data than just using the keyword “sustainability” in the category of “Hospitality, Leisure, Sport & Tourism”. The population includes all papers up to 31 December 2017. The collection of data was carried out in February 2018. The total sample was reduced by considering only articles, reviews, letters, and notes [52], resulting in a final sample of 2279 works.

The study used bibliometric indicators as analysis methods, which are the appropriate mechanisms for analyzing and representing the data used [52]. Specifically, the study used some of the most popular indicators of research according to this methodology, such as: the total number of papers, to measure productivity, and total citations, to represent incidence of a country, institution, or author [51,54]; the h-index to indicate the quality of a set of papers [55] (h-index, for a researcher, means that he/she has at least H papers cited at least H times [11]); the number of papers above a threshold (number of citations) to analyze the influence of articles [52]; the impact factor provided by the WoS to quantify the influence on dissemination of journals [53]; and the ratio of citations/articles to measure the impact of each article.

Additionally, the research focused on the use of science mapping to graphically map the data. Specifically, the study used the visualization of similarities (VOS) viewer software [56], a popular tool broadly used in bibliometric literature [53]. This software, using bibliometric maps, shows the structure and networks of authors, journals, universities, and countries. We analyzed: the co-occurrence of author keywords (keywords appearing below the abstract); co-citation [57] (when two papers receive a citation from the same article); bibliographic coupling [58] (when two papers cite the same third article); and co-authorship (the number of co-authors among the most productive sources) [11,52]. These analyses were chosen as they are the most widely used in the bibliometric literature. Hence, we essentially followed a previous bibliometric study in this journal [11], and added bibliographic coupling, a relevant research topic in the literature on recent bibliometric studies [51–54].

3. Results

The results described in this paper take in account seven analyses. Firstly, the paper analyzes the situation and progress of sustainability and tourism in the literature, concentrating on employment and income, also analyzing the citation structure of documents. Secondly, it concentrates on the most cited papers in TS and TS regarding employment and income. The third part studies the leading journals in these general and specific topics. The fourth one examines the co-occurrence analysis of author keywords in TS. Fifthly, the article explores the co-citation of references, journals, and authors regarding TS. The sixth section investigates the bibliographic coupling of authors. Finally, the paper considers the co-authorship networks of countries and institutions.

3.1. Status and Evolution of Sustainability and Tourism, Employment, and Income in the Literature

The first paper related to sustainability appeared in the Web of Science (WoS) in 1933. However, regular publications about this topic started in the 1970s with four papers. Since then, growth was substantial in the 1980s, and especially in the 1990s with some thousand articles in the decade. From 2003, more than 1000 papers were published a year, and since 2015, the number of papers a year has surpassed 10,000 (Figure 1). This trend was translated to the literature of sustainability and tourism, and to the literature about sustainability related to income and employment. Focusing on tourism research, although the first paper related to sustainability appeared in 1990, in 2001, the number increased to 17 annual papers, since 2010 there were more than 100, and in last 2 years surpassed 400 papers annually. However, only 3.55% of papers about sustainability were related to tourism in 2017. Regarding sustainability related to income and employment, the increment has been higher: in 1991, the first 7 papers appeared, the amount increased to 42 annual papers in 2001, 219 in 2010, and more than 600 annually in 2016 and 2017, this last year representing 5.31% of the papers regarding sustainability. Finally, focusing on the literature about tourism sustainability related to income or employment, the first paper appeared in 1995; in 2001, the annual publications were also 1 paper, an amount that increased to 12 annual publications in 2010 and more than 30 annual publications in the last 2 years, with an increment of more than 700% in the period 2008–2017, but representing only 7.12% of the papers in the tourism literature related to sustainability. Figure 1 illustrates the annual trends of publications.

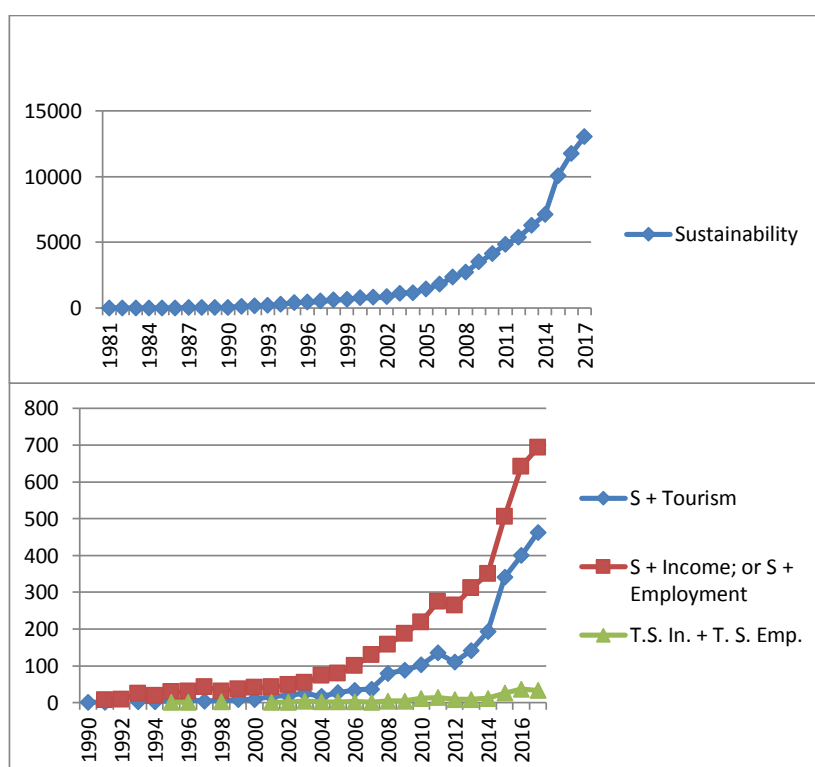


Figure 1. The annual publications in Web of Science (WoS) in sustainability, tourism sustainability, sustainability related to income and employment, and tourism sustainability (TS) related to income and employment. The dark blue line in the first plot shows the number of publications per year in WoS in sustainability research. In the second graph, the blue line indicates the annual research in TS, the red line the documents about sustainability related to income or employment, and the green line the annual research about TS related to income or employment. Data from the WoS.

The relevance of the diverse documents can be also shown through the analysis of the number of citations that published articles have in this field. We have concentrated on the analysis of TS research, and on TS research related to income and employment. The most cited paper about sustainability is the one by Yusuf Chisti [59], with more than 4000 citations in the WoS. Focusing on TS, the most cited paper is an article by Dimitrios Buhalis [60] with more than 750 citations in the WoS. More specifically, within the research in TS related to income or employment, the most cited paper is that by Loumou and Giourga [61], with 125 citations in the WoS.

Table 1 illustrates the general citation structure in TS, and TS related to income and employment. Following the WoS, in TS only the paper by Buhalis received more than 250 citations (0.04%), and 13.43% of papers have more than or equal to 10 citations. Specifically, for TS related to income or employment, only 1 paper (0.56%) has more than 100 citations, while 14.04% of articles exceed 10 citations. In addition, looking at the h-index [55], which provides a holistic analysis of the field [53], for all the articles related to TS it is 66 (66 papers have 66 or more citations), which is reduced to 20 for the TS papers of TS related to income or employment.

Table 1. General citation structure in TS and TS related to income or employment.

Tourism Sustainability					
Number of Citations	Number of Articles	Accumulated N. of Articles	% Articles	% Accumulated Articles	
≥500	1	1	0.04	0.04	
≥250	0	1	0	0.04	
≥100	32	33	1.40	1.45	
≥50	74	107	3.25	4.70	
≥25	152	259	6.67	11.36	
≥10	306	565	13.43	24.79	
<10	1714	2279	75.21	100	
Total	2279				
Tourism Sustainability Related to Income or Employment					
Number of Citations	Number of Articles	Accumulated N. of Articles	% Articles	% Accumulated Articles	
≥100	1	1	0.56	0.56	
≥50	4	5	2.25	2.81	
≥25	10	15	5.62	8.43	
≥10	25	40	14.04	22.47	
<10	138	178	77.53	100	
Total	178				

Source: Own elaboration based on WoS 2017.

3.2. Main Cited Papers in TS and TS Related to Employment or Income

In order to identify the most influential papers in the field of TS and specifically in its relationship with income or employment, we went for the top 30 and 15 papers with the most citations. The examination of the number of citation reveals the quality of a document [11], and also the popularity and influence of a paper within a research field [53]. Table 2 illustrates the highly cited papers and their characteristics.

Table 2. Top 30 papers with the most citations in TS and top 15 papers with the most citations in TS related to income or employment.

Papers with the Most Citation in TS						
R	Journal	TC	Article	Authors	Year	CY
1	TM	752	Marketing the competitive destination of the future	Buhalis. Dimitrios	2000	44.24
2	TM	237	Sustainability indicators for managing community tourism	Choi. HwanSuk Chris; Turk. Ercan Sirakaya	2011	21.55
3	ATR	234	Traditions of sustainability in tourism studies	Saarinen. Jarkko	2006	21.27
4	JST	202	Food, place and authenticity: local food and the sustainable tourism experience	Sims. Rebecca	2009	25.25
5	ERE	196	Economic Analysis for Ecosystem Service Assessments	Bateman. Ian J.; Mace. Georgina M.; Fezzi. Carlo; et al.	2011	32.67

Table 2. Cont.

Papers with the Most Citation in TS						
R	Journal	TC	Article	Authors	Year	CY
6	ATR	190	Reconceptualizing tourism	Farrell. BH; Twining-Ward. L	2004	14.62
7	EE	186	Ecological footprint analysis as a tool to assess tourism sustainability	Gossling. S; Hansson. CB; Horstmeier. O; et al.	2002	12.4
8	TM	181	The development of indicators for sustainable tourism: results of a Delphi survey of tourism researchers	Miller. G	2001	11.31
9	ATR	173	Sustainable tourism: Research and reality	Buckley. Ralf	2012	34.6
10	BC	167	The role of ecotourism in conservation: panacea or Pandora's box?	Kruger. O	2005	13.92
11	ATR	154	Managing heritage tourism	Garrod. B; Fyall. A	2000	9.06
12	JST	150	Governance, the state and sustainable tourism: a political economy approach	Bramwell. Bill	2011	25
13	EC	144	Present state and future prospects for groundwater ecosystems	Danielopol. DL; Griebler. C; Gunatilaka. A; et al.	2003	10.29
14	TM	141	Equity, management, power sharing and sustainability - issues of the "new tourism"	Ryan. C	2002	9.4
15	TM	139	A benefit segmentation of tourists in rural areas: a Scottish perspective	Frochot. I	2005	11.59
16	OCM	136	Trends in ocean and coastal tourism: the end of the last frontier?	Hall. CM	2001	8.5
17	TM	129	Tourism and water use: Supply, demand, and security. An international review	Gossling. Stefan; Peeters. Paul; Hall. C. Michael; et al.	2012	25.8
18	A	128	Meeting ecological and economic goals - marine parks in the Caribbean	Dixon. JA; Scura. LF; Vanthof. T	1993	5.33
19	AHV	125	Olive groves: "The life and identity of the Mediterranean"	Loumou. A; Giourga. C	2003	8.93
20	JTG	124	"A holiday is a holiday": practicing sustainability, home and away	Barr. Stewart; Shaw. Gareth; Coles. Tim; et al.	2010	17.71
21	PNASUSA123		The worldwide costs of marine protected areas	Balmford. A; Gravestock. P; Hockley. N; et al.	2004	9.46
22	TM	118	Visitors' learning for environmental sustainability: Testing short- and long-term impacts of wildlife tourism experiences using structural equation modelling	Ballantyne. Roy; Packer. Jan; Falk. John	2011	19.67
23	TM	115	Evaluating ecotourism sustainability from the integrated perspective of resource, community and tourism	Tsaur. SH; Lin. YC; Lin. JH	2006	10.45
24	TM	112	The ecological footprint as a key indicator of sustainable tourism	Hunter. Colin; Shaw. Jon	2007	11.2
25	TM	109	Development of a tourism sustainability assessment procedure: a conceptual approach	Ko. TG	2005	9.08
26	TM	104	Playing with risk? participant perceptions of risk and management implications in adventure tourism	Cater. CI	2006	9.45
27	ATR	103	Current Sociological Theories and Issues in Tourism	Cohen. Erik; Cohen. Scott A.	2012	20.6
28	JST	103	Why sustainable tourism must address climate change	Scott. Daniel	2010	14.71
29	TM	103	Tourism development of World Heritage Sites in China: A geographic perspective	Li. Mimi; Wu. Bihu; Cai. Liping	2008	11.44
30	SS	102	Creating an academic landscape of sustainability science: an analysis of the citation network	Kajikawa. Yuya; Ohno. Junko; Takeda. Yoshiyuki; et al.	2007	10.2
Papers with the Most Citation in TS Related to Income or Employment						
1	AHV	125	Olive groves: "The life and identity of the Mediterranean"	Loumou. A; Giourga. C	2003	8.93
2	BIOC	91	Economic value of terrestrial and marine biodiversity in the Cape Floristic Region: implications for defining effective and socially optimal conservation strategies	Turpie. JK; Heydenrych. BJ; Lamberth. SJ	2003	6.5
3	JCP	89	Resource use and waste management in Vietnam hotel industry	Trung. DN; Kumar. S	2005	7.42
4	JAE	75	The socio-economic and environmental impacts of tourism development on the Okavango Delta, north-western Botswana	Mbaiwa. JE	2003	5.36
5	TM	64	Sustainable performance index for tourism policy development	Castellani. V.; Sala. S.	2010	9.14
6	CM	47	Sustainability of scuba diving tourism on coral reefs of Saba	Hawkins. JP; Roberts. CM; Kooistra. D; et al.	2005	3.92
7	JST	45	Does the tourist care? A comparison of tourists in Koh Phi Phi, Thailand and Gili Trawangan, Indonesia	Dodds. Rachel; Graci. Sonya Rita; Holmes. Mark	2010	6.43
8	PO	42	Drivers and Socioeconomic Impacts of Tourism Participation in Protected Areas	Liu. Wei; Vogt. Christine A.; Luo. Junyan; et al.	2012	8.4
9	AR	41	Adaptation and sustainability in a small Arctic community: Results of an agent-based simulation model	Berman. M; Nicolson. C; Kofinas. G; et al.	2004	3.15
10	DSA	38	Community-based tourism as a sustainable solution to maximise impacts locally? The Tsiseb Conservancy case, Namibia	Lapeyre. Renaud	2010	5.43
11	E	38	Spatial Patterns of Mangrove Ecosystems: The Bragantian Mangroves of Northern Brazil (Braganca, Para)	Krause. Gesche; Schories. Dirk; Glaser. Marion; et al.	2001	2.38

Table 2. Cont.

Papers with the Most Citation in TS						
R	Journal	TC	Article	Authors	Year	CY
12	JST	34	Changes in demand for tourism with climate change: a case study of visitation patterns to six ski resorts in Australia	Pickering, Catherine	2011	5.67
13	TM	32	Tourist sector perceptions of natural hazards in Vanuatu and the implications for a small island developing state	Meheux, K; Parker, E	2006	2.91
14	JST	29	Developing an evaluation model for destination attractiveness: sustainable forest recreation tourism in Taiwan	Lee, Cheng-Fei; Huang, Hsun-I; Yeh, Huery-Ren	2010	4.14
15	TM	28	Changes on traditional livelihood activities and lifestyles caused by tourism development in the Okavango Delta, Botswana	Mbaiwa, Joseph E.	2011	4.67

Source: Own elaboration based on WoS 2017. R: ranking; TC: total citations; CY: citations per year. TM: Tourism Management; ATR: Annals of Tourism Research; JST: Journal of Sustainable Tourism; ERE: Environmental & Resource Economics; EE: Ecological Economics; BC: Biodiversity and Conservation; EC: Environmental Conservation; OCM: Ocean & Coastal Management; A: Ambio; AHV: Agriculture and Human Values; JTG: Journal of Transport Geography; PNASUSA: Proceedings of The National Academy of Sciences of the United States of America; SS: Sustainability Science; BIOC: Biological Conservation; JCP: Journal of Cleaner Production; JAE: Journal of Arid Environments; CM: Coastal Management; PO: Plos One; AR:Arctic; DSA: Development Southern Africa; E: Ecotropica.

The article by Buhalis [60] ranks first in number of citations (752) in the area of TS, and also in number of citations per year (44.24). This article studies the destination concept and synthesizes several models for strategic marketing and management of destinations. The second most cited article (237) is a paper by Choi and Turk [62], although it is the seventh in number of citations per year (21.55). This paper develops indicators to measure community tourism development within a sustainable framework, using the Delphi technique. The paper by Saarinen [63] ranks third in number of citations (234), but it is the eighth in number of citations per year (21.27). This paper analyzes the nature of the limits of growth, and how these limits are approached and evaluated in discussions on a local scale.

Focusing on TS related to income or employment, the most cited paper is the paper by Loumon and Giourga [61] (125 citations), which ranks second in number of citations per year (8.93). The paper analyzes olive cultivation, and how it contributes to the sustainability of natural resources and especially agriculture. The second most cited paper in this area (91) is the article by Turpie, Heydenrych, and Lamberth [63], although it ranks fifth for citations per year (6.5). This document analyzes the contribution of the biodiversity of the Cape Floristic Region to the regional and national economy, the income generated by natural resource-based tourism, and some conservation strategies. Another relevant document is the one by Trung and Kumar [64], which ranks third in number of citations (89) and in citations per year (7.42). The paper analyzes the expansion of the hotel industry of Vietnam and the impact on income and environment, analyzing efficient practices to use and manage resources for the sustainability of the tourism sector. The rest of the papers are very diverse in authors and in content.

3.3. Leading Journals in TS and TS Related to Employment or Income

The 2279 and 178 publications about TS and TS regarding income or employment were published in 757 and 133 journals, respectively. The main categories of publications were Hospitality, Leisure Sport and Tourism (41.71%), Environmental Sciences (19.56%), and Green Sustainable Science Technology (19.47%) in TS, and Hospitality, Leisure Sport and Tourism (29.61%), Environmental Sciences (24.58%), and Environmental Studies (18.99%) regarding TS related to income or employment.

When analyzing TS, 60% of the sources just published 1 paper; 16 published 20 or more; 25 between 10 and 19; 52 between 5 and 9; and 94 published 3 or 4 (116 published 2 papers). Focusing on TS related to income or employment, only 21% of the sources published more than 1 paper. Only two journals published 10 or more papers, 1 published 4 papers, 6 published 3 papers, and the rest 2 papers.

One can observe that 28% of the papers (639 publications) in TS and 21% of documents (38 papers) in TS related to employment and income were published in the top 10 journals in these areas (Table 3). Concretely, the three top journals by number of publications in TS were: *Journal of Sustainable Tourism*

with 3.35% of the total publications, *Sustainability* with 4.17% of total publications, and *Tourism Management* with 4.08% of total papers. However, the h-index for TS is led by *Tourism Management* (36), *Journal of Sustainable Tourism* (28), and *Annals of Tourism Research* (25). As for the three top journals by number of papers in TS related to income or employment, they are again the same journals as in TS, and in the same order, with 7.30%, 5.62%, and 2.25% of the papers published, respectively. They are also leading the h-index, although in reverse order, with an amount of 7, 3, and 4, respectively.

Considering the top 10 journals, if we focus on the sources that dedicate the highest number of their published articles to the topic of TS, they are *Journal of Sustainable Tourism* with more than 33% of its publications dedicated to TS, followed by *Tourism Management Perspectives* (10.96%) and *Current Issues in Tourism* (7.71%). As for the journals concentrating on the topic of TS related to income or employment, from the top 10 journals, the ones dedicating the highest number of their publications to TS related to income or employment are *Journal of Sustainable Tourism* (2.05% of its publications), *Worldwide Hospitality and Tourism Themes* (1.81%), and *Current Issues in Tourism* (0.53%).

Finally, the sources with the highest number of citations per article published about TS, from the top 10 journals in number of publications, are *Annals of Tourism Research* (55.28 citations on average), *Tourism Management* (48.87), and *Journal of Sustainable Tourism* (15.37). If we analyze the same variable about TS related to income or employment, the top sources with the highest number of citations per article published about this topic are *Tourism Management* (32.25 citations on average), *Current Issues in Tourism* (15.33), and *Journal of Sustainable Tourism* (12.69).

Table 3. The top journals with TS and TS related to income or employment publications.

R	Journal	APTS	H-TS	TAP	TCST	ACTS	PCTS	%APTS	IF	≥200	≥100	≥50	≥20
1	JST	213	28	634	3273	2232	15.37	33.60	2.98	1	4	15	51
2	S	95	9	5579	296	249	3.12	1.70	1.79				3
3	TM	93	36	2520	4545	3636	48.87	3.69	4.71	2	13	29	55
4	CIT	44	11	571	342	323	7.77	7.71	2.45				5
5	JCP	43	14	9294	530	434	12.33	0.46	5.72			2	7
6	ATR	39	25	1976	2156	1814	55.28	1.97	3.19	1	6	15	29
7	OCM	34	12	2430	456	429	13.41	1.40	1.86		1	1	6
8	IJTR	29	8	518	289	277	9.97	5.60	1.86			1	4
9	TMP	25	5	228	56	50	2.24	10.96	-				0
10	JCR	24	6	6552	179	176	7.46	0.37	0.92			1	2
11	JTR	24	13	554	419	402	17.46	4.33	4.56			2	7
12	PRTPC	24	1	237	4	4	0.17	10.13	-				0
13	TG	24	11	333	336	301	14.00	7.21	1.66			1	6
14	JEPE	23	4	2168	49	42	2.13	1.06	0.77				0
15	EI	21	10	3709	414	366	19.71	0.57	3.90			3	8
16	IJSDWE	20	5	996	74	67	3.70	2.01	1.86				0
17	APJTR	19	6	502	122	115	6.42	3.78	1.05				1
18	WHTT	19	2	166	9	9	0.47	11.45	-				0
19	MP	17	7	3432	134	130	7.88	0.50	2.24				1
20	CSEG	16	1	171	7	7	0.44	9.36	-				0
21	BAGE	15	3	735	43	41	2.87	2.04	0.32				1
22	ES	15	7	1833	153	153	10.20	0.82	2.84			1	1
23	EEMJ	15	5	2743	43	34	2.87	0.55	1.10				0
24	TE	15	5	774	100	96	6.67	1.94	0.83				1
25	AE	14	2	679	23	22	1.64	2.06	0.58				0
26	EE	14	9	4263	429	382	30.64	0	2.97		1	3	4
27	ESTHPRS	14	1	17	6	6	0.43	82.35	-				0
28	JDMM	14	3	181	53	52	3.79	7.73	1.56				0
29	TPD	14	2	93	14	14	1.00	15.05	-				0
30	EM	13	7	4492	153	153	11.77	0.29	1.88				4
31	MRD	13	7	1453	159	156	12.23	0.89	1.149				3
32	SJHT	13	8	285	123	120	9.46	4.56	1.09				1
R	Journal	APTSIE	H-TSIE	TAP	TCTSIE	ACTSIE	PCSTIE	%APTSIE	IF	≥200	≥100	≥50	≥20
1	JST	13	7	634	165	158	12.69	2.05	2.98				3
2	S	10	3	5579	22	22	2.20	0.18	1.79				0
3	TM	4	4	2520	129	126	32.25	0.16	4.71			1	3
4	CIT	3	3	571	46	46	15.33	0.53	2.45				2

Table 3. Cont.

R	Journal	APTSIE	H-TSIE	TAP	TCTSIE	ACTSIE	PCSTIE	%APTSIE	IF	≥200	≥100	≥50	≥20
5	ES	3	3	1833	31	31	10.33	0.16	2.84				0
6	JEPE	3	2	2168	6	5	2.00	0.14	0.77				0
7	MP	3	2	3432	17	17	5.67	0.09	2.24				0
8	OCM	3	2	2430	10	10	3.33	0.12	1.86				0
9	WHTT	3	0	166	0	0	0.00	1.81	-				0

Source: Own elaboration based on WoS 2017. R: ranking; H-TS: indicates the h-index in the area of tourism sustainability (STIE: indicates tourism sustainability related to income or employment); APST: articles published in TS; TAP: total articles published; TCTS: total citations in TS; ACTS: articles in which TS is cited; PCTS: average of citations by articles in TS. %APTS: percentage of articles published in TS (TS/TAP); IF: impact factor; ≥200, ≥100, ≥50, and ≥20: articles with more of 200, 100, 50, and 20 citations. JST: Journal of Sustainable Tourism; S: Sustainability; TM: Tourism Management; CIT: Current Issues in Tourism; JCP: Journal of Cleaner Production; ATR: Annals of Tourism Research; OCM: Ocean & Coastal Management; IJTR: International Journal of Tourism Research; TMP: Tourism Management Perspectives; JCR: Journal of Coastal Research; JTR: Journal of Travel Research; PRTPc: Pasos Revista de Turismo y Patrimonio Cultural; TG: Tourism Geographies; JEPE: Journal of Environmental Protection and Ecology; EI: Ecological Indicators; IJSDWE: International Journal of Sustainable Development and World Ecology; APJTR: Asia Pacific Journal of Tourism Research; WHTT: Worldwide Hospitality and Tourism Themes; MP: Marine Policy; CSEG: CSRR Sustainability Ethics Governance; BAGE: Boletín de la Asociación de Geógrafos Españoles; ES: Ecology and Society; EEMJ: Environmental Engineering and Management Journal; TE: Tourism Economics; AE: Amfiteatru Economic; EE: Ecological Economics; ESTHPRS: Education for Sustainability in Tourism a Handbook of Processes Resources and Strategies; JDMM: Journal of Destination Marketing Management; TPD: Tourism Planning Development; EM: Environmental Management; MRD: Mountain Research and Development; SJHTJ Scandinavian Journal of Hospitality and Tourism.

3.4. Keywords Analysis

This analysis studied the distribution of the most frequent keywords, investigated through keywords co-occurrence (keywords that appear together in the same paper). The aim is to highlight the most relevant research topics in the area of TS (as TS manuscripts related to income and employment are very scarce, we only concentrate on general TS publications) by focusing exclusively on the author keywords appearing below the abstract. This technique counts the number of papers in which two keywords appear together (keywords highlighted by the authors in each paper); considering the 2279 TS-related publications, VOS viewer software revealed the existence of 5552 keywords. Figure 2 illustrates the main keywords and the size of the nodes. (The larger the node and the keyword, the greater the weight is (how many papers a keyword appears in). Thicker lines mean more frequent co-occurrence (how many papers a keyword appear in together with another keyword). The smaller the distance between the nodes, the stronger the relationship they have (how many papers these two keywords appear in together, and relatively comparing co-occurrence with other keywords)). The same color of the nodes and keywords means that they belong to the same cluster (group of related keywords). The program created nine clusters. Figure 2 considers a threshold of 10 occurrences, representing the 96 keywords with most frequent co-occurrences. The most common keywords leading the main clusters are: “sustainability” (orange), “tourism” (green), “sustainable tourism”, and “sustainable development” (both in the same purple cluster), “ecotourism” (brown), and “climate change” (pink). Table 4 shows the top 30 keywords, including frequencies and total link strengths.

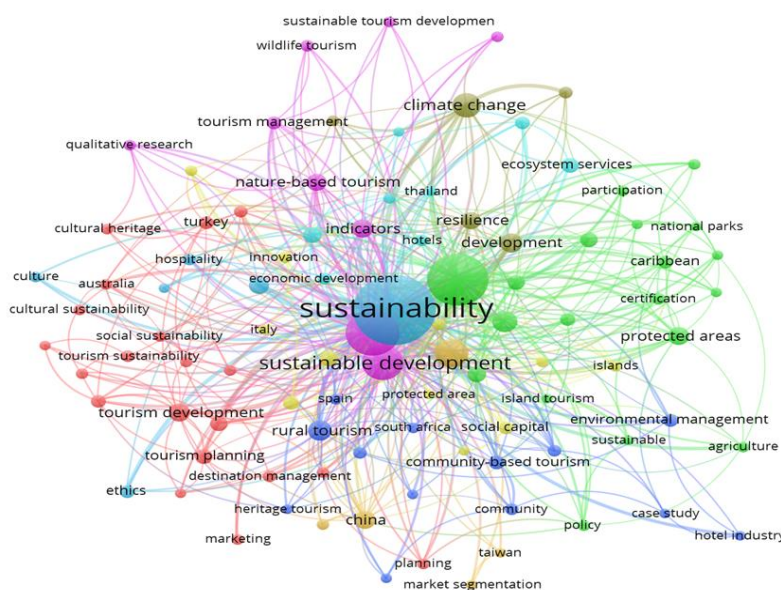


Figure 2. Co-occurrence network of author keywords of TS-related publications. The figure considers a threshold of 10 occurrences, which shows the 96 keywords with the most frequent co-occurrences, of the 5552 keywords.

Table 4. The top author keywords co-occurrence of TS-related publications.

R	Keyword	Oc	Co
1	sustainability	525	383.00
2	tourism	296	233.00
2	sustainable tourism	226	160.00
3	sustainable development	135	106.00
4	ecotourism	87	69.00
5	climate change	66	49.00
6	governance	51	41.00
7	development	42	36.00
8	rural tourism	45	36.00
9	indicators	36	31.00
10	environment	33	31.00
11	resilience	32	31.00
12	stakeholders	30	27.00
13	protected areas	38	26.00
14	tourism development	37	26.00
15	China	36	26.00
16	nature-based tourism	31	25.00
17	management	25	24.00
18	corporate social responsibility	26	23.00
19	conservation	30	23.00
20	heritage	24	22.00
21	tourism planning	24	21.00
22	environmental sustainability	29	19.00
23	cultural tourism	20	18.00
24	tourism management	20	18.00
25	rural development	22	18.00
26	ethics	19	17.00
27	carrying capacity	17	16.00
28	Caribbean	19	16.00
29	Turkey	20	16.00
30	coastal tourism	17	16.00

Source: Own elaboration based on WoS 2017. R: rank; Oc: author keyword occurrences; Co: author keyword co-occurrences link.

3.5. Reference, Journal, and Author Co-Citation Analysis

Apart from the previous analysis of the quality of the papers by the number of citation, in this section, we use co-citation, analyzing references, journals, and authors. The co-citation analysis

examines the simultaneous citation of two items (paper, journal, or author) by a third document's citation (they appear together in the reference lists of other papers) [57]. This mechanism divides the bibliometric material into clusters, through a network analysis, permitting visualization and analysis of the relationships, characteristics, structure, and development of a field, in this case TS.

We start with the reference co-citation network. In this analysis, the nodes show the connections between the diverse papers, illustrating the investigation themes strongly related to a research domain, in this case TS [11]. The chart (Figure 3) and the cluster analysis reveal that two articles by Butler [65,66] were cited 138 and 99 times in the 2279 papers related to TS, and hence led this ranking. The first of these papers is the one with most citations, although it ranks fifth in total link strength (608). A second ranking was led by the second paper by Butler, with a link strength of 882 (although these two papers are not included in the list of 2279 documents regarding TS, as the journals of these papers did not belong to the WoS when these papers were published). These two papers by Butler led the cluster in red, of the six clusters shown. The third most cited paper is the one by Saarinen [1] (97 citations), although it ranks seventh in total link strength (661), this paper is also included in the same cluster as the two papers by Butler. The second ranked paper according to link strength is the one by Choi and Turk [62] (734), ranking fourth in number of citations (95 citations). This paper led the second main cluster, violet in the image. Completing both ranks, the fifth most cited paper is the one by Hunter [67] with 83 citations, ranking third in link strengths (733), also in the main red cluster. As for the other main clusters, the green cluster is led by the papers by Gossling et al. [68] (67 citations, 332 link strength) and Buckley [5] (64, 334), and the blue cluster by Murphy [69] (58 and 455) and Jamal and Getz [70] (52 and 429). The authors of the other two clusters are not ranked in the top papers.

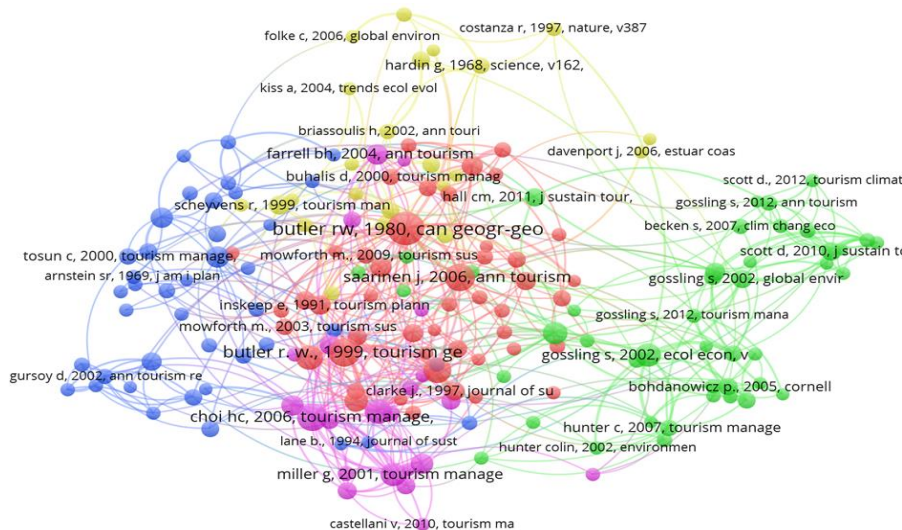


Figure 3. Co-citation of cited references on TS: 177 references of the 87,676 cited references that meet the threshold of a minimum number of citations of a cited reference of 20.

The first paper by Butler [65] relates the concept of a tourist area cycle of evolution, while the second one [66] is a state-of-the-art review of sustainable tourism. The paper by Hunter [67] studies the evolution of the concept of sustainable tourism. The one by Choi and Turk [62] is about sustainable indicators. A review of other papers in this violet cluster also reveals some tourism sustainability assessment procedures or critiques of sustainable tourism developments. The main papers in the green cluster are strongly connected to the previous papers, especially to the one by Choi and Turk [62]. Hence, the paper by Gossling et al. [68] provides a methodological framework for the calculation of ecological footprints as a tool to assess tourism sustainability, while the one by Buckley [5] is a review of social and environmental impacts, responses, and indicators of tourism sustainability. Finally, the book by Murphy [69] and the paper by Jamal and Getz [70] are related to community tourism.

The second co-citation study analyzes the journal co-citation network on TS (Figure 4). In this analysis, the size of a node shows the number of published papers and hence its activity, and a short distance between two journals reveals a greater citation frequency. The program revealed three main clusters plus one residual. The first one, in green, includes *Tourism Management* as the journal with most citations (5330) and highest link strength (4457), *Journal of Travel Research* (1704 citations, 1578 link strength), *Journal of Clean Production* (657 and 570), and *International Journal of Hospitality Management* (593 and 510). This cluster comprises journals oriented to the management of organizations. The second cluster, in blue, is led by *Journal of Sustainable Tourism*, a source ranked second by number of citations (4555) and by link strength (4027). This cluster also includes *Annals of Tourism Research*, which is the third in both rankings (4457 citations and 3616 link strength), and *Current Issues in Tourism* (776 and 755). The journals in this cluster are mainly orientated to the analysis and management of destinations. The third cluster, more separate from the previous two, is led by *Ecological Economics*, the fifth most cited source and the fifth also in link strength (939 and 827), and also includes *Science* (571 and 513), *Journal of Environmental Management* (523 and 491), *Ocean Coast Management* (506 and 430), *Environmental Management* (402 and 376), and *Nature* (300, and 278). The orientation of these journals is mainly environmental. Finally, the reduced yellow cluster is led by *Tourism Geographies* (460 and 440), and could be associated with a geographical perspective.

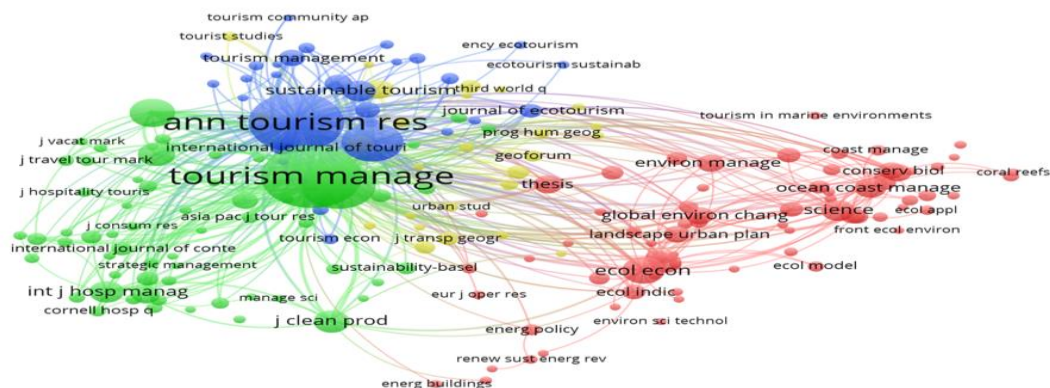


Figure 4. Journal co-citation network on TS: 191 main journals, of the 41,528 cited sources, by the 2279 documents regarding TS which meet the threshold of a minimum number of citations of a cited source of 60.

The third co-citation analysis studied the network of the main authors. The author analysis, plotted in Figure 5, illustrates the existence of six clusters. By number of components, the first cluster is the red one with 43 authors; the second with 38 authors is the green cluster; the third cluster is the dark blue in the image, with 20 items; the fourth one, with 19 authors, is the yellow; the fifth, with 15 items, is the violet; while the last one in light blue contains only 14 items. However, if we focus on the citations, the main cluster is the yellow one, led by Colin Michael Hall (706 citations) (the main cited author in the label; tourism at Google Scholar) and Stephan Gossling (633 citations). This is the most central cluster and includes the most cited authors. A review of its main authors reveal that the yellow cluster has essentially an environmental and ecological perspective, although this behavior is observed from many viewpoints, as is shown by its relationship with the other clusters. Hence, while Hall analyzes environmental problems highlighting business, planning, and geographic perspectives (and Moscardo (162 citations) concentrates on ecotourism and community problems), Gossling focuses more on the pure environmental management perspective (for instance, with the calculation of ecological footprints, and the analysis of environmental problems and consequences). Between both of them in this cluster are Buckley (297 citations) and Mckercher (196 citations), who focus on environmental and ecological impacts, and sustainable development. Far from the center, Scott (285 citations) concentrates on climate and biology questions, and Becken (262) on climate and energy consumption. The second important

cluster according to citations is in red. This is also a multidisciplinary cluster, although it focuses on destinations and has a mainly geographical perspective. The red cluster is led by Richard Butler (562 citations), whose work (located very centrally on the green cluster) highlights questions related to cycle tourism, reviews of sustainable tourism, tourism geography, and urban management. The contribution of Bill Bramwell (419) is also important, at the heart of the red cluster, his work is centered on local tourism policy making, rural tourism governance, and community participation; Tosun (147) concentrated on community participation, and Getz (217) (close to the light blue cluster) centered on community tourism. However, this cluster includes well-known researchers in tourism, such as Dwyer (186) with a planning and economic perspective, Buhalis (122), and Cooper (113). Finally, only one of the other four clusters, the green one, includes authors ranking in the top 10 cited authors: Weaber (419), professor of tourism research focusing on ecotourism and tourism management, is ranked 5; Sharpley (248), ranked 9 (and between the two main clusters: yellow and green), centered on environmental, economic, social, and sustainable development. Important authors in the green cluster are Scheyvens (185), focusing on ecotourism, local communities, and poverty; Cohen (176), with a sociological perspective; Sarinen (172), who analyses limits of growth, and natural resources at local and regional level; Jamal (130); and Ryan (136). The other three clusters are light blue—including Graham Miller (186), Hunter (186), Choy (115), World Tourism Organization (111), and OECD (107)—with a business and policy-making perspective, concentrating also on sustainable concepts and sustainable indicators; the dark blue cluster, with an economic, strategic planning, and growth perspective, with the analysis of physical and social impacts and institutional diversity and self-organizations, includes Ostrom (148 citations), Wall (127), World Bank, United Nations, World Commission on Environment, and UNESCO; finally, the violet cluster, led by Xabier Font (183) and Bohdanowicz (146), focuses on the sustainability of organizations, such as hotels and destinations, and on questions related to marketing, attitudes, impacts and awareness of managers and organizations, and corporate social responsibility.

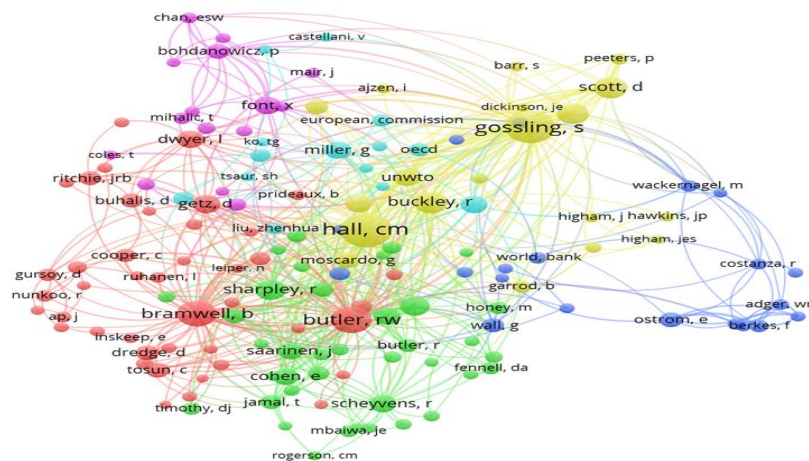


Figure 5. Author co-citation network on TS: 149 authors, of the 53,523 cited authors, which meet the threshold of a minimum number of citations of a cited author of 50.

3.6. Bibliographic Coupling of Authors

Another way of analyzing the degree similarity of a subject or, in this case, of authors' work, is by analyzing bibliographic coupling, a concept introduced by Kessler [58]. Bibliographic coupling is used in the literature to complement the co-citation analysis, offering another perspective of a subject or authors' relatedness. While co-citation indicates that two documents appear together in the reference list of another document, bibliographic coupling counts the number of references a group of papers have in common (paper A and paper B are coupled if both of them cite document C). Figure 6 illustrates our analysis. According to the strength and number of documents, the list

is led by Hall (1078 link strength, 19 documents), Gossling (975 link strength, 13 documents), Scott (742 link strength, 9 documents), Pulido-Fernandez (486 link strength, 9 documents), and Weaver (461 link strength, 15 documents). There are six main clusters. The dark blue one is led by the three main authors mentioned before, and also Peeters (437 link strength, 7 documents). Pulido-Fernandez and Lopez-Sanchez (7th in link strength) led the yellow one. Wall (8th) and Su (11th), light blue; Higham (10th) and Lusseau (19th), violet; and Gonzalez (15th) and Caballero (16th), green, are the only authors from three other separate clusters. Finally, the central cluster is led by Weaver (5th) and Buckley (9th) and includes 34 other authors, located centrally in the figure. Previously, we explained the works of most of these authors. Moreover, this analysis shows the existence of three new perspectives of studying sustainability issues: the main one, led by Pulido-Fernandez and Lopez-Sanchez, from University of Jaen, analyzes sustainable tourism, mainly in order to improve tourism policies, from an applied economic perspective, focusing on relevant areas such as income and employment (the differentiated topic of this paper). Gonzalez and Caballero, from University of Malaga, concentrate on sustainable tourism indicators, programming, and optimization, with a mathematical perspective. Finally, Higham and Lusseau focus on a biological and ecological perspective of managing environmental tourism sustainability.

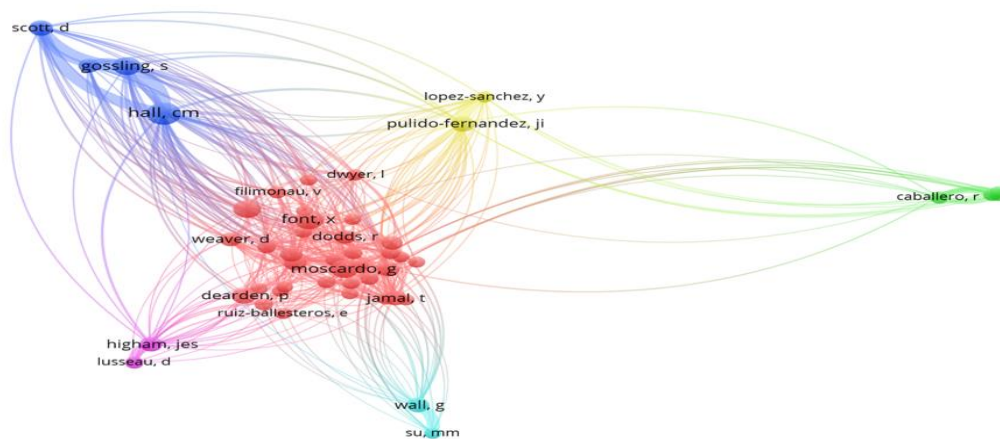


Figure 6. Bibliographic coupling of authors: 48 authors, of the 4897 authors, who meet the threshold of a minimum number of documents of an author of 5.

3.7. Country and University Co-Author Analysis

Finally, the bibliometric literature also highlights the so-called co-authorship analysis. This analysis helps to interpret the structure of research collaboration networks in a specific field. Hence, it contemplates the endogenous and self-organizing behavior of research teams [71]. The nodes in this analysis reveal the influential countries or institutions, while the thickness and distance between them show the degree of collaboration [11].

Starting with the analysis of countries, the VOS viewer program shows a dispersion of the literature. Led mainly by four nations (Figure 7): USA (329 documents, 4114 citations), Australia (285 documents, 4080 citations), Spain (255 documents, 1711 citations), and England (213 documents, 5095 citations). These four countries led the main important clusters. The other 10 top relevant countries are: Italy (141 documents, 1137 citations) leading a fifth cluster; Canada (127 documents, 1835 citations) leading the sixth cluster, together with China (122 documents, 1023 citations); New Zealand (82 documents, 1656 citations) and South Africa (72 documents, 692 citations) leading a seventh cluster; and Germany (69 documents, 886 citations) in the cluster with Italy. Two other smaller clusters are led by Brazil, France, and Mexico.

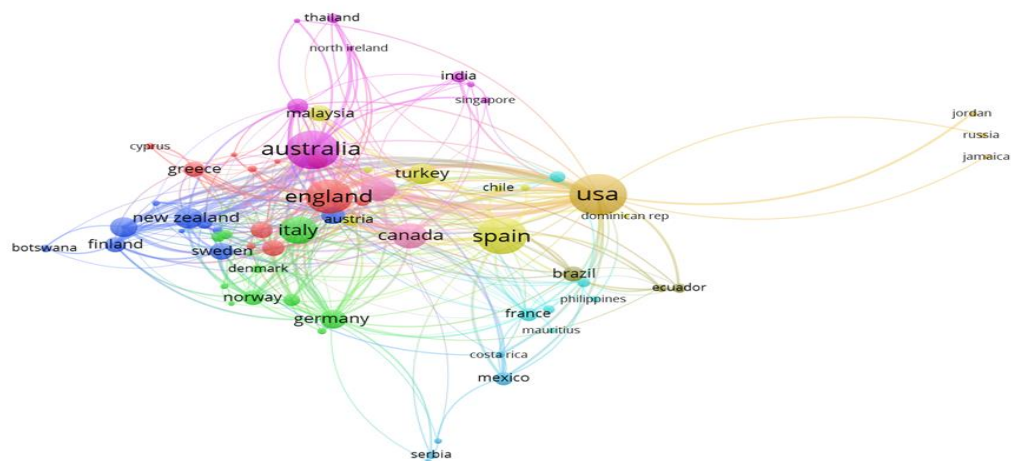


Figure 7. Countries' co-authorship network of TS: 71 countries, of the 121 nations, which meet the threshold of a minimum number of papers of a country of 5.

We also analyzed the most influential institutions in TS-related publications (Figure 8). In this ranking, the 10 top leading universities are Griffith University (58 documents, 976 citations), University of Queensland (39 documents, 732 citations), James Cook University (34 documents, 284 citations), University of Waterloo (28 documents, 452 citations) University of Surrey (24 documents, 654 citations), University of Oulu (23 documents, 537 citations), University of Otago (23 documents, 394 citations), University of Johannesburg (22 documents, 235 citations), University of Canterbury (21 documents, 400 citations), and Hong Kong Polytechnic University (21 documents, 185 citations). The figure also reveals a great distance, and hence, little collaboration, among the Spanish universities, especially University of Malaga and Pablo de Olavide (specialized in a mathematical perspective), and the rest.

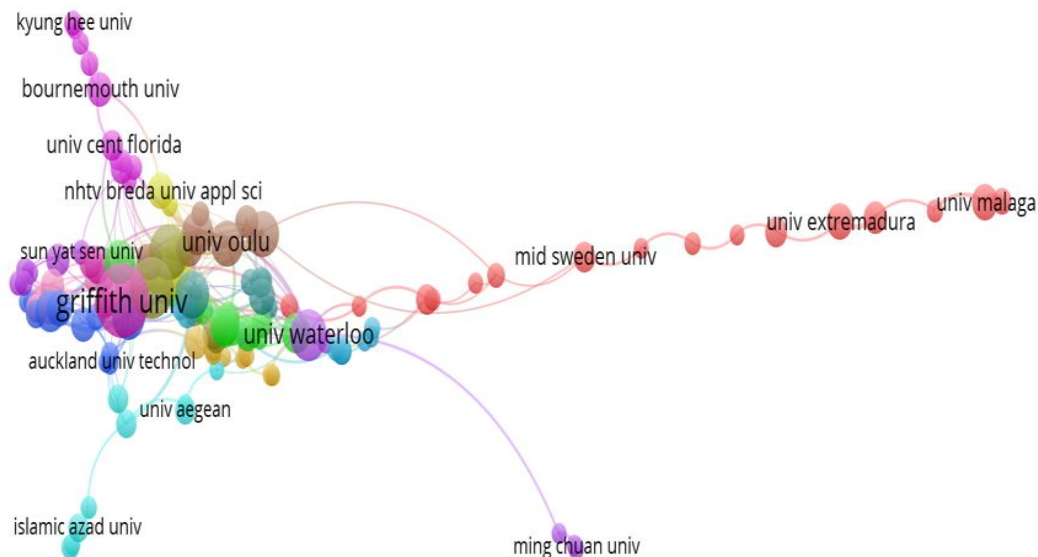


Figure 8. Institutions' co-authorship network of TS: 176 organizations, of 1904, meet the threshold of a minimum number of documents of 5.

4. Discussion and Conclusions

This paper has studied the relevance of tourism sustainability theoretically, concentrating on its relationship with employment and income growth. The article analyzed and defined the concept of TS and focused on the previous analyses of the structure of the field of sustainability in general (and its

relationship with diverse areas such as management, marketing, and economy), concentrating on the use of bibliometrics.

Moreover, the paper examined the previous bibliometrics regarding tourism in general and TS. Due to the lack of studies in the literature, and the importance of the bibliometric approach, we developed a bibliometric study and visualization of TS-related documents, also focusing on their connection with income and employment. From the results, we can extract the following conclusions. Debates, discourses, and criticism about the term TS have been a consistent feature of the literature [5,8,9] and continue with authors noting a raft of shortcomings [48,72]. In this respect, this paper highlights the complexity of the process and shows the interdisciplinary nature of TS research, with the need to integrate and bring together economic, social, and environmental–ecological dimensions of sustainability [1,73], and the relevance of focusing on tourism-specific characteristics in TS conception [5]. Nevertheless, and in the light of previous bibliometric studies, the results highlight that research into TS questions is maturing, moving away from definition and conceptual papers to more applied and empirical research [48].

Furthermore, research about sustainability, although being developed regularly since the 1970s, has shown a huge growth in recent years, with more than 10,000 papers annually since 2015. This increase has been translated to the literature on sustainability and tourism (more than 400 papers annually in the last 2 years), and to the literature about sustainability, income, and employment (more than 600 annually in 2016 and 2017). Results show that the growth in TS research continues to be remarkable, as observed some years ago [48]. The literature about tourism sustainability related to income or employment is still scarce, although it has increased more than 700% in the last 10 years. This paper is pioneering in analyzing this aspect.

The relevance of the subject was also reflected in an important number of citations. Hence, the most cited paper about sustainability, TS, and TS related to income and employment had more than 4000, 760, and 125 citations in the WoS, although all of them were published recently. These results agree with the relevance of TS outside the academic field. Hence, TS was recognized by the UN in the 2030 agenda for sustainable tourism, where in 3 of the 17 goals featured tourism. They indicate the need to: “devise and implement policies to promote sustainable tourism that creates jobs and promotes local culture and products”; “develop and implement tools to monitor sustainable development impacts for sustainable tourism with creates jobs, promotes local culture and products”; and “increase the economic benefits of Small Island Developing Spaces and LCDs from the sustainable use of marine resources, including through sustainable management of fisheries” [74].

Examinations of the citations indicates that the most influential and cited papers in TS are the ones by Buhalis [60], with 44.24 citations per year, and the one by Loumon and Giourga [61] (125 citations), focusing on TS related to income and employment.

The top journals in the area were *Journal of Sustainable Tourism*, *Sustainability*, and *Tourism Management*, and these three journals, in the same order headed the specific area of TS related to income or employment. Moreover, results indicate that despite being a relatively young area of study, research on TS and the specific area related to income or employment has developed simultaneously across multiple academic disciplines and is expanding.

Focusing on the main topics in TS, the keyword co-occurrence analysis highlights “sustainability”, “tourism”, “sustainable tourism”, “sustainable development”, “ecotourism”, and “climate change” as the most frequent keywords. This agrees with the appreciation that the main subjects in TS literature, with some exceptions, remain constant and stress the emerging area of climate change [5,48]. The results also indicate that areas such as population, prosperity, peace, pollution, protection [5], social responsibility [45], or ethics have yet to fully emerge, as posited in previous bibliometric studies [45,48].

Co-citation analysis reveals that two articles by Butler [65,66] led the rank of the most cited papers of the 2279 papers related to TS. Other relevant documents are one by Saarinen [1], which is included in the same central cluster, and another by Choi and Turk [62], which led another cluster. The cluster analysis reveals other clusters, surrounding the first central one, which are relatively dispersed.

The journal co-citation network indicates the existence of four clusters of journals. One, led by *Tourism Management*, comprises journals oriented to the management of organizations; another, led by *Journal of Sustainable Tourism*, is mainly orientated to the analysis and management of destinations; the third one, more dispersed from the previous two, led by *Ecological Economics*, with a mainly environmental–ecological orientation; and a reduced cluster associated with a geographical perspective.

The author co-citation analysis illustrates six clusters. The main, central one, led by Hall and Gossling, observes an essentially environmental and ecological perspective, although analyzed from many scientific viewpoints; its relationship with the other clusters is shown. Other clusters essentially deal with planning and geography (Butler, Bramwell, Getz); ecotourism and social and local development (Weaver, Sharpley); business and policy-making (Miller, Hunter, Choi); and economic, strategic planning, institutional (Ostrom, Wall), organizational, social responsibility, and marketing (Font, Bohdanowicz) perspectives.

The bibliographic coupling of authors indicates the existence of two central clusters of authors. The main one is led by the three authors with the highest link strength (Hall, Gossling, and Scott). Another, more central in the figure, is led by Weaver and Buckley (5th and 9th in link strength, respectively), which includes 36 of the 48 main authors considered. Moreover, the analysis discovered new perspectives of analyzing TS: applied economic (with Pulido-Fernandez and Lopez-Sanchez (4th and 7th in link strength)), mathematical (Gonzalez and Caballero), and biological and ecological (Higham and Lusseau) views. These new perspectives could be added to other previous ones, such as biosecurity or rural policies founded in previous research when studying circular-, green-, and bio-economy sustainability concepts in tourism [29], or others related to the use of information and smart technologies when focusing on urban sustainability [46,47].

Finally, the co-authorship analysis of TS reveals the prevalence of four countries (the USA, Australia, Spain, and England), leading the main clusters. The study shows that the top institutions analyzing our field are Griffith University, University of Queensland, and James Cook University. The analysis also shows the lack of collaboration between some Spanish universities, such as U. of Malaga and U. Pablo de Olavide, with the central ones. To sum up, the bibliometric and visualization study on TS-related documents shows that TS is a broad area that should integrate and reconcile very diverse perspectives and the main traditions and narratives of TS.

The paper also revealed the diverse traditions and main lines of research in TS and their relative importance in the literature, and it offers some interesting trends in TS literature. These questions are important for practitioners when considering different policies. They are especially relevant to researchers, as the study found differences and connections among the diverse areas studying TS and revealed the existence of new and growing conceptions of study that can open new areas of research. The literature also indicates the need of future research about the sustainability of tourism growth, its effects on questions related to indicators that measure this sustainability, and, specifically, economic indicators [75]. Let us focus on the main findings and contributions for practitioners and researchers.

Focusing on practitioners, the diverse perspectives included in TS, and knowledge of the industry and the tourism research literature [5], cannot be avoided if the aim is to improve sustainability during the planning and management of organizations or destinations. Hence, policy makers and practitioners should include, comprise, and integrate the complexity of the area. In particular, social, economic, and environmental–ecological impacts should be incorporated [29], but also landscape, culture and patrimony, and new perspectives facing TS. Practitioners should also consider the advances, effects, and implications (for both organizations and destinations) of changes in information technology for the sustainability of tourism—the impact of social media, for instance [76]—or the availability of new green techniques, smart governance, planning techniques, technological solutions, or even social and environmental applications and crowd-sourcing and open-source solutions affecting sustainability, as highlighted in recent bibliometric studies about urban sustainability [46,47]. For successful governance, the planning needs to include public and

private participation, considering the involvement of the main stakeholders from all tourism interests, on various levels, as posited by Gössling et al. [72] and Buhalis [60] in the most cited paper about TS. Tourism polices need to be created to influence sustainable planning processes, for instance, with the promotion of socially responsible policies from organizations [45] or the promotion of social entrepreneurship [77]. In addition, the increased involvement of communities is needed to guarantee the equity of benefits to every group that will influence or will be influenced by tourism operations, “ensuring economic development that is also ethical and environmentally, socially, culturally and politically conscious”, as stressed by Dos Santos et al. [45] (p. 223) in their bibliometric study of hotels. Moreover, the analysis of TS should be conceived as a multilevel dynamic process rather than a goal, as posited recently by Kristjánisdóttir et al. [73], by continuously redefining sustainability challenges in response to economic, social, or environmental situations. Furthermore, technological, individual, and political means, including regulation and participatory governance, are recognized as essential to generate gains in sustainability [5,47].

Focusing on the theoretical importance of the paper, bibliometric analysis can offer some answers to important questions that researchers should consider when focusing on developing a paper about TS. Specifically, the results could help researchers to better discover the reasons that promote new trends, or, specifically, the factors that influence these publication trends. Obviously, this is crucial for researchers when developing new research on TS. From our point of view, the new trends are motivated by three main reasons: the expansion of the topic (in this case, TS), that makes it more interesting for researchers; the development of new sciences or areas of study; and the existence of fashionable questions in research or society. Taking these perspectives into account, this bibliometric analysis can provide us with some points for further research. In this regard, and apart from the evolution of society, this paper shows that the evolution of TS is making its research more interesting for classical areas, such as applied economics, mathematics, biologics, and ecology. An example of this is, for instance, the explosive growth of TS papers related to income or employment, mainly associated with applied economics, as shown in our analysis. In addition, the explosive expansion of other areas, such as that related to marketing [60] or those linked to information technologies, social media, open innovation, or crowdsourcing [46,47,76], are also provoking the expansion of TS to topics related to these areas. For instance, the most influential paper on TS (the one with most citations in the general literature, of the 2279 papers analyzed) is the one by Buhalis [60]. However, this is not the paper most cited by the other 2278 TS-related papers analyzed in our study (the most cited by the TS literature are the ones by Butler [65,66] and Hunter [67]). Moreover, focusing on the paper by Buhalis [60], although it obviously deals with TS (the paper considers the relevance of the “sustainability of local resources”, also in the abstract), it would be not ranked as a classical TS paper by many readers (unlike, for instance, the papers by Butler [66] or Hunter [67], which review TS or its conception). This is because the main focus of Buhalis’s work is not TS, but “destination marketing”. Nevertheless, the expansion and popularity of marketing-related areas in academia means this paper is the most cited, and, as a consequence, citation of this paper could provoke the appearance of papers on topics related to TS, such as marketing, as they will probably have more citations in the future. As a result, this example indicates that TS research will eventually evolve toward some of the most popular areas and subjects in the general academia. Moreover, the still scarce but incipient research in some important scientific fields (such as mathematics, programming, or optimization), observed in this chapter, or the still relatively low importance of some important keywords (some of them related, for instance, to tourism literature, such as the one by Buckley [5], or others relevant in academia in general) indicates that some areas of TS need more research. Specifically, and only concentrating on topics related to management and economy, the small amount of TS literature in fields such as finance, information systems, social media, and user-generated content, crowd-sourcing, entrepreneurship, ethics, social responsibility, and so forth, indicates that more research is needed in these fields. Finally, as pointed out before, results indicate the maturity of TS, the trend to more

empirical papers, and especially the need for papers related to the development of TS indicators [48], and particularly economic TS indicators [75].

Nevertheless, the extent of the paper reveals some limitations, which, together with a further focused evaluation of the trends observed, can promote further interesting analyses. Firstly, bibliometric methodology has limitations, as it is based on the objective collection of keywords, which can produce confusing interpretations if it is not complemented with more qualitative analyses, as in the example of the paper by Buhalis [60]. In addition, the work used the WoS Core Collection database as a data source, considering only articles, reviews, letters, and notes. Although this method provides us with the most relevant and important works, other studies could complement this one by analyzing other kinds of secondary documents included in the database in order to detect other pioneering trends. Other possibilities could be extending the analysis with the use of databases such as Scopus or Google Scholar, or other sources and data sets that analyze other kinds of reports, such as doctoral theses or works in other languages.

Further analyses could also focus on some of the trends detected by analyzing some of the trends about sustainability (or TS) considered from specific scientific points of view (management, economics, geography, and so forth). Moreover, the software used in this paper permits further analysis, using more bibliographic or mapping tools (for instance, one can extend bibliographic coupling, co-citations, co-authorship, or other analyses), or other software or methodologies which could enrich this work, using other possible bibliographic studies. Finally, the study could be completed by refining the analysis with a deeper study of some of the clusters and themes detected and observed in this work.

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