

Article

A Bibliometric Analysis of Sports Tourism and Sustainability (2002–2019)

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Abstract: Sports tourism is a relatively recent type of tourism, which has grown significantly in recent times. Not all effects of tourism are positive, so the analysis of its sustainability has particular relevance; especially since the publication of the 17 United Nations Sustainable Development Goals (SDGs) in 2015. The growing concern about tourism and sustainability makes it essential to examine how scientific research has adapted to new realities. This paper uses bibliometric techniques to investigate research trends related to sports tourism and sustainability. VOSviewer and SciMAT software were used. A total of 214 articles from Web of Science (WoS) indexed journals were analyzed. The results confirmed that interest in the study of these concepts has been growing, especially in the last four years. This is a comparatively new field of research (since 2002), so consolidated relations between thematic areas have yet to be observed, and there is a generally low concentration of authors and journals. Increases in several publications in this area are related to the celebration of mega sporting events or the publication of SDGs. The main contribution of this analysis lies in identifying important research issues, such as education and destination planning, which should continue to be addressed.

Keywords: sustainable; SciMAT; VOSviewer; research trends; tourism; sport

1. Introduction

Sports tourism can be defined as those trips made for recreational (noncommercial) reasons, to participate in or observe sports activities that take place outside the place of habitual residence [1] and may or may not have a competitive purpose [2]. Although in the first instance sport tourism appears just as a tourist activity, nowadays it is seen as an experience of sport culture [3].

There are common elements in the different sports tourism classifications [1,4–6]. Using these common elements, we have identified the following categories: mega-sport-events, small-scale events, and nostalgia-sport-tourism. Under this last concept, sports tourism refers to places related to sports and to vacation places frequented by famous athletes [4].

Sports tourism has emerged as a typology relatively recently, but is one that has shown significant growth in recent times. According to data collected by the World Tourism Organization (WTO) from EUROSPORT, sports tourism generates annual revenues of USD800 billion worldwide. That constitutes approximately 10% of the trips and 25% of the income from tourism. This last percentage increases to 55% in Australia and some parts of New Zealand. The United Nations rates this type of tourism as the fastest growing in recent years [7,8].

Its importance is such that in 1999, the International Olympic Committee and the WTO signed a cooperation agreement to coordinate efforts and improve links between sports tourism activities [9].

This form of tourism is the result of globalization, thanks to cheaper transport and the rise of sports culture, especially in those typologies where certain geographical conditions are needed for its development, such as mountain climbing [10–12]. Sports tourism has contributed to health policies that encourage more active lifestyles. This sector can generate significant economic growth in its areas of influence, favoring subsectors as varied as the hospitality sector, training facilities, and the sports supplies industry. It is not only major sports events that generate significant economic impact [13], but also local sport events [14]. Also, the fact that this form of tourism is seen as healthy leads to its approval among the population in areas where it is practiced. In addition, this form of tourism is useful in overcoming the issue of seasonality [15–17].

However, not all tourism's effects are positive. At present, the excessive growth of sports tourism and its lack of planning in the last decades of the twentieth century have made some tourist destinations victims of its success, and are testing their carrying capacity [18].

This is because the concepts of planning and sustainability in the tourism sector did not develop in a generalized way until the late 1980s and early 1990s. In 2015, the general debate on sustainability led the United Nations to promote the 2030 Agenda on Sustainable Development. This Agenda includes 17 Sustainable Development Goals (SDGs), each with specific targets, which must be achieved in the next 15 years. Tourism appears in the Goals of Objectives 8, 12, and 14, concerning sustainable and inclusive economic development, sustainable production and consumption, and sustainable use of the oceans and marine resources, respectively. Therefore, tourism and sustainability are closely related [19].

Sports tourism, due to its progression, characteristics, and typologies, contributes to achieving the SDGs promulgated by the United Nations differently from other tourist modalities. In addition, since this typology is related to the celebration of sporting events at different levels, both local and international, the micro and macroeconomic impacts on the host territories and societies can be analyzed. This makes sustainability an underlying theme in tourism research. The growing interest in sustainability at all levels of sports tourism is of particular interest, as it shows how researchers have been adapting to these 21st-century concerns.

The present study is presented as an exploratory analysis of this research topic. This work aims to contribute to the literature involving bibliometric techniques and literature reviews. Examples include analysis of the concept of sustainability in areas such as tourism [20], income and employment [21], corporate reputation [22], development of enterprises [23], and management [24]. In this study, we analyzed the field of sports tourism and sustainability.

Different methodologies can be applied to the understanding of the treatment and vision of diverse kinds of scientific literature on sports tourism and sustainability. One of the main examples is the systematic literature review, that is the formal, systematic, structured approach to reviewing all the relevant literature on a topic. The literature review can be quantified using meta-analysis [25]. Meta-analysis refers to the statistical methods used in research synthesis for combining and integrating results from individual studies. Systematic reviews often, but not always, include a meta-analysis [26,27].

The systematic literature review aims to answer one or more research questions, selecting criteria for the inclusion/exclusion of the studies, and requiring a preliminary overview of the current state of research [28]. However, as mentioned above, our study is presented as an exploratory analysis of a relatively recent research topic. These factors make the application of a systematic review of the literature, and the use of meta-analysis, less suitable, and make the application of bibliometric analysis better adapted to the study. This type of analysis enables an understanding of the structure of the research field, its evolution, and trends in academic activity [29–31].

There are two different ways to analyze a research area bibliometrically. First, performance analysis focuses on the measurement of scientific impact and citations through different indexes.

Second, science mapping enables the representation of scientific research and its evolution in the intellectual, conceptual, and social fields [32].

The purpose of this work is twofold. First, this study aims to identify the main trends in research on sports tourism and sustainability, thereby allowing a better understanding of the evolution of this research topic. Second, this study aims to offer a map of the analyzed field, which will be useful for researchers in this area who need a theme tree to guide their careers and future research.

Therefore, a bibliometric analysis was performed on the topic of “sports tourism and sustainability”, based on the information collected on the Web of Science (WoS) using the Science Mapping Analysis Software Tool (SciMAT) and VOSviewer [33].

In the following section, we describe the data sources and bibliometric methods used. The results and discussion are included in Section 3. Finally, Section 4 presents the main conclusions and makes some recommendations for further research.

2. Materials and Methods

This research study used the WoS Core Collection database, accessed in January 2020 [34]. We chose this database because it collects scientific publications with the most significant impact [35] and is used as the main criterion in academic decision making [36,37].

The search of documents in this database was carried out using the terms “sustain*” AND “sport * touri*” OR “sustain*” AND “sport* event*”. Articles and reviews in which these terms appeared in the title, abstract, and/or keywords were selected. Under these search parameters, there were 226 publications. However, they included some research that did not address the subject under consideration, including publications in journals such as *Sports Medicine*, the *Journal of Forensic Sciences*, the *Health Gazette*, and the *British Journal of Sports Medicine*. Therefore, we used a WoS filter, “WoS categories”, to eliminate these medical journals from the present research. The filter produced a sample composed of 214 publications (31 in special editions) dated between 2002 and 2019, with 2,921 citations, an average of 13.69 citations per article, and a h-index of 28 (according to the information provided by the WoS dating report).

From this sample, a bibliometric analysis was performed in two different phases:

First, a report was generated for the entire study period, 2002–2019. The objective of this analysis was to obtain a preliminary overview of the scientific literature in the field of sustainability and sports tourism. We used WoS to produce an index of the journals that had published articles on tourism and sustainability, a citation index, and a list of the most important works based on their number of citations and the leading organizations publishing in the area.

Subsequently, the VOSviewer software [38,39] was used to eliminate duplications in the keywords in our database using thesaurus files [32], and a co-occurrence network of keywords was carried out. This software is a widely used tool for processing keywords [40]. In this analysis, all 1042 keywords collected in our database were used. The keywords include the author keywords (keywords appearing below the abstract) and ISI’s KeyWordsPlus (words or phrases that frequently appear in the titles of an article’s references, but do not appear in the title of the article itself).

Second, the aim was to learn more about the evolution of the field of leading bibliometric indicators. For this, the study period was divided into different stages, depending on the number of publications.

On the one hand, this new, much more detailed time division enabled an analysis of productivity and impact indicators, similar to that carried out for the entire period, showing the number of articles and citations, leading journals, and authors [41]. On the other hand, conceptual analysis enabled research on the main topics related to sustainability and sports tourism, in addition to knowing their structure, evolution, and trends. SciMAT software was used for this analysis because it facilitates the organization of the topics into four categories (motor clustering, highly developed and isolated, emerging or declining, and basic and transversal clusters) depending on Callon’s centrality and density indicators [42,43]. The bibliometric details of the papers were exported into SciMAT. They included

the journal title, publication date, author details (name and affiliation), article title, keywords, abstract, and citation count.

Before starting the data analysis, it was necessary to homogenize the database exported to SciMAT from the WoS to obtain consistent results. The absence of standardization in the researchers' signatures can have severe consequences in the measurement and evaluation of scientific literature using statistics and bibliometric indicators [44]. The proprietary software allows author searches using different criteria (automatic, manual, search for similar names by number of characters) to identify cases in which the same author signs their works differently.

Co-words analysis using the author keywords was performed for each of the stages into which the period 2002–2019 was divided. In this case, a more restrictive criterion was followed for the analysis. Only the 690 original keywords defined by the authors in their articles were used [21]. This analysis provided us with three representations: strategic diagrams, cluster networks, and evolution areas [32].

3. Results and Discussion

3.1. Performance Analysis and Keywords: 2002–2019

Consistent with the research theme being relatively new, as discussed in the introductory section, the first publications collected in the WoS were published in 2002. Since then, the literature has experienced rapid growth, going from a single article published in 2002 to 40 articles in 2019, amounting to 214 over the entire period. The distribution of the 214 publications used in this study is shown in Figure 1.

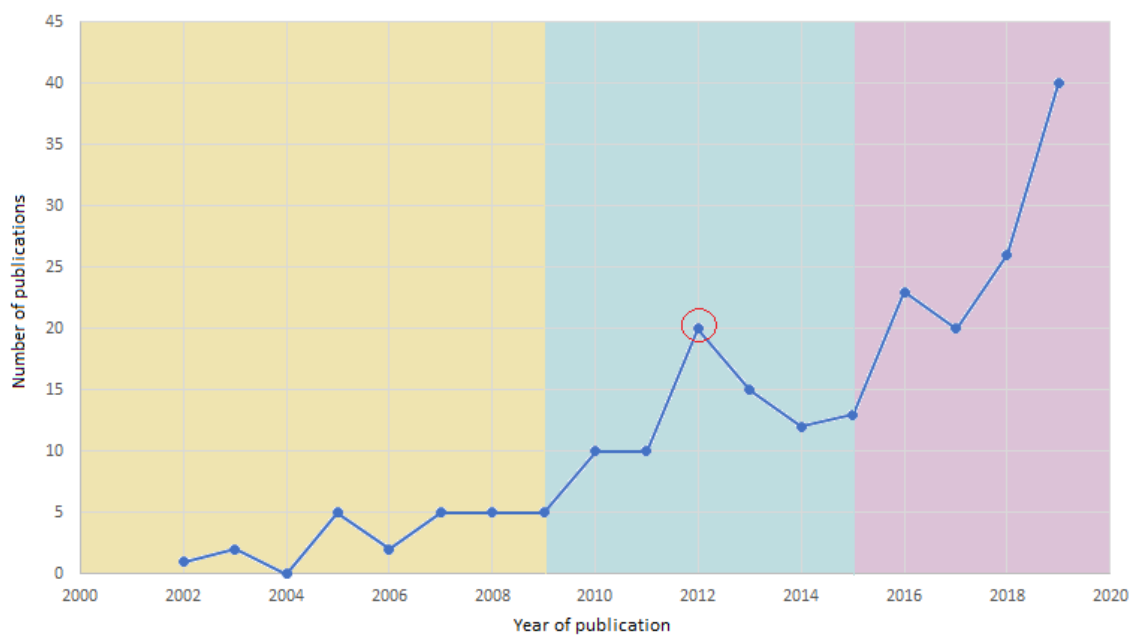


Figure 1. Evolution of scientific research on sports tourism and sustainability. Source: Prepared by the authors based on WoS data.

These articles were published in 121 different magazines. Only 40.2% published just one article, and 15.9% published two articles. This shows that scientific production in the field of sports tourism and sustainability is often published in nonspecialized publications. An explanation could be the transversal nature of both tourism and sustainability. These topics can be covered in many different fields of knowledge [45]. Therefore, such papers are published in magazines as diverse as *Revista Romaneasca Pentru Educatie Multidimensionala*, the *Journal of Business Ethics*, or *Urban Geography*.

The journals that published the most papers on the subject of this study, by volume of published articles, are listed in Table 1. This table shows that 30.8% of the papers published are concentrated in eight magazines.

Table 1. Most productive journals for sports tourism and sustainability (2002–2019).

Journal	N° of Items	N° of Citations	Average Citations
<i>Sustainability</i>	19	65	3.4
<i>Journal of Sport Management</i>	8	243	30.4
<i>European Sport Management Quarterly</i>	7	99	14.1
<i>International Journal of Event and Festival Management</i>	7	25	3.6
<i>Sport in Society</i>	7	51	7.3
<i>International Journal of the History of Sport</i>	6	69	11.5
<i>Leisure Studies</i>	6	56	9.3
<i>South African Journal for Research in Sport, Physical Education and Recreation</i>	6	18	3

Source: Prepared by the authors based on WoS data.

According to Table 1, the journal *Sustainability* stands out with 19 articles published on the subject (9%), well ahead of the *Journal of Sport Management* in the second position with eight papers. This significant difference is not due to the publication of any special issue on sustainability. *Sustainability* is an interdisciplinary journal that deals with sustainability from different perspectives: economic, social, cultural, and environmental. *Sustainability* is not a journal that specializes in tourism or sports tourism. Therefore, the number of sports tourism-related articles published in *Sustainability* is striking. However, the *Journal of Sport Management*, with only eight articles, has by far the most citations, with 243, averaging more than 30 citations per article published. Unlike *Sustainability*, the *Journal of Sport Management* does not have a focus on sustainable development, but on sports and sports organizations in general—the other aspect of the analyzed field. Almost 4% of the scientific production analyzed has been published in the *Journal of Sport Management*. The 14 citations per article of the *European Sport Management Quarterly*, in third place for number of articles, are also very high.

The field of sports tourism and sustainability is characterized by the participation of a large number of authors. The names of 482 different authors were obtained from the WoS; each article has an average of 2.24 authors. However, only five authors published more than three articles (Table 2), and more than 95% of the authors produced just one paper, indicating a low concentration in this field of study.

Table 2. The most productive authors in sports tourism and sustainability (2002–2019).

Author	N° of Articles
Malchrowicz-Mosko, E.	5
O'Brien, D.	5
Misener, L.	4
Saayman, M.	4
Schulenkorf, N.	4

Source: Prepared by the authors based on WoS data.

The most productive organizations in this area are located in the United States (State University System of Florida) and Australia (Griffith University and the University of Technology Sydney).

The most important works in this field, according to the number of citations received [46,47] are presented in Table 3. Unequal distribution is observed, with most of the works being concentrated at the lower end of the interval, without citations or with a small number of citations. The number of papers with fewer than five citations is 28.5%. More than 30% have no citations and little or no visibility. This may be because the research was not of sufficient academic interest to be cited, or because the articles were published very recently [20]. This second option could justify the small number of citations of articles published in 2018 and 2019 (the final two years of our analysis period), which represent 48% of all articles with fewer than five citations.

In contrast, only 10 papers (less than 5% of all publications) were cited more than 50 times.

Table 3. General citation structure in sports tourism and sustainability (2002–2019).

Number of Citations	Number of Articles	% Articles
≥200	1	0.47
199–100	2	0.93
99–50	7	3.27
49–25	16	7.48
24–5	62	28.97
1–5	61	28.50
No citations	65	30.37
Total articles	214	100

Source: Prepared by the authors based on WoS data.

More details about the 10 most cited papers are presented in Table 4 (ordered by number of citations). The table shows that two of the magazines listed in Table 1 appear to have the highest productivity in the field: the *International Journal of the History of Sport* and the *Journal of Sport Management*. Table 2 includes the names of the two most productive authors in the field: Schlenkorf and O'Brien (who produces two articles).

Table 4. Most cited papers (2002–2019).

Authors	Title	Source	Year	Citations in WoS	Citations per Year
Hightower, R.; Brady, M.K.; Baker, T.L.	Investigating the role of the physical environment in hedonic service consumption: an exploratory study of sporting events	JBR	2002	244	12.84
Collins, A.; Jones, C.; Munday, M.	Assessing the environmental impacts of mega sporting events: Two options?	TM	2009	118	9.83
Scott, D.; Gossling, S.; Hall, C.M.	International tourism and climate change	WIRCC	2012	110	12.22
Schulenkorf, N.	Sustainable community development through sport and events: A conceptual framework for Sport-for-Development projects	SMR	2012	88	9.78
O'Brien, D.; Chalip, L.	Sport Events and Strategic Leveraging: Pushing Towards the Triple Bottom Line	TM_ABS	2008	80	6.15
Minnaert, L.	An Olympic legacy for all? The non-infrastructure outcomes of the Olympic Games for socially excluded groups (Atlanta 1996-Beijing 2008)	TM	2012	79	8.78
Gibson, H.J.; Kaplanidou, K.; Kang, J.	Small-scale event sport tourism: A case study in sustainable tourism	SMR	2012	77	8.56
Leopkey, B.; Parent, M.M.	Olympic Games Legacy: From General Benefits to Sustainable Long-Term Legacy	IJHS	2012	56	6.22
Collins, A.; Flynn, A.; Munday, M.; Roberts, A.	Assessing the environmental consequences of major sporting events: The 2003/04 FA Cup Final	US	2007	54	3.86
Fo, K.; Funk, D.C.; O'Brien, D.	The Meaning Behind Attachment: Exploring Camaraderie, Cause, and Competency at a Charity Sport Event	JSM	2009	53	4.42
Hightower, R.; Brady, M.K.; Baker, T.L.	Investigating the role of the physical environment in hedonic service consumption: an exploratory study of sporting events	JBR	2002	244	12.84

Abbreviations: JBR: *Journal of Business Research*; TM: *Tourism Management*; WIRCC: *Wiley Interdisciplinary Reviews-Climate Change*; SMR: *Sport Management Review*; TM_ABS: *Tourism Management: Analysis, Behaviour and Strategy*; IJHS: *International Journal of the History of Sport*; US: *Urban Studies*; JSM: *Journal of Sport Management*. Source: Prepared by the authors based on WoS data.

Finally, the most frequently used keywords in the different papers are identified. These keywords indicate the most studied topics. For this purpose, both the authors' keywords and KeyWordsPlus were taken into account. Out of the 1,042 keywords identified, only 18 appeared more than 10 times. 'Sustainability' and 'tourism' were the keywords that recurred the most, which means that they are at the center of the network. The other frequently used keywords are as follows: impact, sports events, Olympic Games, sports tourism, sport, legacy, and mega-event. All of them had occurrences of between 21 and 34 and a link strength of between 68 and 122. The full link strength indicates the number of links of an item to other items and the overall strength of the links of an object with another item [39].

Figure 2 shows the co-occurrence of the 38 keywords with a minimum number of five occurrences. The most recurring keywords are represented in larger nodes. The shorter the distance between the different nodes, the stronger the relationship between the keywords. The program identified four clusters or groups of words related to each other (nodes of the same color belong to the same cluster). Sustainability, sports events, and mega-events belong to the same cluster (green); impacts, Olympic Games, and legacy belong to the blue cluster; sport tourism and sport to the red one; and tourism to the yellow one.

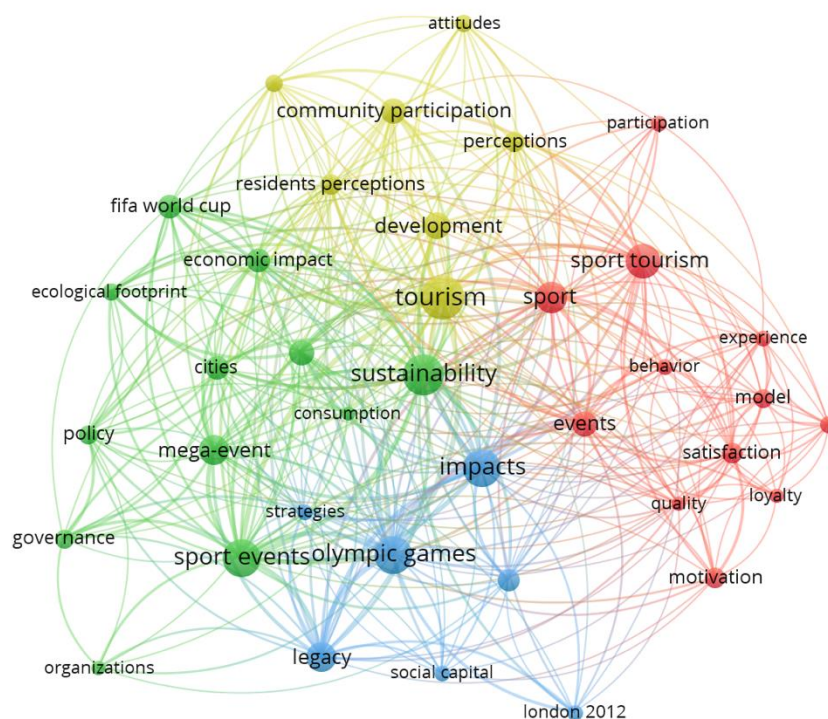


Figure 2. Co-occurrence network of keywords (2002–2019). Source: Prepared by the authors using VOSviewer, based on WoS data.

3.2. Performance and Conceptual Analysis: Three Stages in the Period 2002–2019

However, although the research topic is relatively new, significant changes in productivity are observed for the period 2002–2019, which allow us to identify three stages of research [41] (see Figure 1).

In the first period (2002–2009), which we call the “initial stage”, there were 25 published articles (just over three articles per year). It is noted that in 2004, according to the search criteria used, there were no publications. A second “development stage” (2010–2015) followed, during which more than 13 articles a year were published, with 80 publications during that period. The year 2012 saw above-average productivity, with the publication of 20 articles. This high production can, to an extent, be explained by two major worldwide sporting events in 2010: the Winter Olympics in Vancouver and the FIFA World Cup in South Africa. In the third stage, the “expansive stage” (2016–2019), 109 articles

were published. This last four-year stage contributed almost 51% of the total literature production in the field to date. This production boom in the field can be directly connected with the increased visibility of the theme of sustainable development worldwide, resulting from the 2015 United Nations SDGs, which could explain the increase in scientific research in the field since 2016.

Of the 121 journals that make up our study, Table 5 presents the ones that dealt most frequently with the subject of study, by volume of articles published and distributed according to the three stages or periods into which the study is divided.

Table 5. Most productive journals for sports tourism and sustainability (per stage).

Journal	N° Total Items	N° Articles per Stage			N° Citations per Stage			Citations per Article		
		Initial	Devel.	Expans.	Initial	Devel.	Expans.	Initial	Devel.	Expans.
SUST	19	0	1	18	0	16	49	0	16	2.72
JOSM	8	2	5	1	89	153	1	44.5	30.6	1
ESQM	7	0	6	1	0	99	0	0	16.5	0
IJEFM	7	0	3	4	0	23	2	0	7.67	0.5
SIS	7	1	2	4	44	4	3	44	2	0.75
IJHS	6	0	4	2	0	65	4	0	16.25	2
LS	6	0	2	4	0	35	21	0	17.5	5.25
SAKRSPER	6	0	3	3	0	15	3	0	5	1

Abbreviations: SUST: *Sustainability*; JOSM: *Journal of Sport Management*; ESMQ: *European Sport Management Quarterly*; IJEFM: *International Journal of Event and Festival Management*; SIS: *Sport in Society*; IJHS: *International Journal of the History of Sport*; LS: *Leisure Studies*; SAKRSPER: *South African Journal for Research in Sport, Physical Education and Recreation*. Source: Prepared by the authors based on WoS data.

Table 5 shows a different evolution pattern between journals. Some journals show growth in the number of articles published per year on the subject. This is the case for *Sustainability*, *International Journal of Event and Festival Management*, *Sport in Society*, and *Leisure Studies*. Other journals have experienced a different evolution, with greater productivity in the development stage than in the expansive stage. This is the case for the *Journal of Sport Management*, the *European Sport Management Quarterly*, and the *International Journal of the History of Sport*. Regarding the number of citations, the development stage is the only stage where all the journals in Table 5 received a citation. The average number of citations is lower in the expansion stage, which may be explained by the current status of the articles. Finally, although in the initial stage articles were published in just two of the most productive journals, these journals have the highest average number of citations per article.

However, in general, the results show that research on sports tourism and sustainability has grown throughout the three stages of development in the field. In the initial phase, 29 articles were published in 24 different journals; in the development stage, 84 studies were published in 55 journals; finally, in the expansion stage, 113 papers were published in 73 journals.

More complete and detailed information is collected in Table 6, which shows the most productive authors for each period and the average number of citations for each article. The number of authors with productivity equal to or greater than two articles increases as we move from the initial stage to the development stage, and from there to the expansive stage. By the average number of citations, it could be said that the authors in the initial stage can be considered as primary referents. However, there are also other relevant authors by their academic production on this topic in more than one period. This is true of D. O'Brien (initial stage and development stage) and K. Kaplanidou and L. Misener (development stage and expansive stage).

Table 6. Most productive authors in sports tourism and sustainability in each period.

2000–2009			2010–2015			2016–2019		
Author	N° Articles	Average Citations	Author	N° Articles	Average Citations	Author	N° Articles	Average Citations
O'Brien, D.	3	58	Saayman, M.	3	5	Malchrowicz-Mosko, E.	5	0
Collins, A.	3	66	Schulenkorf, N.	3	52	Poczta, J.	3	0
Chalip, L.	2	61	Derom, I.	2	13	Ribeiro, G.M.	3	1
Lines, G.	2	7	Kaplanidou, K.	2	61	Toffano Pereira, R.P.	3	1
Munday, M.	2	86	Kruger, M.	2	6	Wise, N.	3	3
Roberts, A.	2	86	Leopkey, B.	2	44	Burnett, C.	2	2
			Mallen, C.	2	17	Diedrich, A.	2	10
			Misener, L.	2	12	Durkin, J.	2	5
			O'Brien, D.	2	27	Filimonau, V.	2	1
			Parent, M.M.	2	44	Hinch, T.	2	3
			Ponting, J.	2	27	Kaplanidou, K.	2	6
			Scharr, K.	2	1	Koutrou, N.	2	1
			Steinicke, E.	2	1	Li, Hongxin	2	0
			VanWynsberghe, R.	2	13	McGillivray, D.	2	3
						Misener, L.	2	8
						Nauright, J.	2	0
						Peric, M.	2	5
						Rivera Mateos, M.	2	2
						Sheaves, M.	2	10

Note: Average citations are not weighted according to the number of authors of the article. All figures are rounded to the nearest whole number. Source: Prepared by the authors based on WoS data.

Having analyzed the keyword network in Figure 2, we performed a longitudinal analysis to find out the bibliometric map of the evolution of the research topics during the three defined stages of the period analyzed (Figure 3). To carry out this analysis, in all cases, items were tagged using the most significant keyword, apart from the group called nostalgia-sport-tourism. In this case, all keywords responding to the concept of nostalgia-sport-tourism have been collected in a single cluster with that name.

An inclusion index was used to detect the links between the different themes (represented by circles) and define the thematic areas (lines). The size of the sphere corresponds to the number of documents on each subject [48].

As shown in Figure 3, in the first period, 2002–2009, five research topics were identified. It was a beginning stage in the field, during which the academic literature focused primarily on case analysis of the impact of small-scale sporting events, their relationship with tourism, and the role played by different public policies. However, during the second period, 2010–2015, there was a greater diversity of issues related to the earlier concerns, such as education, regional development, environment, behavior, and legacy. Two themes from the first period were maintained: tourism and impacts. It is possible to differentiate between subjects with reliable connections to issues in the first period (continuous lines), such as education, legacy, community and residents, tourism, impacts, and environment. However, behavior, methodological models, and regional development had weaker connections (dotted lines) with keywords from the previous period, though none of these were the main themes in the second stage. The importance of destination and urban planning is a new issue that arises during this second period. Finally, in the third period, 2016–2019, there was another increase in research topics, with four of the themes of the previous period being maintained (education, behavior, methodological models, and destination-urban-planning) and a reappearance of public policy from the first stage. Also, seven new themes arose in this period: nostalgia-sport-tourism, mega-sport-events, satisfaction, ecological footprint, management, sports organizations, and disability sports.

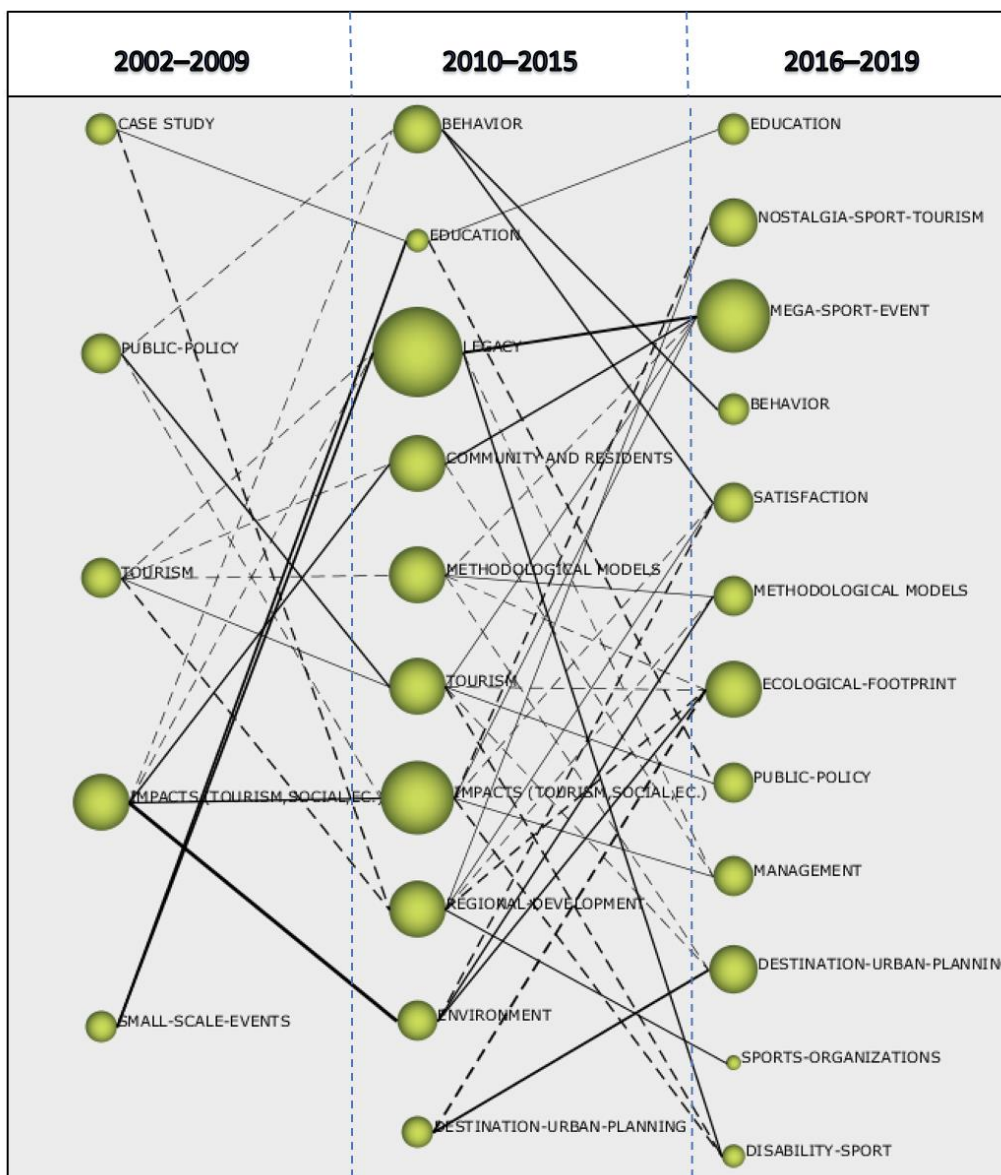


Figure 3. Thematic evolution (2002–2019). Source: Prepared by the authors based on SciMAT data.

The different themes identified in Figure 3 for each period are represented in a strategic diagram, in which the size of the sphere is proportional to the number of documents linked to each research topic (Figures 4–6). Centrality can be interpreted as the external cohesion of the network since it measures the degree of interaction of a system with other networks, while density can be understood as the internal cohesion of the network since it measures the inner strength of the network [42].

Analysis of the different topics’ positions in the strategic diagrams for each period revealed that, in the first period (2002–2009), the field pivoted around five themes, among which the analysis of impacts (economic, social, and regional) stands out. This is a relevant topic, considered as a transversal and necessary theme in sports tourism and sustainability. The theme of public policy had more centrality in this period. Together with tourism, it constituted a “motor cluster” in the research area. The theme of public policy includes research on topics such as governance, the implementation of public policies, and general tourism policies. Meanwhile, the second theme, tourism, includes articles researching issues related to the development of tourism, such as tourist motivation, trust, and perceptions. In this period, there was little apparent development in the analysis of small-scale sporting events (Figure 4).

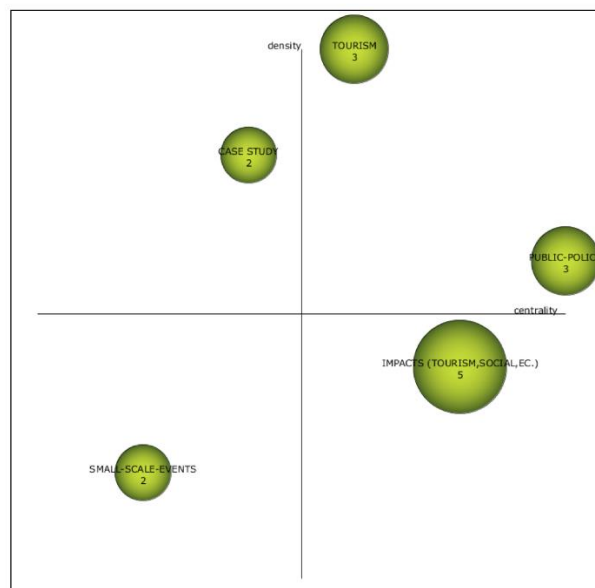


Figure 4. Strategic diagram for period 1 (2002–2009). Source: Prepared by the authors based on SciMAT data.

In the following two periods, it is evident that the field was composed of motor clustering themes and basic and transversal themes (upper and lower right quadrants, respectively), which are considered as those that favor the development and consolidation of a field of knowledge due to its density and centrality.

In the second period (2010–2015), the tourism issue was consolidated as a motor clustering theme, also appearing as motor behavior (including work on tourist practices, consumer practices, changes in behavior, or intentionality) [49,50], and legacy. The position in the center of the diagram of a topic already relevant in the previous period can be highlighted, specifically the analysis of different impacts: this was a prevalent topic in this second period, being equidistant in centrality and density. Other new issues of great significance also appeared in this period, such as community and residents (where topics such as residents' perceptions, commitment, and community participation are discussed), the feelings of residents, and regional development (Figure 5).

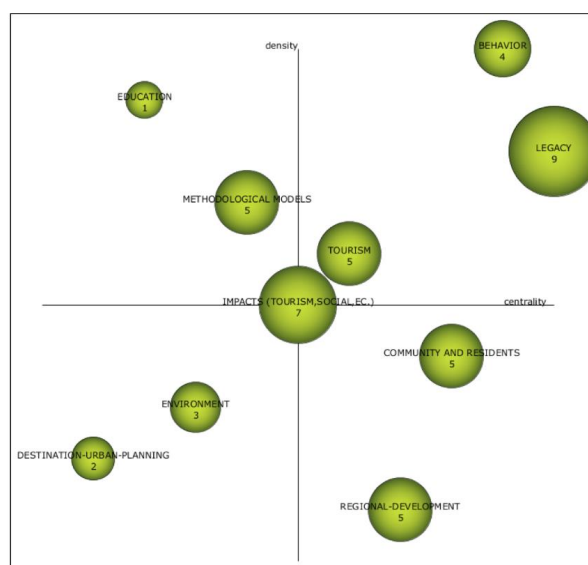


Figure 5. Strategic diagram for Period 2 (2010–2015). Source: Prepared by the authors based on SciMAT data.

In the third period (2016–2019), the field pivoted around 12 research topics, some of them having already been present in one of the two preceding periods, but that showed changes in their role or their weight within the subject of the analysis. For example, in these four years, education became a motor theme, while behavior, a motor theme in the previous period, had less development in the third period and could be considered as an important, but declining, issue. Overall, the field evolved toward more significant methodological development through models, measurements, and quantification of impacts, effects, and indicators that constitute thematic and methodological models (cluster analysis, Delphi technique, and partial least squares). Methodological models appeared in the previous period as a developed topic, although isolated from the rest, while in the third period, it was an important transversal theme in the development of the field. In this sense, the destination-urban-planning theme had also evolved as an emerging theme in the previous period. The focus was on infrastructure research, urban planning of the tourist destination, and the urbanization process. In this period, public policy, the motor theme of the first period, reappeared, but this time as a declining issue, with much less development (Figure 6).

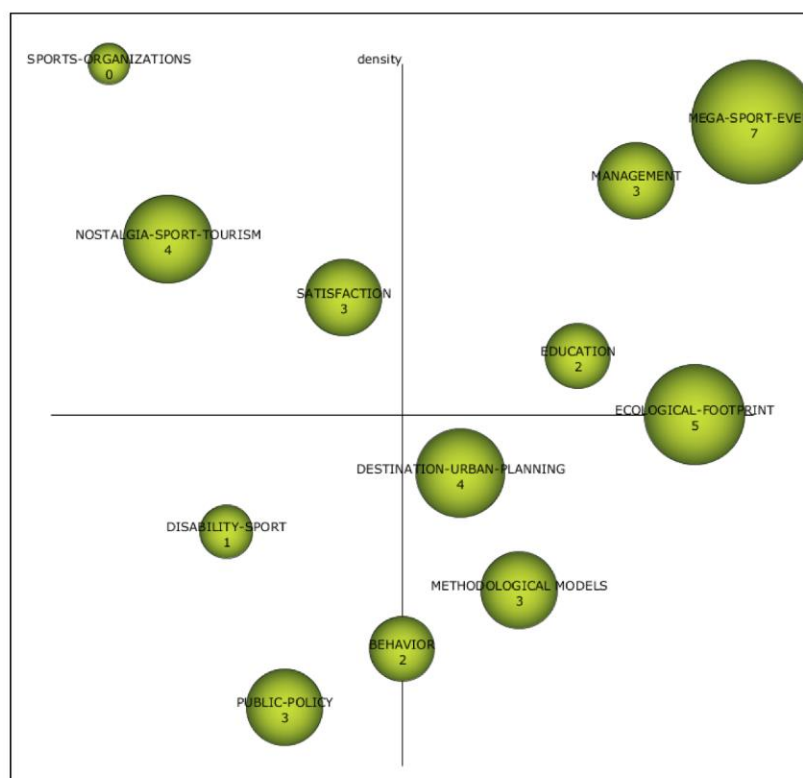


Figure 6. Strategic diagram for Period 3 (2016–2019). Source: Prepared by the authors based on SciMAT data.

In addition to these changes, it is noteworthy that, in last period, mega-sport-events were emerging as the theme with the highest centrality and density. This theme refers to research on remarkable sporting and tourist events at international and world levels such as the Olympic Games, the FIFA World Cup, the Tour de France, and the Ironman. This theme is closely related to sustainability in its network of keywords (Figure 7). It was also found as a motor management theme (event, visitor, and destination) and as an ecological footprint, which falls between a motor theme and an underlying theme.

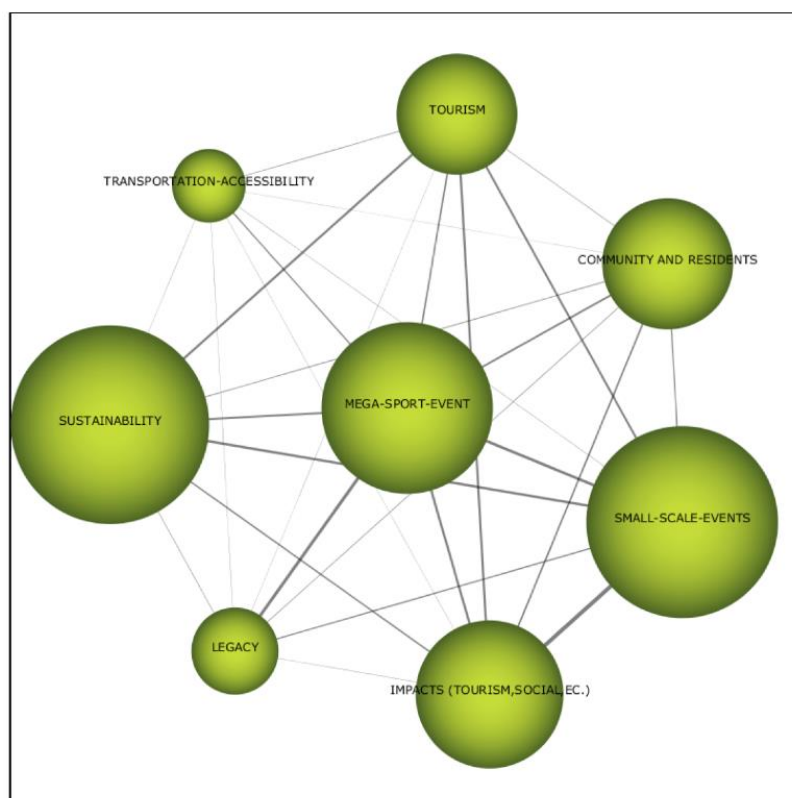


Figure 7. Thematic network of the main cluster 2016–2019. Source: Prepared by the authors based on SciMAT data.

Finally, it should be noted that, although the concept of sustainability does not seem thematic in any of the strategic diagrams built for the three stages, it did appear in the keywords related to relevant motor themes, such as the analysis of mega sporting events, and emerged under another denomination as ecological footprint [51,52] and transversely in other keywords, such as impact analysis or destination planning.

4. Conclusions

Both sports tourism and sustainability have been widely discussed and analyzed from different perspectives. However, the evolution of both fields has led to their interconnection, dealing with sustainability as a cross-cutting issue. In this way, since the beginning of the century, scientific interest has focused on the interrelationship between the two themes, leading to a progressive increase in the research literature. Therefore, this work aimed to identify the trends in scientific publications on the treatment of both topics, detecting the main lines of research, their evolution, and their importance in terms of volume of scientific production.

To fulfil the aims of the study, bibliometric techniques were applied to map the research in the field of sports tourism and sustainability. Some of the main ideas drawn from this field of study are as follows:

First, we showed that this field has recently emerged (the first WoS article dates from 2002). However, the area has evolved rapidly, especially in the boom of the last four years, with 51% of the research listed by the WoS being published.

Second, it can be said that current events highly influence this field. Parallels have been found between the evolution of scientific literature in this field and the celebration of different sporting events that are constituted as case studies to be analyzed by various researchers, such as the Olympic Games and the World Cup. Also, the publication by the United Nations of the 17 SDGs (in 2015) has been reflected in an increase in publications. In 2016, publications on sport tourism increased by more than

75%, compared to the previous year. We can highlight the publications focused on the quality of life, the resident's perspective and perceptions, sports event participants' attitudes and satisfaction, or the analysis of impacts on some communities.

Third, the published works on this matter have been collected in 121 journals, with a high concentration in *Sustainability* (with 9% of the sample). However, the *Journal of Sport Management* has a greater impact as regards the number of citations received, with more than 30 citations per article.

Fourth, a specific fragmentation of different thematic areas with little relationship between them is observed, which may be explained by the recency of the field. Insufficient time has elapsed for the consolidation of these thematic areas, and it remains too early in their evolution to conclude whether they are isolated. Besides, this conclusion is reinforced by the low number of articles per author (maximum 5, in the case of Malchrowicz-Mosko and O'Brien), indicating that the research area is not very concentrated.

Finally, this is a field of study with great potential for continued growth. There is a progressive increase in research topics throughout the three stages (initial, between 2002 and 2009; development, from 2010 to 2015; and expansive from 2016 to 2019). As a result of comparison between these three stages, the development and importance of some issues (such as education) and their importance for field can be appreciated. However, there has been slow development of some issues (such as destination planning), and new issues have emerged (such as satisfaction or disability sports). Other areas show declining interest (such as behavior or public policy).

The analysis carried out in this review also identified some future research lines. This exploratory analysis of sports tourism and sustainability could lend itself to deeper and more specific analyses. Future research should continue to explore the relationship between sustainable sport tourism activity and the participation of the community where the activity takes place, as well as the perceptions and satisfaction obtained by the tourist who performs in or is a spectator at the sporting event. A new line of research extends to the field of education and training through research exploring how these concepts are developed and implemented from the earliest school years and throughout a person's life leading to the exercise of best practice. Also, papers that quantify the different impacts (at a social, economic, and environmental level) of sports tourism policies and, in turn, provide mechanisms to improve and promote the sustainability of an event would be of great academic interest. The scientific community must contribute its knowledge to achieve the SDGs, and the field of sports tourism has a vital role in offering new analyses that can help change the current model into a more sustainable one.

Despite the contributions of this paper, there are limitations that we must mention. On the one hand, only indexed publications in the WoS were considered. For future research, comparison of these results is recommended with those from other databases such as Scopus or Google Scholar [48]. On the other hand, the search term "sustain*" as a generic concept in the database may have led to excluding discussion of the economic and/or social implications of sport tourism or sports events. The search terms should be expanded to include sustainability dimensions such as the social, economic, and environmental aspects [53], as well as adding concepts related to sustainable tourism, such as green tourism/ecotourism/ecological tourism, blue tourism, circular tourism, or bio tourism [20]. Furthermore, SciMAT offers different grouping algorithms and similarity measures that are selected at the discretion of the researcher, as is the case with the clustering of keywords in the co-word analysis, which was performed based on the authors' criteria [34]. However, attempts were made to minimize the bias presented in this regard through the thorough review, reading, and understanding of the literature, and many of the articles analyzed. Finally, the recent appearance of the field of study (since 2002) prevents the establishment of reliable and resounding conclusions about its thematic evolution. The analysis should be performed again over a longer term to determine if the changes and growth detected in this work have been structural, affecting the configuration of the field and its evolution, or short term, opening new lines of research.

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