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Papers

Systematic review of the literature on scientific tourism

Revisão sistemática da literatura sobre Turismo científico

Revisión sistemática de la literatura en turismo científico

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Keywords:

Scientific Tourism;
Systematic Review;
Bibliometrics.

Abstract

This work aims to present a systematic review of the literature on Scientific Tourism, in the Brazilian and international contexts. Through exploratory research and systematic and bibliometric reviews of the literature, in Web of Science, Scopus, and Publicações de Turismo databases, this study sought to identify scientific paper production related to the term "Scientific Tourism" until the present moment. A total of 32 articles were qualitatively and quantitatively analyzed, using Mendeley, Excel, QGIS and IRAMUTEQ software. Bibliometric laws were also verified. The main results point to a concentration of studies in 2016, and coming from European countries, especially from Poland. The articles were published in 23 journals from 13 countries, with emphasis on: *Ido Movement for Culture*, *Annals of Tourism Research* and *Revista Brasileira de Ecoturismo*. A total of 65 authors or co-authors were identified, the main ones being Polish: Wojciech J. Cynarski and Krzysztof Kubala. The categorization of themes around Scientific Tourism brings together discussions about scientific travel and events, nature tourism, education, geotourism, and socioeconomic development. Finally, the need for publications that deepen the theoretical discussion on Scientific Tourism is highlighted.

Palavras-chave:

Turismo Científico;
Revisão Sistemática;
Bibliometria.

Resumo

Este trabalho tem como objetivo apresentar uma revisão sistemática da literatura sobre Turismo Científico, nos contextos nacional e internacional. Por meio de pesquisa exploratória e de revisões sistemática e bibliométrica da literatura, nas bases de dados "Web of Science", "Scopus" e "Publicações de Turismo", buscou-se verificar a produção em formato de artigo científico relacionada ao termo "Turismo Científico". Foram analisados quali-quantitativamente 32 artigos científicos, por meio da utilização dos softwares Mendeley, Excel, QGIS e IRAMUTEQ. Foram também verificadas as leis que regem os estudos bibliométricos. Os principais resultados apontam para uma concentração de estudos no ano de 2016 e oriundos de países europeus, sobretudo da Polônia. Os artigos foram publicados em 23 periódicos de 13 países, com destaque para: "Ido Movement for Culture", "Annals of Tourism Research" e "Revista Brasileira de Ecoturismo". Foram identificados 65 autores ou coautores, sendo os principais os poloneses Wojciech J. Cynarski e Krzysztof Kubala. A categorização dos temas em torno do Turismo Científico reúne discussões sobre eventos e viagens científicas, turismo de natureza, educação, geoturismo e desenvolvimento socioeconômico. Por fim, evidencia-se a necessidade de publicações que aprofundem a discussão teórica sobre Turismo Científico.

Palabras clave:

Turismo Científico;
Revisión sistemática;
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Peer-reviewed article.

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**Resumen**

El objetivo de este trabajo es presentar una revisión sistemática de la literatura sobre Turismo Científico, en los contextos nacionales e internacionales. Por medio de investigaciones exploratorias y revisiones sistemáticas y bibliométricas de la literatura, en las bases de datos "Web of Science", "Scopus" y "Publicações de Turismo", este estudio buscó verificar la producción en formato de artículo científico relacionado con el palabra "Turismo Científico" hasta el momento presente. Un total de 32 artículos científicos fueron analizados cualitativa y cuantitativamente, utilizando el softwares Mendeley, Excel, QGIS e IRAMUTEQ. También se verificaron las leyes que rigen los estudios bibliométricos. Los principales resultados apuntan a una concentración de estudios en 2016 y procedentes de países europeos, especialmente de Polonia. Los artículos fueron publicados en 23 revistas de 13 países, con énfasis en: "Ido Movement for Culture", "Annals of Tourism Research" y "Revista Brasileira de Ecoturismo". Se identificaron 65 autores o coautores, los principales fueron los polacos Wojciech J. Cynarski y Krzysztof Kubala. La categorización de temas en torno al Turismo Científico reúne debates sobre eventos y viajes científicos, turismo de naturaleza, educación, geoturismo y desarrollo socioeconómico. Finalmente, existe la necesidad de publicaciones que profundicen la discusión teórica sobre Turismo Científico.

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1 INTRODUCTION

This work is part of a larger study on Scientific Tourism (ST), aiming to deepen this topic of discussion in tourism, which can be understood as a field for scientific research and tourism practices. In this context, this article intends to further the academic debate on ST.

There is no consensus among researchers and governmental and non-governmental organizations on the concept of ST. Despite the scarce literature, it is possible to identify two strands: (1) the one that presents ST as a market segment, identifying it, sometimes, as a subtype of already consolidated segments (cultural tourism, exchange tourism, event tourism, ecotourism) (Bravo, Cuadrado, Belema & Sáenz 2017; Cynarski & Ďuriček, 2014; Margoni, 2015; Mieczkowski, 1995; Montaner Montejano, 2001; Revilla & Moure, 2017; Schlindwein, Akaki & Laganaro, 2011). And (2) another strand that considers ST as one of the paradigms of alternative, sustainable tourism (Benson, 2005; Cornéloup, 2009; Laing, 2010). Thus, ST is understood as the process of developing scientific knowledge from travel experiences made to observe, collect data and information for scientific use (Margoni, 2015), as will be discussed in this paper.

The present study attempts to map the scientific production on ST, through a systematic and bibliometric literature review. Thus, the objective of this work is to present a systematic review of the literature on Scientific Tourism, in the Brazilian and international contexts.

The proposed systematic review of the literature includes a bibliometric study on academic production on ST, using Mendeley (version 1.19.5), Excel (version 16.35), QGIS (version 3.8 Zanzibar), and IRAMUTEQ (version 0.7 alpha 2) software. The final study sample consisted of 32 scientific papers that were analyzed qualitatively and quantitatively.

This article is organized into five sections, including this Introduction. The second section presents the theoretical framework of ST, which shows the evolution of the theme since its emergence and the main theoretical approaches to the subject. The third section deals with the research methodology. The next section, "Results and Discussion", is divided into two parts, the first presents the data from the bibliometric analysis of the articles comprising the study sample. The second part is an analysis of word frequency in the text corpus and the connection between them, based on the abstracts of the selected works, in addition to a categorization of articles by related themes. The fifth section offers some concluding remarks.

2 THEORETICAL FRAMEWORK

The origins of Scientific Tourism can be traced back to the end of the nineteenth century, when expeditions and field studies began to be used as research strategies (Morse, 1997). But the academic discussion about ST started in the 1980s (Campos, 2018; Molokacova & Molokac, 2011), when it first appeared in two works,

in 1989. These articles, authored by Jan Laarman and Richard Perdue, were published in the following journals: *Tourism Management*, with the title “Tropical Science and Tourism: The case of OTS in Costa Rica”, and *Annals of Tourism Research*, with the title “Science Tourism in Costa Rica” (Campos, 2018; Laarman & Perdue, 1989).

In the ST literature, in addition to scientific papers, it is possible to identify books dealing with the theme, such as the work entitled “Scientific Tourism: Researchers as Travelers”, by Susan Slocum, Carol Kline and Andrew Holden, published by Routledge, in 2015. And more recently, in 2019, the work “Scientific Tourism: Some Places on the Way”, by Peter Day.

The term scientific tourism has been used, in the field of tourism, to characterize the work carried out by travelers in exploring a certain location (Margoni, 2015; Revilla & Moure, 2017). The emergence of ST is also linked to the initiative of governments in partnership with the private sector to send researchers to remote locations to investigate unexplored areas (Novelli, 2005). As Margoni (2015, p. 165) points out, ST “...is the visitation of a tourist destination with the objective of making observations and collecting data and information that can be used for scientific purposes”.

However, there is no consensus among researchers and governmental and non-governmental organizations on the concept of ST. In the literature, some confusion is also identified between the terms “scientific/science tourism” and the “science of tourism”.

The “Science of tourism” brings together the contribution of research in all areas of tourism for its improvement as a field of science (Margoni, 2015), with emphasis on the epistemological studies in tourism, essential for establishing the scientific foundations of this field of studies. As discussed by Moesch and Beni (2015), the knowledge necessary to build a “science of tourism” uses tools with multi, inter, and transdisciplinary approaches, which enable the contribution of different fields of knowledge to the construction of knowledge in tourism. “Scientific tourism” or “science tourism”, on the other hand, has been understood as a practical possibility aimed at the production of science, i.e., a tourism practice associated with the production of scientific knowledge, in different areas of knowledge.

The distinction between these two terms leads to the following reflection, which may explain the confusion between them: ST practice is directly associated with the production of scientific knowledge, but not necessarily with the production of the “science of tourism”, even though the knowledge arising from ST practice can contribute to the evolution of tourism as a science.

Little scholarly attention has been paid to ST, however, it is possible to identify two main strands: (1) the one that presents it as a market segment, identifying it, at times, as a subtype of already consolidated segments (cultural tourism, exchange tourism, event tourism, ecotourism); and (2) another strand that considers ST as one of the paradigms of alternative, sustainable tourism.

Margoni (2015) argues, regarding ST as a segment (1), that this is always associated with other tourism subtypes, since it begins with the observation and analysis of a theme, be it an event, nature, or culture. The author also understands that ST can be part of educational tourism and exchange tourism, since the objective is the improvement that will be achieved by studying a specific theme. In this sense, it is a way for the participant to delve into a theme, but without the obligation to publish the results observed when practicing ST (Margoni, 2015).

As a subtype of cultural tourism, ST is an experience in which the tourist contacts with the culture of the visited community, and this observation can generate the production of scientific knowledge or not. Considered a subtype of exchange tourism and/or educational tourism, ST is characterized by professional improvement or attendance of specific programs for learning and training. As a subtype of ecotourism, it involves the production of scientific knowledge through activities such as geotourism, bird-watching, environmental research in protected areas, adventure tourism with a scientific dimension, among others. As a subtype of event tourism, it comprises the participation of students and researchers in academic events (Bravo et al., 2017; Cynarski & Āuriček, 2014; Mieczkowski, 1995; Montaner Montejano, 2001; Revilla & Moure, 2017; Schlindwein, Akaki, & Laganaro, 2011).

Specifically, for Montaner Montejano (2001), the term ST is associated with visits, stays, or trips to places where nature offers possibilities to learn about aspects related to natural sciences. In this line, Margoni (2015) understands that ST involves the study and analysis of a location or of a specific object in that area, such as fauna or flora. The author also highlights that the study may focus on the culture of a place, in which case the involvement of the local community is key for its development.

Therefore, ST develops in areas that, for scientific reasons, represent important testimonies of human culture (from prehistory to the present and future times). Filippova, Savvinova, Danilov, Gadal, and Kamičaitytė-Virbašienė (2017), when studying the ontological characteristics of the cultural landscape in Yakutia, Russia, identified three types of ST practitioners: (1) scientific research for researchers; (2) practical training and education for students of educational institutions; (3) the history of scientific research, unique natural resources, historical and cultural heritage for the general public.

In this sense, Ereshko (2006 as quoted in Filippova et al., 2017) subdivides ST into two types: (1) introductory, when natural and anthropogenic objects and samples are shown to tourists and explanations about them are provided by researchers; and (2) subsidiary participation, when tourists take part in scientific and related activities as support staff, for example in restoration work and field research in cooperation with scientists; which suggests the need for further investigation of processes involving co-creation.

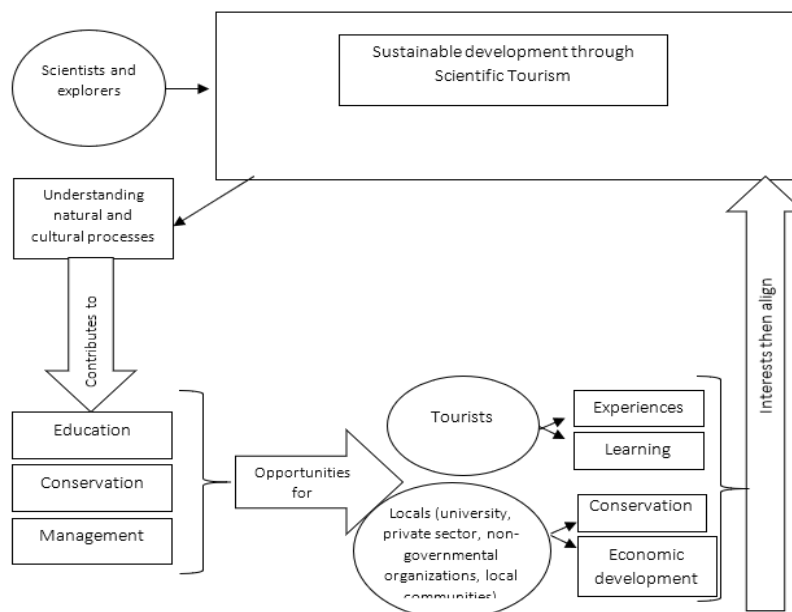
The other strand views ST as a paradigm of alternative tourism (2), as opposed to mass tourism (Benson, 2005; Laing, 2010), and as a renewal of tourist motivations (Corneloup, 2009). Alternative tourism is characterized by a small-scale development, with a high level of local involvement, minimization of negative impacts on local resources and existing social relations, maximization and preservation of positive economic outcomes in local economy, involvement of local actors in decision-making processes, and local community control of tourism development, instead of outside investors.

In this sense, ST is based on this concept of tourism, i.e., it moves away from modern and industrial tourism paradigms, and aligns with the concept of sustainability in its broadest sense (Benson, 2005). This current argues, therefore, that ST promotes the development of immersive experiences, the increase in cultural exchanges, awareness of environmental protection, the enhancement of the territory, and an existential and experiential investigation that give new meanings to the trip (Corneloup, 2009).

Bridging ST and sustainable tourism presents itself as an innovative model for tourism development. As stated by Bourlon et al. (2011) this can be a way of rethinking tourism in areas of great socio-environmental importance. As an example, we can mention the Center for Scientific Tourism of Patagonia, which aims to develop local capabilities by strengthening technological and entrepreneurial capabilities necessary for the operation of products for ST, including universities and their networks. The sustainability of the model proposed by the Center is based on the link between public and private sectors, business and academia. This model allows the development of academic research and, based on scientific interpretation, new tourist products of a more cultural and educational nature are created.

Also, within the strand that understands ST as a path to sustainable tourism, Bosak (2015) describes ST process (Figure 1). This process involves the production, dissemination, and implementation of knowledge, where science is at the heart of the ST practice. Scientific knowledge is, therefore, the key to the sustainable development of scientific tourism.

As shown in Figure 1, the first step in ST development process is the scientific inventory that will lead to the production of knowledge about the environment and its processes. This knowledge will be disseminated in the field of education, conservation, and resource management for tourists and residents. For both, it is an opportunity for learning and experience, in addition to conserving resources and landscapes, which are fundamental to the production of space for tourism. This path can result in economic benefits for tourism stakeholders, with emphasis on the local community. Bosak's (2015) process proposes the alignment between tourists' and residents' interests as key to the sustainable development through ST.

Figure 1 – Scientific Tourism development process

Source: Adapted from Bosak (2015).

Regarding the renewal of tourist motivations, Molokacova and Molokac (2011) argue that ST practitioners include people who travel for science-related reasons, being divided into: (1) amateurs - tourists who, in general, seek an in-depth study on a topic of specific interest; (2) professionals - researchers who work in the field of tourism and carry out studies based on a scientific basis. For Revilla and Moure (2017), the ST audience is restricted to students, teachers, and researchers from different disciplines and areas of knowledge, with the main objective of expanding and complementing their knowledge.

Thus, the interest or need to carry out studies and research is the key element in ST. Thus, ST presents itself as a search for meaning and motivation for tourism, i.e., traveling, but with a useful purpose (Bravo et al., 2017). As an example, Revilla and Moure (2017) highlight the following countries that receive tourists who travel motivated by scientific knowledge: Madagascar, South Africa, China, Colombia, Chile, Argentina, Brazil, since they have natural and cultural resources and places with high scientific value. The main issuing countries mapped by the authors are: Luxembourg, Sweden, Norway, and the Netherlands.

From the brief analysis of the currents of thought in ST, previously presented, it is possible to notice that they both identify a key point: the development of scientific knowledge through travel experiences – even if they meet the interests of a tourism market segment or consider that science is at the heart of the process, with scientific knowledge being the key to the sustainable development of tourism.

The following section describes the methodology used in this study.

3 METHODOLOGY

The methodology used in this study comprises the systematic review of the literature on Scientific Tourism, added to a bibliometric review of the academic production found.

The literature review consists of surveying the available scientific production, “[...] aiming to select everything that may serve in your research” (Laville & Dionne, 1999, p. 112), based on the compilation and understanding of the previous concepts research, which have already been the subject of analytical treatment in previous studies. Thus, the literature review aims to understand the scientific and theoretical foundations upon which knowledge is built (Panosso Netto & Nechar, 2014).

The objective of a systematic review, on the other hand, is to identify research gaps in extant literature (Busalim & Hussim, 2016), consisting of a method of identifying, evaluating, and interpreting a specific object

(Sonego & Echeveste, 2016). One of the main characteristics of this type of review is that it provides a comprehensive data collection and the research criteria is revealed, in order to allow its replication (Galvão & Pereira, 2014).

Six steps comprise the process of conducting a systematic review: a) Identifying the guiding question, step in which we determine which studies will be included, the means adopted for the identification, and the information collected from each selected study. The question must be clear and well-defined, including theories and reasonings already learned by the researcher. b) Surveying the literature, at this stage the search in the database must be broad and diversified. The sampling criteria need to guarantee the representativeness of the sample, being important reliability and validity indicators. The ideal is to include all the studies found or their randomized selection; or instead, it is possible to define clear criteria for inclusion and exclusion of articles. c) Data collection, step in which data are extracted from the selected articles. These data must include the sample size, methodologies used, basic concepts, measurement of variables, among others. d) Critical analysis of the selected studies, taking into account the experience of the researcher. e) Discussion of the results, with synthesis, interpretation, and possible comparison between the data evidenced in the analysis of the articles. f) Clear and complete presentation of the systematic review, allowing a critical evaluation of the results (Ganong, 1987; Souza, Silva, & Carvalho, 2010).

The systematic review, therefore, offers a summary of the extant literature added to the critical interpretation of the diagnosis made, resulting in theoretical advances on a phenomenon.

The combination of a systematic literature review and a bibliometric review, bridging qualitative and quantitative data, will provide an overview of a given field (Albach, 2015). Bibliometrics, or a bibliometric review, therefore consists of applying statistical and mathematical methods in the analysis of scientific production, whose objectives are: to map the production of articles in a field of knowledge, the academic communities focused on a specific topic, the networks of researchers that analyze the subject, the productivity of journals, among others (Chueke & Amatucci, 2015).

In this sense, bibliometrics can help in the task of organizing the scientific production in a field of knowledge and point to new areas of research (Chueke & Amatucci, 2015). To carry out a bibliometric study, it is recommended that the researcher consider the Laws that govern this study model, as shown in Table 1:

Table 1 – Laws of bibliometrics

Laws	Measures	Criteria	Main objective
Bradford Law	Degree of attraction of the journal	Journal reputation	Identify the most relevant journals that give the highest flow to a specific topic
Zipf Law	Keyword frequency	Ordered list of themes	Estimate the most recurring themes related to a field of knowledge
Lotka Law	Author productivity	Size, frequency	Raise the impact of an author's production in an area of knowledge

Source: Chueke and Amatucci (2015, p. 3).

In view of the above, this paper intends to present a systematic and bibliometric review of the literature on Scientific Tourism. The methodological procedures used are described below.

3.1 Methodological procedures

The methodological procedures consisted of the following steps: a) Selection of scientific databases; b) Choice of search keywords; c) Selection of search parameters used in each database; d) Selection of scientific productions identified in the search bases; e) Identification of publications in the format of a scientific paper; f) Qualitative and quantitative analysis of the results.

The search for scientific production was conducted (a) in Web of Science and Scopus databases, which include leading journals in the English language, a variety of search filters, and researchers in the field of Tourism; and the website Publicações de Turismo¹ (Tourism publications), for focusing on Ibero-American articles, in addition to providing full articles with open access.

¹ Website developed by the Graduate Program in Tourism from the University of São Paulo (PPGTUR) to offer free access to tourism journals.

The search term (b) used was the keyword “turismo científico” in its language variations “science tourism” and “scientific tourism” in English; and “turismo científico” in Spanish (same as in Portuguese). The terms were chosen based on the results of a pre-study using the Boolean operator “and” combining the words “tourism”, “science”, “scientific”, in order to have cross-references, as suggested by Chueke and Amatucci (2015).

The primary search showed that the combination of “tourism” and “science” or “tourism” and “scientific” did not yield articles that in fact dealt with the theme Scientific Tourism. Based on the combination of the words “tourism” and “science”, for example, many of the articles identified dealt, in fact, with a discussion on the “science of tourism”, as previously explained. Thus, we decided to use a single keyword, which is: “scientific tourism”. It is also worth noting that this pre-study pointed to the use of different terms in English, but that translate the same meaning, namely: “science tourism” and “scientific tourism”. In addition, the search for terms in Portuguese and Spanish yielded the same results because the words are written the same in the two languages.

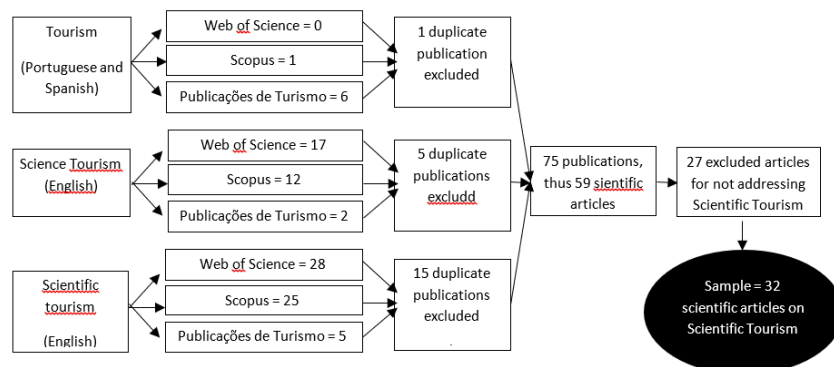
Search (c) was carried out in September 2019, including publications up to that date. For the Web of Science database, the search parameter was “topic”, which comprises “title”, “abstract”, “author keywords” and “keywords plus®”. In the Scopus database, the search parameters were “article title”, “abstract”, “keywords”, “articles”. In these databases, searches were conducted in English, Portuguese, and Spanish. All files were exported to BibTeX format considering the information related to the author, title, source, and abstract. In the case of Publicações de Turismo database, the search parameter was “all fields”, which comprises “title”, “author”, “keywords”, and “abstract”. Subsequently, using Mendeley (version 1.19.5), the articles that make up the sample of this study were selected and organized. In addition, the software made it possible to read their respective abstracts and categorize them. The articles in Publicações de Turismo database were saved as PDF and added to Mendeley manually.

The initial search (d), based on the criteria previously presented, yielded 96 results and after excluding duplicates, 75 remained. Of these publications (e), 15 items were published in proceedings of meetings and one was a book review. These were excluded from the sample because they fail to meet the criterion of “publications in the format of a scientific paper” established. Thus, 59 scientific papers remained (Figure 2).

After reading and analyzing the titles and abstracts (f) – to verify whether the publications focused on the topic of Scientific Tourism – 32 articles were retrieved. The analysis excluded a total of 27 articles from the sample because they did not present a theoretical discussion or a proposal for the application or planning of ST. Most of these papers included one of the search terms only in their keywords, but not in the title or abstract. Others indicated, at the end of the abstract, ST as a possibility for a given destination, without, however, developing any analysis or proposal in this respect. Finally, other excluded articles addressed ST from the perspective of science of tourism (tourism epistemology).

Figure 2, below, presents the final sample analyzed in a qualitative and quantitative way in Section 3 of this article. It is important to highlight that we decided to carry out an analysis of a qualitative and quantitative nature due to the small sample size, following the recommendations of Chueke and Amatucci (2015).

Figure 2 – Data collection procedure and definition of the study sample



Source: The authors, using Mendeley software with research data (2019).

For the analysis of the final sample ($n = 32$), Excel (version 16.35), QGIS (version 3.8 Zanzibar), and IRAMUTEQ (version 0.7 alpha 2) were used. Quantitative data analysis was done using Excel to generate figures and tables that present the timeline of the publications, identify the authors and their affiliation institutions, the most relevant journals, among other data. The QGIS software allowed to create a map with the location of the areas of interest of the case studies that make up the sample of this research (see Section 4.1). And the IRAMUTEQ software, based on the qualitative analysis of text corpus (abstracts of the papers), allowed to generate similarity analyses between this corpus and word cloud (see Section 4.2).

4 RESULTS AND DISCUSSION

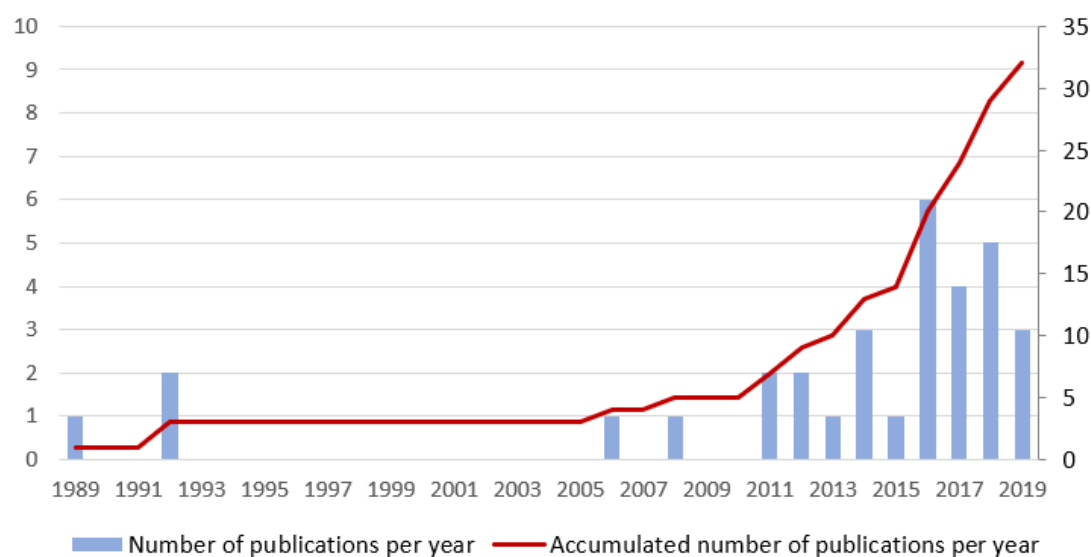
4.1 Descriptive analysis

In this section, data from the literature review and bibliometrics of the sample articles are presented and analyzed using the Excel software, such as: 1) Evolution of the number of publications over the years; 2) Main authors and the impact of their production in a given field of knowledge; 3) Countries where the topic is most popular; 4) Most important journals addressing the topic in question.

From the analysis of the 32 retrieved articles, it is possible to identify that the first article on ST was published in 1989, with the title “Science Tourism in Costa Rica”, in *Annals of Tourism Research*. The article is authored by Jan Laarman and Richard Perdue, both faculty members at North Carolina State University. The study analyzes students, researchers, and teachers who conduct training and research in Costa Rica and considers Scientific Tourism to be a subcomponent of nature tourism.

The evolution of publications on SC can be seen in Figure 3, below:

Figure 3 – Evolution of publications on Scientific Tourism



Source: The authors, using Excel software with research data (2019).

It is possible to see, in Figure 3, that 2016 was the most relevant year for publications on ST, from when an increase in the number of publications is identified, the most recent article being indexed in 2019. It is possible to identify that the Polish authors expand their publications on ST in the period from 2014 to 2018, with emphasis on the years 2016 and 2017, which may be one of the reasons for the increase in the number of publications in recent years.

In addition, it is possible to explain the growing importance of the theme due to the expansion of several strategies worldwide that have been recently adopted for science popularization. In the case of Brazil, the actions and initiatives of the Ministry of Science, Technology, Innovations and Communications for science

and technology popularization and scientific dissemination can be cited in order to contribute to the promotion and appropriation of scientific and technological knowledge by the general public, and the ST has been considered among these efforts (MCTIC, 2020).

In addition, science popularization is covered in the 17 Sustainable Development Goals established by the United Nations (Goal 9.5) (UN, 2015), which calls upon countries to promote, until 2030, scientific research; improve the technological capabilities of industrial sectors, particularly developing countries; and encourage innovation and public and private spending on research and development. Tourism is also seen as a path for the dissemination of science among the peoples.

Another possible explanation for the increase in publications on the subject in 2016 may be related to the publication of the book *Scientific Tourism: Researchers as Travelers*, by Susan Slocum, Carol Kline, and Andrew Holden, released in the previous year, which launches the Scientific Tourism debate worldwide.

Regarding the journals, we observed that the articles were published in 23 journals from 13 different countries. The most recurrent publications are concentrated in 3 journals: *Ido Movement for Culture - Journal of Martial Arts Anthropology*, *Annals of Tourism Research*, and *Revista Brasileira de Ecoturismo* (RBEcotur) (Table 2).

Table 2 – Journals of the studies analyzed

Journal name	Continent	Journal country	Frequency
Ido Movement for Culture - Journal of Martial Arts Anthropology	Europe	Poland	7
Przegląd Geologiczny			1
Physical Activity Review			1
Polar Journal			1
Tourism Management		United Kingdom	1
Applied Ecology and Environmental Research		Hungary	1
Revista de Artes Marciales Asiáticas		Spanish	1
Estudios Geográficos		Spanish	1
GeoJournal of Tourism and Geosites		Romania	1
Quality - Access to Success		Romania	1
Revista Portuguesa de Estudos Regionais		Portugal	1
Skhidnoievropeiskiy Istorychnyi Visnyk-east European Historical Bulletin		Ukraine	1
Revista Brasileira de Ecoturismo (RBEcotur)	South America		3
Anuário do Instituto de Geociências		Brazil	1
Periódico Tchê Química			1
Revista Turismo & Desenvolvimento			1
Revista Geográfica Venezolana		Venezuela	1
Annals of Tourism Research	North America	United States of America	2
Hastings Center Report			1
Journal name	Continent	Journal country	Frequency
Current Anthropology	Asia		1
Acta Geoscientica Sinica		China	1
Advances in Environmental Biology		Jordan	1
Tecnología en Marcha	Central America	Costa Rica	1
Total			32

Source: The authors, using Excel software with research data

It is interesting to note that the journal with the largest number of articles on ST is Polish, publishing original scientific articles on various topics, in particular on the martial arts in their sociological and anthropological aspects. It is worth mentioning that the articles on ST published in this journal characterize the events held around the discussion of martial arts, in their majority, as being of Scientific Tourism.

The second most important journal for ST is also one of the leading international journals in the field of Tourism: *Annals of Tourism Research*, affiliated in the United States of America. This journal focuses on academic tourism perspectives, strives for a balance between theory and practice and, finally, dedicates to the development of theoretical constructions. The third journal in the ranking, of Brazilian origin, is aimed at

theoretical discussion and case studies on ecotourism. Papers on ST published in *Revista Brasileira de Ecoturismo* address it in association with researchers' trips to protected natural areas, bird-watching tourism, geotourism, among other perspectives of research or education in natural environments.

In Table 3, the three journals with the most publications on ST are shown in relation to the field/category, publication language, ISSN, and different citation metrics such as "H Index", "RG Journal Impact" and "Qualis Capes". Regarding metrics, the journal *Annals of Tourism Research* has the highest scores in the considered parameters. Of these three journals, the *Ido Movement for Culture - Journal of Martial Arts Anthropology* is the only publication outside the field of Tourism, belonging to the field of Physical Education.

Table 3 – Journals with more concentration of publications on Scientific Tourism

Journal	Area	Language (a)	ISSN (a)	H Index (b)	RG Journal Impact (c)	Qualis Capes (2013-2016) (d)
Ido Movement for Culture - Journal of Martial Arts Anthropology	Sociology of Culture; Psychophysical Culture; Anthropology of Martial Arts, Combat Sports, Cultural Tourism (a)	English, Polish	2084-3763 2082-7571	7 (2018)	1.90 (2018/2019)	B1 – Physical Education Area
Annals of Tourism Research	Business; Management and Accounting; Tourism, Leisure and Hospitality Management; Social Sciences Development (b)	English	0160-7383	144 (2018)	2.50 (2018/2019)	A1 – Public and Business Administration, Accounting and Tourism A2 – Interdisciplinary Area
Revista Brasileira de Ecoturismo (RBEcotur)	Ecotourism and Environmental Education; Ecotourism Planning and Management; Management and Conservation of natural resources through Sustainable Tourism; Teaching, Research and Extension in Ecotourism; Community Based Ecotourism (a)	Portuguese, Spanish, English	1983-9391	0	0	B3 – Public and Business Administration, Accounting and Tourism B3 – Interdisciplinary Area (e)

(a) Data retrieved from the journal's website; (b) <https://www.scimagojr.com>; (c) <https://www.researchgate.net/>; (d) <https://sucupira.capes.gov.br/>; (e) This journal has 21 different scores (ranging from B1 to C) for different areas.

Source: The authors, using Mendeley and Excel software with research data (2019).

Comparing the above results with Bradford's Law (Table 1) – which relies on the reputation criterion of journals to identify the most relevant ones and which give more space to a specific topic – we conclude that the most relevant journal addressing scientific tourism issues is *Annals of Tourism Research* for the areas of "Public and Business Administration, Accounting and Tourism" and "Interdisciplinary". On the other hand, for the "Physical Education" area, the most relevant journal is *Ido Movement for Culture - Journal of Martial Arts Anthropology*. The criterion used to check the relevance of journals was the classification of scientific production Qualis/CAPES². For international journals, the "H Index" reference available on the "Scimago Journal & Country Rank"³ website, developed by Scopus, was also used.

The analysis of authorship of articles shows a total of 65 different authors or co-authors. Most articles were co-authored, with only 9 single-authored ones. Two authors stand out due to authorship or co-authorship in more than one article: Wojciech J. Cynarski and Krzysztof Kubala. The former authored 8 papers (6 as the first author and 2 as the second author). Cynarski is a professor at the Faculty of Physical Education, Department of Cultural Foundations of Physical Education, Tourism and Recreation, at the University of Rzeszów (Poland), editor-in-chief of *Ido Movement for Culture - Journal of Martial Arts Anthropology*, and he is linked to the International Martial Arts and Combat Sports Scientific Society (IMACSSS). He develops research in the following areas: sociology of sport and sociology of free time, sociology and anthropology of culture, tourism and martial arts, and science of military cultures. In turn, the latter authored 2 papers (1 as the first author and 1 as the second author). Kubala is also affiliated with the University of Rzeszów and the International Martial Arts and Combat Sports Scientific Society (IMACSSS), Poland. These authors have been co-authors on two papers together.

² Brazilian standard for the evaluation of journals, established by the Coordination for the Improvement of Higher Education Personnel (CAPES), which lists and classifies the means used for the dissemination of the intellectual production of the "stricto sensu" graduate programs. Retrieved Apr. 28, 2020, from <https://sucupira.capes.gov.br/sucupira/public/consultas/coleta/veiculoPublicacaoQualis/listaConsultaGeralPeriodicos.jsf>.

³ Retrieved Apr. 28, 2020, from <https://www.scimagojr.com/index.php>.

The application of Lotka's Law – which points out the need to map prolific authors and, therefore, of relevance to their field of knowledge – was found to be irrelevant, since only two authors had more than one publication: Wojciech J. Cynarski and Krzysztof Kubala. When analyzing the researchers' "H Index" ⁴ using the Scopus platform, one finds, respectively, $H = 9$ and $H = 2$.

In relation to the country of the authors who published about ST, Table 4 shows a total of 65 nationalities, with the highest concentration in Brazil, with 16 authors (24.6%); Poland, with 8 authors (12.3%); and China, with 4 authors (9.2%). One explanation for this large number of Brazilian authors is the existence of several co-authored articles and, specifically, a work with 6 authors. On the other hand, the smaller number of Polish authors is explained by the fact that many works are written by 1 or 2 authors. It should be noted that it was not possible to identify the nationality of 7 authors (10.8%). However, it was evident that the authors are mainly from Europe (30.7%).

Table 4 – Authors' country with publications on Scientific Tourism

Author's country	Frequency
Brazil	16
Polonia	8
China	6
Canada	2
Iran	4
United States of America	4
Georgia	3
Egypt	2
New Zealand	2
Portugal	2
Spanish	2
Ukraine	2
Costa Rica	1
England	1
Germany	1
Mexico	1
Scotland	1
Not identified	7
Total	65

Source: The authors, using Excel software with research data (2019).

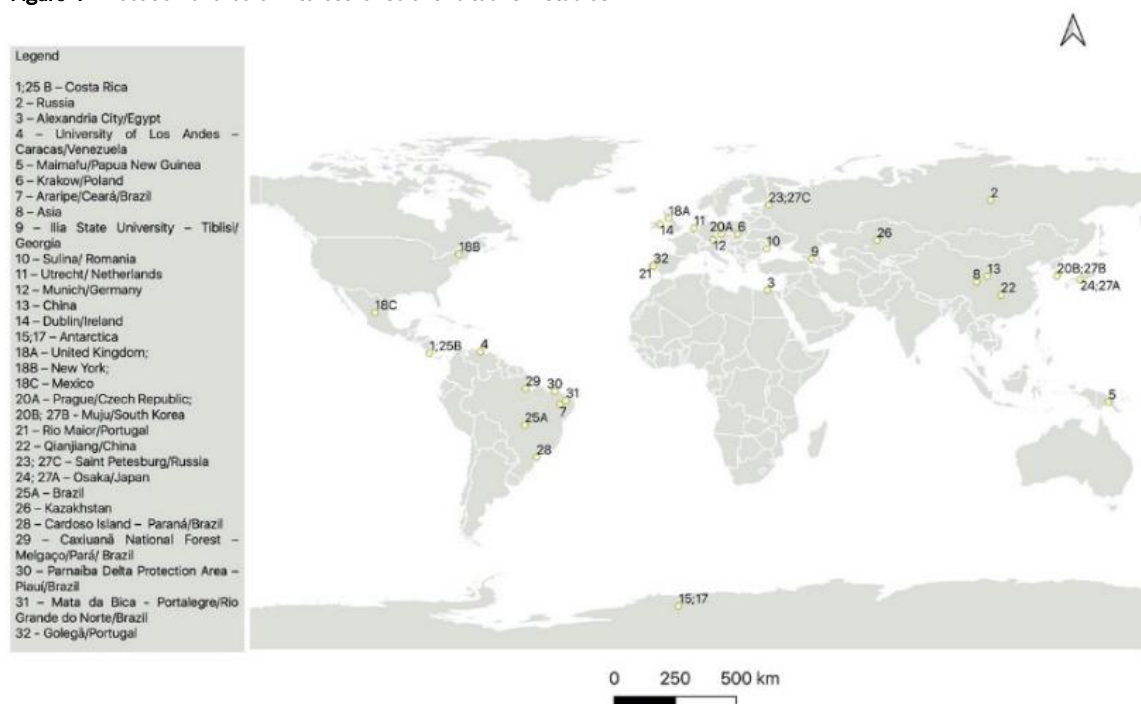
From the quantitative analysis, it was also possible to map the areas of interest of the case studies addressed in the sample articles, in order to identify some of the main practices related to the subject in question. Figure 4 shows the geographical distribution of these case studies.

As can be observed from Figure 4, of the 32 articles, 11 case studies are concentrated in the American continent, 12 in Asia, 10 in Europe, 1 in Oceania, and 1 in the African continent. It should be noted, however, that there are studies that have more than one place of interest, i.e., they compare situations in more than one country or city, located in different continents, which results in a sum of case studies greater than the number of articles in the sample.

China, Russia, Costa Rica, Japan, South Korea, and Brazil were the most empirically studied countries, totaling 17 studies, with emphasis on Brazil, addressed in 6 articles of the sample. Of these 6 articles, one has the country as a study reference (25A), the others deal specifically with the Araripe Geological Park, in Ceará (7); Ilha do Cardoso, in Cananéia, São Paulo (28); the Caxiuanã National Forest, in Pará (29); the Parnaíba Delta Protection Area, in Piauí (30); and the Area of Relevant Ecological Interest Mata da Bica, in the municipality of Portalegre, Rio Grande do Norte (31).

In the case of Antarctica, two articles addressed it (15 and 17). It is noteworthy the large number of publications by Polish authors, identified in Table 4, which is not shown in Figure 4. This can be explained because studies carried out by the Poles involved analyses of sporting events held in countries other than Poland.

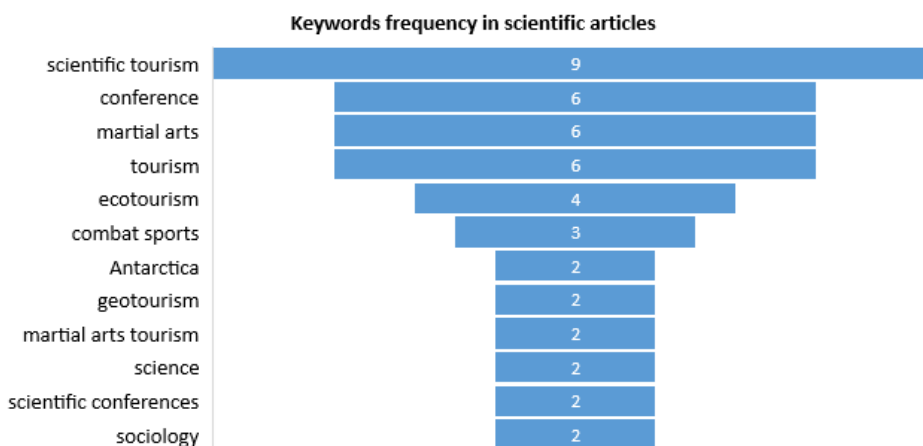
⁴ The "H-Index" measures the impact of researchers' scientific production. Retrieved Apr. 28, 2020, from <https://www.scopus.com/>.

Figure 4 – Location of area of interest for scientific tourism studies*

*** Note:** The sample articles were numbered and are identified in the legend and on the map. However, there was a need to include letters for the organization of the legend: the articles were named with A, B, C when they presented, in their case studies, more than one geographical reference (example of article 18 that works with three different geographical areas of investigation: United Kingdom, New York, and Mexico, identified on the map as 18A, 18B and 18C). When the studies referred a country as the study area, its capital was marked, which occurred in articles 1, 13, and 25A and B (Costa Rica, Brazil, and China). When the study addressed a continent, its central point was marked (article 8). When there are specific areas within the same country, those areas were marked individually, like Brazil and its six case studies (7, 25A, 28, 29, 30 and 31). Article 16 was not marked because it is a theoretical study and the 19 does not address a study with a specific focus.

Source: The authors, using QGIS software with research data (2019).

The analysis of Zipf's Law (Table 1) – measured by the frequency of keywords in scientific papers – revealed that the most recurrent words related to the field under analysis are “scientific tourism”, “conference”, “martial arts”, “tourism”, “ecotourism”, “combat sports”. Figure 5 presents the keywords, with the terms in English, that appear more than twice in the scientific articles.

Figure 5 – Frequency of keywords in scientific articles

Source: The authors, using Excel software with research data (2019).

It is also possible to observe the use of words with similar meanings which, when grouped, further demonstrate the importance of these terms, such as: “conference” and “scientific conferences”, and “martial arts” and “martial arts tourism”.

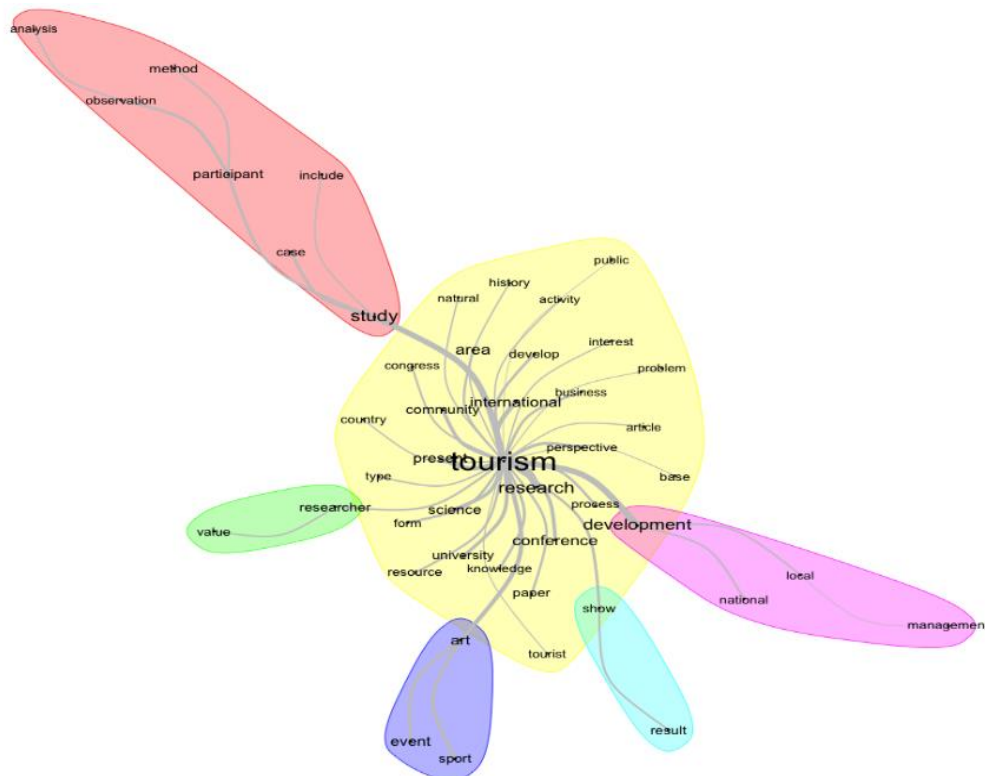
and work of the traveling researchers. In other words, ST does not seem to behave just like a market segment. The terms “conference” and “event” corroborate this analysis, since several articles focus on discussing the importance of holding a given scientific event (events related to martial arts and other sports are relevant in ST articles, as discussed), or even, report the trips of teachers and students to these events and to several research centers or areas of great scientific value, with emphasis on natural areas. In this sense, the words “natural”, “environment”, “nature”, “park”, “observation”, “knowledge” stand out, although less frequently than the previous ones.

Another direction identified in the word cloud concerns the possibility of ST acting as a development strategy and generating economic benefits for a given community. In addition to the words “development” and “community”, there are “business”, “value”, “local”, “growth”, “management”, “country”, “work”, “plan”, “public”. From reading the abstracts, it was possible to identify that these studies discuss possibilities for planning and developing ST, in partnership with local communities, to generate positive economic impacts. In this sense, they also emphasize the importance of local public authorities.

Figures 7 and 8 present the similarity analysis that, based on graph theory, identifies the occurrences between the words, separating them into clusters and relating them to each other. To better visualize the relationships between words, we chose to use only those that are most repeated in the texts, thus eliminating many words with few citations, as suggested by Salvati (2017).

As Figure 7 shows, the similarity analysis for words that appear ten or more times in the corpus highlights 6 clusters, the central and most important being represented by the term “tourism”. This central cluster includes the other words that characterize most of the articles, such as “research”, “science”, “university”, “knowledge”, “conference”, “congress”, “international”, “community”.

Figure 7 – Similarity analysis of Scientific Tourism (n ≥ 10)



Source: The authors, using IRAMUTEQ software with research data (2019).

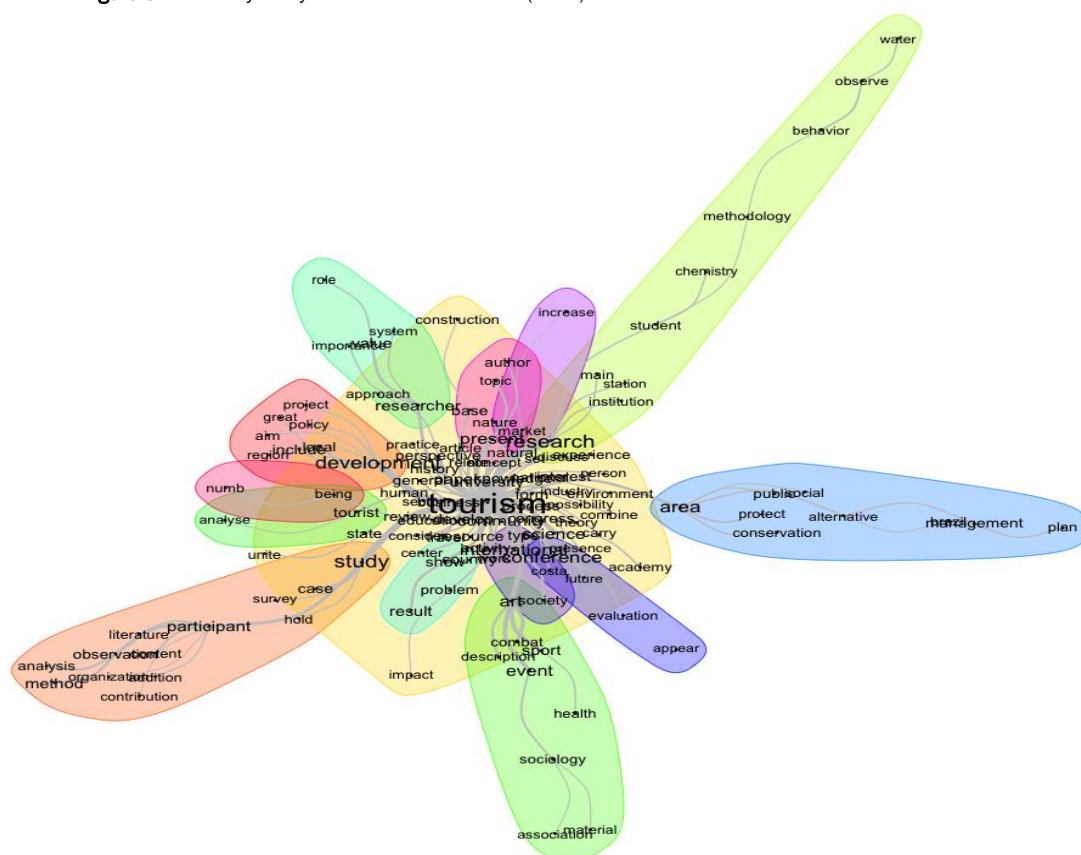
The analysis of Figure 7 also shows that there is a correspondence with the analysis carried out in the word cloud, since it is clear the existence of a cluster representing the articles that discuss the “development” of ST at “local” and “national” levels; another cluster represents the studies on sports and arts “events”; and a

third one brings together the objectives aimed at carrying out “studies”, “observation”, “analyses”, involving scientific “methods” and research “participants”.

Figure 8 shows the similitude analysis made considering the words that are repeated five or more times in the abstracts, which resulted in a greater number of words contemplated and, consequently, in the formation of new clusters, 14 in total.

Again, the term “tourism” remains central, as shown in Figures 6 and 7. The four largest clusters that stand out (not counting the central cluster that brings together several smaller clusters and shared words), show the gathering of articles dealing with: 1) “events” (of art, combat, sport, or health), understood and analyzed by the authors from a socio-anthropological perspective. 2) “areas” of relevant scientific interest, especially those related to “conservation” – ST is often analyzed in these articles as an alternative for the protection of natural resources. 3) ST as an education strategy, involving new teaching “methodologies”, “observation”, “behaviors” change – the “chemistry” subject appears relevant in this regard. 4) “case” “studies” about ST and these as a way to carry out new “research” and development of new “methods”, involving the “participants”.

Figure 8 - Similarity analysis of Scientific Tourism (n ≥ 5)



Source: The authors, using IRAMUTEQ software with research data (2019).

From the analyses presented, we carried out a more detailed qualitative examination of the selected abstracts, making it possible, from that, to create seven categories that condense the main topics addressed by researchers around Scientific Tourism, as in part already represented in the similarity analysis clusters (Figures 7 and 8) and in the word cloud (Figure 6). These categories are presented and described in Table 5:

Table 5 – Categorization of scientific articles

Categories	Number of articles	Description
1. Events (scientific or sports)	10	Articles that describe scientific or sporting events, with emphasis on articles in the context of martial arts.
2. Education	5	Articles dealing with scientific tourism as an education/teaching strategy.
3. Scientific trips	7	Articles dealing with scientific trips by researchers, professors, students, to a place of scientific interest or to research centers.
4. Nature tourism	8	Articles that link scientific tourism to nature tourism, the conservation of protected areas and/or ecotourism practices.
5. Geotourism/Geopark	4	Articles dealing with geotourism and/or geoparks in association with scientific tourism.
6. Socioeconomic development	3	Articles that deal with scientific tourism as a possibility for socioeconomic development of a place.
7. Theoretic	1	Articles that have as main objective the theoretical discussion about scientific tourism.
Total	38	

Source: The authors, using Mendeley and Excel software with research data (2019).

It should be noted that six articles analyzed were classified into two different categories, which in the previous table totaled 38 classifications in the various categories. Of these six articles, two are included in the “Geotourism/Geopark” and “Education” categories. Another three are included in the “Education” and “Nature Tourism” categories. And an article was included in the categories “Scientific travel” and “Nature tourism”.

The largest number of articles are in the “Events” category ($n = 10$), which includes scientific or sports events. In these articles, the authors address the organization of events as arenas of knowledge production, whether academic or not. As to sporting events, several articles have repeatedly addressed the topic of martial arts, mainly Polish authors linked to the International Martial Arts and Combat Sports Scientific Society (IMACSSS) and their publications in the journal *Ido Movement for Culture - Journal of Martial Arts Anthropology*.

In addition, the categories “Scientific Travel” ($n = 7$) and “Nature Tourism” ($n = 8$) were the ones that gathered the largest number of articles. The first includes articles that portray trips motivated by research, educational improvement, scientific exchange. It is worth mentioning that these destinations are understood by the authors as of great scientific value and become tourist attractions for niche travelers. Thus, Scientific Tourism becomes associated with visits, stays or trips to places where nature offers possibilities to learn about aspects related to natural sciences. It may also involve the study and analysis of a location or a specific object in that area, related, for example, to fauna and flora, or even to the study of the culture of a place, which considers the involvement of the local community essential for a deeper understanding.

In this sense, Scientific Tourism experiences have been understood as a way of interpreting the space for tourism use as composed of natural or cultural heritage resources, and as a possible way of applying measures aimed at the recovery, conservation, dissemination, and sustainable use of attractions (as shown in Figures 7 and 8).

In the category “Nature Tourism”, ST is addressed in association with trips to natural areas of great interest for leisure practices, while promoting environmental protection. Some even identify ST as a form of sustainable tourism or as a subtype of ecotourism, involving the production of scientific knowledge from activities such as geotourism, bird-watching, environmental studies in protection areas, adventure tourism with a scientific dimension, among others. Therefore, the recurrence of the term “ecotourism” was observed as a synonym for Scientific or Nature Tourism. This idea needs to be problematized, since in the literature on tourism, the concept of ecotourism has been challenged, in the last decades, because often it does not correspond to tourism practices based on a model compatible with the environmental sustainability of the areas visited.

Although it was possible to consider the articles dealing with “Geotourism” or tourism in areas called “Geoparks” ($n = 4$) under the category of “Nature Tourism”, we decided to analyze them in a separated category. The reason is that 4 of the articles emphasized this type of tourism and its specific features that led to the creation of geoparks. This number of articles also shows the concentration of knowledge areas around the creation of geoparks.

From the production examined, we observed that ST, in many countries, corresponds mainly to geotourism experiences. Currently, this is perhaps the field of greatest coverage and growth when thinking about an activity that combines visitation and science. Geotourism is a reality in some countries of the world, such as Portugal – in the Azores archipelago and in the Natural Park of Aire and Candeeiros Mountains. It is also known that there are many geoparks located in Europe (Portugal, Spain, United Kingdom), Australia, Malaysia, USA, and Iran, where the practice of geotourism is already seen as an innovative way for promoting sustainable development (Moreira, 2014), and which are the object of analysis of some of the articles identified in this study.

In the case of Brazil, the production on ST presents different approaches, however, the topic of “geoparks”, associated with “geotourism”, has been quite recurrent, given the great potential presented for ST practice. There are many ongoing proposals for the creation of geoparks as a form of territorial management based on geotourism (in the countryside or in the city), geographically located mainly in the states of Minas Gerais (Caminho dos Diamantes, Serra do Rola Moça State Park, and Ouro Preto – Geology and Geomorphology related to precious minerals); Rio Grande do Norte (Geopark Seridó); Maranhão, in the city of Carolina (Chapada das Mesas Park); and in the Brazilian Pantanal (Bonito region, in Mato Grosso do Sul), which is currently one of the areas that most stands out in this segment (Nascimento et al., 2015). In the urban environment, for example, the proposals for paleontological geotourism in the city center of Rio de Janeiro stand out (Medeiros & Polck, 2017).

In the category “Education” ($n = 5$), we identified articles that present Scientific Tourism as an education strategy in a broader sense, or even, the teaching of specific subjects, such as biology, physics, chemistry, geography, geology, and history. In these cases, ST can be an experience in which tourists contact with the local culture, an interaction that can generate the production of scientific knowledge. Thus, ST can also be classified as a subtype of exchange and/or educational tourism, as it allows professional improvement or specific learning and training programs.

The category “Socioeconomic Development” ($n = 3$) includes the articles that present ST as a strategy for the development and promotion of tourism in certain locations (as also shown in Figures 7 and 8). It should be noted that the articles show the importance of community participation in these processes.

Studies in this category also emphasize the importance of research motivated by Scientific Tourism in natural areas, especially in poor communities. These studies present their results pointing to the creation of tourism development proposals that value and democratize access to knowledge production thus promoting ST initiatives that positively impacts local communities. ST, as a form of sustainable tourism, is therefore presented as a development strategy for several economies, among them, the least developed.

Finally, only one article addressed ST on a theoretical-epistemological basis (“Theoretical” category, $n = 1$). The category encompasses the monographic study by Wojciech Cynarski, in which “Science Tourism” is approached from the perspective of visual sociology. The study highlights the debate on business tourism, as well as on the singularities of the concept of conference tourism (portrayed as an intellectual phenomenon). Among the conclusions of the study, the importance of Cynarski's work stands out, as a valuable addition to the study of tourism and as an important scientific publication on ST, since it points to the evolution of this field of knowledge and suggest directions for future ST researchers.

5 CONCLUDING REMARKS

This study aimed to conduct a systematic review of the literature on Scientific Tourism, in the Brazilian and international contexts. To this end, we carried out a bibliographic and bibliometric analysis of the identified sample. We analyzed 32 scientific articles both qualitatively and quantitatively, using different software: Mendeley, Excel, QGIS, and IRAMUTEQ. With Mendeley we gathered the articles retrieved from the databases;

selected and organized those of interest; and read the abstracts and categorize the articles. Excel was used to analyze the data quantitatively and to generate figures and tables. QGIS software allowed to map the areas of interest in the case studies on ST that make up the study sample, to identify some of the main practices related to the topic in question. And with IRAMUTEQ qualitative analyses of similarity and word cloud were generated, as presented in the figures.

Through the compilation and understanding of concepts prior to the investigation, which have already been the object of analytical treatment in previous studies, the literature review aimed to contribute to the understanding of the scientific and theoretical foundations of knowledge in the field of interest (Panosso Netto & Nechar, 2014).

It was possible to verify that the most frequent terms (investigated because of Zipf's Law), are consistent with the categories that cover a large part of the production in ST so far, which are: the practice of tourism to enhance scientific knowledge; the trip to attend or study scientific events; the correlation between tourism and sport, especially the martial arts; and ecotourism or the practice of tourism for the purpose of visiting natural areas.

Likewise, the corpus analysis made it possible to identify, at least, four categories:

1) Scientific or Sports Events and Congresses: the repetition of the results for the terms "conference" and "event" is consistent with this analysis, since several articles focus on the discussion of the importance of holding a given scientific or sports event. In this context, events related to martial arts and other sports have relevance in ST articles, as previously discussed. These articles also report on the trips of teachers and students to these events and to various research centers or areas of great scientific value, with emphasis on natural areas. It is an approach of different dimensions of event tourism, especially with theoretical anthropological and sociological perspectives on tourism.

2) Nature Tourism, Geotourism and Parks: the study on screen suggests that the evolution of the topic "Scientific Tourism" is the result of empirical studies developed, for example, in natural and/or cultural areas of relevant scientific interest, or even, geotourism experiences and ecotourism that combine visitation and science, for researchers in an area of knowledge and/or visitors/tourists interested in the theme. Geotourism and scientific tourism are presented as interrelated activities that take place in protected areas. It is a new understanding of geotourism that includes not only visits to abiotic objects in nature, but its broad cognition, from geological structures and history, to the development of landforms, environmental problems, nature protection, impact on economic growth in the region to historical and cultural contexts. These lines of study can assist in different ways in the recovery, conservation, dissemination, and sustainable use of tourist attractions.

3) Scientific and Educational Travel: in this case, travel is associated with motivations for educational improvement and scientific exchange. Regarding education, it has been understood that travel for this purpose can be an educational strategy in a broader sense, when direct contact enhances the learning experience. Studies suggest that Scientific Tourism related to travel and education can become a reference for heritage conservation, especially because it allows greater dissemination and popularization of science in a playful way, associated with leisure.

4) Socioeconomic Development: many articles highlight the potential of ST as an alternative economic development strategy for communities, as well as a way of valuing and protecting their natural and cultural heritage. In this sense, several case studies located in China, Russia, Costa Rica, Venezuela, Brazil, Portugal, and New Guinea are presented.

Finally, the analysis of the categories presented suggests that ST does not behave only as a market segment, although this trend has appeared in some of the studied literature, when classified as a subtype of already consolidated tourism segments. On the other hand, there is a strong indication for the understanding of ST as one of the paradigms of sustainable tourism.

There are some limitations to this study. Firstly, despite the results obtained with IRAMUTEQ, this software did not recognize some important words for the research, both in the analysis of similarity and in the word

cloud. Terms like “scientific”, “martial”, “ecotourism”, “ecological”, “geopark”, among others, were not considered in these analyses. This shows a limited word database of this software. Future studies should evaluate the possibility of using other tools for further analysis, or wait for IRAMUTEQ software upgrade.

Another limitation is sample selection. Future studies should expand on these observations by using other terms associated with the theme in the keywords and/or other search parameters and/or in other databases. Regarding the databases, it is also important to highlight that this study did not yield one of the first two scientific articles on ST, mentioned at the beginning of the second section of this paper. This is the article by Jan Laarman and Richard Perdue, published in *Tourism Management*, in 1989 (Campos, 2018). Again, this suggests the expansion of databases in future bibliometric studies on this topic. Also, few articles in the Spanish language were retrieved, which may also justify the inclusion of new databases.

Finally, we can conclude that bibliometrics can be useful in the task of organizing the scientific production in a given field of knowledge, pointing to new areas of research investigation, thus furthering the understanding of fields of science, such as Tourism and Scientific Tourism. This article indicates the need for studies that deepen the theoretical discussion on ST, as well as the establishment of a conceptual framework providing guidelines for studies and promotion of ST activities in different parts of the world.

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