

Smart tourism destination: A bibliometric review

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Abstract

This study aims to review the articles published in journals indexed in the Web of Science (WoS) database on smart tourism destination (STD) using the bibliometric analysis technique. In line with this main purpose, the annual number of STD articles, WoS categories, and indexes, most productive countries, country collaborations, most productive institutions, co-citation network of journals, most cited articles, and authors, co-citation network of authors, and most used author keywords were analysed. The WoS database was scanned between the 1975-December 2021 period and 70 articles were found. CiteSpace 5.8.R3 bibliometric data analysis software was used in the analysis. The results obtained from the analysis show that the first article on STD in the WoS database journals was published in 2013. However, it has been determined that Spain is the leading country in the world in terms of article productivity, country collaboration, and centrality. Most of the STD articles have been published in the SSCI-indexed journals and hospitality leisure sport tourism category. According to other results, the most productive institution is Universidad de Alicante, the most cited article is published by Boes et al., titled "Smart Tourism Destinations: Ecosystems for Tourism Destination Competitiveness" and the author with the highest co-citation count is Ulrike Gretzel. With this study, the current situation and emerging trends in the STD literature are revealed and a research guide for future studies is formed.

Keywords: Smart Tourism Destination, Bibliometric Analysis, CiteSpace, WoS Database.

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1. Introduction

Technological developments have greatly affected the tourism industry in recent years and the use of smart technologies has become widespread among tourism stakeholders. In addition to tourists, tourism businesses, and other service providers, destinations also can be shown as one of the main stakeholders benefiting from smart technologies. Today, destinations are trying to increase their long-term competitiveness in light of rapid technological and social changes by using smart tourism applications effectively (Gretzel, 2022). Smart tourism, which is accepted as an extension of e-tourism, consists of a structure in which the destinations, visitors, businesses, and other service providers all use smart technologies. Smart technologies can be used by tourists in all processes, starting from the pre-travel information search stage to post-travel evaluations (Gajdošík, 2018). Therefore, smart tourism is a broader concept covering smart destinations. STD can be described as the integration of information and communication technologies (ICTs) into physical infrastructure. Mobile applications with some functions such as searching for address and transportation information, translation, and tourist guidance service during the destination visit are assistive technologies for visitors (Gretzel, Sigala, Xiang & Koo, 2015). Technology, which is a key factor in the interaction between tourists and destinations, makes significant contributions to the development of tourism. Therefore, being a STD is shown as an inevitable necessity for all touristic cities today (Garcia-Milon *et al.*, 2020). As a result of all these developments, STD draws attention as an issue of increasing importance.

Basically, STD, which is defined as the adaptation of the smart city concept to tourism destinations (Ortega & Malcolm, 2020), is one of the research topics that has become the focus and kept up-to-date in the tourism literature (Wang *et al.*, 2013; Chiappa & Baggio, 2015; Vecchio & Passiante, 2017; Ivars-Baidal, *et al.*, 2021). Nowadays, cities around the world have been implementing smart city projects in order to improve the living standards of their citizens and to ensure the sustainability of cities and touristic areas, which is considered a driving factor in considering the concept of STD among important research topics (Cavalheiro *et al.*, 2021). In addition, the fact that technology has a significant impact on the promotion and marketing of tourism destinations and supporting the tourists' mobility in the destination is shown as other factors that are effective in the increasing importance of STDs (Liberato *et al.*, 2018).

Since the beginning of the 21st century, academic studies on the use of technology in tourism (Afsarmanesh & Camarinha-Matos, 2000; Pechlaner & Abfalter, 2005; Werthner & Klein, 2006) have begun to deal with the use of new smart technologies in destinations. While the role of the internet, digital technologies, and new media in the tourism industry is the focus of these studies, the use of smart tourism technologies in destinations is among the other topics discussed in these studies. Rusu & Cureteanu (2009) pointed out that with the development of smartphones, mobile internet, mobile applications (Google Earth, Amadeus, etc.), mobile websites facilitate the travel of tourists and smart destination applications are becoming increasingly common. Transactions such as obtaining information about the destination, reservation, and location detection can be carried out through these smart technologies.

The concept of STD has been studied from various perspectives by different researchers. Koo *et al.* (2013) stated that destination social media channels and websites are the key tools for communicating with tourists and increasing their travel motivation in STDs. In the research conducted by Boes *et al.* (2016), innovation, social capital, human capital, and leadership were identified as the most important components of STD and it was emphasized that their combination would increase the competitiveness of smart destinations. Vecchio *et al.* (2018) revealed in their studies that social big data obtained from social media was effective in the development of the decision-making process, enriching tourist

experiences, developing new business and product/service models, and thus creating value in STDs. Baggio, Micera & Del Chiappa (2021), conducted a critical review of the STD literature by analysing it with machine learning topic modeling algorithms. The findings obtained from this study reveal that the need to improve operational and organizational processes to increase the effectiveness of STDs has not been adequately discussed in the relevant literature. It is noteworthy that especially in the last few years, studies on STD have increased in quantity and researchers have focused on this issue (Ballina *et al.*, 2019; Wang *et al.*, 2020; Gelter *et al.*, 2021). Therefore, the focus of this study is STD, which is an important component of smart tourism.

When the relevant literature is reviewed, it is seen that various bibliometric studies on the use of technology in tourism have been carried out. For example, studies on social media usage in tourism were examined by Zeng & Gerritsen (2014) using the bibliometric analysis method. In another study, Soliman *et al.* (2021) analysed the studies on smart experiences in tourism with the same method. Singh & Bashar (2021) reviewed the studies on e-tourism using the bibliometric analysis technique and revealed the current situation in the literature. Although academic studies on STD have increased recently, it draws attention that there is no bibliometric study on this subject. In addition to the development of articles on STD over years, bibliometric features such as country collaborations, productivity, and co-citation network have not been examined in previous studies. In order to fill this gap in the relevant literature, it is aimed here to review the articles published in the journals indexed in the WoS database on STD with bibliometric analysis. The refereeing of the articles by the double-blind review process increases the scientific quality of such publications. This factor has been influential in the selection of articles as the type of academic publication for bibliometric analysis.

Filling the gap in the existing literature, revealing current trends in academic studies, and contributing to the field of tourism theoretically and methodologically are the factors that increase the importance of this study. This study is also aimed to help researchers develop different perspectives for future studies on this topic. Examining academic studies in a particular research field using the bibliometric analysis method enables a more insightful perspective to be developed towards the literature. With this study, it will be possible to understand the concept of STD more clearly and develop a deeper understanding of the subject. In addition to the current situation and future trends, identifying the deficiencies in the relevant literature is important for the development of academic studies. In this respect, the current study will provide the development of STD research and the further development of the theoretical background. This study will be an important reference for researchers in terms of guiding future research. For the purpose of this study, first of all, the literature on STD was reviewed. In the next section, the research method was described. In the third section, the results were given. The final part of the study contains conclusion, discussion, and suggestions for future research.

2. Literature Review

STD draws attention as one of the emerging concepts that have gained importance in the tourism field nowadays and the number of research is increasing (Gelter *et al.*, 2021; Femenia-Serra & Ivars-Baidal, 2021). This concept, which has been frequently seen in the literature since the 2010s, is closely related to the smart city concept (Santos-Junioret *et al.*, 2020). The term "smart city" was used in the 1990s firstly (Eichelberger *et al.*, 2020). As a result of rapid urbanization and population growth, the smart city concept has come to the fore both in urban planning and academic studies. In addition to technology, sustainability, and management issues, tourism destinations are also discussed under the smart city term (Corte *et al.*, 2017). Thus, STD is a new term that emerged under the concept of "smart tourism" in the tourism literature. However, the emergence of smart city applications is also the basis for the development of STDs (Coca-Stefaniak, 2021).

The convenience and advantages provided by smart technologies to cities cause destinations to be more interested in these technologies and to spend more effort to become STD (Huertas *et al.*, 2021). STDs integrate high-tech applications with advanced physical infrastructure to increase the competitiveness of the city by providing innovative services for tourists. Therefore, STD is a set of applications built on the existing smart city infrastructure (Damayanti *et al.*, 2021). In other words, STD is a digital ecosystem consisting of elements that are in constant interaction with each other. STD aims to increase efficiency and sustainability, enrich tourist experiences and maximize destination competitiveness by using ICT solutions (Errichiello & Micera, 2021). Central and local governments, travel agencies, transportation and accommodation businesses, tour operators, local people, and most importantly tourists are the elements in this STD ecosystem (Arenas *et al.*, 2019).

Ballina (2022) shows that smart tourism technologies as one of the main components of destinations today. Globally leading destinations are using smart tourism technologies to increase their long-term competitiveness by adapting themselves to rapid technological, social, and environmental changes. In this context, destination management organizations see smart tourism governance as an important strategic tool in competition (Errichiello & Micera, 2017; Gretzel, 2022). STDs integrate technology into the tourism ecosystem. Thus, unlike the concept of e-tourism, it is possible to create further connectivity levels by connecting various physical objects by using smart destination technologies (González-Reverté, 2019). Similarly, Shafiee *et al.* (2019) state that smart tourism differs from e-tourism with its wide-ranging connectivity feature, and those smart destination technologies are used at every stage of human life and travel. Recommendation systems, social media, Internet of Things (IoT), big data, augmented reality (Hamid *et al.*, 2021), cloud computing, mobile applications, virtual reality (Tavitiyaman *et al.*, 2021), and artificial intelligence (Kırıl & Aşkun, 2021) stand out as the main technologies used in STDs.

STD technologies enable tourism destinations to collect data through sensing systems (sensors) and convert different types of data into information by data processing. Tourism stakeholders in the destination can respond to the service demands of tourists using this information (Jiang & Ke, 2019). Through simultaneous information sharing, tourists' destination experiences become interconnected. To create smart tourist experiences, all elements within the destination digital ecosystem must work in harmony (Soliman *et al.*, 2021). Therefore, it is expected that the smart technologies used in the destination will work in harmony and connect the elements to provide smart experiences. The basic logic of the STD idea is to reach the determined targets by providing fast, personalized and accurate answers to the needs of tourists, tourism businesses, and destination management organizations. For this, technological solutions are developed using existing knowledge (Hernández-Martin *et al.*, 2017). Enriching tourism experiences, promoting sustainability, providing benefits for local people, and reducing privacy concerns are cited as the most important goals of STD applications (Tyan *et al.*, 2020). Smart technologies facilitate and encourage the efficient use of touristic resources in destinations by both local people and tourists. Innovative approaches based on technology increase stakeholders' quality of life and experience with STDs (Boes *et al.*, 2016). Destination governance and marketing are among the other advantages that smart technologies provide to destinations. Big data collected using smart technologies allow more reviews and information about the destination. This is used by destination management organizations in management practices. In addition, obtaining data about tourist demands and needs offers important advantages for real-time marketing activities (Ivars-Baidal *et al.*, 2019).

When the related literature is examined, it is seen that there are review papers on STD and smart tourism. It is noteworthy that in these studies, the development trend of academic publications and

literature on smart tourism is analysed. For example, using the meta-narrative analysis technique, Gelter, Lexhagen, & Fuchs (2021) outlined how the language used in previous research shapes the current discourse about STD. Borges-Tiago, Verissimo & Tiago (2022) conducted a study using the scientometric analysis technique to reveal the intellectual structure of the smart tourism literature. As a result of this study, it has been determined that the majority of the articles on smart tourism have been published in the last two years and they are related to the smart ecosystem. Here, STD is discussed under the smart ecosystem, which is one of the humanware dimensions. In another study by Shafiee, Ghatari, Hasanzadeh & Jahanyan (2021), a systematic review study was conducted using the meta-synthesis technique of STD articles. The characteristics of the articles reviewed by the authors in this study were revealed and the conclusions were synthesized. It can be stated that similar compilation studies on smart tourism and STD have been made by other authors (Vargas-Sánchez, 2016; Ye, Ye & Law, 2020) and that such studies have increased in recent years. However, it is noteworthy that the smart tourism issue is studied more, and academic studies that specifically review STD literature development are less prominent. According to Chen, Tian, Law, and Zhang (2021), it is crucial to enhance the number and scope of smart tourism bibliometric studies in order to acquire comparable findings and improve relevant literature. It is possible to reveal the authors, institutions, and organizations that contribute to the production of scientific knowledge on STD.

3. Research Methodology

This study aims to examine the articles on STD published in journals indexed in the Web of Science (WoS) database using bibliometric analysis. This study planned to reveal the current status of the scientific articles in this field and the developments in the relevant literature. Science is cumulative, each new research is based on previous studies and increases knowledge in a particular research field. Bibliometric analysis which is applicable to all fields of science is suitable for the analysis of studies in different disciplines (Sánchez *et al.*, 2017). With bibliometric analysis, it is possible to evaluate the research productivity of the developing literature quantitatively and systematically in a particular field. Thus, researchers are supported to develop a new perspective toward studies in a particular field and create a future research plan (Martinez *et al.*, 2012). Research trends, publication productivity of authors, organizations, and countries, keyword frequencies, most cited authors, journals, and countries, etc. are some of the statistical data that can be obtained by bibliometric analysis. Bibliometric analysis can be performed on articles and other publication types in different databases (Mavric *et al.*, 2021).

In this study, the development trend of articles on STD, which has gained importance, especially in the last 10 years, is examined in terms of quality and quantity. Data were collected by the author from the WoS database on December 15, 2021. The WoS database is the oldest (since 1964) and selective citation index of scientific and scholarly publishing journals, books, etc. (Birkle, Pendlebury, Schnell & Adams, 2020). However, the WoS database is used as a reference by many researchers around the world, consists of journals that publish articles of high scientific quality, and has been widely used in bibliometric tourism studies currently (Garrigos-Simon *et al.*, 2019; Suban *et al.*, 2021). WoS database can provide researchers with more detailed results with graphs and tables than other databases such as Scopus and Google Scholar in citation analysis queries (Falagas, Pitsouni, Malietzis & Pappas, 2008). In addition, journals with high scientific quality are indexed in the WoS database. Also, data files in WoS format are shown more suitable for bibliometric analysis (Chen, 2014). These factors were effective in choosing the WoS database as the data source for this study.

In this study, data were collected from the Social Sciences Citation Index (SSCI), Emerging Sources Citation Index (ESCI), Science Citation Index Expanded (SCI-Expanded), and Book Citation Index-Social Sciences & Humanities (BKCI-SSH) indexes in the WoS database. In the "title" part, articles

containing the terms “smart destination”, “smart destinations”, “smart tourism destination”, “smart tourism destinations”, “smart tourism city” or “smart tourism cities” were scanned. These specific terms were used in the article search process in order to filter out the articles that are not related to the scope of this study. However, a literature review was conducted to determine the terms to be used in the article search. Articles whose title and content are not compatible with the purpose of this study were not included in the bibliometric analysis. This process is shown in Figure 1. By using quotation marks in the words used while searching, specific articles suitable for the purpose of this study were accessed.

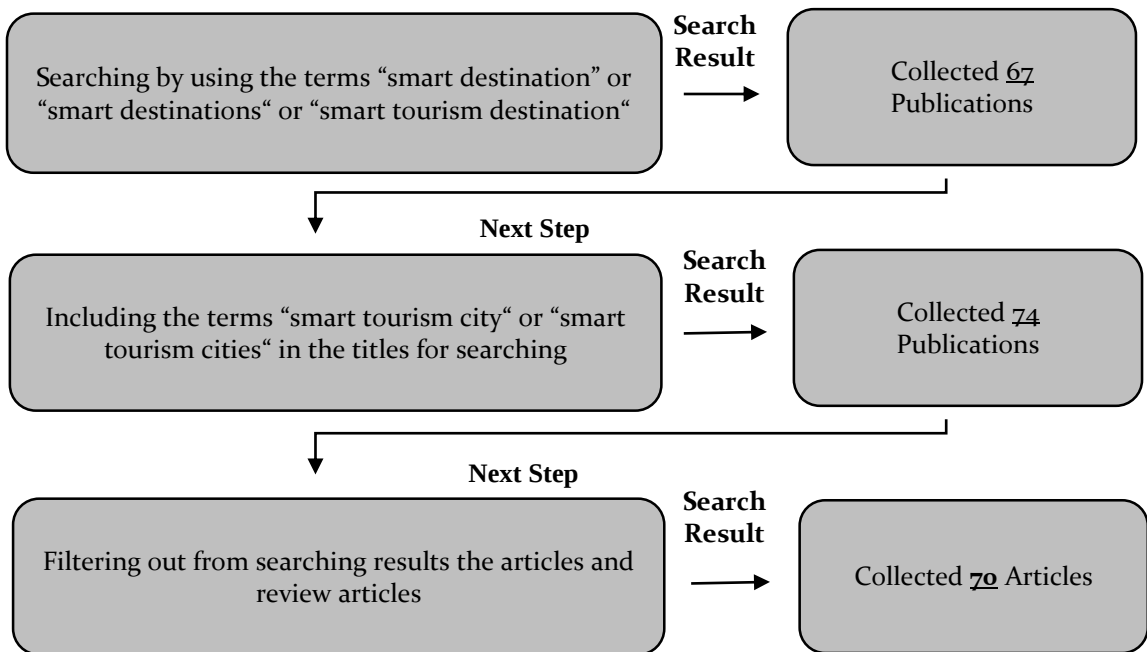


Figure 1. Article Search Process

At the end of the article search, a total of 70 STD articles were found in the WoS database. By analyzing these articles, the annual publication number, WoS categories and indexes, most productive countries, country collaborations, most productive institutions, journal, and author co-citation network, most cited articles and authors and most used author keywords were examined. CiteSpace 5.8.R3 software was used in the data analysis. CiteSpace was preferred in this study because it is more compatible than other software for bibliometric analysis with files in WoS format or plain text (Chen, 2014). The articles downloaded from the WoS database were transferred to the CiteSpace software for analysis.

4. Research Results

4.1. Annual Number of STD Articles

The annual distribution of articles published on STD is shown in Figure 2. All articles published between 1975-2021 in the WoS database were searched. As a result, it was determined that the first article on STD was published in 2013. It is noteworthy that there has been a significant increase in the number of STD articles published since 2019. This finding shows that the STD research topic has been started to be studied more by researchers recently.

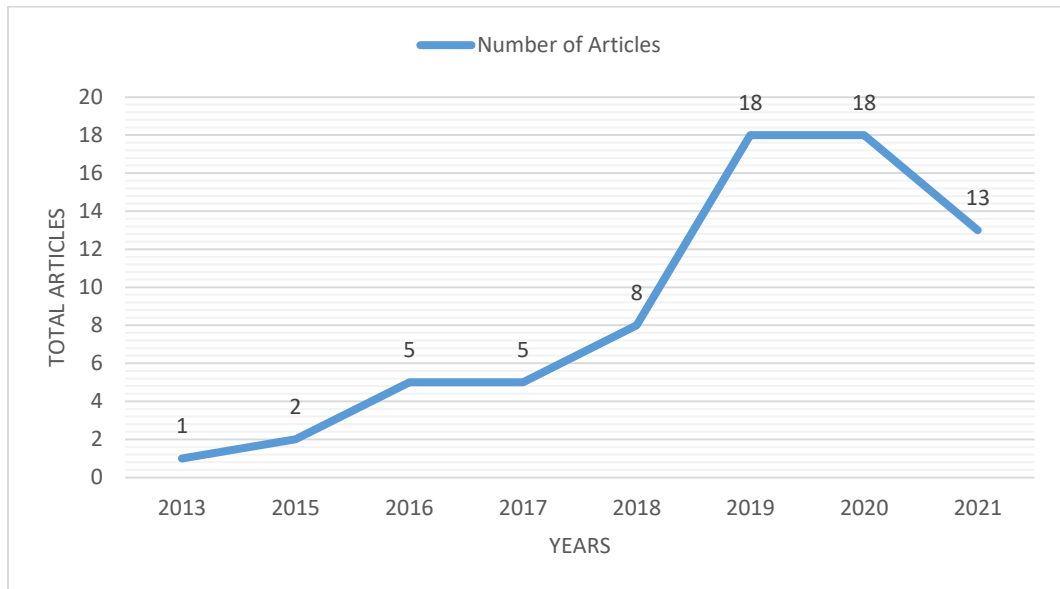


Figure 2. Annual Number of STD Articles

WoS Categories and Indexes of STD Articles

Figure 3 shows the top 10 WoS categories in which STD articles are published the most and the distribution of these articles. Accordingly, the WoS category in which the most STD articles are published is Hospitality Leisure Sport Tourism ($n=41$). Therefore, it is seen that the majority (58.57%) of the STD articles were published in the tourism field. Following that, it was determined that 12 (17.14%) articles were published in the management category and 10 (14.28%) articles were published in the environmental studies category. Geography 3 (4.28%), Computer Science Information Systems 2 (2.85%), and Information Science Library Science 2 (2.85%) are the WoS categories with the least number of articles published on STD.

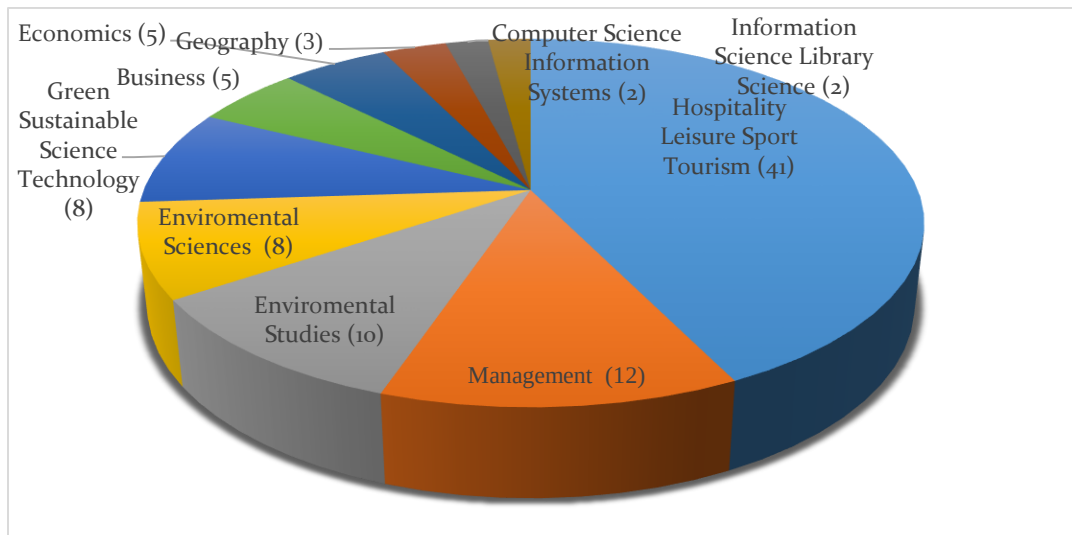


Figure 3. WoS Categories of STD Articles

When the indexes are examined, it is noteworthy that 39 STD articles were published in the SSCI (Social Sciences Citation Index) indexed journals. In addition, it was determined that 28 articles were published in the ESCI (Emerging Sources Citation Index) indexed journals, 10 articles in the SCI-Expanded (Science Citation Index Expanded), and 3 articles in the BKCI-SSH (Book Citation Index–Social Sciences).

4.2. Most Productive Countries

The most productive countries in STD article publications are shown in Figure 4.

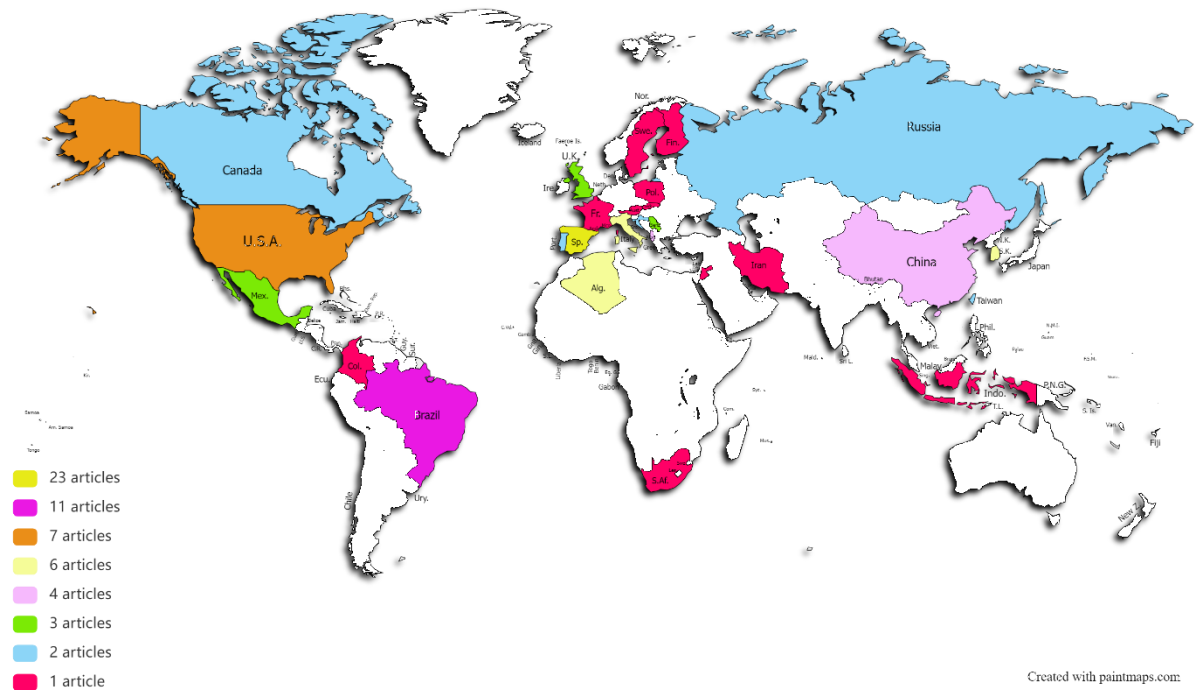


Figure 4. Most Productive Countries (this map was created by the author via paintmaps.com)

When Figure 4 is examined, it is seen that Spain is the most productive country with 23 articles in STD articles. This country is followed by Brazil with 11 articles and USA with 7 articles. Among the European countries that give strategic priority and importance to smart tourism for the development of tourism, Spain is a particular country that adopts it as a national policy (Gajdošík, 2018). Therefore, this country's leading position in STD article productivity can be explained in this way. These countries are followed by Italy and South Korea (6 articles), People's Republic of China (4 articles), England, Mexico, Serbia (3 articles), Canada, Croatia, Portugal, Russia, Taiwan (2 articles), Austria, Colombia, Finland, France, Indonesia, Iran, Jordan, Poland, Slovakia, South Africa and Sweden (1 article).

4.3. Country Collaborations

Figure 5 shows the network of country collaborations on STD articles. Each node in the network represents a country and the links show the collaboration between countries. These links thicken according to the intensity of country collaborations.

CiteSpace, v. 5.8.R3 (64-bit)
 December 17, 2021 1:18:27 PM EET
 Vio: C:\Users\Tahin\citespace\Examples\Data
 Timespan: 2013-2021 (Slice Length=1)
 Selection Criteria: g-index (k=25, LRF=3.0, L/N=10, LBY=5, e=1.0)
 Network: N=24, E=18 (Density=0.0652)
 Largest CC: 15 (62%)
 Nodes Labeled: 5.0%
 Pruning: None



Figure 5. Network of Country Collaborations
 (Note: Multiple occurrences of a country in the same paper are counted once)

As a result of the country collaboration analysis, it has been determined that there is a network consisting of 24 nodes and 18 links. Density 0.0652, weighted mean silhouette 0.931, and modularity $Q=0.6358$. The mean silhouette value between -1 and +1 and the Q value between 0.4-0.8 are considered sufficient for the homogeneity of the network (Li *et al.*, 2017). Therefore, it can be stated here that this network is close to homogeneous. When the network is examined, it is seen that seven countries are at isolated points and have no collaboration links while other countries have a total of 18 collaboration links. According to the analysis results, it is noteworthy that the collaboration links between countries such as England-Finland, Mexico-Switzerland, China-Taiwan, China-USA, and Taiwan-Indonesia are thick. The link strength value between these countries was determined as 1.0. 1.0 value indicates the strongest link, and 0 value indicates no link (Chen, 2016). Therefore, the collaboration between these countries is quite intense. It has been found that the link strength values between other countries are close to 0, that is, weak.

Table 1. Number of Country Collaborations and Centrality Degrees

Country	Collaboration Frequency	Centrality Degree	Year
Spain	22	0.43	2015
Brazil	9	0.36	2019
USA	6	0.34	2013
Italy	6	0.00	2015
South Korea	5	0.00	2017
Peoples Republic of China	4	0.19	2013
Mexico	3	0.32	2016
Canada	2	0.26	2020
Russia	2	0.19	2020
Taiwan	2	0.10	2020

Table 1 shows the country collaboration frequencies and centrality degrees. According to these data, Spain (22) draws attention as the country with the highest collaboration frequency and centrality degree (0.43).

4.4. Most Productive Institutions

The top 5 institutions in which STD articles are published can be seen in Figure 6. In terms of productivity, Universidad de Alicante (Spain) stands out as the most productive institution with 7 articles. The authors of this institution published 1 article in 2016 (Ivars Baidal, Solsona Monzonis & Giner Sánchez, 2016), 3 articles in 2019 (Femenia-Serra, Perles-Ribes & Ivars-Baidal, 2019b; Ivars-Baidal, Celdran-Bernabeu & Perles-Ivars, 2019; Femenia-Serra, Neuhofer & Ivars-Baidal, 2019) and 2021 (Femenia-Serra & Ivars-Baidal, 2021; Soares, Ruiz & Ivars Baidal, 2021; Ivars-Baidal, *et al.*, 2021). Therefore, it can be stated that the productivity of STD articles in this institution has started to increase in recent years.

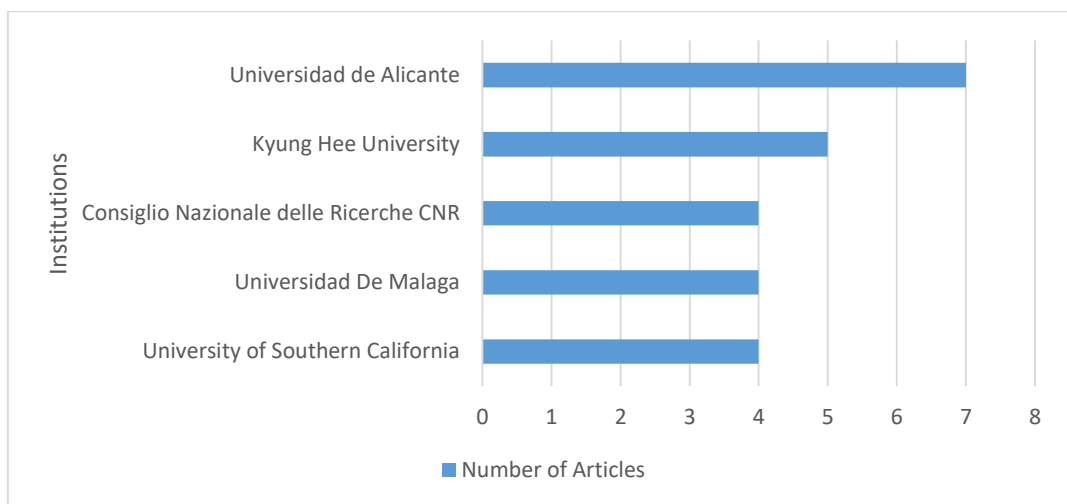


Figure 6. Top 5 Productive Institutions

Kyung Hee University (South Korea) ranked second in STD article productivity after Universidad de Alicante with a total of 5 articles. The total number of articles published by the authors of this institution in the 1975-2022 period is 41,680. While 453 of these articles are in the category of Hospitality Leisure and Sport Tourism, 983 of them are in Multidisciplinary Sciences, 312 in Management, 63 in Social Sciences Interdisciplinary, and 17 in Cultural Studies. The authors of this institution published 1 STD article in both 2019 and 2020 and 3 articles in 2021. Institutions that shared the 3rd, 4th, and 5th ranks in STD article productivity with 4 articles each were Consiglio Nazionale Delle Ricerche CNR (Italy), Universidad De Malaga (Spain), and University of California Southern (USA). It is noteworthy that the number of STD articles published by the authors in these three institutions has started to increase since 2018. The presence of two universities from Spain in the top 5 institution rankings can be considered another important finding.

4.5. Co-citation Network of Journals

Figure 7 shows the results of the journal co-citation network analysis. This entire network consists of 267 nodes and 1194 links. Network values were calculated as 0.0336 for density, 0.7769 for weighted mean silhouette, and $Q=0.5621$ for modularity. The thickness of the link lines shows that the journal co-

citation network is strong. When figure 7 is examined in detail, Tourism Management (52) and Information, Communication & Society (52) journals share the first place among the Top 10 journals with the highest number of co-citations. The journals with the highest centrality degrees were equally found as Asia Pacific Journal of Information Systems (0.15) and Current Issues in Tourism (0.15). In this respect, it can be stated that these journals have a central position in the citations made by the STD articles and are important reference sources for the researchers. The fact that the journal links appearing on the network are mostly in light orange indicates that most of the STD articles are current studies published in recent years.

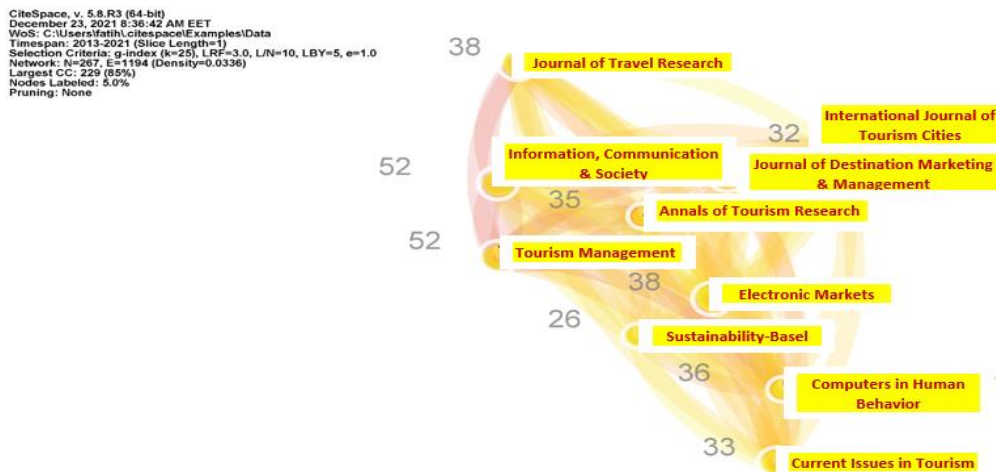


Figure 7. Co-citation Network of Top 10 Journals

4.6. Most Cited Articles

Table 2 contains data on the total number of citations, average per year, and publication years of the Top 10 most cited STD articles according to the WoS database. According to these data, the most cited article is published by Boes *et al.* (2016). This article was cited 184 times in total and the average number of citations per year is 30.67. Therefore, it stands out with its high citation performance both in total and per year. This article is followed by Wang *et al.* (2013) with a total of 146 citations. On the other hand, with an average of 16.22 citations per year, this article appears to be lower in the ranking. The article published by Ivars-Baidal *et al.* (2019) is the fifth STD article with the highest performance in terms of total citations and the second highest performance in terms of average citations per year (30.33)

Table 2. Top 10 Cited Articles

Article	Total Citation	Average Per Year
Boes et al. (2016)	184	30.67
Wang et al. (2013)	146	16.22
Chiappa & Baggio (2015)	129	18.43
Vecchio et al. (2018)	100	25
Ivars-Baidal et al. (2019)	91	30.33
Buonincontri & Micera (2016)	91	15.17
Jovicic (2019)	74	24.67
Femenia-Serra et al. (2019a)	53	17.67
Femenia-Serra et al. (2019b)	52	17.33
Kim et al. (2017)	51	10.2

Source: Web of Science Core Collection, 2021.

4.7. Author Co-Citation Network and Co-Citation Counts

Figure 8 shows the co-citation network of STD article authors. The co-citation network of all authors consists of 278 nodes and 1155 links. The density value is 0.03, the weighted mean silhouette value is 0.7769, and the modularity value is $Q=0.5621$. According to these data, it can be stated that the co-citation network has a value close to homogeneous. The figure shows that the Top 10 authors have strong co-citation network links. In addition, Table 3 contains the data of the Top 10 authors with the highest number of co-citation counts and the highest centrality degree in 70 STD articles.

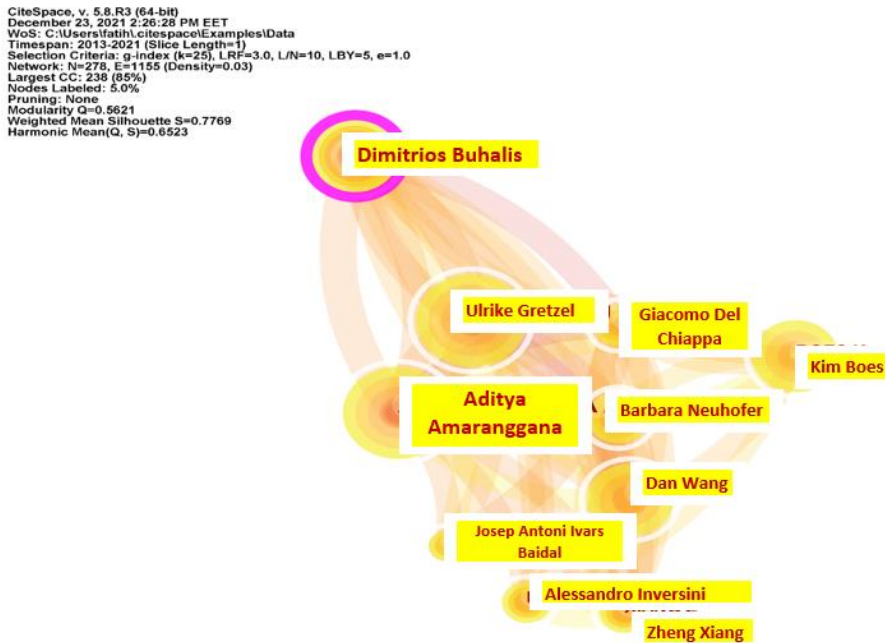


Figure 8. Co-citation Network of Top 10 Authors

According to the data in Table 3, the author with the highest co-citation count is Ulrike Gretzel with 50 citations. This author is followed by Aditya Amaranggana with 47 co-citations and the third author is Dimitrios Buhalis with 37 co-citations. Dimitrios Buhalis also draws attention as the author with the highest degree of centrality (0.16) among the Top 10 most cited authors. Piera Buonincontri (0.27) and Luigi Atzori (0.24) are the authors with the highest centrality degree. Therefore, it is possible to state that the articles of these two authors are of key importance as basic reference sources in STD studies.

4.8. Most Used Author Keywords

In Figure 9, the distribution of keywords used in 70 STD articles is given by years between 2013-2021. The size of the "+" increases according to the frequency of using the keywords in the articles. According to the Figure 9, "internet", "innovation", "city", "technology", "foundation", "china" and "ict" were dominant keywords in the first years (2013-2016) when the STD articles were published. In recent years (2019-2021), keywords such as "big data", "social media", "image", "destination competitiveness", "destination image", "public value", "collaboration", "value creation" have come to the fore.

Table 3. *Top 10 Author Co-Citation Counts and Centrality Degrees*

Author	Co-Citation Counts	Years	Author	Centrality Degrees	Years
Ulrike Gretzel	50	2016	Piera Buonincontri	0.27	2016
Aditya Amaranggana	47	2015	Luigi Atzori	0.24	2013
Dimitrios Buhalis	37	2015	Dimitrios Buhalis	0.16	2015
Dan Wang	37	2016	Rodolfo Baggio	0.14	2015
Kim Boes	33	2017	Bénédicte Aldebert	0.10	2015
Barbara Neuhofer	23	2016	Carlos Lamsfus	0.09	2018
Giacomo Del Chiappa	22	2016	Xia Wang	0.09	2019
Alessandro Inversini	20	2018	Namho Chung	0.09	2017
Josep Antoni Ivars Baidal	20	2018	Aditya Amaranggana	0.08	2015
Zheng Xiang	19	2018	Boyd Cohen	0.08	2016

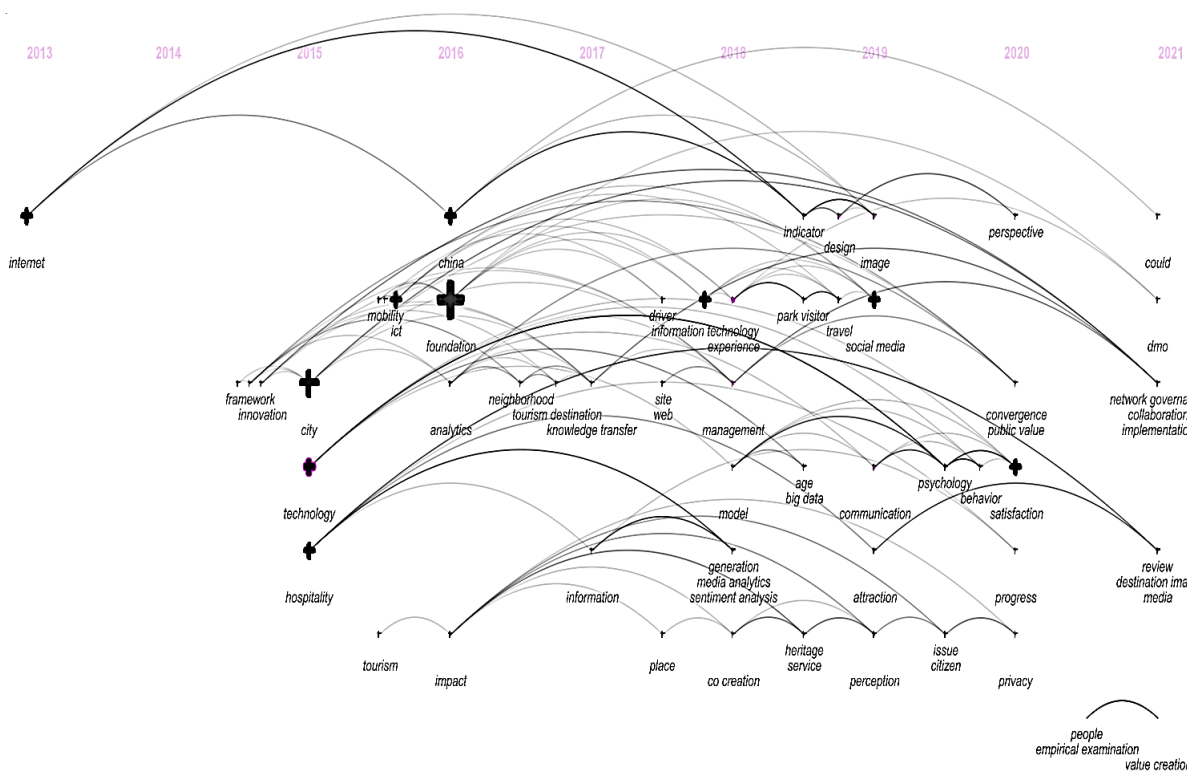


Figure 9. *Timeline View of Author Keywords*

When the keyword frequencies are examined in Table 4, it is seen that "foundation", "city" and "technology" are the most frequently used keywords. According to the centrality degree values, "technology", "hospitality" and "experience" were determined as the most central keywords used in the STD articles.

Table 4. *Frequencies and Centrality Degrees of Top 10 Keywords*

Keywords	Frequencies	Years	Keywords	Centrality Degrees	Years
foundation	22	2016	technology	0.31	2015
city	19	2015	hospitality	0.23	2015
technology	16	2015	experience	0.22	2018
internet	9	2013	foundation	0.21	2016
experience	9	2018	management	0.21	2018
hospitality	8	2015	internet	0.19	2013
ict	8	2016	value creation	0.17	2021
china	7	2016	model	0.12	2018
information technology	6	2018	city	0.11	2015
management	6	2018	co-creation	0.10	2018

5. Discussion and Conclusion

In this study, a bibliometric analysis of STD articles was performed. In this context, the bibliometric features of the STD articles published in the WoS database journals which have attracted great interest by researchers in the last 10 years are determined and contribute to the relevant literature. As a result of the article search process in the WoS database, it was found that the first STD article was published in 2013. Therefore, it can be stated that the articles published on this subject do not have a deep-rooted history. In other words, it is possible to conclude that STD studies are still in their infancy. The noticeable increase in the number of STD articles published in the last 3 years shows that this subject is one of the important trend topics in the tourism research field for the last few years. It was determined that the STD articles were mostly (58.57%) published in the Hospitality Leisure Sport Tourism WoS category. In addition, it is seen that STD articles have been published in different categories of management, environmental sciences, geography, and computer science information systems. For this reason, it is possible to find articles published on STD in different research fields besides tourism.

In terms of the total number of articles published in the WoS journals, the most productive country on STD is Spain with 23 articles. The fact that Spain has more than twice the article productivity of Brazil (11 articles), the country with the closest number of articles, reinforces its leading position in STD research. In addition, the fact that it ranks first in terms of the number of country collaboration ($n=22$) and centrality degree value ($C=0.43$) in STD articles clearly shows that Spain acts as a bridge and plays a key role in collaborative studies between countries. In the ranking of the most productive institutions, Universidad de Alicante from Spain ranks first, and the presence of two universities from this country in the Top 5 productive institutions ranking is another data revealing the importance of Spain in terms of STD studies. It is noteworthy that the projects and investments made in the field of smart city and smart tourism in Spain have been supported by academic studies in recent years (Femenia-Serra & Perea-Medina, 2016; González-Reverté, 2019). Cities such as Málaga, Valencia, Palma are shown among the exemplary cities that implement the best smart tourism practices in Europe (<https://smart-tourism-capital.ec.europa.eu/>). Spain's success in articles and studies on STD sets a good example for other countries.

Tourism Management Journal and Information, Communication & Society Journal are in the first place in terms of the number of co-citations. Asia Pacific Journal of Information Systems and Current Issues in Tourism are journals with equal value and the highest centrality degree. These journals also draw attention as journals with a high impact rate at the Q_1 level in academic studies in the field of tourism

(www.scimagojr.com). Therefore, it is possible to evaluate these journals as important sources for STD articles published. In addition, it can be stated that these journals are effective sources in terms of co-citation in STD articles. In other academic studies (Park *et al.*, 2011; Mauleon-Mendez *et al.*, 2018; Garrigos-Simon *et al.*, 2019), the effectiveness of these journals as a reference source in the field of tourism is revealed. Other findings from this study reveal that the most cited (n=184) article is published by Boes *et al.* (2016). The article authored by Ivars-Baidal *et al.* (2019) has just been published recently. In this short time, it is noteworthy that this article's performance in average citations per year is quite high. These two articles are rich information sources for researchers in STD studies.

According to research results, the author with the highest co-citation count is Ulrike Gretzel, and the author with the highest citation centrality degree is Piera Buonincontri. In addition, Dimitrios Buhalis is seen to be in an important position, together with the other two authors, as the third in terms of the number of citations and the centrality degree. It is also revealed in another bibliometric study conducted by Leung *et al.* (2017), in which the studies co-authored by Dimitrios Buhalis are cited many times. In the relevant literature, it is possible to see that there are bibliometric studies showing the success of Ulrike Gretzel in the citation (Nuasir *et al.*, 2019). It can be suggested that these authors should be considered by other researchers both in terms of collaboration and as a reference source in future studies on STD.

It is noteworthy that new and different words were added to the keywords such as internet, ICT, technology, and innovation, which were frequently used in the first years of the STD articles. In this context, it is seen that keywords such as big data and social media which emerged with the developing new technologies are used in STD articles. However, foundation, city, and technology are the most frequently used keywords in STD articles. In recent years, the concepts of destination competitiveness, destination image, and value creation have come to the fore among keywords, indicating that the subject of STD has begun to be researched in this context by the authors. Accordingly, it can be pointed out that the importance of STD applications in destination management and marketing has been emphasized in recent studies (Corte *et al.*, 2017; Lee *et al.*, 2020). In addition, experience which ranks third in keyword centrality is among the keywords that have been frequently used in the studies on tourism experiences in smart destinations (Femenia-Serra & Neuhofer, 2018; Azis *et al.*, 2020) in the last few years. Therefore, the relationship between STD applications and tourism experiences is seen as one of the key elements of academic research conducted in recent years. From this point of view, it is possible to note that STDs create a new holiday and travel experience for tourists. The role of these experiences in creating destination image and providing competitive advantage is among the topics that remain current in academic studies in this field.

The results obtained from this study provide up-to-date data on the quality and quantity of STD articles. The results also can be used in the planning of future studies on this subject. On the other hand, this study provides some clues for researchers to better understand the current trends in the literature on the STD subject. Although academic studies on STD have tended to increase in recent years, more research in the future will provide a deeper understanding of the subject.

Future Research Directions

In this study, only articles were included in the bibliometric analysis. Other types of academic publications such as conference papers, books, or chapters were excluded from the study. In future studies, research can be carried out in which other types of publications are included. Although the WoS database is the leading source of information covering journals and articles, other databases such as Scopus can be used for similar research. Especially since 2019, the number of studies on STD has been

increasing. The subject has been researched from different perspectives with an interdisciplinary approach. In this context, the knowledge of the STD can be increased by giving more attention to the studies that can be done with interdisciplinary collaboration in the future. The relationship of STD with fields such as geography, economy, environment, sustainability, and smart applications in this context can be examined in depth in future research. Studies comparing the STD practices of countries can be conducted. In the future, similar new bibliometric studies can be carried out to reveal the current status of the literature on STD with up-to-date data.

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