BIBLIOMETRIC ANALYSIS OF SMART CITIES AND TOURISM STUDIES WITH VISUAL MAPPING TECHNIQUE

Análise Bibliométrica de Cidades Inteligentes e Estudos de Turismo com Técnica de Mapeamento Visual

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ABSTRACT

Smart cities, where technological innovations are used and which provide easy access to information in the city where both local people and tourists are located, may have the potential to become prominent cities in terms of tourism. In the study, the bibliometric method with the Vosviewer package program was used. 1050 studies obtained from the Web of Science data platform were examined, which contain smart city and tourism. The obtained data were analyzed using the visual mapping technique. According to the collocation analysis made on the keywords, twelve different themes were determined and grouped as smart city, tourism, smart tourism destination, tourism. Within the scope of the research, most of the studies are congress papers. In the literature, it has been determined that the subject of the smart city is mainly associated with the concepts of destination, internet, sustainability, accessibility, big data, tourism. According to the findings, the studies started in 2000 and increased in 2020. Engineering, computers and tourism are the disciplines where most studies are done.

KEYWORDS

Tourism; Smart City; Bibliometric; Visual Mapping.

RESUMO

Cidades inteligentes, aquelas onde utilizam-se inovações tecnológicas e que apresentam facilidade de acesso à informação tanto onde esteja a população local como turistas, podem ter potencial para se tornarem cidades de destaque em termos de turismo. No estudo foi utilizado o método bibliométrico com o programa Vosviewer. Foram examinados 1050 estudos obtidos da plataforma de dados Web of Science, que tratassem de <cidade inteligente> e <turismo>. Os dados obtidos foram analisados por meio da técnica de mapeamento visual. De acordo com a análise de colocação das palavras-chave, doze temas diferentes foram determinados e agrupados como cidade inteligente, turismo, destino turístico inteligente, turismo. No âmbito da pesquisa, a maioria dos trabalhos são trabalhos de congressos. Na literatura, foi determinado que o tema da cidade inteligente está associado principalmente aos conceitos de destino, internet, sustentabilidade, acessibilidade, big data, turismo. De acordo com os resultados, os estudos começaram em 2000 e aumentaram em 2020. Engenharia, informática e turismo são as disciplinas onde mais estudos são feitos.

PALAVRAS-CHAVE

Turismo; Cidade Inteligente; Bibliometria; Mapeamento Visual.

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INTRODUCTION

There are some changes in destinations because of the technological developments in the world. One of the changes experienced is the widespread use of information and communication technologies in the tourism sector. The construction of cities with information and communication technologies and smart technologies in a way that facilitates the opportunities of both local people and tourists provides an opportunity to compete in tourism (Gretzel, Sigala, Xiang & Koo, 2015). The concept <smart city> has emerged as that has been widely used in the literature in recent years. The concept of a smart city emerges to create livable and sustainable areas due to reasons such as environmental pollution, traffic problems, rapid population growth, and climate change in cities (Lazaroiu & Roscia, 2012).

The widespread use of technology in smart cities increases the quality of life of local people, provides better services, problems are resolved in a shorter time. Smart city transformation is considered an alternative because of health problems, economic problems, social and environmental problems that arise especially with population growth (Duran & Meydan Uygur, 2019). Information and communication technologies and the use of the internet find solutions to people's problems. Especially in the tourism sector, there is the intensive use of information (Koo, Gretzel, Hunter, & Chung, 2015:100). Thanks to smart applications in cities, providing citizens and tourists with attractions, food and beverage, alternative travel suggestions or personalized services increase tourist experiences. Tourists use smart applications and share their experiences so they affect the decision-making process of other tourists (Yoo, Sigala, & Gretzel, 2015: 240).

Smart cities act as a ladder to the formation of smart tourism destinations (Jasrotia & Gangotia, 2018). The establishment of smart cities, not only facilitates the life of citizens but also ensures the development of sustainable tourism (Silik & Ozdemir Akgul, 2021). The study is important because of the identification of scientific studies evaluating the relationship between <smart cities> and <tourism>. Also, it contributes to the field in terms of determining the relationships between these studies. So, this study fills in the gaping smart city and tourism fields. The emphasis on <smart city> in the tourism literature supports the research of <smart city and tourism>. This study has been prepared to analyze the situation of studies that deal with the <smart city and tourism> phenomena together. The study aims to reveal the bibliometric profile of the studies that deal with <smart city and tourism> together in the international literature, in line with the determined parameters, and to reveal the results with visual mapping analysis. In

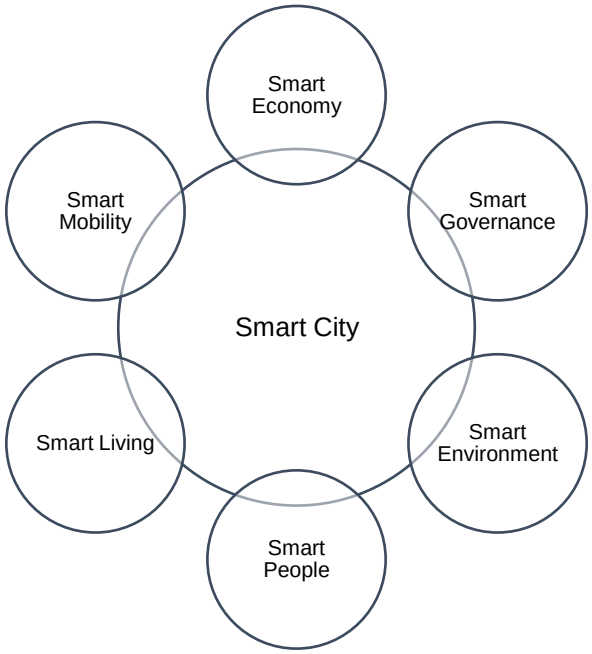
the light of increasing bibliometric studies, the topic of <smart city> is up-to-date and important, which also played an active role in the study.

SMART CİTY AND TOURİSM

There are many definitions of a <smart city>, which are frequently encountered in the literature. The concept <smart city> has come to the fore especially due to reasons such as population growth, rapid urbanization, and environmental problems. The word <smart> is a concept created by combining the initials of the words Specific-Measurable-Achievable-Relevant-Time Bound (Rubin, 2002). The smart city includes many features and is above the ordinary city (Giffinger, Fertner, Kramar, Kalasek, Pichler-Milanoviç & Meijers, 2007). The smart city is a city management model that aims to increase the quality of life of both, citizens and tourists and the efficiency of the city infrastructure by using information and communication technologies (Cicirelli, Giandomen, & Andrea, 2017, 106). The smart city includes the use of the collective intelligence of the city by the citizens as a result of the interconnection of information and communication technologies and infrastructure (Harrison, Eckman, Hamilton, Hartswick, Kalagnanam, Paraszczak & Williams, 2010). When the smart city is mentioned, quality, ability, intelligence level and social cohesion are emphasized (Batty, Axhausen, Giannotti, Pozdnoukhov, Bazzani, Wachowicz, Ouzounis & Portugali, 2012). The continuity of innovation in the concept of a smart city is associated with the use of human capital in solving problems. At the same time, smart cities aim to increase sociality, quality of life and economic development. In smart cities, lifelong learning is defined as a city management model that emphasizes sustainability with the most efficient and effective use of resources (Ojo, Dzhusupova & Curry 2016).

Smart management, smart cities, smart environment, smart economy, smart life and smart transportation are smart city components (Kim, Carlos & Sabah, 2017). While these components provide the development of the city in terms of socioeconomic, logistics and competitiveness, they also prioritize sustainability (Kummithaa & Crutzen, 2017: 43). These components are shown in Figure 1.

Figure 1. Smart City Components



Source: Cohen, 2012

The relationship between tourism and the city has a complex structure. Cities are places where the tourists and the local people come together. This situation makes it mandatory for cities to provide services by responding to different requests. Therefore, tourists can disrupt the balance by affecting the facilities and quality of life in the city. However, cities define themselves as tourism destinations because of their competitiveness and the economic contribution of tourism. Cities attract the attention of tourists as places where more touristic experiences can be obtained in a contemporary sense (La Rocca, 2014). Due to the widespread use of technology and accessibility, tourists have become conscious of the people who use the city. With the widespread technology, smart cities have been evaluated together with smart tourism (Gretzel et al., 2015).

The concept of a <smart city> is associated with smart tourism (Duran & Meydan Uygur, 2019). Smart tourism for the smart city includes the technological developments used in tourism (La Rocca, 2014). Smart tourism covers the use of physical infrastructure, social connections, government resources and the human mind to collect data in a city and destination (Gretzel et al., 2015). Smart tourism also includes smart cities (Celik & Topsakal, 2017). In the smart tourism structure, there is an information exchange center consisting of cloud computing, internet-connected objects and artificial intelligence. Tourist requests and responses, natural areas

reports and monitoring, government statistics and management, business advertisements and responses are met in the information exchange center (Zhang, Li & Liu, 2012). Augmented reality used for tourism in smart cities, electronic travel guides, QR codes, smart complaint management systems, vehicle tracking systems are some of the technological innovations. It is aimed to increase the tourist experience with the smart technologies used (Buhalis & Amaranggana, 2015).

In studies on smart cities and tourism in the literature, Habeeb and Weli (2020) examined the relationship between smart cities and smart tourism. The contributions of smart cities and smart tourism to sustainable tourism studies and increasing the competitiveness of countries are discussed. In the study on Iraq, it was emphasized that smart city and smart tourism are two closely related concepts and have importance in the development and growth of touristic destinations. La Rocca (2014) stated that technological development can improve urban supply with a holistic approach to increasing the quality and efficiency of smart cities. The internet of things plays an important role in sustainable tourism practices in smart cities (Nitti, Pilloni, Giusto & Popescu, 2017). The relevance and usability of blockchain technology in smart cities have been investigated (Nam, Dutt, Chathoth & Khan, 2021). Jasrotia and Gangotia (2018) stated that smart cities and smart tourism are interrelated and that it is necessary to create sustainable smart cities to create smart tourism destinations. Gretzel (2018) states that smart tourism is the basis of the smart city. It has been stated by Dabeedooal, Dindoyal, Allam and Jones (2019) that smart tourism will contribute to sustainable urban development. Another study in which smart cities and tourism are associated was conducted in Dubai (Khan, Woo, Nam, & Chathoth, 2017). It has been stated by González-Reverté (2019) that smart tourism contributes to sustainable development in cities. According to the literature smart city and tourism subjects are related to each other.

METHOD

In the study, visual mapping was done with bibliometric analysis, which is a quantitative research method. The research aimed to fill the gap about which fields the studies examining the <smart city and tourism> phenomena together intersect, which subjects they deal with, in which countries the studies are carried out, the distribution by years, and which type of document contributes more to the field. In this way, the issue of how to direct the studies of researchers in the field of smart city and tourism against the increasing works was taken into account, and

it was aimed to increase the awareness of the authors and subjects that make up the discipline with minimum effort. This study is important in terms of showing the bibliometric analysis of publications that include high-impact scientific journals and multidisciplinary indexes. The studies in which the concepts of <smart city and tourism> were filtered through the Web of Science database system between 01-02-2022 and 15-02-2022. Because of the use of <smart city and tourism>' subjects in scientific research, these keywords are used for research. 1050 studies were identified according to keywords and all studies in the database were used for analysis. All data merge and data cleaning processes were done for text mining with the help of Bib Excel. Statistical analysis was used for showing the effective organizations, authors and countries using MS Office Excel 2016. Also, the annual evaluation of published papers was illustrated and a trend analysis of these papers was interpreted.

Since the study is conceptual research conducted on the Web of Science database, it does not require ethics committee approval. The Web of Science database was chosen in terms of having a very broad perspective and offering very rich content. In the research, the content analysis of the <smart city> and <tourism> research area was carried out with the Vos viewer package program. With VOS viewer, it is possible to analyze the subject distribution of the journals according to the year studies can be created. Analysis of the citations of the Author/Authors can be performed. By using distance-based and graphic-based maps, a general profile of subjects and areas can be created. With distance-based maps, it can detect the proximity of words in the studies to be analyzed. With such studies, it can be determined with which words the words used in the literature have closer coordinates. It is possible to detect related words in the field. On the other hand, it can be made more possible to detect meaningful relationships in big data (Artsin, 2020).

Vos viewer is a software tool for creating and visualizing bibliometric networks. Vosviewer also offers a text-mining function that can be used to create and visualize co-occurrence networks of important terms extracted from scientific literature (Van Eck & Waltman, 2020). Data mapping was carried out thanks to the feature of the Vosviewer program and the 1.6.18 version of the Vosviewer program was used as the visual mapping method. MapIn map seated by Vosviewer, elements also provide the opportunity to analyze information tags and junction points such as countries, journals, authors, co-citation literature and keywords as network connections between them. The size of the circles in the network maps represents the size in the number of

occurrences, and the colors represent the clusters. The distance between the two circles indicates the relationship between the groups.

FINDINGS

With the 1.050 studies obtained within the scope of the research, the document type, current trends, thematic topics and countries of the <smart city and tourism> research were determined. It has been determined that the studies started to be published in 2000 and there was a regular increase over the years. To evaluate the periodical process, the research was designed around the subject of <smart city and tourism>, and the 22-year course in the literature was tried to be determined bibliometric ally. According to Table 1, there is a serious acceleration in the number of publications between 2011 and 2020. Especially in the last seven years [2016-2022], the percentage of studies [70.20%] constitutes more than half of the total percentage. In 2020, the peak point was reached with 168 publications. The fact that the subject of <smart city and tourism> is a subject that is researched around the world and the increase in studies from year to year emphasizes the increase in interest in the subject.

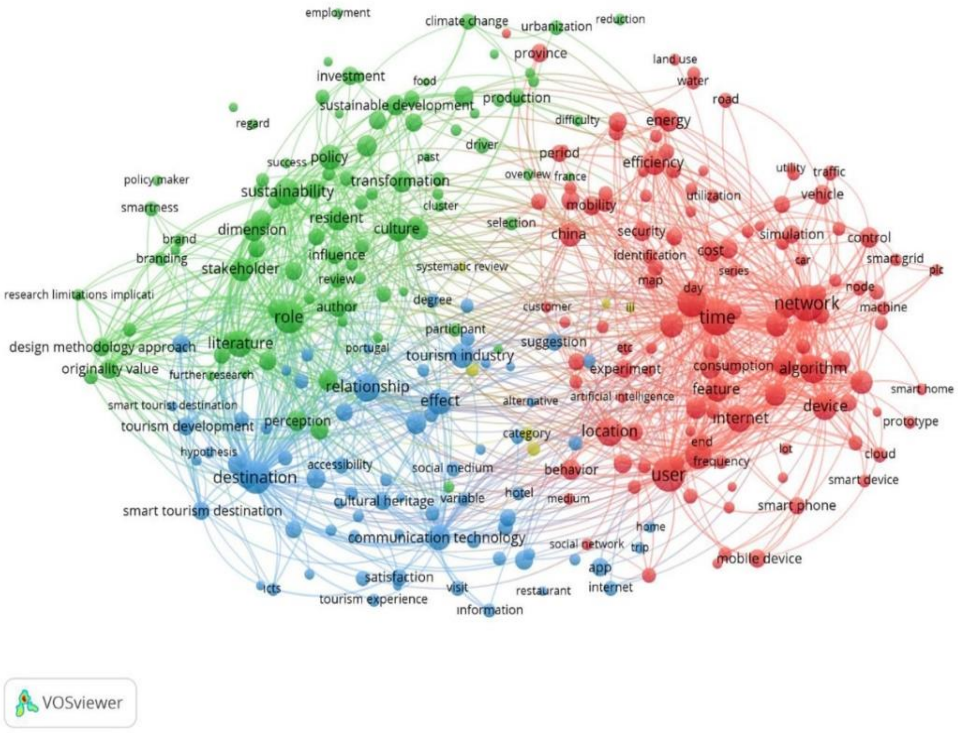
Table 1. Distribution of Research on Smart City and Tourism by Years

Year	Number	%
2000	2	0.190
2005	3	0.285
2006	2	0.190
2008	2	0.190
2009	4	0.380
2010	1	0.095
2011	12	1.142
2012	11	1.047
2013	42	4.00
2014	59	5.619
2015	63	6.00
2016	145	13.809
2017	120	11.428
2018	150	14.285
2019	167	15.904
2020	168	16.00
2021	97	9,238
2022	2	0.190

Source: Created by the author

The analysis of the words in the abstracts of 1.050 studies related to the keywords <smart city and tourism> between 2000-2022 in the Web of Science data platform are indicated in Map 1. It is seen that the most used words in the studies on <smart city and tourism> are the destination, time, network, user, role, sustainability, tourism, smart tourism destination. When the map is examined, it is seen that there are four main connection sets. These clusters are grouped as destination, network, role and tourism industry. The close positioning of the groups created shows that the cooperation network is strong. Although the words destination, network and tourism industry are in different groups, it is seen that they are related to each other. Especially in the destination word group, it is seen that accessibility is closely related to smart tourism destinations and communication technologies. The short distance between the keywords shows that the relationships are strong.

Map 1. Text Data Based Analysis of <Smart City and Tourism> Topics Reduced Network Map



Map 2, the cooperation between the keywords used in the publications titled <smart city and tourism> was examined through the reduced network map. Keyword analysis was used to

evaluate the content of the topics covered in studies published on <smart city and tourism>. According to the co-occurrence analysis made on the keywords given by the authors in the studies published on the subjects of <smart city and tourism>, it is seen that there are twelve different clusters. It is seen that these are grouped as Smart Tourism, Smart City, Smart Cities, Tourism, Smart Tourism Destination, Sustainability, Information Communication Technology (ICT), Technology, Big Data, Social Media, Urban Tourism, Augmented Reality. When the network map is examined, the most collaborative words were Smart City (138) and Smart Tourism (124). The concepts of "smart city and smart tourism" are the focal point of the clusters on the map. These focal points are evolving into an increasingly broad and comprehensive area of research, covering a variety of topics.

Map 2. Reduced Network Map of Keywords Used Together in Publications on <Smart City and Tourism>

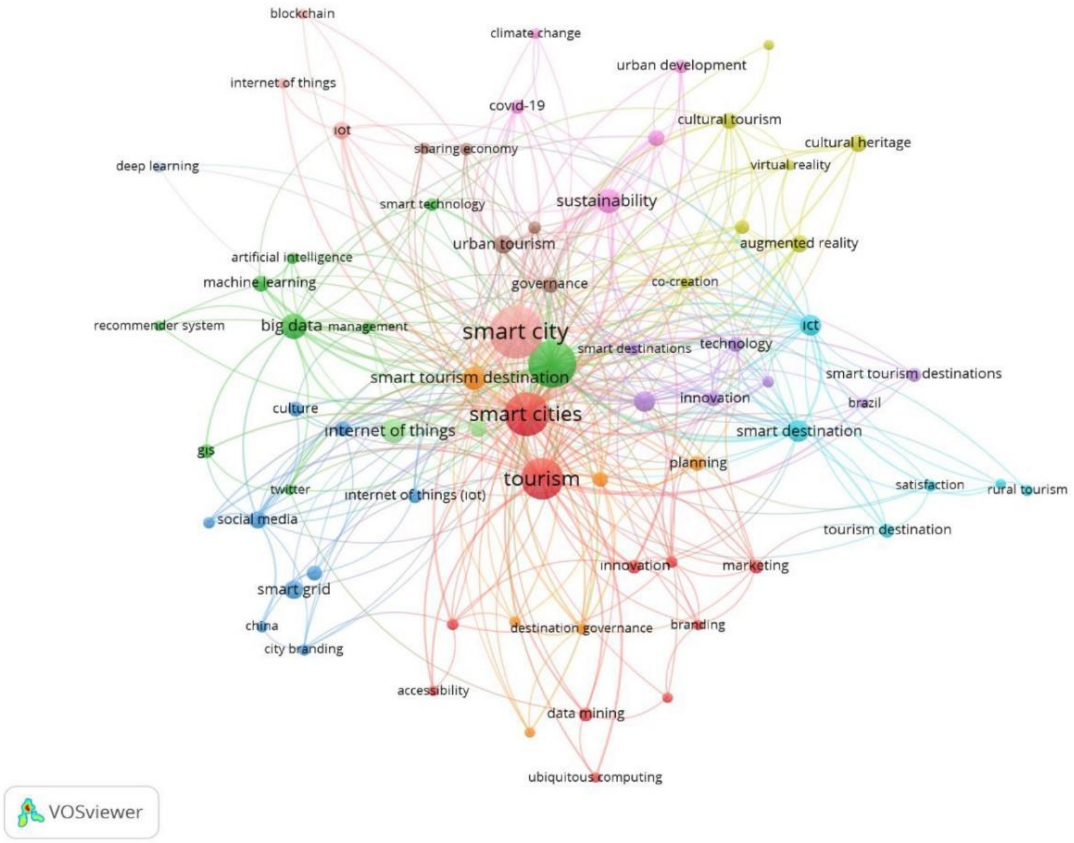


Table 2 shows the distribution of publications on smart cities and tourism by keyword categories. By examining the journals in which studies on <smart city and tourism> were published, which interdisciplinary studies were determined, a total of 1050 studies were categorized under twelve main headings. 142 of the studies were related to the tourism sector

and were determined as the third most published area. Studies on the subject of smart cities cover a slice of 13.80% in the tourism category. This rate is an indication that the tourism sector is moderately studied and can be improved in the category of smart city studies.

Table 2. Distribution of Publications on Smart City and Tourism by Subject Categories

Field of Publications	Number of Publications	%
Electrical Electronics Engineering	225	21.42
Computer Communication Systems	145	13.80
Tourism	142	13.52
Computer Theory and Methods	124	11.80
Green Sustainable Technology	109	10.38
Computer and Artificial Intelligence	106	9.52
Communication	96	9.14
City Research	90	8.57
Environment	79	7.52
Regional Planning	46	4.38
Management	43	4.09
Another Engineering	41	3.90
Business	38	3.61
Cybernetics	15	1.42
Geography	15	1.42
Interdisciplinary	15	1.42
Instrumentation	14	1.33
Mechanic	12	1.14
Field Studies	11	1.04
Nanotechnology	11	1.04
Development	10	0.95
Education	10	0.95
Chemical	9	0.85
Culture	9	0.85
Public Administration	9	0.85
Another	60	5.71

Source: Created by the author

Table 3 shows the distribution of studies on smart cities and tourism by document type. In the document type analysis of studies on smart cities and tourism, it was determined that the studies were predominantly [55.67%] in the form of papers. This analysis explains what material is missing in the field and the type of document often used in references in major studies. Studies on <smart city and tourism> are discussed in many countries around the world. The top five countries contributing the most to the literature in terms of publication in the Web of Science

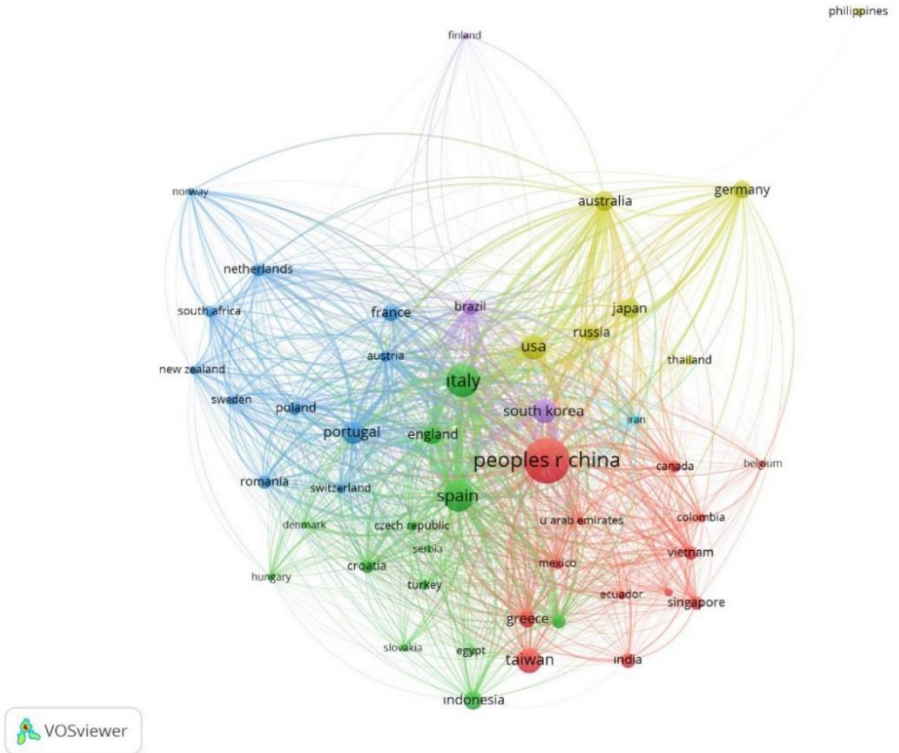
database are China (211), Italy (111), Spain (97), the USA (65), Taiwan (61). The first five countries listed make up 51.90% of the total percentage.

Table 3. Distribution of Publications on <Smart City and Tourism> by Document Types

Document Type	Document Number	%
Paper	613	55.67
Article	407	36.96
Book Section	30	2.72
Review Article	22	1.99
Early View	15	1.36
Editorial Material	10	0.90
Meeting Summary	2	0.18
Book Review	1	0.090
Retracted Release	1	0.090

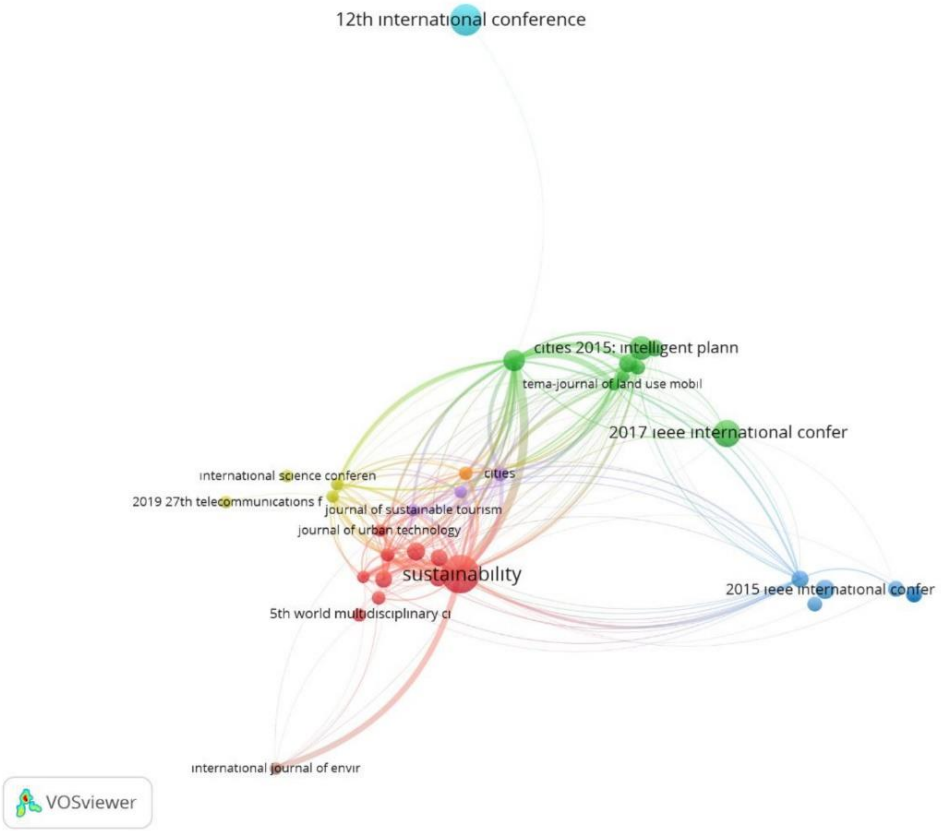
Source: Created by the author

Map 3. Reduced Bibliographic Network Map of Countries Related to "Smart City and Tourism" Topics



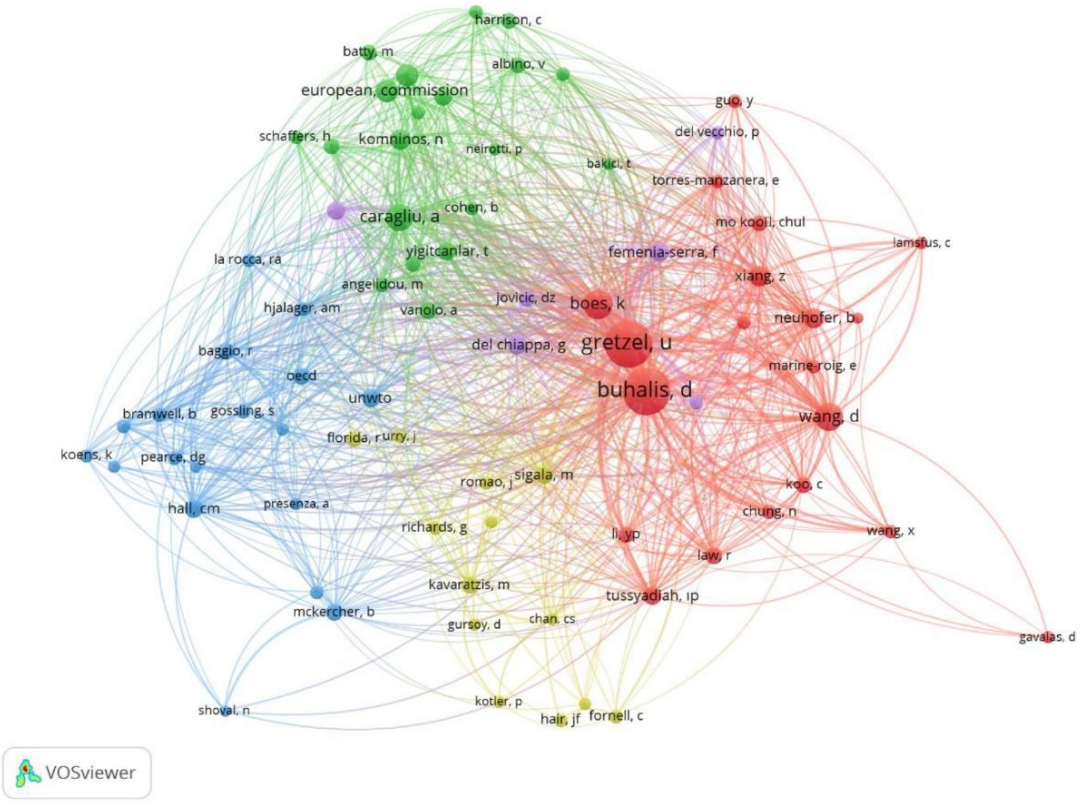
According to the Network map in Map 3, it is seen that six different clusters are reduced to the countries related to <smart city and tourism> issues. These clusters consist of country groups such as China, Spain, Portugal, the USA, Brazil and Iran. These groups are directly or indirectly related to each other. The strongest bibliographic matching network is between China (211), Italy (111), USA (65). The number of studies also includes those published in collaboration between different countries based on co-authorship. In the field of <smart city and tourism>, it has been determined that China, Italy and the USA are dominant in terms of international cooperation and the leading countries in the field. The fact that Turkey is not included in the network map showing inter-country cooperation in Map 3 can be evaluated as low cooperation with other countries.

Map 4. Reduced Bibliographic Network Map of Publication Sources Related to <Smart City and Tourism> Topics



Articles on <smart city and tourism> topics are available in a wide variety of published sources. This network map provides links to at least five cited sources in at least five publications. In Map 4, there are six different main connection groups. It is seen that the most influential sources in the field are Sustainability, Cities 2015: Intelligent Plan, 2017 IEEE International Conference on Consumer Electronics, and they are directly or indirectly related to each other. It would be fair to say that the strongest bibliographic matching network is Sustainability.

Map 5. Reduced Bibliographic Network Map of Authors on the Topics of <Smart City and Tourism>



By using the author's information in the data obtained in the study, the leading authors in the field of <smart city and tourism> were examined. Map 5 consists of five different clusters and shows the citation network for at least five documents among authors. These include Ulrike Gretzel, Dimitrios Buhalis, Micera Roberto, Cukusic Maja, Koo Chulmo, Rodrigues Carlos, Dias Ana, Queios Alexandra. These authors are directly or indirectly related to each other. Ulrike Gretzel ranks first with 308 citations in 8 documents.

CONCLUSİON

In the study, the current situation was examined as a result of the bibliometric analysis of the studies containing the concepts of <smart city and tourism> in the Web of Science database. According to the results of the bibliometric analysis within the scope of the research, studies on <smart city and tourism> started to be published in 2000 and it was determined that they had a 22-year course. It is seen that the subject of <smart city and tourism> is becoming more popular every year. Especially in 2020, it was determined that the highest number of publications was made. Although there is a decrease in 2021. As a result of the research, it has been determined that the studies on <smart city and tourism> mainly concentrate on the main themes of engineering, computers and tourism. It is seen that these results are similar to the results of the study of Gretzel et al. (2015) and La Rocca (2014). It is seen that tourism is an area where studies on smart cities will gradually increase. Studies on tourism and smart cities will both contribute to the literature and provide opportunities for interdisciplinary studies.

When the studies on smart cities and tourism are examined, it has been determined that there are studies related to sustainability, the internet of things, big data, smart tourism, smart tourism destinations. Buhalis and Amaraggana (2015), Koo et al. (2015) support the findings. These studies show that studies on smart cities are related to the internet of things and smart tourism destinations. It appears to be an open area for further research. Therefore, it can be an indication that smart city and tourism phenomena can be researched by academicians. The fact that the highest rate of publication is in the article type after the paper shows that the subjects are curious.

It has been determined that the keywords <smart city and tourism> chosen for the research and the words smart city, smart tourism destination, tourism obtained as a result of collocation analysis overlap with each other. The results of mapping based on text data and the results of collocation analysis show similarities. It can be stated that this situation is explanatory of the universe of the study. It is recommended to follow these journals and congresses in particular. The presence of smart technologies increases the tourist experience in terms of tourism and offers a competitive advantage to the destination. For this reason, when tourism and the city come together, smart technologies contribute to both tourism and the city. As a result, although it has become widespread with the use of smart technologies, it is aimed that this study, which is focused on tourism, which is labor-intensive, will contribute to the literature and be a source for future research. The Web of Science database used in the study represents the limitation of

the study. In future research; Scopus, ScienceDirect, etc. By collecting data from different platforms such as "smart city and tourism", it may be possible to compare the subject of <smart city and tourism>.

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