Research trends of digital tourism: a bibliometric analysis

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Abstract

Purpose – Discussions about digital tourism continue to increase among scholars as Information Communication and Technology (ICT) infrastructure develops. Dynamic changes due to technological aspects have given rise to various developments in the tourism industry. Therefore, this study aims to evaluate the scientific structure of the development of digital tourism topics through a bibliometric analysis approach. In total, 102 publications from research on digital tourism were taken from Scopus database between 2001 and 2021, for further bibliometric analysis using the VOSviewer application. Interesting findings describe the most cited digital tourism publications, the contribution of digital tourism by various authors, institutions, countries, co-citation analysis, bibliographic coupling, and co-occurrence for the main trends of digital tourism. This study compiles a detailed review of digital tourism research. This article adds substantial value to the digital tourism topic by analyzing bibliometric data. It provided scientific information regarding digital tourism for other researchers and future research.

Keywords Digital tourism, Tourism industry, Technology, Bibliometric analysis, VOSviewer

Paper type Research paper

1. Introduction

The rapid development of information and communication technologies (ICT) impacts all fields, including the tourism industry (Alford and Jones, 2020; Bødker and Munar, 2014; Kalia *et al.*, 2022; Watkins *et al.*, 2018; Zhao, 2014). In the 21st century, the tourism industry is expected to transform information and engagement tools (Dexeus, 2018; Navío-Marco *et al.*, 2018; van Nuenen and Scarles, 2021). Many industries rely on digital technologies to run their operations. Major economic segments use digital technologies to improve their capabilities (Akhtar *et al.*, 2021). Currently, the industry trend is easy to access online or on the internet (Belonozhko *et al.*, 2018). The online system provides interactive convenience

and has a global reach at the speed of interaction between tourists (Puspawati and Ristanto, 2018). Therefore, all entities need to adapt and innovate appropriately to survive in an era of uncertainty. It takes creativity and good promotional innovation (Del Vecchio *et al.*, 2015) because the digital era has given potential tourists the freedom to quickly and precisely obtain information on the internet (Dexeus, 2018; Zhang, 2014).

Nowadays, tourists are getting smarter (Pan, 2016), and those who understand the online concept can quickly obtain information through smartphones and tablet computers (Watkins *et al.*, 2018). The travel industry also does not rely on offline but online (Kayumovich *et al.*, 2020), and many countries are preparing a sizeable digital tourism market to compete and attract foreign tourists (Huang and Liu, 2011). Marketing makes planning and developing tourism destinations easier (Khurramov *et al.*, 2020). Many other conveniences accrue to vacationers who use digital tourism, such as the ability to skip the ticket counter and get straight to the attraction of their choice and the speed with which they may arrange their transportation and lodging.

According to united national world tourism organization (UNWTO) data, world tourism visitors reached 1.3 billion in 2001, while in 2021, it is estimated that 2.3 billion tourists have traveled. Tourists do not only travel conventionally but also online or using the internet. Li *et al.* (2020) explained that about 70 million and 14.2 million people in Japan and Taiwan use the internet. The concept cannot be separated from the role of the millennial generation (Iorio *et al.*, 2020) targeted to increase tourism because most of this generation spends time in a digital environment (Bennett *et al.*, 2008).

Information technology users are spread worldwide to market tourism by using digital tourism websites (Mathew and Soliman, 2021; Ziyadin *et al.*, 2018). It is significant to be used in modern times because online information and communication development are straightforward (Liu *et al.*, 2016). For example, smartphones and intelligent tourism are powerful tools for visitors to aid in traveling. The ownership of different technology devices impacts the contribution of mobile travel bookings to the entire travel industry (Adeola and Evans, 2019).

The development of digital tourism in the past decade has increased following the trend of digitization in all fields. Many publications discuss the idea in various countries, but no research explains the scientific structure of the latest development trends. This study evaluates digital tourism to obtain scientific information and research mapping as input for developing topics using a bibliometric approach. The analysis is expected to provide an up-to-date view of a particular scientific topic based on a recognized bibliographic database/previous publication.

2. Literature review

Digital tourism is an information service system based on networks, technology and databases (Adeola and Evans, 2019; Wu, 2020). It forms complex projects, from surveys and evaluation of tourism resources to planning (Ziyadin *et al.*, 2018). Supporting service facilities needed are marketing of tourism product designs, protection of resources and the ecological environment related to geology and geomorphology, land use at all levels and transportation aspects (Bounab *et al.*, 2020). Digital or electronic tourism (e-tourism) combines one of the fastest-growing technologies, such as telecommunications and information technology, the hospitality industry and strategic planning (Happ and Ivancsóné Horváth, 2020; Mistilis *et al.*, 2014; Navío-Marco *et al.*, 2018). Digital tourism also can be defined as the use of technologies to improve the tourist experience (Adeola and Evans, 2019).

The trend is an alternative by stakeholders due to the impact of the current spread of COVID-19 (Akhtar *et al.*, 2021). Restricted mobility and social distancing significantly affect the decline of the world tourism industry sector (Gössling *et al.*, 2020). Most people will use the internet and mobile devices to obtain information, explore, interact and experience travel

(Ruiz-Gómez *et al.*, 2018), such as millennials (Ketter, 2020; Kim and Park, 2020). Veiga *et al.* (2017) conveyed that millennials have the potential to change the work pattern of the tourism industry with their strong digital skills. According to Liu *et al.* (2019), they can share their travel experiences in one tourist destination through their social media, such as Facebook and Instagram, which can influence other people to be interested in visiting these tourist destinations. Therefore, there is a significant change in consumer behavior patterns (Navío-Marco *et al.*, 2018) and a disruption in the tourism sector (Buhalis *et al.*, 2019). For example, taking selfies posted on social media has become a new trend in tourism.

The use of digital information and communication technology also helps the development of tourism. An online system will reduce promotional costs, increase employee effectiveness and make ordering easier (Watkins *et al.*, 2018). Customers can share information and research assessments based on purpose, quality of service in hotels and restaurants and environmental conditions through new technologies, such as Facebook, Twitter and blogs (Dessovic and Egger, 2011). For travelers, technology may be a valuable tool in a variety of ways, including the acquisition of information on desired destinations, climate and weather patterns, hotels, scenery, geopolitical and economic situations, trip arrangements, online purchasing and payments and preserving memories (Kumar and Kumar, 2020). On a peer-to-peer basis, digitizing tourism can also increase the sharing economy among actors (van Nuenen and Scarles, 2021).

The use of technology can improve the tourist experience by posting recommendations for attractions on the Web or using reality technology (Poux *et al.*, 2020). Examples are TripAdvisor, Airbnb, MakeMy Trip and other local apps. Additionally, the benefits of digital tourism attract tourists to digital experiences by building an environment that can be conducted interactively (Stors and Baltes, 2018). Innovation, especially with information technology, has a positive impact on several sides of tourism.

3. Research methods

This study uses bibliometric analysis to search for the formal nature of the scientific domain in a rigorous, systematic and innovative way (Leong *et al.*, 2021; Sánchez *et al.*, 2017) by using quantitative and qualitative analysis derived from publications on previous research (Azizatun *et al.*, 2021; Herrera-Franco *et al.*, 2020; Leong *et al.*, 2021). Indicators, such as the total number of authors and publications, citations, institutions and countries, were used to analyze data. Research trends in this study focus on scientific structure in the specific field of digital tourism on a certain period, starts from the annual output and subject areas, top cite articles by the most productive authors, most contributing institutions and countries. Furthermore, bibliometric studies are carried out using a database and a specific period.

The bibliometric analysis shows a map of tourism's distribution of knowledge structures, measurement and evaluation in some particular topic (Robertson *et al.*, 2020). Several studies using the bibliometric approach in the tourism topic include (Singh and Bashar, 2021) concerning e-tourism; (Suban *et al.*, 2021) related to halal and Islam; (Sánchez *et al.*, 2017) about wine; (Liu and Li, 2020) and (Khanra *et al.*, 2021) related to ecotourism;, (Knani *et al.*, 2022) about the role artificial intelligence in hospitality and tourism; (Herrera-Franco *et al.*, 2020) about geo-tourism; and (Kalia *et al.*, 2022) about the past three decades of digital tourism.

Each of these studies has made a scientific contribution in looking at trends in specific topics and succeeded in providing comprehensive information. Especially from Kalia *et al.* (2022) argued that new research areas in digital tourism include consumer behavior, technology and sustainability, management of smart destinations and the internet as a platform for marketing and communication. When Kalia *et al.* (2022) analyzes the current direction of digital tourism research (2020), this study aims to evaluate the scientific

structure of digital tourism based on the Scopus database (2021). Additionally, in the limitations, Kalia *et al.* (2022) used broad keywords that allow for bias in determining the number of articles reviewed. Therefore, in this study, we focus and specifically use the keyword digital tourism in searching for document titles to ensure the topics discussed are appropriate and minimize bias on other topics.

Data processing was carried out through data sets obtained from the Scopus database and then processed with VOSviewer. VOSViewer is used to construct and visualize the bibliometric network (van Eck and Waltman, 2010), which will form information related to the field of study, developments and existing trends. Some of the features are cooccurrence, coauthorship and bibliographic coupling. According to Suban *et al.* (2021), the VOS viewer graphically displays the nodal network through the use of two defined weights, such as the quantity and overall strength of the links. A lot of numbers of software for bibliometric analysis, such as Citespace, Bibexcel, Pajek, Gephi, SciMat, Sci2, R Studio and UCINET. Each software has its own advantages and deficiency; it is important depends on the case study or research questions (Donthu *et al.*, 2021; Miraj *et al.*, 2020). The VOSviewer was chosen for usage in this study. The rationale is that, in comparison to other software tools, VOSviewer provides a large number of functions for visualizing bibliometric networks and scientifically mapping networks. Furthermore, the software has been used in several previous research studies and features a special text mining tool for visualizing bibliometric networks. For these reasons, this study thought VOSviewer was sufficient to meet its goals.

Scopus was selected as the index because it is the world's largest abstract and citation database for peer-reviewed journals, books and conference proceedings. Another side, it offers in-depth information on the field's global research output. Collecting the data set in the Scopus database, the authors provide a limit for two decades, namely, 2001–2021, to see the latest developments in the 21st century, where technology has become a culture and slowly enters all lines of human society. The Scopus data set was analyzed using MS Excel for data description, and the stages are described in detail in Figure 1.

Substantively, the four stages in Figure 1 serve to map research on digital tourism with the keyword from the title category. The bibliometric method can provide a new mapping regarding the latest developments in digital tourism research and its position with other research topics (Singh and Bashar, 2021). The bibliometric analysis will assist practitioners in discussing future digital tourism studies.

For the next chapter, the research results are divided into several sub-sections. First provides annual output and subject areas regarding digital tourism topic. Second, it discusses regarding top cited articles by the most productive authors. Third, the researcher discusses about most contributing institutions and countries from digital tourism research. Further, it discusses regarding bibliometric network analysis. Finally, based on the research cluster of digital tourism, the researcher proposes a future research agenda.

4. Results and discussion
4.1 Annual output and subject areas
Articles about digital tourism first appeared in 2004 (Ghafoor *et al.*, 2004), discussing multiagent systems related to digital tourism, the development of intelligent agents to receive information quickly and agents that can provide insight by managing the system and transferring knowledge. In line with the discussion, the momentum of digital tourism should be assisted by human intelligence in managing digital aspects.

Based on Figure 2, discussions and publications related to digital tourism continue to develop simultaneously. From 2007 to 2017, 33 articles were published by several authors, and the information is increasingly diverse with the existing linkages. In 2001–2010 digital
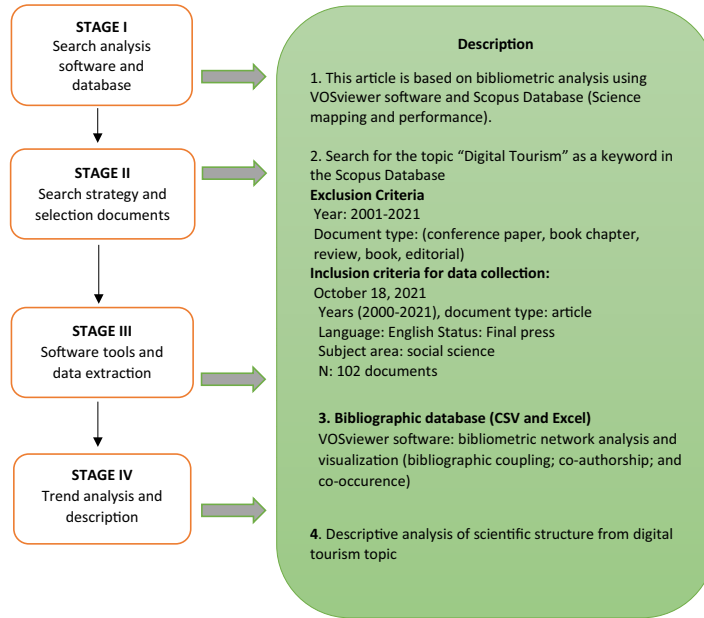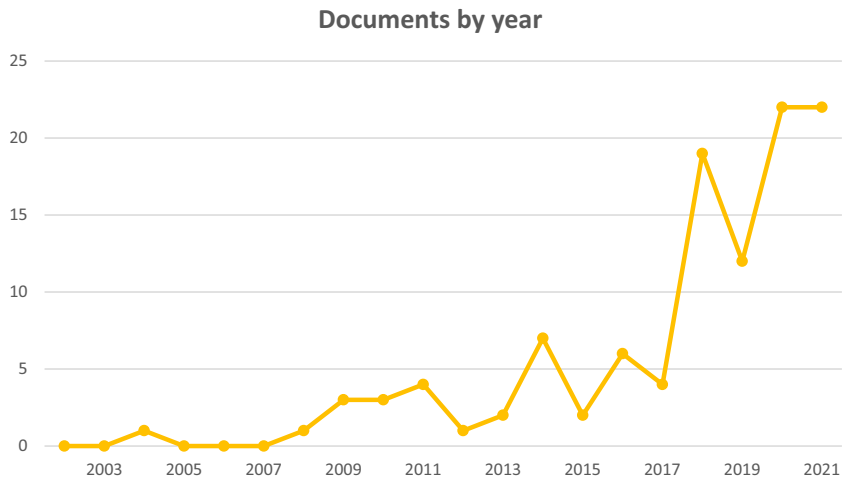
Figure 1.
Research stages and
description

STAGE I
Search analysis
software and
database

STAGE II
Search strategy and
selection documents

STAGE III
Software tools and
data extraction

STAGE IV
Trend analysis and
description

Description

1. This article is based on bibliometric analysis using VOSviewer software and Scopus Database (Science mapping and performance).

2. Search for the topic "Digital Tourism" as a keyword in the Scopus Database
Exclusion Criteria
Year: 2001-2021
Document type: (conference paper, book chapter, review, book, editorial)
Inclusion criteria for data collection:
October 18, 2021
Years (2000-2021), document type: article
Language: English Status: Final press
Subject area: social science
N: 102 documents

3. **Bibliographic database (CSV and Excel)**
VOSviewer software: bibliometric network analysis and visualization (bibliographic coupling; co-authorship; and co-occurence)

4. Descriptive analysis of scientific structure from digital tourism topic

Source: Figure by authors

Documents by year

Figure 2.
Annual digital
tourism research
results (2001–2021)

Source: Figure by authors

tourism was about the usage of websites, desktop and laptop. In 2011–2021, it was more about social media, software applications and mobile phones. Some academics predicted that in the next decade, digital tourism will be about virtual reality (Zhu *et al.*, 2023) and metaverse tourism (Buhalis *et al.*, 2023). One important thing in this trend is the positive

value of technology can provide innovations to the public (Del Vecchio *et al.*, 2015). Increasing the number of digital tourism articles since 2017 proves that many academics are starting to take an interest in the development of digital tourism.

Research on digital tourism gained momentum when the COVID-19 pandemic hit the world in 2020–2021. Restrictions and social activities have had a negative impact on the tourism industry (Akhtar *et al.*, 2021; Gössling *et al.*, 2020). Digitalization of tourism is considered an alternative for tourism industry players. According to Akhtar *et al.* (2021), future digital tourism research development will focus on using technology for marketing, mobile apps and virtual reality. Optimizing digital tourism for economic growth is using training and development for school and college students to increase awareness and create innovations.

The use of technology in digital tourism should adapt to the times (Almeida-Santana *et al.*, 2020). Research on the concept continues to increase and is also influenced by the development of the internet and social media (Adeola and Evans, 2019; Munar and Gimóthy, 2013). In various countries, tourism industries are growing by using digital-based platforms as an alternative to marketing. The influence of digital information spreads quickly throughout the world. Most European Union countries purchase tourism services or packages online (Ruiz-Gómez *et al.*, 2018). This arises from the massive development of information technology in various sectors of people's lives, including tourism, which impacts consumer behavior patterns in accessing products or services.

Figure 3 shows the importance of discussing Digital Tourism's multiperspective managing digital data. It does not only pay attention to or focus on one scope but relates to other scopes. The development has spread to social science, economics, business, management and accounting, arts and humanities. The discussion about digital tourism is dominated by social science, business, management and accounting and computer science (Tosida *et al.*, 2020b).
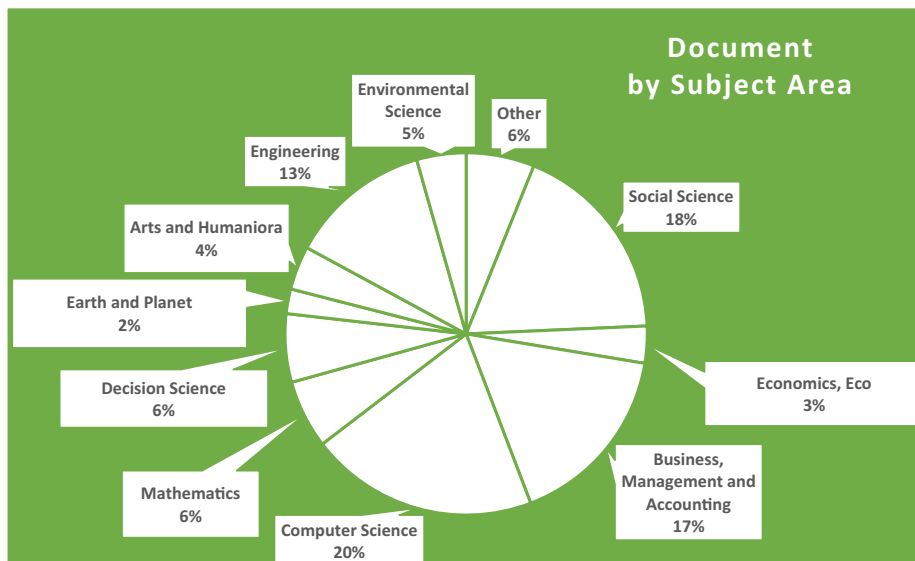

Source: Figure by authors

The development of digital tourism, combined with digital-based local wisdom, can positively impact the economic and business fields (Subali *et al.*, 2018). The numbers are very multiperspective and not only related to technological developments.

4.2 Top cited articles by most productive authors

Based on the 102 scientific documents analyzed, Table 1 shows the top 10 articles or the most cited in the period based on the search, such as the article entitled "Progress in information technology and tourism management: 30 years on and 20 years after the internet – Revisiting Buhalis and Law's landmark study about e-Tourism" by Navío-Marco *et al.* (2018). The article has been cited or quoted 89 times, describing the analysis and evaluation of the sustainable development of tourism websites. The numerous citations are all global issues examined and studied urgently. Mistilis *et al.* (2014) articles titled "Future e-Destination Marketing: Perspective of an Australian Tourism Stakeholder Network" have been quoted or cited 60 times.

The high number of citations from each article indicates that it has a significant scientific influence on other research. This is because the topic is a strategic issue and has an established theoretical value, such as Navío-Marco *et al.* (2018) on trend and development of e-tourism, Mistilis *et al.* (2014) on stakeholder engagement and networks of e-tourism (Watkins *et al.*, 2018) and (Adeola and Evans, 2019) on tourism and ICT. Each article that gets the most citations mostly has an academic contribution for further research. Additionally, the influence of big names in publishing journals can also be a consideration for other researchers to cite as primary data.

For 20 years, studies on digital tourism have involved many authors. Figure 4 shows the ten most productive authors who often publish articles on the topic. Benyon, D is the most productive author producing four articles on digital tourism, especially the blended spaces framework (Benyon *et al.*, 2014; O'Keefe and Benyon, 2015). In addition, one of the articles from Benyon, D entitled "Presence and digital tourism," has been widely cited by other researchers as many as 35. Miao, F had four articles on fuzzy analysis hierarchy process (FAHP)-Based Digital Tourism Engineering Research, with the essential findings being seven factors. The main factors in evaluating digital tourism are infrastructure construction, data support, technology systems, application platforms, industrial size systems, security systems, planning and organization (Miao *et al.*, 2009). Furthermore, Bon, A.T., and Ziyadin, S published three articles, and in the order of 5 to 10, two were produced articles by Adi, S; Andria, F; Ardiansyah. D; Blembayeva, A; Bonacini; Chen R. Even though the number of articles from the most authors only has four articles, each paper has made a consistent scientific contribution to further research, whether it is the theory used or the phenomenon being explained.

4.3 Most contributing institutions and countries

Reviving tourism potential using technological developments has attracted studies from different research institutes. Figure 5 shows that Edinburgh Napier and Chengdu University of Technology produced five and four articles. In order from 3 to 6, universities are donating three publications each. One of the publications from Al Farabi Kazakh National University discusses the main aspects of digital tourism modernization. The formation in Kazakhstan is environmentally oriented and uses near field communication (NFC) technology (Madiyarova *et al.*, 2018). Even though Edinburg Napier University and Europe have the most significant number of documents, countries in the Asian region continue to conduct digital tourism studies.

Figure 6 shows the ten countries with the most contributors to published articles. China is at the top by donating 22 documents, followed by Spain, the USA, Indonesia, the UK,

Authors	Title	Source	Theoretical framework	Cited
Navio-Marco, J., Ruiz-Górez, L.M., Sevilla-Sevilla, C.	Progress in information technology and tourism management: 30 years on and 20 years after the internet – Revisiting Buhalis and Law's landmark study about e-Tourism	Tourism Management 69, pp. 460-470	Trend and Development of e-tourism	89
Mistilis, N., Buhalis, D., Gretzel, U.	Future eDestination Marketing: Perspective of an Australian Tourism Stakeholder Network	Journal of Travel Research 53(6), pp. 778-790	Stakeholder engagement and networks of e-tourism	60
Bec, A., Moye, B., Timms, K. (..) Stavronskaya, L., Lilttle, C.	Management of immersive heritage tourism experiences: A conceptual model	Tourism Management 72, pp. 117-120	Digital tourism experiences	45
Benyon, D., Quigley, A., O'Keefe, B., Riva, G.	Presence and digital tourism	Al and Society 29(4), pp. 521-529	Digital tourism and tourist experience	35
Watkins, M,, Ziyadin, 5., imalayeva, A., Kurmangalieva, A., Blembayeva, A.	Digital tourism as a key factor in the development of the economy	Economic Annals-XXI 169 (1-2), pp. 40-45	Digital tourism (Tourism and ICT)	32
Ghafoor, A., Rehman, M.U., Khan, Z.A.,(…) Farooq Ahmad, H. Suguri, H.	SAGE: Next generation multi-agent system	Proceedings of International Conference on Paraleland Distributed Processing Techniques and Applications, PDPTA04 1, pp. 139-145	Multi-agent system in tourism	26
Del Vecchio, P., Mele, G., Ndou, V., Secundo, G.	Open Innovation and Social Big Data for Sustainability: Evidence from the Tourism Industry	Proceedings of International Conference on Paraleland Distributed Processing Techniques and Applications, PDPTA04 1, pp. 139-145	Open innovation and social big data in tourism	22
Adeola, O., Evans, O.	Digital tourism: mobile phones, internet and tourism in Africa	Tourism Recreation Research 44(2), pp. 190–202	ICT in tourism	18
Ketter, E.	Millennial travel: tourism micro-trends of European Generation Y	journal of Tourism Futures 7(2), pp. 192–196	Travel behaviors of Millennials in tourism	17
Hassan, A., Rahimi, R.	Consuming "Innovation" in Tourism: Augmented Reality as an Innovation Tool in Digital Tourism Marketing	Global Dynamics in Travel, Tourism, and Hospitality pp. 130–117	Technology innovation in tourism	17

Source: Data retrieved from the Scopus database (October 18, 2021)
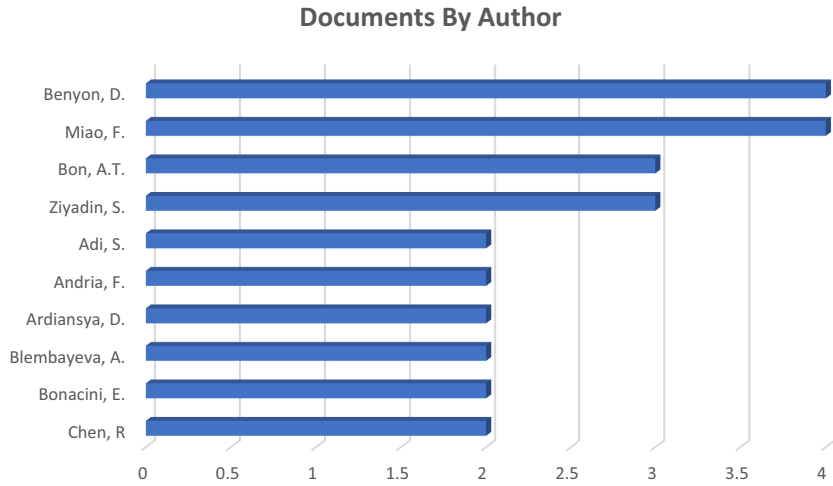
Documents By Author

Source: Figure by authors

Documents by Affiliation
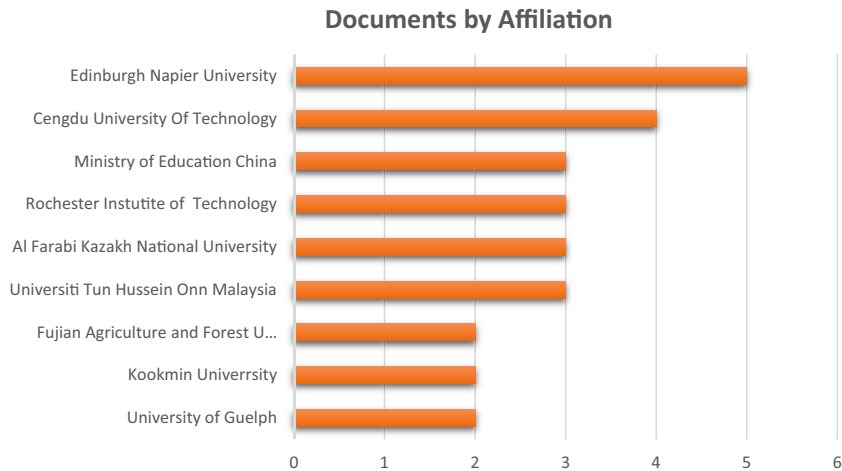
Source: Figure by authors

Australia, Germany, Kazakhstan and Malaysia. From the available data, European Union countries provide digital tourism articles. Indonesia and China also played a significant role in developing digital tourism. This follows the predictions that big countries such as Indonesia, the USA and China will dominate the world's economic power in the next few years, including the tourism industry (Giorgi *et al.*, 2020; Pramana *et al.*, 2021). The number of documents is only small evidence of the variations in the contribution of science to digital tourism, considering that the database used is only Scopus. Studies only focus on international recognition research; hence, several countries with the most documents are productive with internationally recognized standards (Scopus).

Documents by Country
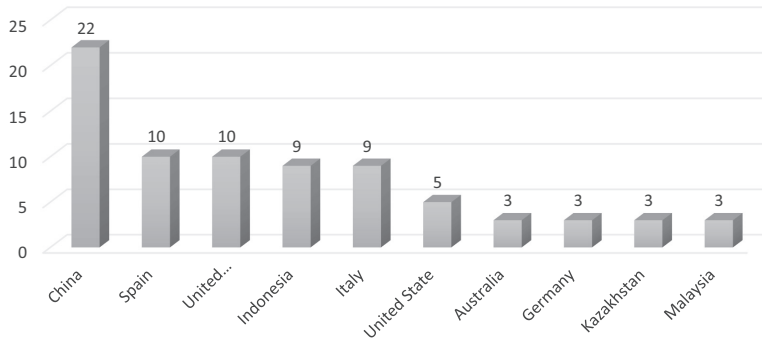
Source: Figure by authors

Figure 6.
Documents by
country (Top 10)

4.5 Bibliometric network analysis
Cooccurrence features are used on VOSviewer to create graphic maps based on the author
and search for keywords to understand the relationship's structure with the digital tourism
concept cluster. Figure 7 shows the coauthorship analyzed using VOSviewer (van Eck and
Waltman, 2010) with a minimum threshold of two. Furthermore, the relationship between
the authors will appear in Figure 6, where Bon, A.T dominates by frequently conducting
joint research with other authors. An example of research results from Bon, A.T, Hidayat,
M, Tosida, E.T is "Strengthening the competitiveness of micro-businesses based on local
wisdom through digital tourism education collaboration" (Tosida *et al.*, 2020a).

Figure 8 shows the related names with the same reference document, and the authors
have interrelated references. The most numerous documents were Navio-Marco J in 2018,
with publications explaining information technology and tourism management advances.
The second was Mistilis N in 2014, which explained strategic efforts for tourism
destinations to encourage digital tourism marketing (Mistilis *et al.*, 2014).
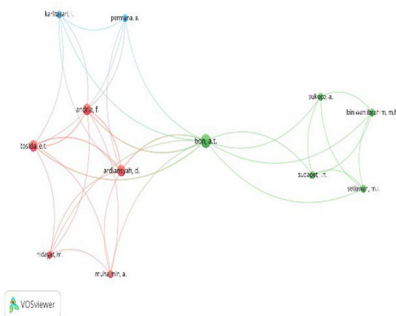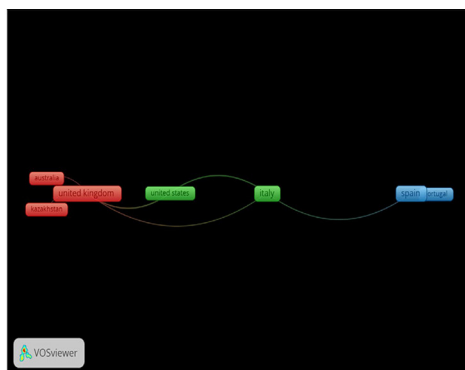

Source: Figure by authors
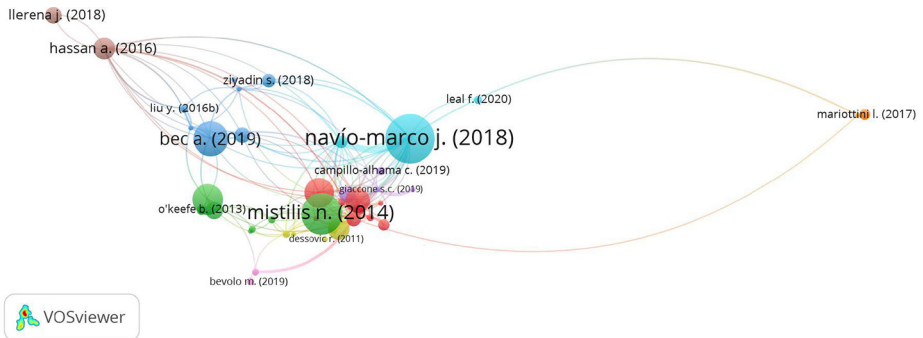
Figure 7.
Coauthorship by
country and author

Source: Figure by authors

Table 2 and Figure 9 explain the connectivity or coverage related to digital tourism. Each cluster has an interrelated concept in case studies of clusters 1 and 2 related to information communication technology in tourism. In a diverse global society, the transformation of information technology is a factor in economic development, especially tourism. Technological advances gave birth to the internet, contributing to tourism by providing information when planning a vacation (Qian and Zhou, 2017). Information technology produces changes and new paradigms as opportunities and challenges in driving the tourism industry digitally (Zolotovskiy et al., 2020).

Clusters 3 and 4 explain digital tourism marketing, where digitalization in modern times is not rare. Digitalization can make it easier and expand tourism marketing (Madiyarova et al., 2018). By using digital marketing, marketing costs can be reduced rather than conventional methods. Tourists can easily see digital marketing, and the interest in visiting a tourist destination can be high. This is because substantive marketing can provide the understanding and persuasion to be interested in tourist destinations (da Silva-Pina et al., 2018). Therefore, digital tourism marketing is critical to boosting tourism destinations. Clusters 5 and 6 provide a general description of the innovations. The digital strategy is a managerial process of developing digital tourism to achieve benefits in specific tourist destinations and should also be able to run sustainably (Bec et al., 2019).

Professional human resources are needed to provide intelligent innovation. The development of digital tourist destinations applies not only to artificial tourist attractions but also to cultural or heritage tourism (Chareyron et al., 2020). Therefore, human resources will determine the direction of innovation that is developed. Clusters 7–10 provide information about digital tourism through a collaborative process in developing tourism destinations (Gao et al., 2010). The safety of tourists should be considered in digital tourism when developing tourism destinations. Applications or search sites regarding digital tourism should be provided with a security system when making transactions. It requires collaboration between tourism developers and the government or third parties to develop tourism destinations in line with a guaranteed security system (Shrestha et al., 2020).

Collaboration in developing tourism destinations can also be conducted using social media applications, and every smartphone user has a social media account (Adi and Heripracoyo, 2018). Since the tourism industry cannot stand alone, good cooperation is needed for promoting and marketing digital tourism (Stors and Baltes, 2018). In addition, this study explains potential future research regarding four topics, namely, millennials, marketing strategy, metaverse tourism and virtual tours which are quite far apart and not

No.	Cluster	Concept items	Color	Item no.	Research trend
01	Clusters 1	Communication technology, cultural heritage promotion, destination management organization, digital communication, earth spatial data service application system, global internet communication network, online platform, smart tourism, Web and website usability	Red	10	ICT for tourism
02	Clusters 2	Communication, digital content, digital space, digital tourism experience, e-branding, mobile agent, mobile agent application, tourism experience and tourist information	Green	9	Digital tourism and tourist experience
03	Clusters 3	Future e-destination marketing, management information subsystem, network, recommendation system, service, tourism info structure, tourism information and tourism service intelligent recommendation system	Blue	8	Tourism digital marketing
04	Clusters 4	Artificial intelligence, computer, computer platform, digital earth platform, digital tourism system, virtual reality technology, virtual reality technology application and virtual tour	Yellow	8	Tourism application
05	Clusters 5	Data collection, digital tourism development, digital tourism research, digital tourism research document, educational tourism, sustainable tourism and tourism research	Purple	7	Innovations
06	Clusters 6	Accessibility, application analysis, digital tourism marketing, digitalization, innovations, potential technology and technological innovation	Navy	3	Tourism innovations
07	Clusters 7	Destination marketing organization, google, information source, marketing strategy, social network and tour operator	Black	6	Destination marketing
08	Clusters 8	E-tourism, millennial, millennial travel and publication	Brown	4	Tourism and millennial
09	Clusters 9	Digital development, e-tourism, potential tourism and traveler	Silver	4	Digital development
10	Clusters 10	Collaboration, digital medium and digital tourism education collaboration	Pink	3	Collaboration

Source: Table by authors

Table 2.
Clustering by
VOSviewer

connected. It demonstrates that these four topics have not been extensively researched as of yet. At the same time, there are still few scholars who link other themes like sustainable tourism, technological innovation and tourism experience. This visualization certainly provides information for future researchers to adjust the research topics to be discussed, making it easier to find novelty or research gaps.

During the 2001–2010 period, as explained in Figure 2, there were not many articles that discussed digital tourism in detail. In total, there are only eight documents, such as the development of mobile agents (Ghafoor *et al.*, 2004) and the use of geospatial information technology to optimize digital tourism (Chen *et al.*, 2009; Gao *et al.*, 2010). So, the trend in this decade is the geospatial technology system in digital tourism. Furthermore, in the
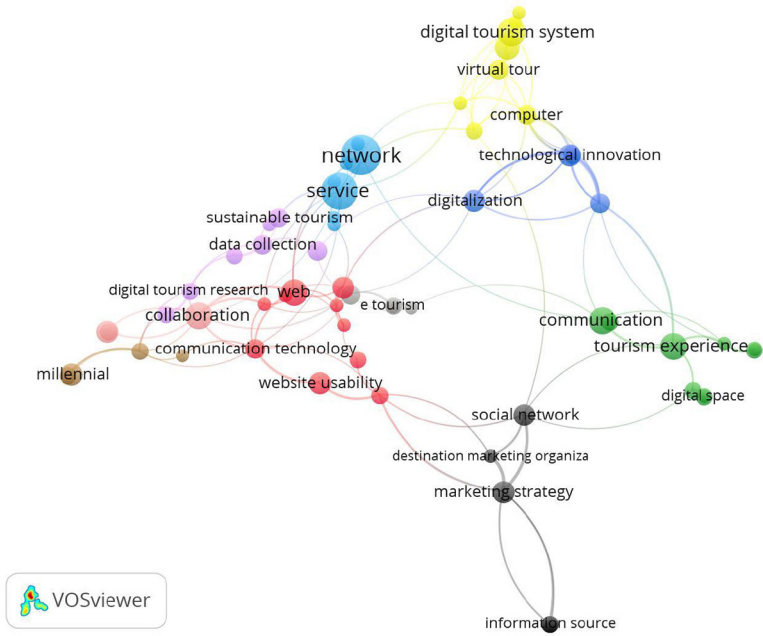
Figure 9.
Clustering concept
item

Source: Figure by authors

2011–2021 period, discussions regarding digital tourism began to appear significantly, starting in 2018, along with the massive development of information and communication technology in society. The research trend in this period is the use of the internet and innovation in the tourism sector, including the benefits of e-commerce and social media in supporting digital tourism. Some examples of papers in this period are Madiyarova *et al.* (2018) about modern trends in digital tourism; van Nuenen and Scarles (2021) regarding the advancement of digital media for tourism; and Almeida-Santana *et al.* (2020) about the new ecosystem of digital tourism.

5. Conclusion

This study evaluates and provides a comprehensive understanding of the latest digital tourism research consisting of annual output and subject areas, influential works, most productive authors, universities or institutions and most productive countries on the topic of digital tourism, as well as bibliometric analysis of digital tourism topic within the scope of the publication. Furthermore, this study uses bibliometric analysis reviewed using the VOSviewer and can provide a visualization analysis to scholars interested in digital tourism. There are 102 documents analyzed in the Scopus database and the cooccurrence, coauthorship and bibliographic coupling features. This comprehensive scientific information is helpful for further research to determine mapping research related to digital tourism.

This study found that the trend of digital tourism publications continues to increase. The topic is multidisciplinary, with the dominant areas being computer science, social sciences and business management. Many authors, universities and research institutes in various countries collaborate to conduct research related to digital tourism. Benyon, D and Miao, F

are the top two authors who contribute most to digital tourism research based on the number of publications. Meanwhile, Edinburg Napier University is the most productive institution, with five published documents. China is the most productive country, and the topic of digital tourism has 10 clusters, with the dominant concept being communication technology in tourism.

This review demonstrated the fundamental developments in the field of digital tourism over the past two decades and provided the pertinent data that would be needed for future authors to publish their work. It is also intended to guide scholars interested in the topic of digital tourism by providing more space for contextual papers. For countries that are developing and will be develop digital tourism, they can make digital tourism models references in countries that have the highest number of publications, such as China, Spain and the UK, as confirms the findings of Kalia *et al.* (2022). These can be started through collaboration between institutions, countries and practitioners in the digital tourism industry to conduct research and publication in journals to improve conditions and realistic needs in the field, especially for developing countries in the Asia, Africa and South America regions.

The findings increasingly emphasized that changes occur because developments in information technology make tourism move rapidly. The application of digital tourism is related to implementing information and communication technology in the tourism industry. Building on the work of other scholars, this study offers certain practical implications for tourism managers and policymakers. From a managerial perspective, this article suggests that business managers should formulate and execute more extensive strategies to cover the requirements all of tourists while, especially on millennial tourist, metaverse tourism and virtual tourism.

This bibliometric research finding might be used to educate tourist manager on how to respond to a new behavior of tourist in the digital era. They would get a competitive advantage as a result of this bibliometric. A growing number of research on the digital tourism sector in every country in the world, as well as cross-country studies between developed and developing countries, are greatly encouraged to make the industry more acceptable, profitable and sustainable.

Managers should consider applying for digital tourism based on cluster findings and research trend, for instance, communication technology as supported by (Pawłowska-Legwand, 2020; Ruiz-Gómez *et al.*, 2018), tourism experience and virtual tour as argued by (Knani *et al.*, 2022; Leal *et al.*, 2020; Zhu *et al.*, 2023), sustainable tourism as explained by (Scott, 2014; Del Vecchio *et al.*, 2018) and website usability as supported by (da Silva-Pina *et al.*, 2018). Furthermore, smart strategies should be used to improve access inclusively, including dealing with destinations that have internet network problems by building adequate digital infrastructure. For policymakers, the government should provide economic incentives such as low taxes for digital tourism industry developers, increase digital capacity for managers and everyone involved in the digital tourism industry, and help to overcome digital dividends by building digital infrastructure evenly. The government should also setup a committee that could develop, establish and monitor digital tourism development. The government should devise strategies to encourage digital tourism through a mature and comprehensive planning in reading the development of the tourism sector in the future.

5.1 Limitations and future research
This study uses only one reputable international database, namely, Scopus. Within the scope of reputable international publications, there are other international databases, such as Web of Science or Clarivate Analytics. Hence, further research can use several databases to cover this limitation. It is also limited by the period of the documents analyzed in the past

10 years and the specific topics, namely, digital tourism. The topic is selected due to the increasing use of information technology in the tourism sector. Bibliometric analysis cannot provide a detailed description of the development of specific topics due to various factors, especially in the practical aspect. This study can be essential for studying digital tourism, especially mapping relevant topics from previous research. Referring to the existing literature, future research on digital tourism should develop empirical studies to contribute to academic research and society, especially the role of social media and internet to improving the digital tourism sector.

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