Digital tourism research: a bibliometric visualisation review (2002–2023) and research agenda

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Abstract

Purpose – This study aims to review the diversified existing literature on digital tourism from 2002 to 2023 using bibliometric analysis to present a holistic review of the current scientific structure of digital tourism and sets the future research agenda.

Design/methodology/approach – A detailed search of 646 SSCI articles collected from the Web of Science Core Collection (WOSCC) database was analysed through CiteSpace.

Findings – The findings indicate that developed countries are at the core of the co-authorship network, although developing countries represented by China increasingly contribute valued research findings. The conceptual structure of digital tourism mainly evolves from exploration (2002–2006), and acceleration (2007–2014), to diversification (2015–2023), with the most recent focus on consumer-oriented value creation and potential technological risks. Three well-established thematic groups have been identified, namely, technological innovation and application, destination digital management and consumer value creation. Constructive insights for future research are also offered, including digital scenarios, digital production and digital governance.

Practical implications – The research helps scholars and practitioners grasp the current issues and needs of digital tourism and provides a guide for policymakers in the tourism industry who seek to intelligently improve tourism performance.

Originality/value – This study thoroughly evaluates 22 years of digital tourism literature through bibliometric analysis. It creates a framework for understanding how digital tourism is theorised and developed and indicates future research directions.

Keywords Bibliometrics, Digital tourism, Scientific structure, Future research agenda, CiteSpace

Paper type Research paper

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**Investigación sobre turismo digital: Una revisión de visualización bibliométrica (2002-2023) y agenda de investigación**

**Finalidad:** Este estudio tiene como objetivo revisar la diversa literatura existente sobre turismo digital desde 2002 hasta 2023 utilizando un método de análisis bibliométrico para revisar de manera integral la estructura científica actual del turismo digital y desarrollar una agenda de investigación futura.

**Diseño/metodología/enfoque:** A partir de una búsqueda detallada de 646 artículos del SSCI recogidos en la colección principal de Web of Science (WOSCC), se analizó la base de datos mediante CiteSpace.

**Resultados:** Los resultados muestran que los países desarrollados constituyen el núcleo de la red de coautoría, mientras que los países en desarrollo representados por China también contribuyen cada vez más con valiosos resultados de investigación. La estructura conceptual del turismo digital evoluciona principalmente desde la exploración (2002–2006), y la aceleración (2007–2014), hasta la diversificación (2015–2023), centrándose más recientemente en la creación de valor orientada al consumidor y en los posibles riesgos tecnológicos. Se han identificado tres grupos temáticos bien establecidos, a saber, innovación y aplicación tecnológicas, gestión digital de destinos y creación de valor para el consumidor. También se ofrecen ideas constructivas para futuras investigaciones, como los escenarios digitales, la producción y la gobernanza digitales.

**Limitaciones/implicaciones practices:** La investigación ayuda a estudiosos y profesionales a comprender los problemas y necesidades actuales del turismo digital y proporciona una guía para los responsables políticos del sector turístico que pretenden mejorar de forma inteligente los resultados del turismo.

**Originalidad/valor:** Este estudio evalúa exhaustivamente 22 años de literatura sobre turismo digital mediante un análisis bibliométrico. Crea un marco para comprender cómo se teoriza y desarrolla el turismo digital e indica futuras direcciones de investigación.

**Palabras clave** Bibliometría, Turismo digital, Estructura científica, Futura agenda de investigación, CiteSpace

**Tipo de papel** Trabajo de investigación

1. Introduction

The digital revolution has dramatically transformed economic and social domains, wherein the tourism industry is among the major sectors that witness these changes (Pencarelli, 2019). Technological innovations determine the high-quality development and competitiveness of tourism destinations and organisations (Buhalis and Law, 2008). This industrial practise spawned the concept of digital tourism. Digital tourism involves the application of varied digital technologies to integrate digital content into the real world to enhance tourism experience (Adeola and Evans, 2019) and boost tourism business models (Saura et al., 2020). Digital tourism realises virtual-real interaction, resource optimisation allocation, value boundary breakthrough and so on (Melo et al., 2022; Höpken et al., 2020) and has better resilience under crises (Zeng et al., 2020). Overall, digital tourism reflects the thorough transformation of the tourism industry in the context of digital technology development while having great research potential.

Over the past two decades, the field of digital tourism has fostered numerous related sub-topics of scholarship and accumulated a wealth of unique research themes and valued research findings. Relevant research topics include destination digital management and marketing (Luo and Zhou, 2021; Mak, 2017), business service innovation (e.g. artificial intelligence and robotics utilisation) (Tussyadiah, 2020) and tourist interactive or immersive experience and behaviour changes (Yang and Zhang, 2022; Buhalis et al., 2022). Emerging research streams have grown separately, lacking a consensus on relevant theoretical frameworks and research findings and further partially limiting the practical value of each study. Meanwhile, challenges exist alongside opportunities in the practise of the digital tourism industry. While digital environments transform industrial practises and boundaries, they can also threaten privacy issues, strategy and competitiveness simultaneously (Buhalis, 2020). The value of digital tourism has also been highlighted by the COVID-19 pandemic and the subsequent prolonged pause in the tourism industry. Hence, a comprehensive bibliometric analysis is needed to delineate the dynamic laws and developing trends of digital tourism and help identify sustainable industrial development modes and new directions for scholars and practitioners to navigate.
Previous reviews of digital tourism research have suffered from two fundamental limitations: fragmented research contents and subjective research methods. Regarding the research contents, relevant research mainly focuses on the niche areas in the digital tourism field, such as online tourism, smart tourism, mobile technology and big data in hospitality and tourism (Xiang et al., 2020; Lyu et al., 2022; Mehraliyev et al., 2020; Chen et al., 2022). Such literature reviews only focus on information services in the travel processes and fail to recover the entire digital tourism ecosystem. Although Kalia et al. (2022) broadened the analysis of digital tourism research, the study is limited to the evolution of research themes, whilst failing to analyse the intellectual base and emerging research topics. As for analysis methods, in contrast to traditional qualitative reviews and meta-analyses, bibliometric analysis covers a comprehensive range of time frames and studies and ensures a high level of accuracy and objectivity by conducting performance analysis and scientific mapping. Performance analysis recognises the contributions of different research constituents (e.g. total publications, average citations), while science mapping visualises the intellectual interactions among research constituents (e.g. co-authorship and co-citation analysis) (Donthu et al., 2021). Bibliometric analysis assesses the development of knowledge domains, identifies the most influential research and emerging trends in the vast literature and visualises them comprehensively and transparently. Despite its strong data processing capability and wide utilisation in influential tourism literature review [e.g. health tourism (Zhong et al., 2023), tourism destination (Huang et al., 2023), inbound tourism (Li et al., 2022)], an objective and comprehensive picture of intellectual evolution in the field of digital tourism through bibliometric analysis is still missing. To address the gaps and complement prior literature reviews, we use a bibliometric analysis to comprehensively review relevant studies on digital tourism. As such, this study seeks to answer the following four research questions:

- **RQ1.** What are the collaboration forms and leanings among authors and relevant affiliated countries/regions?
- **RQ2.** What are the general trends and emerging research frontiers in digital tourism research over the past 22 years?
- **RQ3.** What are the knowledge bases and major research streams in digital tourism?
- **RQ4.** What are the current research gaps and future research directions concerning digital tourism for scholars and practitioners?

This study answers these research questions using a bibliometric analysis of 646 Social Sciences Citation Index (SSCI) articles. The contribution of this study is threefold. Firstly, this study provides a holistic picture of current research progress and major research themes in digital tourism through a comprehensive, objective and reproductive bibliometric analysis. Secondly, this study addresses the limitations of previous literature reviews of digital tourism by expanding the scope of keywords and extending the time span of relevant articles. Thirdly, a theoretical framework is proposed to classify and organise the fragmented literature on digital tourism and cast a light on future research agenda. The applied framework facilitates unifying the diverse knowledge and better highlighting current research streams and future research opportunities. The findings will guide future research and contribute to the efficient development of digital tourism practises that benefit both scholars and practitioners.

2. Methodology

2.1 CiteSpace

CiteSpace, one of the most powerful bibliometric tools for scientific mapping, was developed to visualise and analyse the intellectual structure and evolution in a knowledge domain. More importantly, it has a strong advantage in identifying emerging research frontiers and critical turning points through burst detection (Chen et al., 2014). In addition,
CiteSpace captures the dynamics of a bibliometric network using different visualisation modes, including time-line, time-zone and cluster views (Chen, 2006). Overall, CiteSpace enables researchers to easily detect structural and temporal patterns and trends, especially intellectual turning points, through performing various bibliometric networks including co-author, co-word, co-citation networks and burst detection (Cobo et al., 2011).

Specifically, the co-authorship analysis identifies the collaboration patterns among authors (including their affiliations) who share the same paper (Bornmann and Leydesdorff, 2015). Keyword co-occurrence analysis reveals the evolution of conceptual structure as it explores changes in research topics by measuring the frequency of paired keywords occurring in the same paper (Liu et al., 2015). Co-citation analysis detects the potential relationships between two documents cited in the same paper (Benckendorff and Zehrer, 2013), thus, revealing the intellectual structures and underlying themes within a scientific field (Liu et al., 2015). The clustering technique identifies the most influential articles and extends the member articles according to their co-cited relationships with the most influential points (Chen, 2006). Co-citation clusters are conducive to confirming intellectual base, research frontiers and cognitive relations among clusters (Braam et al., 1991). The burst detection function of CitSpace identifies research frontiers by capturing keywords or articles with a sharp increase in citations in a certain period (Chen, 2006).

In this study, co-authorship, keyword co-occurrence, co-citation analysis and burst detection function were used to explore the collaborative patterns, the conceptual structure evolution, the intellectual foundation and the research frontiers of digital tourism.

### 2.2 Data collection

The documents were retrieved from the SSCI database of the Web of Science Core Collection (WOSCC) in April 2023. We chose the WOSCC database as it covers numerous leading high-impact journals worldwide and provides powerful access to bibliographic and citation information (Fang et al., 2018). Especially, the cited reference connections it provides enable scholars to explore complete citation networks in any field (Rodríguez-López et al., 2020). Following Buhalís (2020), we extracted the search keywords based on the evolution focuses of digital tourism at different stages, including the multiple forms of digital tourism and the various key technologies involved. A specific query identified the documents: Topic (TS) = “digital” or “smart” or “online” or “virtual” and “tourism”; “e-tourism”; “etourism”; “electronic tourism”; “information and communication technology (ICT)” or “mobile technology” or “information system” or “big data” or “artificial intelligence” and “tourism”, where “Topic” covers the title, abstract and keywords of a document.

Initially, we obtained 707 peer-reviewed articles published in scientific journals in the English language, considering they have obtained peer assessment to ensure quality (Gursoy and Sandstrom, 2016) and have complete references availability for co-citation analysis (Ramos-Rodriguez and Ruiz-Navarro, 2004). Unrelated topics (e.g. online learning and online car-hailing) are further excluded (Zhong et al., 2023). Finally, 646 articles were identified and analysed (Figure 1).

As shown in Figure 2, studies on digital tourism have shown an upward trend over the past 22 years, with an average annual growth rate of 12.74%. Moreover, digital tourism research has continued to surge since 2015.

Figure 3 shows the top 10 tourism journals in terms of the number of published digital tourism studies. Among them, Tourism Management is the leading journal with the most publications on related research.

Based on the Journal Citation Reports provided by the WOSCC, research on digital tourism covered a wide range of topics including 38 categories over the study period. Apart from
3. Results

3.1 Scholarly collaboration

The author collaboration network reflects the collaboration relationship between authors. As shown in Figure 5, the digital tourism domain has formed a major collaboration network around many small-fragmented author groups. The size of the nodes indicates the number of publications by authors. The network shows a trend of multidisciplinary integration, with collaborations across business, environment, and computer sciences, among others.
of articles published by a given author, whilst the links indicating the degree and year of collaboration, with thicker ties representing closer collaboration and warmer colours meaning more recent years. The most influential author in the collaboration network is Law, followed by Chung and Buhalis. The warm-coloured links in the network show a surge of new collaborations around 2016.

The country network is shown in Figure 6. China, the USA, the UK and Spain have laid the foundations for collaboration. The four countries with high research outputs also have high centrality scores, suggesting that these countries share the most influential articles. The links indicate the close cooperation between the USA and the UK, France and Austria and Sweden and Germany. Although China is the most influential country, its cooperation with other countries is relatively weak. Overall, digital tourism is a dynamic field as new co-authorship models are being established, with international collaboration dominating its co-authorship patterns.

**Figure 3** The top 10 tourism journals regarding digital tourism

![Figure 3](image)

Source: Authors own creation

**Figure 4** The top 11 subject categories with digital tourism publications

![Figure 4](image)

Source: Authors own creation
3.2 Evolution of the conceptual structure

Keyword cooccurrence analysis reveals the topic evolution of digital tourism over time (Liu et al., 2015). Figure 7 illustrates a time-zone view of keywords, revealing keywords’ publication years or peak years. Specifically, the topic evolution of digital tourism can be roughly divided into three stages: Stage I (2002–2006), Stage II (2007–2014) and Stage III (2015–2023):
1. **Stage I (2002–2006):** Exploration of the digital transformation. The earliest research revolved around online tourism marketing (i.e. word of mouth). The emergence of information system showed that researchers began focusing on electronic tourism intermediaries. Overall, tourism marketing and tourism product distribution through websites and e-commerce were scholars’ main concerns at this stage.

2. **Stage II (2007–2014):** Acceleration of digital tourism development. Since 2007, numerous keyword categories have emerged. Information technology, communication technology and mobile technology provide technological conditions for digital tourism. Correspondingly, the exploration of tourist attitude (e.g. motivation, customer satisfaction, consumer trust and user acceptance) and behavioural intentions (e.g. information search and decision-making) under the impact of these technologies appeared extensively. Since 2012, tourist experience has also gained wide attention. From the perspective of industry and business functions, explorations on the influence of digital technology on destination management (e.g. destination image) and business services (e.g. business performance, service quality and relationship quality) were popular. This stage involves the knowledge creation and management of consumer demands and business functions based on various digital technology applications.

3. **Stage III (2015–2023):** Diversification of disruptive change. At this stage, the keyword categories have shown a diversified development trend. Big data in tourism has gained wide attention (e.g. tourism demand forecasting). Value co-creation has attracted a lot of research attention as digital technologies have greatly provided opportunities to create or deliver customer value. Virtual reality and virtual tourism were also hot topics, with particular focuses on technology-enhanced experiences (e.g. flow experience and place attachment). Subsequently, topics such as service robots and human-robot interaction have come to the fore since 2021, as well as smart tourism destination and artificial intelligence. Meanwhile, the negative effects (e.g. perceived risk of privacy disclosure) of digital technology have also come to light in recent years.

Correspondingly, we can safely conclude that advances in digital technology are driving disruptive changes in tourism and that an interactive and interoperable digital tourism
ecosystem is being built. Notably, topics such as consumer-oriented value creation, human-robot interaction and potential risks are emerging. Thus, exploring emerging digital technologies used in tourism from the pros and cons is necessary.

3.3 Emerging themes

Burst detection of keywords identifies emerging trends (Chen et al., 2014). Figure 8 presents the top 15 keywords with the strongest bursts from 2002 to 2023. Given that Stage I is the exploratory phase of digital tourism, there is no burst of keywords during this period. In Stage II (2007–2014), service quality was the earliest and longest sustained citation burst, due to the constant attention on the impact of technological advances on tourism services. Similarly, consumer trust has also received constant attention during this period. Furthermore, the Internet as the foundation of the digital transformation in the tourism industry received wide attention. Online travel information search during the destination choice process was also a hotspot. Notably, the role of technology applications in enhancing the destination image came into focus. Research on these topics in Stage II continued into Stage III (2015–2023), indicating that the advent of new digital technologies is changing fundamentally the travel process.

In Stage III (2015–2023), social media emerged as a research hotpot since it could be used to understand consumer attitudes and behaviour patterns. In addition, the impact of electronic word of mouth (eWOM) on consumer purchase decisions also gained attention. The consumer-related relationship quality in the e-tourism environment has attracted the wide attention of scholars, followed by technology acceptance model and tourism information system.

The last three years have witnessed the disruptive impact of emerging technology applications on service experiences and business models. Artificial intelligence has been widely used to forecast prices and customer demand as well as facilitate production.

Figure 8 Top 15 keywords with the strongest citation bursts

<table>
<thead>
<tr>
<th>Keywords</th>
<th>Strength</th>
<th>Begin</th>
<th>End</th>
<th>2002 - April 2023</th>
</tr>
</thead>
<tbody>
<tr>
<td>service quality</td>
<td>3.95</td>
<td>2007</td>
<td>2018</td>
<td></td>
</tr>
<tr>
<td>consumer trust</td>
<td>5.44</td>
<td>2009</td>
<td>2017</td>
<td></td>
</tr>
<tr>
<td>internet</td>
<td>8.73</td>
<td>2010</td>
<td>2016</td>
<td></td>
</tr>
<tr>
<td>information search</td>
<td>3.48</td>
<td>2010</td>
<td>2016</td>
<td></td>
</tr>
<tr>
<td>destination image</td>
<td>2.94</td>
<td>2012</td>
<td>2014</td>
<td></td>
</tr>
<tr>
<td>social media</td>
<td>3.47</td>
<td>2013</td>
<td>2018</td>
<td></td>
</tr>
<tr>
<td>word of mouth</td>
<td>4.71</td>
<td>2015</td>
<td>2018</td>
<td></td>
</tr>
<tr>
<td>relationship quality</td>
<td>3.41</td>
<td>2015</td>
<td>2017</td>
<td></td>
</tr>
<tr>
<td>technology acceptance model</td>
<td>4.23</td>
<td>2016</td>
<td>2019</td>
<td></td>
</tr>
<tr>
<td>industry</td>
<td>2.99</td>
<td>2016</td>
<td>2017</td>
<td></td>
</tr>
<tr>
<td>information system</td>
<td>3.05</td>
<td>2017</td>
<td>2019</td>
<td></td>
</tr>
<tr>
<td>artificial intelligence</td>
<td>2.91</td>
<td>2020</td>
<td>2021</td>
<td></td>
</tr>
<tr>
<td>virtual tourism</td>
<td>9.24</td>
<td>2021</td>
<td>2023</td>
<td></td>
</tr>
<tr>
<td>virtual reality</td>
<td>4.29</td>
<td>2021</td>
<td>2023</td>
<td></td>
</tr>
<tr>
<td>performance</td>
<td>2.94</td>
<td>2021</td>
<td>2023</td>
<td></td>
</tr>
</tbody>
</table>

Source: Authors own creation
management and customer engagement. Virtual reality focused on enhancing tourist experience and behavioural intentions. In addition, the impact of digital transformation on improving tourism business performance has also become a hit.

Overall, the recent hot topics have focused on the disruptive impact of artificial intelligence and virtual reality on tourism, and the role of technological innovation in improving tourism performance. From the perspective of burst strength, virtual tourism could be a turning point for the digital tourism domain. The gradual involvement of tourists in all aspects of tourism services through digital platforms has also highlighted customer value creation.

3.4 Major co-citation clusters

Co-citation clusters reveal the intellectual base and core themes of digital tourism. This study identified 11 major clusters and labelled them by titles presenting each cluster’s core concept (Figure 9). The modularity Q was 0.8511, indicating that this co-citation network has excellent overall structural properties (Ho et al., 2014). Besides, the silhouette values were all above 0.884, illustrating the reliable quality of each cluster. Overall, three core thematic clusters were identified: technology innovation and application, destination digital management and consumer value creation:

1. **Technology innovation and application.** This thematic cluster comprises Cluster #0, #1, #3, #5 and #6 and the research emphasizes the application of multiple digital technologies in the tourism industry. Cluster #0 (silhouette = 0.968) is the largest cluster, which focuses on exploring the applications of virtual reality in tourism. Cluster #3 (silhouette = 0.884) focuses on the role of big data as a knowledge-creation tool in the tourism practise. Cluster #5 (silhouette = 0.977) focuses on information technology applications in tourism and hospitality, while Cluster #6 (silhouette = 0.983) discusses the effect of service robot or artificial intelligence in service innovations.

2. **Destination digital management.** This thematic cluster contains Cluster #1 and #15 and relevant topics centre on destination digital management. Cluster #1 (silhouette = 0.889) explores the foundation and development of smart tourism destinations, especially shaping new smart scenarios and ecosystems (Gretzel et al., 2015). It also
includes enhancing tourism experience by offering personalised services. Cluster #15 (silhouette = 0.988) explores the role of online platforms (i.e. websites and social media) as destination image formation agents for online destination image.

3. **Consumer value creation.** This thematic cluster comprises Cluster #2, #4, #10, #11, #15 and #21, focusing on tourist experience and consumption behaviour pattern. Cluster #2 (silhouette = 0.904) mainly discusses the role of smartphone use in travel planning and shaping tourism experience by addressing various information needs. Cluster #4 (silhouette = 0.990) focuses on the effect of user-generated content (UGC) (e.g. travel blogs) on tourism marketing. In contrast, Cluster #11 (silhouette = 0.943) mainly explores the impact of electronic word-of-mouth (eWOM) on purchase intentions. Cluster #10 (silhouette = 0.962) is labelled as “electronic loyalty” and focuses on customer satisfaction and behavioural intentions in the context of electronic commerce. Cluster #21 (silhouette = 0.985) provides various conceptual frameworks on tourism based on the principle of consumer co-creation.

In general, knowledge innovation closely follows technology innovation in digital tourism. Scholars focus on exploring the value of commercial applications and digital penetration of destinations under technological innovation, and further identify how visitors can engage and achieve value creation.

### 3.5 Articles with citation bursts

Citation bursts of articles reflect the evolution of research hotspots (Chen et al., 2014). Figure 10 lists the top 10 references with the strongest citation bursts. The strongest citation burst is led by Buhalis and Law (2008), who comprehensively reviewed research on ICT in tourism. Furthermore, Xiang and Gretzel (2010) explored the role of social media in online travel information searches. The long-last citation bursts of these two articles further indicate that the transformative impact of ICT and social media on tourism has been a hot topic in the early 20th century.

Sequential citation bursts occurred between 2015 and 2017. Law et al. (2010) led the citation burst in 2015, and reviewed methodological approaches to website evaluation. The strongest bursts from 2016 were Wang et al. (2012) and Munar and Jacobsen (2014).

#### Figure 10  Top 10 references with the strongest citation bursts

<table>
<thead>
<tr>
<th>References</th>
<th>Strength</th>
<th>Begin</th>
<th>End</th>
<th>2002 - April 2023</th>
</tr>
</thead>
<tbody>
<tr>
<td>Xiang &amp; Gretzel (2010)</td>
<td>14.07</td>
<td>2012</td>
<td>2018</td>
<td></td>
</tr>
<tr>
<td>Law et al. (2010)</td>
<td>6.73</td>
<td>2015</td>
<td>2018</td>
<td></td>
</tr>
<tr>
<td>Wang et al. (2012)</td>
<td>6.94</td>
<td>2016</td>
<td>2019</td>
<td></td>
</tr>
<tr>
<td>Xiang et al. (2015)</td>
<td>7.63</td>
<td>2017</td>
<td>2019</td>
<td></td>
</tr>
<tr>
<td>Wang et al. (2016)</td>
<td>7.02</td>
<td>2017</td>
<td>2019</td>
<td></td>
</tr>
<tr>
<td>Bogicevic (2019)</td>
<td>7.77</td>
<td>2021</td>
<td>2023</td>
<td></td>
</tr>
<tr>
<td>Loureiro et al. (2020)</td>
<td>6.89</td>
<td>2021</td>
<td>2023</td>
<td></td>
</tr>
<tr>
<td>Kim (2020)</td>
<td>6.82</td>
<td>2021</td>
<td>2023</td>
<td></td>
</tr>
</tbody>
</table>

Source: Authors own creation
The former article investigated the role of smartphones in influencing tourism experience, while the latter explored the motivations of summer holidaymakers for social media content creation and sharing. The 2017 citation burst was led by Xiang et al. (2015) who discussed the use of the Internet for travel planning. In addition, Wang et al. (2016) explored the spillover effects of smartphone use in daily life into travel.

Bogicevic et al. (2019), Loureiro et al. (2020) and Kim et al. (2020) led the last citation bursts in 2021 and they all focused on virtual reality. Overall, consistent with bursts of keywords, the emerging trends in recent years are exploring the impact of virtual technologies on experience enhancement and visit intention.

4. Discussions and future research agenda

Based on the results of bibliometric visualisation, a theoretical framework was developed to organise the findings into a holistic model of digital tourism and cast a future research agenda (see Figure 11).

The findings are as follows. Firstly, a major collaboration network has been formed, with Law and Buhalis being the most influential and productive authors. Moreover, developed countries are at the core of the network, although developing countries, represented by China, are increasingly contribute valued research findings. Secondly, the development processes of digital tourism are summarised as exploration (2002–2006), acceleration (2007–2014) and diversification (2015–2023), echoing previous studies (Xiang, 2018; Buhalis, 2020). Significantly, research topics evolve with technological advances (Buhalis, 2020), with a particular focus on consumer-oriented value creation and potential technological risks. Regarding emerging themes, current hot topics focus on artificial intelligence, virtual reality and tourism performance. Moreover, virtual tourism could be a turning point for the digital tourism domain, which is recognised as the foundation of Metaverse that converges virtual and physical universes and hopefully disrupt the tourism...
sector in terms of functionality, interoperability and immersion (Buhalis, 2023). Thirdly, in terms of co-citation clusters, three thematic groups were identified: technology innovation and application; destination digital management; and consumer value creation, confirming the findings of Buhalis and Law (2008). Furthermore, citation bursts reveal that the impact of virtual technologies on experience enhancement and behaviour intention is a current research hotspot.

Based on our findings, we propose three future research directions: digital scenario, digital production and digital governance. Firstly, further research could focus on how disruptive technologies shape the digital scenario by transforming tourism service experiences and business models. The emerging ambient intelligence driven by a range of disruptive technology (e.g. Metaverse) inevitably transforms industry structures, processes and practises (Buhalis, 2020; Buhalis et al., 2022). Thus, future research should deeply explore how disruptive technologies address the core and new problems in digital scenarios (ranging from consumer engagement to business performance) to continuously enrich the existing knowledge system.

Secondly, in terms of digital production in tourism, knowledge production and value creation brought about by technological innovations provide a new avenue for future research. With the development of the internet and social media, big data based on mobile devices have been acknowledged as important data sources for understanding and forecasting tourist experience and behaviour (Xiang et al., 2020; Li et al., 2018). Existing studies have further focused on the effect of UGC or eWOM on tourism decision-making and purchase intention. As artificial intelligence methods continue to improve (Doborjeh et al., 2022), knowledge production based on user-generated big data will continue to be an important research direction full of opportunities. In addition, digital technology has greatly expanded the opportunities for involving tourists in the production processes of tourism services as well as value creation (Morosan and DeFranco, 2019). Nowadays, tourists can be seen as digital natives who are cognitively aligned with technological capabilities and have a high demand for technology. Future research should focus on new trends in consumer-involved value enhancement in the digital environment.

Thirdly, future studies should further focus on digital governance, including risk management and sustainable development. On the one hand, as the findings show, technological transformations inevitably involve potential risks in practise. Specifically, intelligent automation and digital surveillance may expose tourism workers to dislocation and unemployment (Rydzik and Kissoon, 2021), and tourists are facing big data-driven price discrimination (Shang et al., 2022) and privacy issues (Tussyadiah et al., 2020). The negative impacts of digital technologies on tourism are worth studying to fulfil the sustainable development of digital tourism. On the other hand, digital technology is recognised as an effective tool for the tourism sector to cope with crises, such as virtual reality technology (Lu et al., 2022) and robotics (Zeng et al., 2020). In this vein, future research should focus on the role of technology in achieving sustainable development as pandemics, climate change and other threats loom over the future of tourism (Xiang et al., 2021).

5. Conclusions

This study uses a bibliometric analysis of 646 SSCI articles to identify the collaboration networks, scientific structure and emerging research trends in digital tourism. Based on scientific mapping visualisations, we propose a conceptual framework that highlights the evolutionary process and research focus of digital tourism, along with three promising research directions, namely, digital landscape, digital production and digital governance. This research provides a bridge between the past and future of digital tourism and responds to the needs and realities of the industry.
This study has three key theoretical implications. Firstly, this study provides a comprehensive and objective picture of the intellectual structure of digital tourism through bibliometric analysis. Secondly, this study expands the knowledge base of previous literature reviews of digital tourism by updating the scope of keywords and extending the time span of relevant articles. Thirdly, a theoretical framework is developed to organise the findings into a holistic model that provides fresh insights into knowledge generation in digital tourism.

From a practical perspective, this study provides a thorough understanding of the relationship between technology and tourism, which will help managers understand the competitive advantages of digital technology in tourism practise and incorporate it into strategic means of efficient development. In addition, the future research agenda proposed in this study presents opportunities and challenges for digital tourism, thereby providing implications for scholars and practitioners to address an uncertain future.

6. Limitations
There are some limitations to this study. Firstly, only SSCI articles from the WOSCC database were selected for analysis, given the quality of the documents and the CiteSpace matching. Future research is expected to extend the database sources (e.g. Scopus and Google Scholar). Secondly, this study focused on peer-reviewed articles to ensure the quality of articles and the availability of complete references for co-citation analysis. Additional types of papers (e.g. research notes and conference papers) can be considered in future research. Finally, we set the scope of keywords based on the multiple forms of digital tourism and the various key technologies involved. The search logic for keywords can be further extended in the future.

The contributions of the authors
Conception or design of the work: Zhiyong Li, Mingmin Huo and Tingting Huo; Data collection: Mingmin Huo, Tingting Huo and Hemin Luo; Data analysis and interpretation: Mingmin Huo, Tingting Huo and Hemin Luo; Drafting the article: Mingmin Huo and Tingting Huo; Critical revision of the article: Zhiyong Li, Mingmin Huo and Tingting Huo; Final approval of the version to be published: Zhiyong Li, Mingmin Huo, Tingting Huo and Hemin Luo.

References


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