

The Impact of Digitalization and Digital Transformation on the Tourism Industry: A Bibliometric Analysis of Research Trends and Directions

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Abstract

This study explores the impact of digitalization on the tourism industry through a bibliometric analysis of the literature, focusing on the main research clusters and future directions. Using the Scopus database and the VosViewer visualization tool, 298 articles were analyzed, and the results indicate the existence of three major clusters. The first cluster focuses on digital transformation and innovation in tourism, highlighting how digitalisation is redefining operational processes and improving services. The second cluster highlights the role of digitalisation in adapting the tourism sector to global challenges, especially in the context of the COVID-19 pandemic. The third cluster explores the link between digitalization and sustainability, emphasizing interest in responsible tourism and emerging technologies such as smart tourism and social media. Based on these clusters, the study suggests future research directions, including deepening the relationship between digitalization and sustainability, comparative studies between markets, and analyzing the impact of advanced technologies on the personalization of tourism experiences. The conclusions highlight the importance of digitalisation as a transformative force in tourism, providing a basis for the development of sustainable and innovative strategies in a digitalised environment.

Key words: Tourism, digitization, bibliometric analysis, VosViewer, Scopus

J.E.L. classification: Z32, C1, B26, F63

1. Introduction

The emergence of digital technology has led to significant changes in the business world, influencing various industries, including tourism. These technologies have fundamentally altered the nature of the competitive landscape in multiple areas. Ever-changing consumer habits are driving organizations to take a strategic approach to digital transformation. Tourism, a key sector of the digital economy, uses these technologies to provide streamlined services and improve customer experiences. Digital technologies have become key drivers of transformation, altering tourism companies, services, and business ecosystems (Sigala, 2018). The implementation of digital technology has had a positive impact on the attractiveness, efficiency, inclusiveness and long-term sustainability of tourism (UNWTO, 2022).

The digitalization and digital transformation of the tourism industry have had a profound impact on business operations, marketing strategies, consumer behavior, and knowledge management, generating significant organizational and policy implications for the sector (Schönherr et al., 2023). In support of this observation, the tourism sector was a pioneer of digital innovation, being among the first industries to adopt the digitization of operations globally by implementing online reservations for flights and hotels. The use of information and communication technologies (ICT) in industry dates back to the 1970s, with the introduction of computer reservation systems (CRS) and continuing in the 1980s with the development of global distribution systems (GDS) (Buhalis et al., 2011).

Travel service providers are increasingly adopting cutting-edge digital technologies to enhance customer engagement. These technologies provide improved insights into consumer preferences and operational performance. A variety of technological tools, including artificial intelligence, blockchain, machine learning, the Internet of Things, big data, virtual and augmented reality, smart devices, sensors, robots, drones, beacons, ubiquitous computing, and proximity communications, among others, are driving this transformation in the tourism industry (Samala et al., 2020). Although digitalization and digital transformation in the tourism industry are considerable and distinct phenomena, researchers have made little effort to systematically organize the literature. Although research on the applications of information and communication technologies (ICT) in tourism has evolved into a significant body of knowledge as a field of scientific investigation (Buhalis, 2020; Sigala, 2018), further studies are needed to better understand the prospects of digitalisation and digital transformation in this sector. Rapid advances and the diffusion of cutting-edge digital technologies, as well as the digitalisation and digital transformation of tourism, require an up-to-date review of the existing academic literature. In addition, the in-depth analysis of research at the intersection of digital technologies and the tourism industry has not received sufficient attention (Kumar et al., 2023). While the relevance of digitalization and digital transformation in the tourism industry is undeniable, it is necessary to gain a complete understanding of the current state and future directions of research in this area (Cheng et al., 2023). Starting from these premises, we aim to fill these gaps using a bibliometric research method. Recently, bibliometric analysis has become a powerful method to understand the structure of research fields, including in tourism (Chen et al., 2022; Fauzi, 2023). Therefore, it is essential to examine the broader context, retrospectively, to determine the current area, characteristics, and possible directions for future research.

The present study aims to carry out an exhaustive bibliometric analysis of the existing academic literature, focusing on digitalization and research in the tourism industry. In line with the previous discussion, this study aims to answer the following research questions: RQ1. What are the main research clusters? RQ2. What are the future directions of research?

2. Literature review

Digitalization and digital transformation are frequently among the key priorities of modern managers (Mikalef and Parmiggiani, 2022). In academic literature, the terms digitalization and digital transformation are often used synonymously (Saarikko et al., 2020). Although these concepts are interconnected, it is important to differentiate them from a business perspective. Digitalization refers to the use of digital technologies to modify and optimize existing business processes, such as distribution, communication or relationship management, with the aim of reducing costs and improving processes, with the potential to enhance customer experiences. In contrast, digital transformation is the most extensive stage of the digital change that a firm undertakes, characterizing a comprehensive change that favors the creation of innovative business models, which go beyond the simple digitization of individual processes or tasks (Verhoef et al., 2021). and a dynamic business environment (Guinan, Parise and Langowitz, 2019; Gómez-Trujillo and González-Pérez, 2022).

3. Research methodology

In order to carry out the bibliometric analysis of research on the relationship between „tourism” and „digitalization,” this paper followed a systematic and structured approach, focused on selecting, extracting and interpreting relevant data from the academic literature. The process of identifying the articles was carried out through the Scopus database, one of the most comprehensive sources of internationally recognized scientific literature, ensuring a rigorous coverage of the areas of interest.

In the search, the keywords „tourism” and „digitalisation” were used to isolate thematically relevant works. In addition, the following selection criteria were applied: the type of document was restricted to articles, excluding other forms of publication, such as conference papers or reviews, in order to maintain a focus on published academic outputs. English was chosen as the language of reference, due to its global recognition in the academic literature and its extensive accessibility. The „final publication level” filter was also imposed to include only articles reviewed and published in final form, excluding materials in the pre-publication or revision stage.

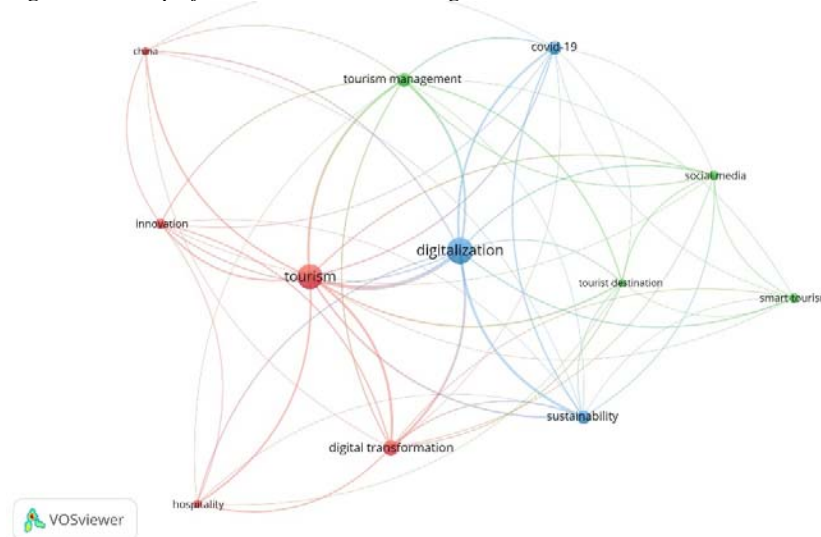
After applying these criteria, the bibliographic and citation data of the 298 selected articles were exported to the VosViewer software. VosViewer is a tool dedicated to bibliometric analysis and visualization of relationships between terms, authors and publications, facilitating the graphical representation and analysis of citation and co-occurrence networks of keywords. The export of the data in the format compatible with VosViewer allowed an in-depth interpretation of the central themes and research clusters in the academic literature, providing an overview of the field of study.

In VosViewer, the analysis aimed to identify and group the main research themes and examine the interconnections between them. Co-occurrence networks were created to highlight the frequency and distribution of concepts within the selected articles, as well as citation networks to determine the influence of authors and fundamental works in the field studied. This methodological approach ensures a clear and rigorous structuring of the existing literature, contributing to the identification of potential gaps in academic research on digitalization in tourism and to substantiate future directions of investigation.

4. Findings

In the context of rapid digital transformations, the tourism industry has extensively integrated emerging technologies such as artificial intelligence, blockchain, big data and the Internet of Things to optimize operations and improve the customer experience. Digitalization and digital transformation have become essential elements for the competitiveness of the tourism sector, contributing to the innovation of business models and adaptation in a business environment characterized by volatility, uncertainty, complexity and ambiguity (VUCA). However, the literature on the impact of digitalization in tourism remains fragmented, and a systematic understanding of the evolution and research trends in this field is needed. The present study aims to explore the mapping of the academic literature on digitalization in tourism, through a bibliometric analysis, in order to identify the main research clusters and suggest future directions relevant to this field.

Figure no. . Map of the relations between digitalization and tourism – Visualization of Major Clusters



Source: Own processing

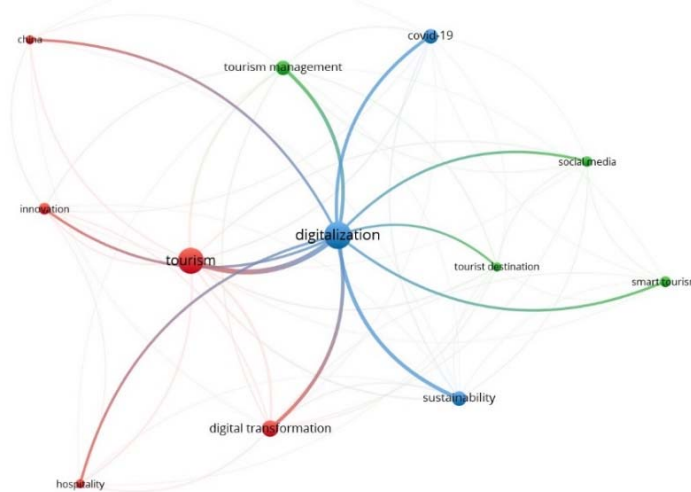
The network map generated in VosViewer (Figure no.1.), provides an overview of the main research topics around digitalization and digital transformation in the tourism industry, illustrating close links between key concepts and highlighting major directions of academic interest in this field. Central to the network is the term „digitalization”, which relates to critical topics for tourism, such as sustainability, the impact of the COVID-19 pandemic, digital transformation, consumer experience, and the development of smart tourist destinations.

The map’s analysis indicates that digitalisation is seen as a catalyst for innovation and adaptability in the face of rapid change and global challenges, such as the COVID-19 crisis. This interdependence between digitalization and sustainability suggests a research direction that explores the role of technology in reducing the environmental impact of tourism and in supporting responsible and sustainable tourism. At the same time, strong connections with terms such as „smart tourism” and „social media” show the importance of digital technologies in personalizing tourism experiences and influencing tourists’ perception of destinations.

The structure of the network also suggests an openness to comparative studies that could look at the different implementation of digitalization in different regions and tourism markets, reflected in terms such as „China”. This comparative approach would allow for a more nuanced understanding of how digitalisation is adopted and integrated according to the characteristics of the markets and their cultural or economic specificity.

Based on these observations, it can be concluded that research around digitalization in tourism is focused on two major directions: exploring the technological impact on tourism experiences and destination management, and analyzing how digitalization supports the sustainability and resilience of the industry in the face of global challenges. The network map also suggests new research opportunities, such as deepening the role of artificial intelligence, augmented reality and other emerging technologies in personalizing tourism experiences, as well as exploring strategies to adapt to rapid changes in the global environment, especially in crisis contexts.

Figure no. 2 Digitalisation and digital transformation in tourism – Innovation and transformation cluster



Source: Own processing

Figure no. 2 represents the keyword network of the central cluster around „digitalization” in tourism. This cluster draws attention to the interdependencies between digitalisation and several relevant topics in the field of tourism, e.g. „tourism”, „digital transformation”, „sustainability”, „innovation” and „COVID-19”. Such an analysis describes the crucial role of digitalisation as a driver of transformation and innovation in the tourism sector.

The word digitalization holds the center in the cluster, emphasizing its central function as a vector of change in the tourism industry. Sigala (2018) argues that digitization encourages innovation and modernization of tourism experiences and is conducive to the development of new business models in response to global market demands and globalizations. Its association with other pertinent terms attests to the centrality of digitalization in framing trends and stimulating innovations in tourism.

Digitalisation is rather associated with „innovation” and „digital transformation”, so it may imply that digitalisation in the tourism sector is not just about implementing digital technologies, but about changing the industry’s processes and services. In addition, Buhalis et al. (2011) argue that digitization also enables innovation and operational efficiency and competitiveness in operation, so that the competitiveness of the industry can seek a boost. In addition, the relationship between the „sustainability” of digitalization has brought to the fore the value of using digital technology for

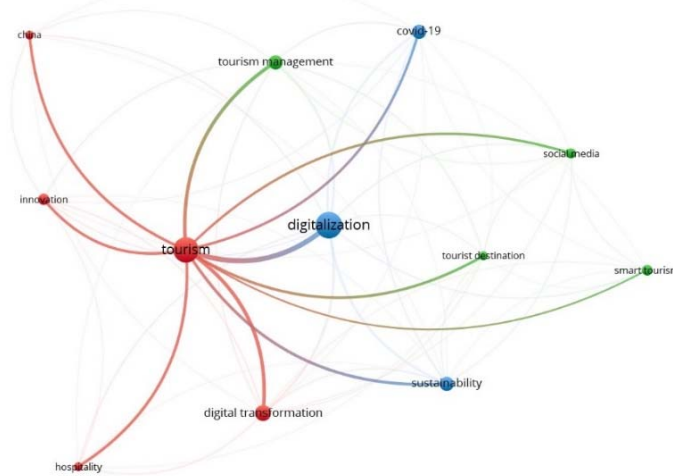
sustainable tourism, a perspective also presented by Gomez-Trujillo and Gonzalez-Perez (2022). This brings a research direction in relation to how technology can mitigate environmental effects, as well as improve responsible practices.

The association of „COVID-19” and „digitalization” signifies a rapid follow-up to the adoption of special technologies for tourism, as discussed by Cheng et al. (2023). Travel companies have invested in digital solutions for support, post-crisis recovery and future resilience. As Anbu et al. (2022) points out that the health crisis has forced travel companies to invest in digital solutions to maintain their operations in times of crisis and to recover from the crisis.

The business model in the sector needs further analysis on how digitalization and digital transformation can contribute to its redefinition (Kumar et al., 2023). He also suggested that sustainability can be supported through digitalization by reducing the industry’s ecological footprint. Therefore, this research direction is specifically concerned with how technology can contribute to greener and more responsible tourism. Further research should also study how the tourism sector „adopts [...] practices in conditions of global crisis”, focusing in particular on organizational resilience (Guinan, Parise, & Langowitz, 2019).

This cluster places digitalization at the epicenter of the transformation in tourism, which is related to innovation in sustainability and even global crisis management, as deeply affected areas. The study demonstrated that digitalization is a necessity for the sustainable development and adaptability of the industry in such a complex and unpredictable global context.

Figure no. 3 Digitalization and Hospitality – Tourism transformation and innovation cluster



Source: Own processing

The second group of terms related to „tourism” in terms of digitisation is shown in Fig. 3, demonstrating the associations between „tourism” and adjacent themes such as „innovation”, „digital transformation”, „hospitality” and „China”. This reflects an increased focus in the literature on how digitization catalyzes change in tourism as an innovation support sector, a prominent point highlighted by Sigala (2018) regarding the contribution of technology to changing business models and consumers. Experiences.

The term „tourism” is in the middle of this cluster, with „digital transformation” and „innovation”, showing how digitalization substantially helps to modernize processes and create new tourism-specific business models. As Buhalis et al. (2011) notes that digital technologies have made industry processes simpler and improved the tourism experience while becoming globally competitive. Here are connections to what has been a concern in the literature – the need to bring new technologies to the tourism industry and transform traditional practices through digital innovation.

As such, the interrelationship between „tourism” and „hospitality” states that digitalisation is not only impacting the tourism industry, but is equally extended to the associated hospitality sector. As Verhoef et al. (2021) observed that incorporating digital technology into hospitality helped the work process become more efficient and supported the management of customer experiences by optimizing touchpoints and personalizing services, this involves delivery. This association describes

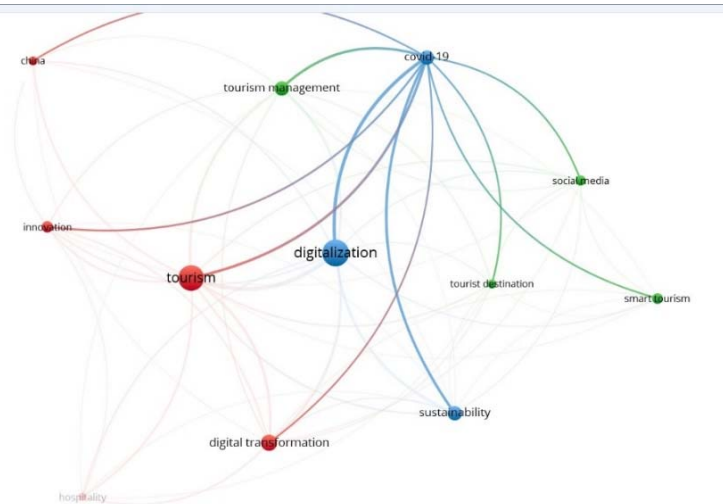
the acceptance of technology in accommodation services, showing how digitalization is transforming the tourist experience for better efficiency and personalization interaction.

The word „China” shows an obvious academic interest in the Chinese tourism market in the context of digitalization, or in the innovative manner of this region in the application of digital technologies in tourism. According to Cheng et al. (2023), in emerging markets such as China, more innovative models on digitalization could be offered, which would be worthy of comparison with those in developed markets for the purpose of identifying globally applicable lessons. The same observation implies the possibility of comparative research that could highlight the different and similar aspects between implementation strategies in emerging versus developed markets.

The cluster emphasizes that digitization is a transformative factor, and ICT a cornerstone for modernization and innovation in the tourism and hospitality sector. Research pathways should, as Mikalef and Parmiggiani (2022) also suggest, examine how digital transformation redefines business models and operational practices in tourism and the impact on processes and services, or in other words, a kind of „adaptation” of digitalization. emerging markets, such as China. It would provide insightful new lessons on how emerging markets could innovate in the direction of digitalisation. Perhaps, examining how technology is intertwined in the provision of tourism and hospitality services can bring to the fore issues related to digital technologies that ensure the personalization and efficiency of consumer experiences as added values that contribute to increased levels of customer satisfaction (Saarikko et al., 2020).

This set focuses on the strategic role of digital transformation and innovation in reframing tourism and hospitality, highlighting the great influence of technology on the business model and customer experience.

Figure no. 4 Digitalization in the context of COVID-19 and sustainability – Smart tourism and social networks cluster



Source: Own processing

The image shows the third group of terms „digitalisation” and „tourism” with the terms „COVID-19”, „sustainability”, „smart tourism”, „social media” and „tourism management”. Such a structure implies a strong correlation of digitalization with various critical functions of the tourism sector and demonstrates how technology challenges not only tourism operations, but experiences themselves (Sigala, 2018; Verhoef et al., 2021).

Digitalisation is centrally positioned around „COVID-19”, underlining the major role of the pandemic as a catalyst for rapid digitalisation in the tourism industry (Cheng et al., 2023). „Global health crisis – fundamental changes in the functioning of the sector...” and „Rapid implementation of social distancing technologies and aggressive promotion of destinations in the online sphere”, as stated by Cheng et al. (2023) further summarises the situation that needs to be made conducive to digitalisation and this difficult challenge. The above case thus illustrates how, during a crisis, the

sector can resort to digital solutions developed to maintain its core functions in times of great turbulence.

The link between „digitalization” and „sustainability” reflects the academic concern for a more responsible and sustainable tourism, and this through the instrumentality of digital technologies. According to Gomez-Trujillo and Gonzalez-Perez (2022), digitization can be a backbone for supporting sustainability initiatives by optimizing resources and reducing the industry’s ecological footprint. This reveals a deep interest in the body of literature on how green and responsible tourism can be developed through digital technology, infrastructure for the creation of sustainable and efficient industrial practices.

The relationship between „digitalization”, „smart tourism” and „social media”, between them, shows the desire to apply advanced technologies and social networks for the personalization and optimization of tourism experiences. Buhalis et al. (2011) argue that smart tourism integrates digital technologies to create smart destinations where visitor experiences are enhanced and effective destination management is at stake. In this perspective, social networks are significant in the perception and decision-making of tourists and form an integral part of contemporary digital marketing in promoting destinations and adapting consumer needs and preferences.

The above literature gaps should guide further research. First, the research will investigate how digital enables the tourism industry to cope with the pandemic and to what extent the digital line can support the resilience of the sector in terms of the global crises that will come in the future. Second, it recommends exploring the impact of digitalisation on the sustainability of tourism, given that digital technologies are a potential force in reducing the negative impact of environmental issues and promoting responsible and environmentally friendly tourism (UNWTO, 2022). The third area where it could be a solution is exploring smart tourism and social media as emerging avenues to shed additional light on the influence of advanced technologies and social media on tourism experiences and consumer behaviors that may be conducive to personalizing and enhancing tourism experiences (Saarikko et al., 2020).

The cluster explains how the tourism industry can be digitized in a dynamic environment, full of complex changes and problems, which will benefit and help the industry to grow further. With a focus on sustainability, innovation and personalization of the tourism experience, it would seem that digitalization is an integral part of the future sustainability and competitiveness of the sector.

5. Conclusions

The present study aimed to explore the impact of digitalization on the tourism industry through a bibliometric analysis, in order to answer two essential questions: *What are the main research clusters?* and *What are the future directions of research?*

Regarding the first question, the bibliometric analysis revealed three major clusters in the literature. The first cluster focuses on digital transformation and innovation in tourism, highlighting how digitalization redefines operational processes and improves hospitality services, contributing to a superior experience for tourists. The second cluster explores the adaptation of the tourism sector to global challenges, especially in the context of the COVID-19 pandemic, where digitalisation has proven essential for crisis management and sustaining resilience. The third cluster focuses on the relationship between digitalization and sustainability, illustrating the researchers’ interest in responsible tourism and the use of advanced technologies, such as smart tourism and social media, in promoting destinations and personalizing tourism experiences.

Regarding the second question, the results suggest clear directions for future research. First of all, it highlights the need to deepen the way in which digitalization can support sustainability in tourism, by implementing ecological practices and promoting responsible tourism. Second, comparative studies across markets and regions could provide valuable insights into variations in digitalisation uptake and innovative practices that can be widely applied. At the same time, future research could analyse the impact of emerging technologies, such as artificial intelligence and augmented reality, on the tourism experience and the personalisation of services, thus contributing to increasing the competitiveness of the industry.

In conclusion, this analysis underlines the essential role of digitalization as a transformative factor in the tourism industry, with an impact on innovation, sustainability and adaptability of the sector in a dynamic and constantly changing global environment. The identified directions provide a solid basis for deepening future research and developing strategies to support the evolution of tourism in a digitized and sustainable framework.

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