Trends of Information Systems in Tourism: A Review of Literature

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ABSTRACT

Travel and tourism is the world's largest and fastest-growing industry that benefits the environment, society, and economy by supporting businesses and improving supply chain efficiency. Reliable information is crucial for informed decision-making and positive experiences in this sector. Information technology has had a significant impact on the industry, leading to changes in organisational operations. Tourism companies use digital tools to promote sustainable tourism and achieve development goals. To stay competitive, businesses must embrace technology and adapt to new trends. Though there has been voluminous but fragmented research to cover the various aspects of the tourism information system by several researchers over the years, a big picture is still missing due to the dynamic changes in the technological aspects that reveal varied developments in the tourism industry. Hence, this paper reviews recent IT developments in tourism and hospitality, analysing research articles from the past decade. It aims to contribute to existing knowledge, provide insights into practical implementations, and suggest areas for further research in information systems in tourism.

Keywords: Information system, Information Technology, ICT, Travel, Tourism and Hospitality

INTRODUCTION

Over the past 50 years, travel and tourism have become a crucial part of the global economy. This industry has grown rapidly and is now the largest and fastest-growing sector worldwide (Dwyer et al., 2020). Tourism is a complex concept that includes various components, driven by both individuals seeking adventure and destinations trying to attract visitors. With its connections to culture and finance, tourism is a vast and intricate industry that affects many aspects of society. Scholars such as Inskeep (1991), Hall (2000), Liu (2003), Miller and Twining-Ward (2005), Page and Connell (2006), and Mill and Morrison (2006) have recognised the systematic nature of tourism. Its complex ecosystem involves various participants, including physical tourist offices and online service providers such as digital platforms, travel agents, tour operators, accommodation suppliers, destination management organisations, visitor attractions, and transport activities. Consequently, this sector has become a significant source of employment and plays a crucial role in driving economic growth (Eurostat, 2020).

Tourism development can bring a range of benefits to a destination, including environmental, social, and economic advantages. This is achieved through various industry associations, such as hotels, restaurants, transportation, catering services, and travel agents. In most countries, the initial stage of tourism development focuses on stimulating economic growth, which ultimately leads to improvements in the overall quality, efficiency, and transparency of the entire supply chain associated with a particular tourism destination. As a result, the tourism industry is continuously striving to improve and revolutionise its approaches to generate, acquire, and distribute value.

Additionally, the travel and tourism industry is structured around various destinations and schedules, making it an information-based business model. This means that consumers must commit to a contract before experiencing the product, without the ability to test it beforehand (Sevrani and Elmazi, 2008). Therefore, decision-making and consumption occur at different times and locations, requiring accurate and reliable information. The quality of tourism services and social interaction between suppliers and consumers depend on the accuracy and perfection of this information.

 The use of information technology has become a critical aspect of the tourism industry, both for internal processes and external communication with third-party entities. Digital technologies have made communication and interaction easier, particularly through the Internet, which most travellers now rely on to access information about their destinations and make informed decisions (Liburd, 2012). Social media platforms have also become increasingly important in the consumer's decision-making process. As a result, the tourism industry has undergone a digital transformation, with a shift towards building a competitive edge through online services rather than physical location and service delivery (Saseanu et al., 2020). Therefore, technology has become a vital resource for innovating business models, and organisations must adopt agility and implement new processes to keep up with evolving trends in the IT sector (Lambert et al., 2018).

Nowadays, tourism companies are investing in digital tools for long-term success amidst market and business strategy challenges (Tohanean et al., 2018; Sahut & Peris-Ortiz, 2014). Information technology has enabled sustainable tourism through the use of social media, chatbots, and digital assistants (Liu & Macerinskiene, 2016). These tools disseminate information on sustainable development, promote best practices, and advance sustainable development objectives. Innovation deployment and new technologies are crucial for developing new products or services in the tourism sector (Bigné & Decrop, 2019; Dredge et al., 2018).

However, the implementation of ICT is a major technological trend that is transforming society and business. Enterprises are constantly required to adopt digital technologies and align their business models with this new reality (Parviainen et al., 2017; Kohli & Melville, 2019). The tourism industry is no exception and must embrace ICT. While digital technologies offer many benefits, they also require significant investments and associated costs (Ahmad & Murray, 2019). The advancements in digital technologies have created a new area of research for scholars to investigate how practitioners in various industries are using those technologies. Henriette et al. (2015), Gebayew et al. (2019), Reis et al. (2018), Bejtkovsk et al. (2018), and Vial (2019) are the pioneering works that have significantly contributed to the literature on digital transformation. But, in the realm of information and communication technologies, there is a lack of research on the organisational impacts of this phenomenon.

In recent years, technological advancements have greatly impacted the travel and tourism industries, leading many organisations to undergo complete transformations (Buhalis, 2019; Navo-Marco et al., 2018). While there are varying frameworks on digitalization illustrated by several scholars, i.e., Williams et al., 2019; Nwaiwu, 2018; Teichert, 2019; and Berghaus et al., 2017, they all agree that it involves more than just introducing new technology. It also requires the development of people, processes, and organisations to adapt to the changes brought about by technology. Hence, the tourism industry faces a technological paradox. This paper tries to review the recent changes, developments, and adoption of information technology in the tourism and hospitality industries, particularly over the last decade. Therefore, the objective of this paper is to conduct an analysis of the content found in

research articles published in prominent tourism and hospitality research journals, with a specific focus on information technology. By examining these research studies, our aim is to contribute to the existing body of knowledge on IT applications within the tourism and hospitality industries. This analysis will provide insights into the recent advancements and practical implementations of information technology in this sector.

METHODOLOGY

The present study conducted an analysis of research articles published in prominent high-impact journals within the tourism and hospitality industry. The objective of this investigation was to encompass research studies published within the past decade. Hence, this study has been utilized the SAGEPUB, ScienceDirect, and Wiley databases to identify the seven prominent travel and hospitality journals, which encompassed the Journal of Hospitality & Tourism Management, International Journal of Tourism Research, Annals of Tourism Research, Tourism Management, Journal of Travel Research, Journal of Hospitality &

Tourism Research, and Cornell Hospitality Quarterly. The initial search using the keyword 'information technology' 'digital technology' 'e-tourism' across these journals yielded a total of 2,320 articles. To narrow down the results, further the search was refined by focusing on the presence of the term 'information technology (IT)' within the abstracts, resulting in 70 research articles. Through a comprehensive content analysis of these 70 articles, only 58 were deemed highly relevant to the present study. These articles are reviewed in the following part of the paper by categorizing them into different themes of use of information technology in tourism & hospitality industry. In this paper, going through a rigorous content analysis three main themes have identified in recent use of information technology in tourism and hospitality industry, namely: studies related to concept of digital tourism, studies related to internet and tourism, studies related to technology and sustainability in tourism. The paper contributes to the literature; and also provides the implications with the suggestion of operational solutions for the industry.
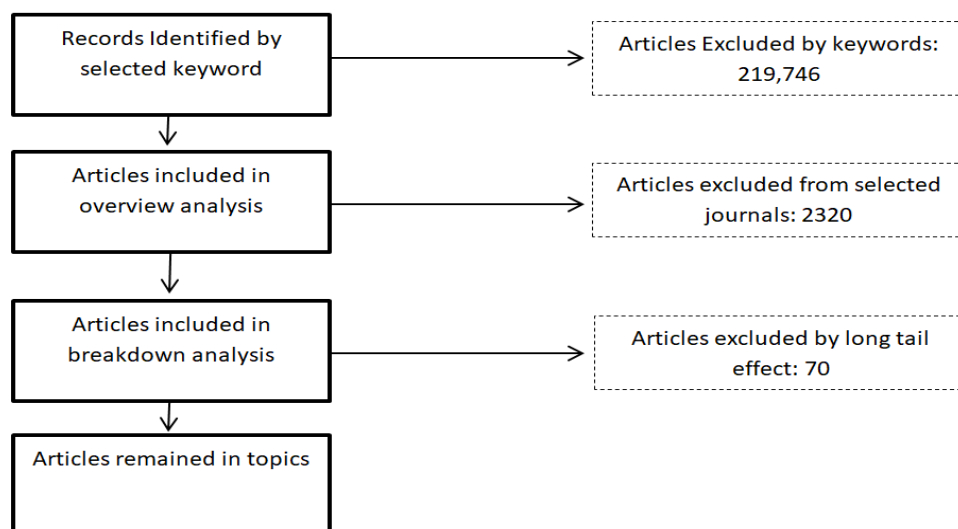

Figure-1 Framework of sorting articles

Revising related works:

Tourism is a collaborative service sector that relies on network management

organizations for effective organization (Volgger & Pechlaner, 2014). Collaboration between customers and service providers

with varying digital skills is necessary, and the adoption of new ICT solutions is influenced by personal, environmental, and governmental factors (Buhalis, 2019; Xiang, 2018). The extent to which tourism providers and tourists benefit from digitalization depends on their ability to keep up with technology and improve service quality and transparency (Marx et al., 2021). Hence, adaptation of information technology in tourism is complex, fast-paced, and uncertain, and requires a diverse skill set from professionals to successfully drive and benefit from digital transformation projects (Hess et al., 2016; Matt et al., 2015; Krcmar et al., 2018; Heberle et al., 2017).

Digital technologies have radically changed the tourism industry and are gaining a lot of attention from stakeholders. At present, there is voluminous but fragmented research to cover the various aspects of information technology in tourism, but a consolidated "big picture" of the existing research is missing. Strandberg et al. (2018) found a clear trend in tourism research from 2000 to 2014 where major focus was on the travel and tourism industries' marketing and consumer behaviour, HR management, and environmental aspects while strategic implications, hospitality and tourism operations, impact assessment, and mitigation received low attention. Regarding methodological design, there had been a significant drop in theoretical development articles in favour of quantitative research designs, in particular survey studies, while very few were longitudinal studies. But the qualitative research trend remains relatively constant. On the other hand, Singh and Bashar (2021) revealed the dynamic changes in tourism research due to technological aspects, revealing varied developments in the travel industry for the period of 2004–2020. It has provided a great visualisation of the bibliographical information about this area of research. There has been an increase in the number of publications in the last few years highlighting smart tourism, robotic implementation, robust recommender systems, implementation of virtual and augmented reality in tourism, social network sites, 3D visualisation and web personalization, digital architecture, human-less interaction in tourism, tourism 4.0, and so on as the major trends in the tourism industry (Singh and Bashar, 2021).

In a similar vein, Sigala et al. (2021) arrived at conclusions pertaining to thematic analyses, with a specific focus on tourism experiences, service quality, hospitality management skills, work-family conflict, sustainability, and responsible tourism issues. Additionally, Kalia et al. (2022) conducted a study on contemporary trends in tourism research spanning the past three decades, revealing that the management of smart destinations, the internet as a communication and marketing channel, technology and sustainability, and consumer behaviour are emerging research directions in the field of tourism. According to Xiang (2018), the current trend of ICT in the tourism industry can be attributed to the age of acceleration in tourism development. Specifically, the author posits that the shift in information technology from a marketing-driven tool to a knowledge creation tool is due to the emergence of new technological conditions such as smartphones, drones, wearables, new connectivity, and big data. As such, the transition from digitization to digitalization in the travel sector is contingent upon the successful adaptation of information technologies and capabilities. It involves the application of digital technologies to blend digital content into the real world to improve the tourist experience (Adeola & Evans, 2019; Benyon et al., 2014). Due to high mobile phone use and internet penetration, the tourism industry has been witnessing a huge transformation. Now, the customer can directly interact with the supply chain (Tan et al., 2017; Wang et al., 2018). Few authors defined it as digital Tourism Business (DTB), where the internet is used as a sales and marketing medium (Saura et al., 2020); on the contrary, most of

the research is focusing on e-commerce and digital marketing for branding, market search, and customer engagement. Such as Palomoa et al. (2017), who presented how tourism research has made use of new data techniques like structural equation modelling, big data, and data mining over the past two decades. O'Connor and Murphy (2004) reviewed the research on information technology in the hospitality industry and revealed three broad research areas: the Internet's effects on distribution; on pricing; and on consumer interactions. Similarly, Buhalis and Law (2008) grouped the main themes of e-tourism research into: consumers and demand dimensions; technological innovation; and industry functions. On the other hand, few studies have determined the evolution of mobile technologies in the tourism industry over the years (Chen et al., 2020; Ortega-Fraile et al., 2018). Some studies related to social media in tourism and hospitality have presented the social structure of collaborative networks (Mehraliyev et al., 2019) or a systematic literature review (Nusair et al., 2019). Durán-Sánchez et al. (2019) presented trends and performance in the field of tourism innovation. Besides, 'sustainability through technology' became one of the most popular themes in tourism research (Corte et al., 2019; Segu-Amortegui et al., 2019; Serrano et al., 2019).

The review of literature reveals that academia witnessed the emergence of plenty of new aspects that are strongly related to the digitised nature of decision-making, information search behaviour, and wider trends in performing business activities in tourism over the last few decades, but most recent scholarly trends highlight major domains that are related to e-tourism, smart tourism, the internet, big data, smart tourism destinations, and destination marketing. For example, an impressive upslope trend can be found related to digital technologies or information technologies in tourism, as their utilisation sharply increased from the point of non-existence in 2010 to reaching its peak in 2020. In particular, at the beginning of the last decade, dominant topics were very general (e.g., investigating internet marketing, websites, e-commerce, tourism information systems, and search engines) and aimed at setting a wider theoretical frame of reference. In 2014, the more profound inception of digitised technologies with the topic of tourism is evident (user-generated content, destination images, e-tourism). 2016 marked the turning point whereby there was an evident boost in studies investigating China, consumer satisfaction, sustainable tourism, and development website evaluations, while the last 4 years (2017–2021) reflect scholars' intentions to profoundly investigate data-driven and smart principles of digitalization in tourism.

Major Trends:
In this section, the comprehensive review of research articles considered for the study is provided. The articles are studied by categorizing them into three thematic areas of use of information technology in tourism & hospitality industry.

Studies related to concept of digital tourism:
Over time, analysing the relations and thematic similarities between the major topics reviewed in the studies can be grouped into several clusters in the context of digital adaptation in tourism. Some of the recent studies have focused on the concept of the digital tourism domain, smart destinations, and how those are managed in the long run. The main idea is to manage and increase the value (co)creation process to grab the market position and deliver outstanding services to travellers. According to Gretzel and Collier de Mendonça (2019), this implies the travellers' spontaneous participation and outstanding experiences of travelling in the context of smart destinations. Similarly, Buonincontri and Micera (2016) argued that digital tools facilitate such interactions based on a very complex series of two-way value co-

creation processes between tourists and companies, service providers, and local authorities. From the perspective of a digitised environment of destinations, it implies technology-driven management and engagement to influence tourist's decision-making processes effectively and fulfil their expectations (Michopoulou & Buhalis, 2013). However, numerous fields that lie within such a conceptual domain, for example, smart destination management and advanced technological solutions (e.g., artificial intelligence, block chain, machine learning), are still pending. Additionally, the moderating effects of different demographic and cultural variables are critical to comprehending the perception of value. Besides value co-creation, particular attention should be directed towards the concept of value destruction in the context of over-tourism and digital tourism (e.g., fake online reviews, anti-competitors' actions online), as this phenomenon has gained momentum in recent years.

Studies related to internet and tourism:

While smart tourism is becoming a dominant domain of tourism research, another corpus of studies has focused on the Internet as a communication and marketing channel in the digital age. It changes the mood of communication dramatically and gives birth to communication channels like e-commerce platforms, various web-based platforms, social media, emails, and smartphones (Bogicevic et al., 2019; Ho & Gebsombut, 2019). Such an omnichannel approach and the proliferation of communication platforms cause radical transformations and changes in information sharing, decision-making, and the overall behaviour of travellers (Del Vecchio et al., 2018). On the other side, Kalbaska et al. (2017) advocated that various stakeholders (e.g., agencies, governmental bodies, local service providers) also benefit from the strategic capabilities and potentialities of digital communication channels and digital promotional services delivered to the respective target audience through artificial intelligence (Múgica & Berné, 2020).

Studies related to technology and sustainability in tourism:

Besides, a group of studies has highlighted the relationship between technology and sustainability in tourism. It presents a significant research domain that has received the least scientific and research attention. Studies show there is a huge gap between advanced technological solutions (e.g., blockchains, data analyses) and their adaptation in tourism, while sustainability through technology emerges as a vocal topic on the research frontier. For example, Morales-Urrutia et al. (2020) argued about the similarities of technological inputs and determinants of ICT adaptation in tourism with defining the internet as a communication and marketing channel in the digital age, and stakeholders should properly utilise the strategic importance of digital tools in the long term (Alford & Jones, 2020). Buhalis (2020) suggested determining, formalising, and incepting the digital tools on a tactical level accordingly, as scientific products need a perfect fit with the industry structure and its respective insights. Additionally, some studies showed that the initiation of technological solutions (e.g., big data, data analytics, internet of things, block chain, artificial intelligence, and cloud computing) in the travel and tourism context is to ensure sustainable and responsible development (Del Vecchio et al., 2018; González-Reverté et al., 2018) and to promote the concepts of sharing customer (and company) behaviour (Almeida-Santana et al., 2020; Battino & Lampreu, 2019).

However, apart from the above-mentioned focused area, some scholars investigate various domains in terms of consumer behaviour and its affiliation with the tourism information system (e.g., business models, internet marketing, online recommendation systems, and innovation). In their recent study, Adeola and Evans (2019) investigated how advanced technologies that

rely on smartphones and the internet help the rise of tourism and concluded that there is a significant relationship between them. Some investigations indicate that tourists' behaviour and consumption patterns will evolve to accommodate the ever-growing inception of novelties in terms of information seeking, expectations, and perception of service quality (Alford & Jones, 2020; Buhalis, 2020), making it more challenging to strategically follow up promptly.

Discussions And Research Directions:

The preceding discourse on digital technology in tourism research offers a comprehensive review of the extensive knowledge and engagement of numerous scholars in the realm of digital tools, ICT, smart tourism, tourism information systems, and related subjects. These scholars have employed diverse methodological approaches, such as factor analysis, big data, information sources, and content analysis, as well as interdisciplinary studies, including innovations, tourism websites, social media, and smart cities. The field of research in this area is highly dynamic, with new technologies emerging almost weekly, thus presenting abundant opportunities for further investigation (Mehraliyev et al., 2020). However, recent domains lack empirical and experimental evidence, with a focus on conceptual studies instead (Yeh et al., 2017). This lack of evidence impedes decision-makers at the strategic management level from formalising their role in serving customers and tourists (Ying et al., 2016). The literature predominantly concentrates on consumers (tourists), neglecting the supply side and the impact of digitalization on their economic well-being and tourism development.

Analysing the literature to the best of my knowledge, there are several topical sub-clusters that warrant further exploration. These include online marketing communication, the potential of the internet as a media vehicle, destination branding through the internet, the utilisation of smart and digital tools to support decision-making at both individual and institutional levels, advanced technological solutions such as blockchains and big data analyses, and the role of mobile devices in brand building and destination online appearance. Despite the significant scope of this research cluster, it is hindered by fragmented statistical inputs that do not adequately reflect the current developments in the industry. Consequently, a comprehensive understanding of global technological adaptation and its impact on tourism has yet to be fully realised in literature.

The prevailing consensus is that there have been substantial shifts in the behaviour of tourists (Mehraliyev et al., 2020), resulting in a significant impact on increasingly competitive markets and thereby presenting a significant challenge for the tourism industry (Pencarelli, 2020). The intense competition to attract tourists and capture their attention necessitates that service providers, local authorities, and supporting industries continually develop new approaches and engagement initiatives (Kalbaska et al., 2017; Oliveira, 2013; Ruiz-Gómez et al., 2018). To capitalise on and effectively communicate the advantages of a digitised environment, the tourism sector must keep pace with the significant behavioural changes that are currently underway. Despite extensive investigation, there remain numerous gaps in methodological approaches that require attention. Specifically, there is a dearth of studies utilising quantitative and experimental designs that are capable of elucidating causal relationships and providing valuable insights into the relationships between observed variables. In light of the rapid pace of technological advancement, it is imperative that more exploratory and quantitative studies, such as interviews, panel data, and longitudinal studies, be conducted as a foundation for new theoretical developments. So, from such a methodological standpoint, the observed evidence is mostly conceptual and review contributions such as those by

Gretzel et al. (2015), Gretzel et al. (2015b), Lu et al. (2015), Mariani (2020), Noguera et al. (2012), and Sun et al. (2016). This has resulted in weak theoretical foundations for the field. While conceptual and review articles are prevalent, there is also a significant amount of qualitative research, including studies by Boes et al. (2016), Buhalis & Licata (2002), Choi et al. (2007). However, there are relatively few quantitative papers available, with only a handful of studies reported, such as those conducted by Choi et al. (2007), Chung et al. (2015), Cox et al. (2009), Kim et al. (2011), and Xiang et al. (2008). Furthermore, it is worth noting that a fraction of studies in this field employ content analyses to explore various aspects of the digital tourism domain, particularly online reviews and recommendation systems. Examples of such studies include those conducted by Choi et al. (2007) and Horng & Simon Tsai (2010). The above summarization of evidence makes a clear sense of the methodological gap with the qualitative research approach, which is still dominant in the digital tourism domain.

The determination of a concrete research gap is contingent upon an analysis of theoretical, contextual, and methodological perspectives (Paul and Rosado-Serrano, 2019). It is noteworthy that many influential scientific outputs do not solely indicate a specific theoretical framework or attempt to empirically verify one. In fact, only a small fraction of domain-relevant articles report solid theoretical anchoring, such as existing theories, models, and concepts. The contextual focus of these articles is on the digital adaptation of business models and destinations, as evidenced by works such as Boes et al. (2016), Buhalis & O'Connor (2005), Gretzel et al. (2015), and Gretzel, Werthner et al. (2015). Several studies have made efforts to capture the development of the tourism industry at an individual customer level, as evidenced by Cox et al. (2009) and Kim et al. (2007, 2011). However, fragmented coverage exists regarding specific subdomains, such as

online reviews (Fang et al., 2016), the sharing economy (Gretzel, Werthner et al., 2015; Papathanassis & Knolle, 2011), recommendation systems (Noguera et al., 2012), augmented reality (Chung et al., 2015), and smart and connected communities and destinations (Sun et al., 2016). While a spectrum of colourful attempts to portray various subdomains within the information system of the tourism sector is available, a holistic approach is currently lacking. The majority of research in the field of tourism development is based on country case studies, with cross-sectional studies being relatively uncommon.

CONCLUSION

This work provides an objective approach to discover emerging research topics from time to time for research review and to provide core documents for scholars to quickly obtain a glimpse of Tourism Information System research. This study confirms that information systems for tourism have become an increasingly popular research subject in the tourism field. The post-modern world has witnessed a revolution in Information and Communication Technology (ICT) especially in the realm of smart tourism where its advocates talk eagerly of the internet of everything (Tribe, J. & Mkono, M., 2017). Information technology (IT) is most commonly used for the fundamental purpose of information need and behaviour & performance study. Developments in ICTs and, especially, the use of web technologies, have made the world a much smaller place and paved the way for new kinds of commitment and relationship. Nowadays, technology is at the very heart of the tourism and travel industry (Drosos et al., 2017). Ratings, comments on the web, rankings, etc., are shaping the reputation of tourism organisations and business success, are closely linked and are inseparable.

However, the present review found limited study focused on promotion and marketing strategies with information technology. When studying the internal business process

design, information technology is found highly used in operation management process and innovation process. Some studies focused on customer management process but very few addressed social and regulatory process of the industry. It is seen that the use of information technology in value creation and competitive advantage is increasing. Since it is a new area of study for tourism and hospitality industry, the IT in this regard is yet to be studied further to exploit the full potential of technologies. The review study has some limitations, such that it includes only seven journals in the area published between the periods 2011 to 2021; and only the English research articles are included. This study also focuses on the adoption and diffusion of information technologies in creating value and gaining competitive advantage. So, the future research study could be directed in the realm of value creation and competitive advantage with ICTs in tourism and hospitality industry.

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