

MAPPING RESEARCH TRENDS IN MOBILE TECHNOLOGY IN WELLNESS TOURISM DESTINATION: A BIBLIOMETRIC AND VISUALIZED ANALYSIS

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Abstract: The study aims to explore and review the literature published on the use of mobile technology in wellness tourism destinations, finding a total of 656 papers published between 2001 and 2021 to determine the thematic direction of the related research flourish. This study created a bibliometric and visualisation map of research trends in mobile technology in wellness tourism destinations using the Scopus database, PRISMA, VOSviewer and Harzing's Publish or Perish software. Results showed that United States published the most articles on this topic and co-occurrence of keywords revealed eight clusters: technological breakthroughs, mobile tourism adoption, tourist mobile applications, destination marketing, smart destination, tourist experience, data intelligence and analytics and service innovations. This study could elucidate this research topic and help researchers forecast its dynamic paths.

Key words: mobile technology, wellness tourism, wellness destination, bibliometric analysis, VOSviewer

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INTRODUCTION

Because of the increasing popularity of 5G mobile communication technology, people's lives and many businesses' modes of operation will be further transformed. Websites, social media and mobile technologies have had the most significant effects on information and communications technologies (ICTs), as they are major avenues for industry practitioners to reach their consumers (Leung et al., 2013; Sotiriadis, 2017). Additionally, mobility and ICT have been combined to create mobile devices, such as smartphones, tablet computers and mobile applications (apps) which are essential to everyday life, making the internet more accessible to everyone (Wang et al., 2016). Owing to ubiquitous internet use and rapid technological advancement, tourism has undergone significant reorganisation (Dorcic et al., 2019). In particular, mobile technology has significantly influenced tourism (Liang et al., 2017). Multiple travel concepts and approaches, including mobile tourism (Guerreiro et al., 2020), e-tourism (Artemenko et al., 2020), smart tourism (Bujari et al., 2020) and sustainable tourism (Sharmin et al., 2021) have originated or developed with the help of mobile-related devices, such as smartphones, glasses and other wearable devices. It is widely believed that mobile technology's radical impact on tourism, especially on wellness tourism, is imminent (Scarles et al., 2020). Therefore, wellness experiences are increasingly relying on mobile technology and the study of wellness tourism destinations is growing in importance (Bugeja and Grech, 2020; Palos-Sanchez et al., 2021; Srinivaasan and Kabia, 2020; Tung, 2021). It is critical for researchers in the age of information explosion to analyze efficiently a constantly growing number of scientific publications in their fields of study. To visualize the research trends in mobile technology in wellness tourism destination studies, this study used bibliometric approaches and graphic plotting. Bibliometrics is a branch of information science that applies statistics to publications, journals and other types of literature (Wang et al., 2019). Bibliometric analysis provides several advantages over typical literature evaluations and summaries. First, bibliometric approaches provide researchers with an overall network picture of their research topics by examining a large database of thousands of pages. Second, citation analysis in bibliometric approaches can quantify the effect of a research area, an individual researcher, or even an individual work in the field. Third, it is possible to easily capture or identify a field's classic literature and research hotspots.

At present, several bibliometric analyses are being undertaken to investigate research trends in a variety of topics and disciplines. Examples include COVID-19 and consumer behaviour studies (Cruz-Cárdenas et al., 2021), research trends

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based on the retrospective documents published over twenty years to guide future tourism studies (Singh et al., 2021), corporate social responsibility research in tourism and hospitality studies (Wong et al., 2021), innovative drivers for family business models in tourism studies (Arcese et al., 2021) and understanding the knowledge structure in studies on shared accommodation (La et al., 2021). Bibliometrics has been used for innovative hotel research (Fernandes and Pires, 2021) to review trends, patterns and future agendas of rural tourism (Karali et al., 2021) and analyse destination choice trends (Pandey and Joshi, 2021). The knowledge base of the last decades of tourism and hospitality entrepreneurship can be charted to focus on sustainable tourism (Trip et al., 2021), determine the field structure of wellness tourism and map significant trends in this expanding tourism area (Suban, 2022) and predict future tourism destination resilience (Wang et al., 2022). Recently, Szum (2021) conducted a bibliometric study on the Internet of Things-based smart cities. Han et al. (2021) performed a bibliometric study on artificial intelligence in business-to-business marketing. Celuch (2021) studied ICTs in the context of events. Moreover, Di Vaio et al. (2020) conducted a bibliometric study on the role of artificial intelligence and business models from the perspective of sustainable development goals. Additionally, Chen et al. (2020) studied mobile technology in tourism using bibliometrics and visualisation. However, to the best of our knowledge, no bibliometric analyses have been reported on the use of mobile technology in wellness tourism destinations.

Therefore, this article aims to systematically, comprehensively, and objectively analyze the current research status and potential future research directions through a visual bibliometric analysis of the use of mobile technology in wellness tourism destinations. Seven research questions were posited regarding the use of mobile technology in wellness tourism destinations: 1) What is the current publication trend regarding mobile technology in wellness tourism destinations? 2) Which are the most productive years of research on mobile technology in wellness tourism destinations? 3) Who are the most productive and influential authors concerning mobile technology in wellness tourism destinations? 4) What is the most influential work in this field of study? 5) Which are the most productive countries and influential institutions regarding the research on mobile technology in wellness tourism destinations? 6) What is the periodic progression of mobile technology in wellness tourism destination research and the intellectual structure of research in this area? and 7) What are the research gaps and future research directions in the use of mobile technology in wellness tourism destinations? The remainder of this article is organised into five sections. Section 2 reviews important literature on the use of mobile technology in wellness tourism destinations. Section 3 details the methods, including the data sources and analytical tools used in this study. Section 4 presents the graphical visualisations, analyses and interpretations and discusses the findings of this study. Finally, Section 5 presents the main conclusions, theoretical and managerial implications, future scope for research and limitations.

LITERATURE REVIEW

Wellness tourism

Wellness tourism has recently grown faster than the entire tourism industry because new healthcare trends emphasise holistic methods geared towards prevention and well-being rather than specialised medical procedures to treat diseases. Wellness tourism is distinct from medical tourism and undertaken by healthy individuals who seek to improve their mental and physical well-being (Karn and Swain, 2017). People on wellness vacations often integrate activities such as spa treatments based on water therapies with other physical activities such as hiking or educational excursions that require certain landscapes, geographical or physical qualities (Feng et al., 2021). The unique and differentiating characteristics of water bodies, natural parks and healthy cuisines are key components that make the wellness tourism experience more appealing to visitors. The Global Wellness Institute describes wellness as an active search for solutions and behaviours that contribute to a holistic state of health (Global Wellness Institute, 2018). Wellness is not a passive condition but a process of making decisions and taking action to achieve optimal health and well-being. Four components of holistic health as physical, mental, emotional and social must all function in harmony to achieve wellness. Including these components into holistic and integrative wellness tourism results in holidays that include 1) pleasure and hedonism, 2) altruistic activities and 3) meaningful experiences (Smith and Diekmann, 2017). The concept of wellness is also an economic growth engine that creates employment and promotes local food, designations of origin and gender equity. Wellness tourism can also aid in reviving traditional healing approaches and reduce mental health crises while contributing to preserving natural and cultural resources, environmental conservation and sustainable tourism. Health boosts both quality of life and social capital (Global Wellness Institute, 2019).

Wellness destinations

Wellness destinations are geographic sites that claim to deliver healing properties through local environmental features such as nature, air, sea or groundwater and soil. Tourists are the primary audience for wellness destinations, which frequently provide complementary recreational options. However, wellness areas benefit more broadly by recruiting permanent inhabitants and exporting local goods such as agricultural products, mineral water, sea salt and other commodities (Phuthong et al., 2022). Cornelia and Pforr (2017) considered the supply side of wellness tourism from the destination perspective. They assessed the generation and delivery of products and services to attract tourists seeking to maintain and improve their health. They analysed locations whose core resources and competencies consisted of 1) natural resources; 2) cultural, historical and spiritual resources; 3) complementary and alternative medicine offerings; 4) community mindsets and wellness-related lifestyles; 5) human resources and competencies; 6) wellness-specific superstructures; 7) wellness-related events; and 8) the combination of wellness with other activities or offerings.

Mobile technology in wellness tourism destinations

Currently, tourists take their smartphones everywhere (Law et al., 2018). Mobile technology has altered the way

travelers interact with destinations, purchase travel-related items, and share their travel experiences with others. Practitioners and marketers have responded by revising their tactics and plans to meet changing customer demands. Identifying the core themes that comprise mobile technology studies in hospitality and tourism helps us understand research interests and discover under-researched subjects that require more attention. The mobile technology component explores the use and function of mobile technology in wellness tourism and associated businesses from various perspectives.

For instance, Zhang and Dong (2021) used data mining technology in a big data environment to extract the image monitoring information of popular tourism destinations. Adi et al. (2021) proposed the potential of mobile phones at the district or city level, the availability of technical support, and the implementation of promotion and marketing support in rural tourism destinations. Srinivaasan and Kabia (2020) proved that smartphones could change tourists' behaviors and emotional states by addressing a wide variety of information needs while they are selecting and exploring the destination, sharing experiences, and "storing" memories. Flavián et al. (2019) revealed that virtual reality devices could generate more immersive experiences, higher sensory stimulation, more engagement, and higher behavioral intentions toward potential tourist destinations. Almobaideen et al. (2017) proposed geographical routing for tourists using mobile devices based on the Internet of Things, which selects a route that is best served by medical centers, and adopts the shortest path possible.

Tung (2021) applied design thinking to foster multidisciplinary collaboration and integrate interactive technology to enhance visitor experience in Herb Lane, a traditional Chinese herb market. Ballina et al. (2019) indicated that ICTs were the main tools to build the value of the tourist experience, and that technological utilities increase the destination's competitiveness. Moreover, Garcia et al. (2019) presented gamified mobile experiences as useful tools for destination marketing organizations to enrich tourists' experiences, and gain insight into tourists' behavior. Moreover, Clarizia et al. (2017) contended that digital storytelling with a mobile tailored story through emerging technology could enrich tourist destinations and attractions and increase tourists' engagement with destinations.

METHODS

In this research, we perform five steps in bibliometric analysis adopted from Zupic and Čater (2015). The flow chart of bibliometric analysis is described in Figure 1. Furthermore, this study employed quantitative bibliometric analysis using the PRISMA technique, visualisation of similarities (VOSviewer) and Harzing's Publish or Perish software to explore the research trends in mobile technology in wellness tourism destinations using articles retrieved from the Scopus database. Bibliometric analysis uses statistical methodologies, such as citation rates, to evaluate journals and authors statistically (Wang et al., 2019). It also examines quantitative metrics, such as citations and prolific authors. Citation analysis can investigate how certain influential papers have been studied subsequently by others (Egghe and Rousseau, 2002; Li, 2017). In other words, it can be descriptive or evaluative. There are millions of papers and journals in Scopus, which is the world's largest abstract and citation database, covering different titles, areas and perspectives.

Therefore, the current research used keywords including "Mobile", "Technology", "Tourism" and "Destination" in the PRISMA flow diagram to find data from the Scopus database, such as "TITLE-ABS-KEY (mobile AND technology)" and "(tourism AND destination)" in the Scopus database. A total of 686 papers were found. When undefined characteristics were eliminated in the second stage, for example, (TITLE-ABS-KEY (mobile AND technology)), ((tourism) AND (destination)) and (EXCLUDE (PUBSTAGE, "aip")) and (EXCLUDE (AFFILCOUNTRY, "Undefined")), 656 documents remained. For greater certainty, Harzing's Publish or Perish software was used in conjunction with VOSviewer, a software tool for bibliometric mapping. Figure 2 depicts information flow through the different phases of a systematic review.

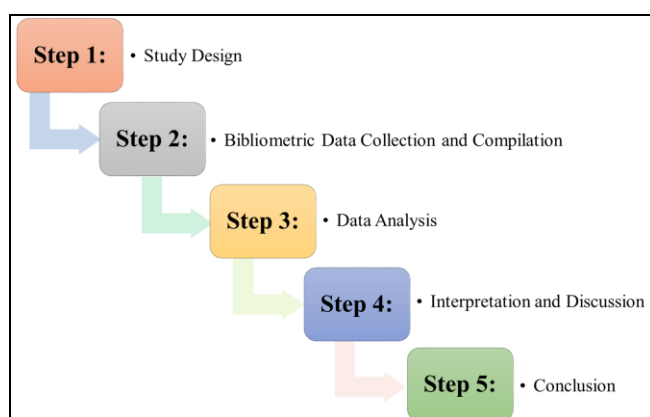


Figure 1. Workflow analysis chart
(Source: adapted from Zupic and Čater, 2015)

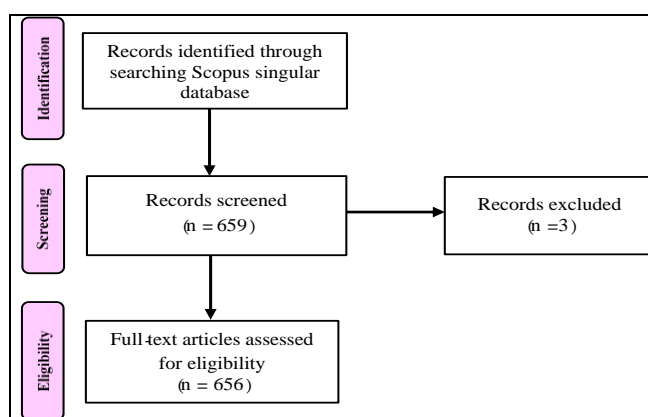


Figure 2. PRISMA flow diagram
(Source: developed by the authors)

RESULTS AND DISCUSSIONS

Results

The Scopus database was used to conduct a bibliometric study of publications on mobile technology in wellness tourism destinations. This section presents the results of our investigation, providing researchers access to information regarding document and source types, publication years, document languages and topic areas. The data include bibliometric information on nations with the largest number of published works, leading publishing venues, prominent institutions, keyword analysis and citation analysis.

Document and source types

Table 1 indicates that the search yielded 656 documents. Articles account for 63.26% (415 documents), conference papers, 27.29% (179 documents), book chapters, 6.25% (41 documents), reviews, 1.98% (13 documents), books, 1.07% (seven documents) and data papers, 0.15% (one document). Furthermore, all 656 document source types revealed that journals are the preferred source type for publication with 64.63% (424 sources), followed by conference proceedings with 20.27% (133 sources), book series with 8.38% (55 sources) and book covers with 6.71% (44 sources), as shown in Figure 3.

Table 1. Document type
(Source: analysed by the authors)

| Document Type | Frequency | %(N = 656) |
|------------------|------------|---------------|
| Article | 415 | 63.26 |
| Conference Paper | 179 | 27.29 |
| Book Chapter | 41 | 6.25 |
| Review | 13 | 1.98 |
| Book | 7 | 1.07 |
| Data Paper | 1 | 0.15 |
| Total | 656 | 100.00 |

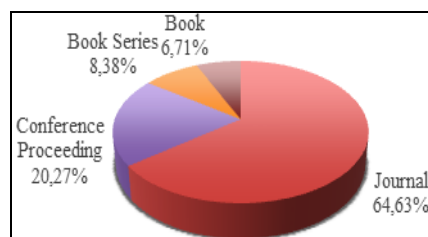


Figure 3. Document source type.
(Source: analysed by the authors)

Growth of publication

Figure 4 illustrates the number of papers examined from 2001 to 2021. Most publications were generated in 2020 (17.38%) and the least in 2002 (0.15%).

Table 2 Publications categorised by language
(Source: analysed by the authors)

| Language | Frequency | %(N = 656) |
|--------------|------------|---------------|
| English | 644 | 98.17 |
| Spanish | 6 | 0.91 |
| Chinese | 3 | 0.46 |
| German | 2 | 0.30 |
| French | 1 | 0.15 |
| Total | 656 | 100.00 |

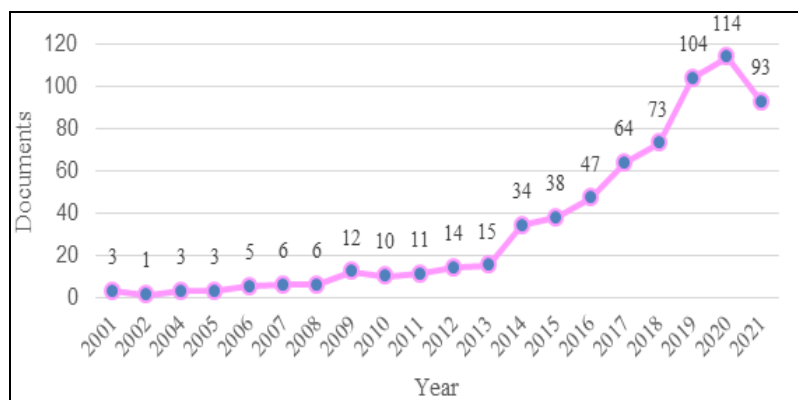


Figure 4. Documents by year (Source: analysed by the authors)

Languages of documents

English is the most frequently used language in publications, accounting for 98.17% of all publications (644 publications). Other languages, such as Spanish, account for 0.91% (six articles), Chinese, 0.46% (three publications), German, 0.30% (two publications) and French, 0.15% (one publication), as indicated in Table 2.

Subject area

The subject areas for the bibliometric investigation are listed in Table 3. Computer science had the highest frequency with 24.62% (304 articles), while neuroscience has the lowest frequency with 0.08% (one article).

Most active source titles

“Sustainability Switzerland” heads the list of the top 20 most active source titles, as presented in Table 4 (5.37%; 23 documents), followed equally by “Journal of Hospitality and Tourism Technology” and “Lecture Notes in Computer Science, Subseries Lecture Notes in Artificial Intelligence” and “Lecture Notes in Bioinformatics” (4.44%; 19 documents each).

Keyword analysis

The fundamental approach that leads a researcher to an author document is keyword analysis. It provides information about the research, focusing on related themes (Lozano et al., 2019; Lozano et al., 2016). For example, 24% of the searches were on the keyword “Mobile”, 18% on “Tourism” and 13% on “Technology”. Unsurprisingly, the title words “Mobile”, “Tourism” and “Technology” received the highest ratings, given that they were included in the search profile. “Information” and “Data” were ranked fourth and fifth, respectively, as indicated in Table 5.

Table 3. Subject areas (Source: analysed by the authors)

| Subject Area | Frequency | %(N = 1235) |
|--|--------------|---------------|
| Computer science | 304 | 24.62 |
| Business, management and accounting | 237 | 19.19 |
| Social sciences | 229 | 18.54 |
| Engineering | 125 | 10.12 |
| Environmental science | 64 | 5.18 |
| Mathematics | 45 | 3.64 |
| Decision sciences | 38 | 3.08 |
| Energy | 31 | 2.51 |
| Economics, econometrics and finance | 29 | 2.35 |
| Earth and planetary sciences | 24 | 1.94 |
| Arts and humanities | 22 | 1.78 |
| Medicine | 17 | 1.38 |
| Physics and astronomy | 17 | 1.38 |
| Biochemistry, genetics and molecular biology | 10 | 0.81 |
| Materials science | 10 | 0.81 |
| Psychology | 7 | 0.57 |
| Chemical engineering | 6 | 0.49 |
| Multidisciplinary | 5 | 0.40 |
| Agricultural and biological sciences | 4 | 0.32 |
| Chemistry | 4 | 0.32 |
| Health professions | 2 | 0.16 |
| Immunology and microbiology | 2 | 0.16 |
| Pharmacology, toxicology and pharmaceuticals | 2 | 0.16 |
| Neuroscience | 1 | 0.08 |
| Total | 1,235 | 100.00 |

Figure 5 depicts a network visualisation map to comprehend keyword analysis connected to mobile technologies used in wellness tourism destinations. VOSviewer was used to extract relevant research topics and tools from these keywords. By connecting the link of co-occurrence representation between the two terms, cluster differentiation was established based on the colour and size of the circles. The relative font sizes of the terms determine their respective popularity (Van Eck and Waltman, 2010). Tourism, augmented reality, smart tourism, mobile technology, smartphone, big data technology, social media, virtual reality, ICT, cultural heritage and mobile augmented reality are prominent keywords in wellness tourism destinations.

Table 4. Most active publications (Top 20) (Source: analysed by the authors)
* Percentage of total most active publications in the sample (N = 428)

| Source Title | No. of Documents | % |
|---|------------------|------|
| Sustainability Switzerland | 23 | 5.37 |
| Journal of Hospitality and Tourism Technology | 19 | 4.44 |
| Lecture Notes in Computer Science including Subseries Lectures Notes in Artificial Intelligence and Lecture Notes in Bioinformatics | 19 | 4.44 |
| Information Technology and Tourism | 12 | 2.80 |
| Communications in Computer and Information Science | 9 | 2.10 |
| Journal of Physics Conference Series | 9 | 2.10 |
| Journal of Travel and Tourism Marketing | 9 | 2.10 |
| Tourism Management | 9 | 2.10 |
| Current Issues in Tourism | 8 | 1.87 |
| ACM International Conference Proceeding Series | 7 | 1.64 |
| Advances in Intelligent Systems and Computing | 7 | 1.64 |
| Annals of Tourism Research | 6 | 1.40 |
| International Journal of Contemporary Hospitality Management | 6 | 1.40 |
| Pervasive Health Pervasive Computing Technologies for Healthcare | 6 | 1.40 |
| Asia Pacific Journal of Tourism Research | 5 | 1.17 |
| IOP Conference Series Earth and Environmental Science | 5 | 1.17 |
| Journal of Destination Marketing and Management | 5 | 1.17 |
| Journal of Retailing and Consumer Services | 5 | 1.17 |
| Journal of Sustainable Tourism | 5 | 1.17 |
| Computers Environment and Urban Systems | 4 | 0.93 |

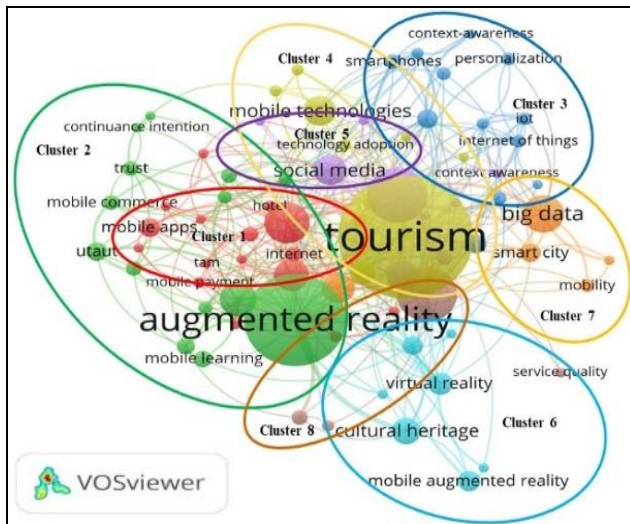


Figure 5. Author keywords dispersed in network visualisation map from 2001 to 2021. (Source: retrieved from VOSviewer)

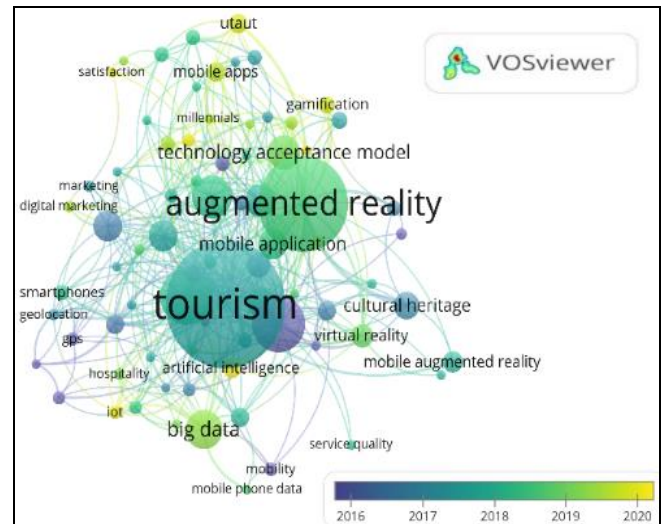


Figure 6. Author keywords dispersed in overlay visualisation map from 2001 to 2021. (Source: retrieved from VOSviewer)

The clustering process revealed eight colour-coded clusters. In addition, the zooming and exploring functionalities of VOSviewer allow for easier identification of gaps and potential streams of study, as follows: 1) The red cluster, which we call the technological breakthrough cluster, reveals gaps in themes such as smartphone, m-commerce, mobile apps, internet, mobile payment and machine learning. 2) The green cluster, which we call the mobile tourism adoption cluster, reveals gaps in themes such as augmented reality, technology acceptance model, mobile learning, gamification, perceived risk, perceived value, trust and continuance intention. 3) The navy cluster, which we call the tourist mobile application cluster, reveals gaps in themes such as smartphones, mobile, GPS, cloud computing, Internet of Things and artificial intelligence. 4) The yellow cluster, which we call the destination-marketing cluster, reveals gaps in themes such as tourism, mobile technologies, marketing, digital marketing and ICT. 5) The violet cluster, which we call the smart destination cluster, reveals gaps in themes such as mobile applications, smart tourism, social media, e-tourism, recommender system and sustainability. 6) The blue cluster, which we call the tourist experience cluster, reveals gaps in themes such as mobile augmented reality, virtual reality, innovation, cultural heritage, tourist experience and sustainable tourism. 7) The orange cluster, which we call the

Table 5 Top 20 keywords. (Source: analysed by the authors)
* Percentage of total keyword frequency in the sample (N = 13,725)

| Keywords | Frequency | % | Keywords | Frequency | % |
|-------------|-----------|-------|--------------|-----------|------|
| Mobile | 2073 | 23.46 | Technologies | 516 | 5.84 |
| Tourism | 1602 | 18.13 | Tourist | 494 | 5.59 |
| Technology | 1121 | 12.69 | Social | 493 | 5.58 |
| Information | 1005 | 11.37 | Applications | 416 | 4.71 |
| Data | 759 | 8.59 | Model | 405 | 4.58 |
| Study | 645 | 7.30 | Systems | 397 | 4.49 |
| Use | 626 | 7.08 | Tourists | 392 | 4.44 |
| Research | 591 | 6.69 | Application | 388 | 4.39 |
| Based | 538 | 6.09 | Experience | 376 | 4.26 |
| Travel | 517 | 5.85 | Analysis | 371 | 4.20 |

data intelligence and analytics cluster, reveals gaps in themes such as big data, smart cities, mobility, mobile phone data and mobile applications. 8) Finally, the brown cluster, which we call the service innovation services' technology cluster, reveals gaps in themes such as mobile technology, service quality, location-based services and user experience.

Figure 6 depicts analytical overlay visualisation. While the size of the circles and labels indicates the number of occurrences of keywords, the thickness of the lines indicates the strength of the co-citation linkages. As the colour code explains, the data are reviewed against a timeline in this display. Consequently, the authors observed that some themes had been investigated thoroughly and quoted more often than others. For instance, themes of augmented reality, the technological acceptance model, big data, mobile applications and growth were more frequently investigated and quoted.

Furthermore, developing issues such as artificial intelligence, the Internet of Things, perceived risk, gamification, unified theory of acceptance and use of technology (UTAUT), technology acceptance model, satisfaction and mobile applications have recently piqued the interest of scientific researchers (yellow colour—the year 2020 as the average publishing date). Figure 7 illustrates the word analysis of the total keywords specified in the author documents.

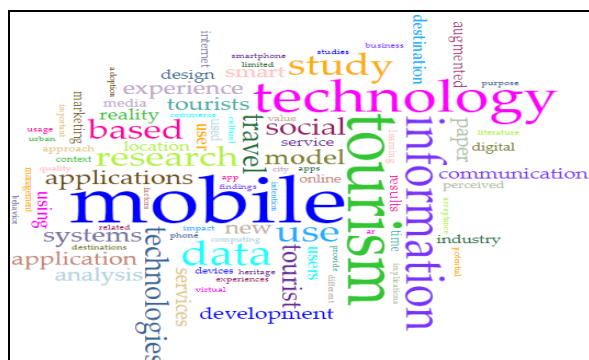


Figure 7. Analysis of the total keywords in author documents (Source: retrieved from Voyant Tools)

Geographical distribution of publications

The geographical distribution of publications is used to create various countries' research productivity indicators for mobile technology in wellness tourism destinations. Table 6 shows the top 20 nations that contributed to publications and the volume of publications' productivity per country. With 86 articles (9.62%) from 894 publications, the United States is ranked first among the top 20 countries to publish information on mobile technology in wellness tourism destinations. China and the United Kingdom share second place with 70 publications each (7.83%). Moreover, Finland and Japan are tied in last place, with 11 publications each (1.23%). The authors also analysed the leading research institutions on mobile technology in wellness tourism destination studies. A total of 1,284 organisations were responsible for the retrieved articles. The 20 institutions' publication numbers have a relatively even distribution. However, mobile technology in wellness tourism

Table 6 Top 20 country contributions to publications (Source: analysed by the authors) * Percentage of total country contributions to publications in the sample (N = 894)

| Country | Frequency | % | Country | Frequency | % |
|----------------|-----------|------|-------------|-----------|------|
| United States | 86 | 9.62 | Hong Kong | 26 | 2.91 |
| China | 70 | 7.83 | India | 25 | 2.80 |
| United Kingdom | 70 | 7.83 | Taiwan | 25 | 2.80 |
| Italy | 40 | 4.47 | Germany | 23 | 2.57 |
| Malaysia | 38 | 4.25 | Greece | 17 | 1.90 |
| Spain | 38 | 4.25 | France | 14 | 1.57 |
| South Korea | 33 | 3.69 | Netherlands | 12 | 1.34 |
| Portugal | 31 | 3.47 | Switzerland | 12 | 1.34 |
| Indonesia | 30 | 3.36 | Finland | 11 | 1.23 |
| Australia | 26 | 2.91 | Japan | 11 | 1.23 |

Table 7. Top 20 most influential institutions for studies on mobile technology in wellness tourism destinations, 2001–2021 (Source: developed by the authors) * Percentage of total institutions in the sample (N = 1,284)

| Rank | Institutions (country) | No. of articles | No. of citations |
|------|---|-----------------|------------------|
| 1 | The Hong Kong Polytechnic University (Hong Kong) | 10 | 340 |
| 2 | Bournemouth University (United Kingdom) | 3 | 210 |
| 3 | Universiti Tunku Abdul Rahman (Malaysia) | 3 | 129 |
| 4 | The Hebrew University of Jerusalem (Israel) | 4 | 89 |
| 5 | Lancaster University (United Kingdom) | 4 | 75 |
| 6 | University of Edinburgh (United Kingdom) | 4 | 75 |
| 7 | University of Southampton (United Kingdom) | 4 | 75 |
| 8 | School of Tourism, Hanyang University (South Korea) | 3 | 64 |
| 9 | University of Central Florida (United States) | 2 | 55 |
| 10 | University of Tartu (Estonia) | 3 | 43 |
| 11 | University of Piraeus (Greece) | 2 | 37 |
| 12 | Cardiff Metropolitan University (United Kingdom) | 4 | 33 |
| 13 | Macau University of Science and Technology (Macau) | 2 | 32 |
| 14 | Texas Tech University, (United States) | 4 | 28 |
| 15 | Victoria University (Australia) | 2 | 25 |
| 16 | University of Houston (United States) | 2 | 23 |
| 17 | University of Salford (United Kingdom) | 2 | 20 |
| 18 | Universidade Nova de Lisboa (Portugal) | 2 | 9 |
| 19 | The Polytechnic Institute of Bragança (Portugal) | 2 | 7 |
| 20 | Fudan University (China) | 2 | 7 |

Table 8. Top 20 most productive authors. (Source: developed by the authors) * Percentage of total productive authors in the sample (N = 388)

| Author Name | No. of Documents | % | Author Name | No. of Documents | % |
|------------------|------------------|------|----------------|------------------|------|
| Law, R. | 10 | 2.58 | Wang, D. | 5 | 1.29 |
| Dickinson, J. E. | 8 | 2.06 | Winstanley, C. | 5 | 1.29 |
| Cherrett, T. | 6 | 1.55 | Gretzel, U. | 4 | 1.03 |
| Davies, N. | 6 | 1.55 | Hassan, A. | 4 | 1.03 |
| Filimonau, V. | 6 | 1.55 | Marto, A. | 4 | 1.03 |
| Hibbert, J. F. | 6 | 1.55 | Ooi, K. B. | 4 | 1.03 |
| Norgate, S. | 6 | 1.55 | Pantano, E. | 4 | 1.03 |
| Speed, C. | 6 | 1.55 | Park, S. | 4 | 1.03 |
| Jung, T. | 5 | 1.29 | Tan, G. W. H. | 4 | 1.03 |
| Shoval, N. | 5 | 1.29 | Ahas, R. | 3 | 0.77 |

destination papers that are published by an institution affiliated with the Hong Kong Polytechnic University have significantly more citations (340) than other institutions. Moreover, Hong Kong Polytechnic University has the highest number of affiliated research institutions that published 10 articles in this field, indicating that papers from this organisation are more influential. Statistical results show that six of the top 20 organisations come from the United Kingdom, indicating that the United Kingdom has the most significant impact on mobile technology in wellness tourism destination research.

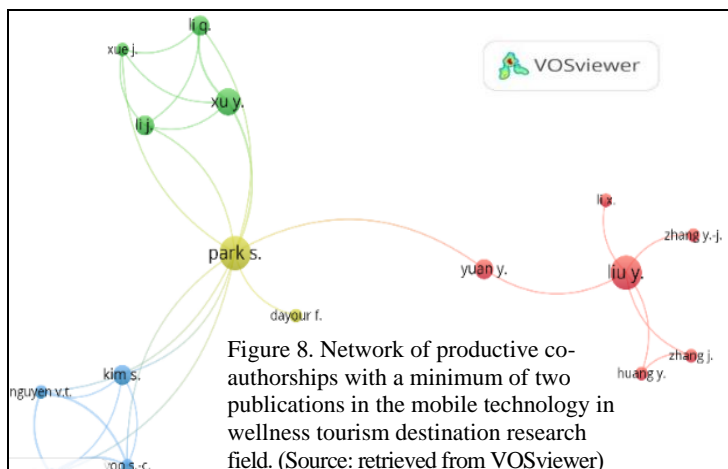


Figure 8. Network of productive co-authorships with a minimum of two publications in the mobile technology in wellness tourism destination research field. (Source: retrieved from VOSviewer)

Table 9 Citation metrics (Source: retrieved from Harzing’s Publish or Perish software)

| Metrics | Data |
|-------------------|----------------|
| Publication years | 2001–2021 |
| Citation years | 20 (2001–2021) |
| Papers | 656 |
| Citations | 9802 |
| Cites/year | 490.10 |
| Cites/paper | 14.94 |
| Authors/paper | 3.11 |
| h-index | 52 |
| g-index | 80 |

Authorship patterns and collaboration

Table 8 lists the number of documents for each author. Approximately 388 documents on mobile technology in wellness tourism destinations are

written by 160 authors and published by numerous organisations. Co-authorship networks show relationships between authors in a social environment (Melin and Persson, 1996). For example, only one of the first 10 most productive authors published 10 documents, while the rest published fewer than that. Furthermore, when considering the network of productive co-authorships in the field of mobile technology in wellness tourism destinations, Park and Liu are the most published authors whose co-authorship in this research field has resulted in at least two publications, as shown in Figure 8.

Citation analysis

Citation analysis is based on the patterns and frequency of citations connected from one text to another. Table 9 presents the citation metrics for 20 years (2001–2021) obtained using Harzing’s Publish or Perish software.

Table 10 lists the top 10 most referenced publications and the most influential paper. Of the 656 documents analysed, “Ubiquitous Computing: Smart Devices, Environments and Interactions” by S. Poslad had the most citations (351). The article “Mobile recommender systems in tourism” by D. Gavalas, C. Konstantopoulos, K. Mastakas and G. Pantziou had the second most citations (291), followed by D. Buhalis and M. Foerste’s essay “SoCoMo marketing for travel and tourism: Empowering co-creation of value”, which was mentioned 204 times.

DISCUSSION

This section summarises our current investigation and the conclusions of the seven research questions specified in the introduction.

(RQ1) What is the current publication trend regarding mobile technology in wellness tourism destinations?

Through a bibliometric analysis of the Scopus database, this study analysed the research trends in mobile technology in wellness tourism destinations from January 2001 to October 2021. The Scopus database was used to retrieve 656 papers on mobile technology in wellness tourism destinations, which were analysed using VOSviewer and Harzing’s Publish or Perish software. Articles were found to be the most common document type, accounting for 415 documents (63.26%). All 656 document sources revealed that journals were the preferred publication source type, containing 64.63% (424 sources) of all documents created. English was the most frequently used language for publishing, accounting for 98.17% of all publications, evidently to assist readers and other document scholars. Most studies on mobile technology in wellness tourism destinations were from the subject area of computer science (304; 24.62%). Research on mobile technology in wellness tourism destinations is directly related to the field of computer science. In particular, mobile technology that encompasses electronic or communication devices, which can be conveniently used in various places, such as notebook/netbook, personal digital assistant, tablet, cellphone, smartphone and mobile internet device, uses innovations in computer science for its development. This may be why most studies on mobile technology in wellness tourism destinations belonged to the field of computer science. Therefore, if researchers studying mobile technology in wellness tourism destinations wish to access a large amount of quantitatively scoped body of knowledge, they can directly search for data from the Scopus database and define subject areas in computer science. These subject areas will lead to direct knowledge of mobile technology in wellness tourism destinations and diverse works. Further, “Sustainability Switzerland”, “Journal of Hospitality and Tourism Technology”, “Lecture Notes in Computer Science”, “Subseries Lecture Notes in Artificial Intelligence” and “Lecture Notes in Bioinformatics” were the top five active source titles with 61 documents, equivalent to 14.25%. “Sustainability Switzerland” published the most papers on mobile technology in wellness tourism destinations. It is an international and cross-disciplinary scientific, open-access journal of human, environmental, cultural, economic and social sustainability that serves as a state-of-the-art venue for sustainability and sustainable development

research. It publishes reviews, regular research papers, communications and brief remarks, with no length restrictions on the works. It also includes sections on tourism, culture and heritage. Therefore, it publishes the most research on mobile technology in wellness tourism destinations compared to travel and computer journals.

Table 10. Top 20 highly cited articles. (Source: retrieved from Harzing's Publish or Perish software)

| Ref. | Author(s) | Title | Year | Cites | Cites per Year |
|------|---|---|------|-------|----------------|
| 623 | S. Poslad | "Ubiquitous Computing: Smart Devices, Environments and Interactions" | 2009 | 351 | 29.25 |
| 543 | D. Gavalas, C. Konstantopoulos, K. Mastakas, G. Pantziou | "Mobile recommender systems in tourism" | 2014 | 291 | 41.57 |
| 502 | D. Buhalis, M. Foerste | "SoCoMo marketing for travel and tourism: Empowering co-creation of value" | 2015 | 204 | 34.00 |
| 505 | B. Neuhofer, D. Buhalis, A. Ladkin | "Smart technologies for personalised experiences: a case study in the hospitality domain" | 2015 | 190 | 31.67 |
| 653 | J. Baus, A. Krüger, W. Wahlster | "A resource-adaptive mobile navigation system" | 2002 | 170 | 8.95 |
| 567 | K. Hannam, G. Butler, C. M. Paris | "Developments and key issues in tourism mobilities" | 2014 | 159 | 22.71 |
| 450 | A.B. Ozturk, A. Bilgihan, K. Nusair, F. Okumus | "What keeps the mobile hotel booking users loyal? Investigating the roles of self-efficacy, compatibility, perceived ease of use and perceived convenience" | 2016 | 157 | 31.40 |
| 656 | S. Poslad, H. Laamanen, R. Malaka, A. Nick, P. Buckle, A. Zipf | "CRUMPET: Creation of user-friendly mobile services personalised for tourism" | 2001 | 155 | 7.75 |
| 509 | N.S. Safa, M. Sookhak, R. Von Solms, S. Furnell, N. A. Ghani, T. Herawan | "Information security conscious care behaviour formation in organisations" | 2015 | 147 | 24.50 |
| 354 | M.C. Tom Dieck, T. Jung | "A theoretical model of mobile augmented reality acceptance in urban heritage tourism" | 2018 | 141 | 47.00 |
| 634 | D.Y. Kim, J. Park, A. M. Morrison | "A model of traveller acceptance of mobile technology" | 2008 | 139 | 10.69 |
| 516 | L.O. Colombo-Mendoza, R. Valencia-García, A. Rodríguez-González, G. Alor-Hernández, J.J. Samper-Zapater | "RecomMetz: A context-aware knowledge-based mobile recommender system for movie showtimes" | 2015 | 136 | 22.67 |
| 621 | M. Haldrup, J. Larsen | "Tourism, performance and the everyday: Consuming the orient" | 2009 | 134 | 11.17 |
| 654 | J. Larsen | "Tourism mobilities and the travel glance: Experiences of being on the move" | 2001 | 125 | 6.25 |
| 346 | Z. Wang, S. Y. He, Y. Leung | "Applying mobile phone data to travel behaviour research: A literature review" | 2018 | 119 | 39.67 |
| 452 | N. Shoval, R. Ahas | "The use of tracking technologies in tourism research: the first decade" | 2016 | 118 | 23.60 |
| 319 | A. A. Alalwan, A. M. Baabdullah, N.P. Rana, K. Tamilmani, Y. K. Dwivedi | "Examining adoption of mobile internet in Saudi Arabia: Extending TAM with perceived enjoyment, innovativeness and trust" | 2018 | 116 | 38.67 |
| 641 | J. Raper, G. Gartner, H. Karimi, C. Rizos | "A critical evaluation of location based services and their potential" | 2007 | 107 | 7.64 |
| 410 | D. C. Ukpabi, H. Karjaluoto | "Consumers' acceptance of information and communications technology in tourism: A review" | 2017 | 105 | 26.25 |
| 499 | C. Lamsfus, D. Wang, A. Alzua-Sorzabal, Z. Xiang | "Going Mobile: Defining Context for On-the-Go Travelers" | 2015 | 104 | 17.33 |

(R Q2) Which are the most productive years of research on mobile technology in wellness tourism destinations?

Our findings indicate an alternating increase and decrease in the number of research papers published between 2001 and 2004. A steady increase was observed from 2014 to 2020, with the year 2020 recording the most publications: 114 papers, accounting for 17.38% of all publications. However, because of the effects of the COVID-19 pandemic, the number of publications declined in 2021. These trends indicate that research studies on mobile technology in wellness tourism destinations started to gain more attention from 2014 and increased by leaps and bounds between 2019 and 2020. This is a result of the volatile situation of the global economy due to the rapid spread of COVID-19, causing a major global recession, which is likely to have a significant international impact on the rate of spending and the spread of global money on activities. The pandemic has also abruptly reduced and limited travel outside a country, significantly impacting the tourism industry. As COVID-19 refuses to relent, it is apparent that tourism must rely heavily on technical solutions. The ongoing crisis necessitates institutional innovation to envision durable, agile and adaptable strategic objectives and operations. Smart technologies, including mobile technology, are transforming the tourism and hospitality industries throughout the pandemic and beyond, opening the way for new business models, consumer touchpoints and value co-creation opportunities. Therefore, 2020 has engendered multiple studies and applications of mobile technology in wellness tourism destinations for facilitating human experiences, supporting critical business processes and enabling important governance aspects.

(R Q3) Who are the most productive and influential authors concerning mobile technology in wellness tourism destinations?

Our findings highlight the works of some of the most prolific and influential authors in mobile technology in wellness tourism destinations. Law, R. was identified as the most productive author in mobile technology in wellness tourism destination research, with 10 documents (2.58%) published between 2015 to 2021. All his published articles pertain to mobile-based technology use in hospitality and tourism. These findings are in line with previous bibliometric research conducted by Chen et al. (2020), who found that Law, R. is one of the top three authors with the largest number of publications on mobile technology in the tourism research field. This points to Law, R. as an expert in mobile technology in wellness tourism destinations whose work can be referenced by other academics to increase the chances of acceptance and publication of their

articles. Furthermore, the network of productive co-authorships in the target research field revealed Park and Liu as the authors with the most co-authorship on mobile technology in wellness tourism destinations. These findings show that researchers who build relationships and collaborate have a greater chance of getting published than those who do not.

(RQ4) What is the most influential work in this field of study?

Our findings reveal that the article titled “Ubiquitous Computing: Smart Devices, Environments and Interactions” by S. Poslad is the most cited research work in this field with 351 citations within the range of 388 documents by 160 authors. Therefore, if relevant personnel in academia and industry want to understand the research on mobile technology in wellness tourism destinations, they can start with the above author and their article.

(RQ5) Which are the most productive countries and influential institutions regarding the research on mobile technology in wellness tourism destinations?

The United States was ranked first among the top 20 countries to publish research on mobile technology in wellness tourism destinations, with 86 publications. This finding concurs with that of Chen et al. (2020), who found the United States of America, the People’s Republic of China (including Hong Kong and Macau) and England to be the top three countries regarding the number of publications in the field of mobile technology in wellness tourism destinations. This indicates the quantitative scope and capacity of research on mobile technology in US wellness tourism destinations. The QS World University Rankings 2022 ranks the Massachusetts Institute of Technology as first in the world and Stanford University as third, indicating the presence of exceptional technology institutions in the United States. In addition, the World University Rankings 2022 by Times Higher Education ranks the US California Institute of Technology and Stanford University as second and fourth in the world, respectively. Both are outstanding educational institutions with a reputation for technology that is recognised worldwide. This makes the United States the country with the highest capacity for research in mobile technology in wellness tourism destinations compared to other countries around the world. Additionally, the Hong Kong Polytechnic University was found to be the most influential research institution that published eight articles with 221 citations in this field. The high impact of published articles by the Hong Kong Polytechnic University is because international publishers and high cite-score journals published most of these articles. For example, the Journal of Travel Research, International Journal of Contemporary Hospitality Management and Journal of Hospitality Marketing and Management were ranked in Quartile 1, with h-indices higher than 50 and 10 as per the Scimago Journal & Country Rank and CiteScore Rank in 2020, respectively. This indicates the Hong Kong Polytechnic University’s credibility and acceptance over other institutions interested in studying mobile technology in wellness tourism destinations. Therefore, research citations from these institutions have a greater chance of gaining credibility and acceptance of research publications in mobile technology in wellness tourism destinations than those from other institutions.

(RQ6) What is the periodic progression of mobile technology in wellness tourism destination research and the intellectual structure of research in this area?

To address this research question, we constructed a network map using bibliographic coupling and keyword analysis based on bibliographic data analysed in VOSviewer. It revealed exciting patterns and themes in the field of mobile technology in wellness tourism destinations and the research hotspots comprised eight clusters: 1) technological breakthroughs, 2) mobile tourism adoption, 3) tourist mobile applications, 4) destination marketing, 5) smart destinations, 6) tourist experiences, 7) data intelligence and analytics and 8) service innovations. We found that keywords in the same cluster shared a similar hotspot. Cluster 1 contained keywords related to technology use in wellness tourism destinations, while most of the keywords in Cluster 2 were from technology acceptance studies, namely mobile tourism adoption. For Cluster 3, the keywords were mainly the various types of mobile computing applied to wellness tourism destinations. Most of the keywords in Cluster 4 were regarding the mobile devices used to communicate and distribute products or services to consumers, that is, destination marketing. The keywords in Cluster 5, referred to as the smart destination cluster, were mainly related to the electronics system used to achieve destination sustainability. The keywords in Cluster 6 were mainly concerned with the technology and innovation used to enhance inclusive experiences in wellness tourism destinations, namely, tourist experiences, whereas those in Cluster 7 were mainly the techniques or methods used to analyze data and tourist behaviour in wellness tourism destinations, namely, data intelligence and analytics. Finally, the keywords in Cluster 8 were mainly related to the technology used to improve service quality and satisfaction of tourists in wellness tourism destinations, namely, service innovations. According to these findings, the keyword trends of the emerging research topics within mobile technology in wellness tourism destination research shifted to exponential technology (e.g., Internet of Things, virtual reality and machine learning) used to enhance wellness tourism experiences. Moreover, the keywords dispersed in the network visualisation map show artificial intelligence, Internet of Things, perceived risk, gamification, UTAUT, technology acceptance model, satisfaction and mobile applications. These findings indicate potential streams and themes for further study.

(RQ7) What are the research gaps and future research directions in the use of mobile technology in wellness tourism destinations?

This study consolidated research on the use of mobile technology in wellness tourism destinations over the last 20 years. Five research gaps and directions for future research were identified using qualitative analysis. These included cross-cultural patterns in mobile technology usage to determine wellness tourism destinations, enhancing wellness tourism experiences from an exponential technology perspective, using artificial intelligence for wellness tourism, convergence of the Internet of Things in wellness tourism destinations and gamification in the context of wellness tourism destinations.

Cross-cultural patterns in mobile technology usage in wellness tourism destinations

Modern mobile technology is becoming increasingly comparable across the world but cultural variations across nations can influence mobile technology usage. Few cross-cultural studies have been published concerning mobile technology usage in wellness tourism destination research. Future studies should examine the influence of cross-cultural backgrounds of mobile technology users on wellness tourism destination visit intention or wellness experience.

Enhancing wellness tourism experiences from an exponential technology perspective

Exponential technologies enable change to occur at a rapid pace. Cost reductions and significant developments in computer power, bandwidth and data storage are transforming the world. Future studies should analyse the influence of exponential technologies such as the Internet of Things, virtual reality and machine learning on enhancing wellness tourism experiences.

Using artificial intelligence for wellness tourism. Tourism is heavily reliant on technical solutions to combat the ongoing COVID-19 pandemic. This crisis necessitates institutional innovation to design durable, agile and adaptable strategic initiatives and operations (Gretzel, 2021). Intelligent technologies are now paving the way for new business models, consumer touchpoints and value co-creation prospects in travel, hospitality and leisure that improve human interactions, assist vital corporate operations and enable critical governance features. Future studies should classify tourist photos and explore wellness tourism destination images using a deep learning model. Sentiment analysis could also be employed to measure quality and build sustainability in wellness tourism destinations, using artificial intelligence to design collaborative strategies and build wellness tourist profiles through neural networks. Convergence of the Internet of Things in wellness tourism destinations.

Disruptive technologies such as the Internet of Things play an essential role in understanding and controlling the wellness tourism business, particularly how supply and demand are related. Future research studies should examine a human-guided machine learning approach for 5G innovative wellness tourism destination. Radio frequency identification could be used with an application of the Internet of Things for shopping and wellness tourism for blind people to improve the tourist experience.

Gamification in the context of wellness tourism destinations. Gamification is gaining popularity in various industries including business, education and healthcare. Game mechanisms are employed in non-traditional gaming contexts to significantly raise brand recognition and increase customer engagement. Future research studies should identify the gamified environment as a strategy to improve tourist behaviour and analyse the effect of gamification adoption intention on brand awareness and loyalty in wellness tourism destinations. Enhancing the smart wellness tourism experience for people with visual impairments could also be assessed using a gamified application approach through needs analysis.

CONCLUSIONS

Many authors have made significant contributions to the development of this topic, which is frequently regarded as uncertain and immature, since the recent commencement of studies on mobile technology in wellness tourism destinations. Regardless of this viewpoint, many methodologies have been used to interpret data from diverse perspectives. This study presents a visualised bibliometric study of mobile technology research trends in wellness tourism destinations. First, we created a series of scientific maps based on annual publications, countries, institutions, author productivity and source journals on mobile technology in wellness tourism destination research. Second, a 20-year bibliometric study of the literature on mobile technology in wellness tourism destinations published in the Scopus database between January 2001 to October 2021 was conducted for this purpose. Third, mobile technology's knowledge bases and hotspots in wellness tourism destinations were discussed using document co-citation analysis and keyword co-occurrence analysis. The key conclusions are as follows.

(1) Study findings may be useful for researchers working on mobile technology in wellness tourism destination studies to select relevant publishing journals and encourage partnerships among authors and researchers. Furthermore, the retrieved high-frequency keywords will assist researchers in identifying hotspots and understanding research dynamics and trends; (2) The steady increase in mobile technology articles linked with wellness tourism destinations shows an active research field, particularly after 2018. According to the research distribution analysis, mobile technology has played a part in wellness tourism destination studies in the United States, China and the United Kingdom. In particular, the United States is the most productive country regarding relevant publications. There is an even distribution of publications on mobile technology in wellness tourism destinations among research institutions; however, articles from the Hong Kong Polytechnic University, Hong Kong had far more citations than those from other higher education institutions. "Sustainability Switzerland" has the greatest influence among all the academic journals publishing on mobile technology; (3) by constructing a co-citation network of cited references, the knowledge bases of mobile technology in wellness tourism destination studies were retrieved. Classical publications mostly address "ubiquitous computing", "mobile recommender systems", "social context mobile marketing", "smart technologies for personalised experiences", "mobile navigation systems" and "developments and key issues in tourist mobilities"; (4) the key study ideas covered were displayed within a network context using visualisation tools. Tourism, augmented reality, smart tourism, mobile technology, smartphones, big data, social media, virtual reality and ICT expansion have received more attention and citations than others. However, the number of links and overall link strength across network items revealed study gaps and future trends; (5) the co-occurrence of keywords in this analysis highlighted rising research themes in mobile technology in wellness tourism destination research. This study indicates eight research clusters: technological breakthroughs, mobile tourism adoption, tourist mobile applications, destination marketing, smart destinations, tourist experience, data intelligence and analytics and service innovations. This study identified five research gaps and future research directions as cross-cultural patterns in mobile technology usage in wellness tourism destinations, enhancing wellness tourism experiences from an exponential technology perspective, using artificial intelligence for wellness tourism, convergence of the Internet of Things in wellness tourism destinations and gamification in the context of wellness tourism destination.

Research Implications

The current study has implications for both scholars and practitioners. Bibliometric analysis addresses key questions

that researchers should consider while researching mobile technology in wellness tourism destinations from an academic standpoint. This study assists practitioners in wellness tourism to understand how to develop and incorporate mobile technology in their responses to tourist behaviour concerns and global wellness tourism trends. The authors recognize the points highlighted in the literature review as areas that need more detailed investigations or hotspots in future studies based on the gaps and trends revealed through bibliometric research. For example, the development of mobile applications for wellness tourism destination assessment using big data analytics technology, wellness tourist experience-based mobile application design and a wellness destination mobile tourist guide using an intelligent wireless system. Nonetheless, the peculiarity of the times we live in, including a pandemic that has had a significant impact on the tourism industry, makes this research a welcome knowledge-based map of mobile technology in wellness tourism destinations and a backdrop for future comparable endeavors. Furthermore, although the database includes articles from January 2001 to October 2021, the authors discovered an unanticipated absence of research on the interaction between COVID-19, mobile technology and wellness tourism destinations. Consequently, there are further research possibilities to explore this topic.

Limitations and future research

This bibliometric study, like any other, has some limitations. First, this study only examined Scopus-indexed papers, but research on mobile technology in wellness tourism destinations is projected to be far greater. Other research databases, such as Web of Science and Google Scholar, can be integrated in the future to obtain more accurate findings. Second, we only analysed research publications published between January 2001 and October 2021, even though studies are released daily. Third, despite cleansing our database, it is still possible that irrelevant papers were included in this study. Another disadvantage of the study is that network visualisation may assign qualitative importance or insignificance to specific components due to time-related bias. Corroboration using overlaying visualisation, which may accommodate the time-frame requirement, is advised to address such inaccuracies. Further investigations may consider extending the analysis by conducting in-depth research that tracks and maps the research status and development trends of mobile technology in wellness tourism destinations using a topic modeling based bibliometric method and subsequently consider applying text-mining approaches to complement well-established mobile technology research methodologies. In addition, although bibliometric analysis is essentially effective in terms of quickly dealing with large-scale literature data, there is a lack of in-depth investigation, compared with manual techniques such as coding and meta-analysis. Therefore, it is encouraged to further survey representative papers, from a qualitative perspective, to provide more profound and fine-grained understanding of mobile technology in wellness tourism destinations. Moreover, our study focus was discipline specialism, however, future studies could be implemented in the context of the discipline (and in comparison to other disciplines) and tracking knowledge evolution and flow within and beyond the discipline boundaries. Finally, this study analysed data using VOSviewer. Future studies may employ different software, such as CiteSpace II and Bibexcel.

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