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Consumers' Use of Smartphone Technology for Travel and Tourism in a COVID Era: A Scoping Review

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Abstract

Mobile phone technology has become a necessary component for today's travellers. Information and communication technologies (ICTs) have substantially affected tourism and hospitality consumers over the past two decades. Mobile technologies such as smartphones, tablets, and mobile applications have become travellers' primary access to information. This study focuses on mobile technologies such as smartphones and mobile applications (apps) and consumers' use of mobile technology when travelling. A scoping review following PRISMA guidelines was used to answer the research question; "How do tourism consumers use mobile technologies for travel and tourism during the COVID era?" This study will identify and analyse any relationships, patterns, trends, and gaps in the literature. Peer-reviewed journal articles from the COVID era (2020 to 2022) were included in this study. Articles were sourced using the keywords listed below. The full articles were imported into NVivo, and the main themes and subthemes were extracted from the data and reported using an inductive qualitative thematic analysis. The results from this study identified "food" as the main theme and "food delivery" as the most frequent subtheme. Food, tourism, transportation, Fourth Industrial Revolution (4IR), Hotel Operations, and Shopping were the top 6 themes. The 4IR is changing how smartphone consumers use their devices for travel and tourism. In the COVID Era, Smartphone technology has been recognised as a solution to maintaining safe distancing and contactless transactions. This research will benefit tourism operators and policymakers to remain competitive in an ever-changing environment during the COVID era

Keywords: Smartphone, Mobile Phone, Apps, Tourism, Travel, COVID-19

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1. Introduction

There has been a significant increase in the number of smartphone users since the COVID era began in 2020. Statista (2022) states that there were four billion, sixty-six million (4,066.29 million) smartphone users worldwide in 2019, before the COVID era. In 2022, this number rose by over 897 million users to four billion, nine hundred and sixty-three million (4,963.92 million) smartphone users worldwide. They are projecting this number of users to increase to over 5.5 billion users by 2025. Dickinson et al. (2014) argued that the smartphone had become a major tourism travel tool due to the rapidly growing number of smartphone users and the emerging variety of smartphone apps. Chang and Shen (2018) confirm that smartphones are emerging as a travel tool due to the variety of functions and advanced mobile technologies. Yu, Anaya, Miao, Lehto and Wong (2018) supported this argument when they stated that scholars had developed a growing interest in the influence of smartphones on the tourist experience in recent years. According to Law et al. (2018), there has been a significant increase in the number of studies on mobile technology over the past five years, from 2012 to 2017. The authors argue that this indicates the importance of this topic to tourism and hospitality scholars, consumers, and suppliers.

This study aims to extend the current knowledge of travel consumers' use of smartphone technology to include the COVID era (2020-2022). This information will benefit tourism operators utilising mobile technologies to gain a competitive advantage. The data collected will benefit tourism operators, policymakers, and researchers. The key research question in this study is: How do tourism consumers use mobile technologies for travel and tourism during a COVID era?

Background Information Smartphone Usage Before COVID era

Law et al. (2018) conducted a comprehensive literature review on mobile technology articles published in the tourism and hospitality journals prior to 2018. They collected all the mobile-technology articles that were specifically about hospitality and tourism from four databases, EBSCO host, Google Scholar, Science Direct, and Scopus, from September to November of 2017. They used several keywords such as "mobile technology," "mobile service," "mobile device," "mobile applications," "apps," and "smartphone." Only the articles that were published in hospitality and tourism journals were included in the study. They identified 92 articles published between 2002 and 2017. The articles were divided into two main categories: supplier-focused, which included 25 papers, and consumer-focused, with 67 peer-reviewed papers. Their main findings that pertain to this study included the impact mobile technologies have on consumer travel patterns and behaviours.

Law et al. (2018) argue that the consumer's perspective of mobile technologies on travel patterns and behaviour has been studied much less, with only 17 out of 92 articles covering this topic. This indicates a gap in the literature and an area that can be explored further. The main findings from their research indicate that mobile technologies change the way consumers plan their trips, experience their trips, and consume their trips. It also discusses the post-trip sharing and feedback stages. The research identified four main stages that the consumer goes through, including the pre-trip planning stage, where

the consumer primarily relies on tablets and smartphones (Murphy, Chen, & Cossutta, 2016); (Wang, Xiang, & Fesenmaier, 2014). The next stage is the during-trip experience stage, where the consumer has control through their mobile devices to adjust their itinerary (Lamsfus, Wang, Alzua-Sorzabal, & Xiang, 2014), (Wang, Park, & Fesenmaier, 2012), (Wang, Xiang, & Fesenmaier, 2016). The final stage is the post-trip sharing stage. The tourist is more likely to share their experience in real-time as they are experiencing the service instead of waiting to get home and give feedback. They generally use their social media on their mobile devices to share their experiences. Mobile devices also make it much easier for tourists to store and retrieve photos and memories.

Smartphone use and the spillover effects

Wang et al. (2016) conducted a study to identify the relationship between smartphone use in everyday life and the use of smartphones in travel. They conducted 24 interviews with smartphone users who had travelled at least three times in the last year. They identified the respondents through Survey Sampling International (SSI), a survey sampling company that manages a large panel of American consumers. SSI conducted a random sample of American travellers with smartphones. The findings indicated that the use of smartphones has completely changed tourist's behaviour. They summarised their findings by developing an illustration of the processes of the smartphone and the Spillover Effects in travel.

According to Wang, Xiang, and Fesenmaier (2016), some of the uses of smartphones in travel that were identified included communication, social activity, information acquisition, information search, entertainment, and facilitation. Some of the reported changes to tourist experiences were activities such as en-route planning and sharing, leading to less prior planning and more travel. Additionally, the tourist uses the smartphone for convenience and connectivity and is more informed, safe, confident, and flexible. These are similar findings to Law et al. (2018), for they identified the pre-trip planning stage with information acquisition and information searches before they go on the trip and during the trip. Also, they use their smartphones during the trip to communicate with their friends and family while travelling.

Mang, Piper and Brown (2016) conducted a similar study on smartphone usage among tourists visiting Rome, Italy, in August 2012 and Athens, Greece, in July 2013. The research assistants surveyed 362 tourists in Rome over three days as they entered the Colosseum. They surveyed an additional 197 visitors over two days in Athens while they were in line to enter the Acropolis. The total sample size was 493 usable surveys and of sample, 388 of the 493 visitors indicated that they were tourists. Only 62 stated they were travelling for business, 15 were there for educational purposes, 20 were visiting friends and family, and seven listed others. The survey was designed to identify potential uses of smartphones during travel. Ninety-two percent of the respondents (474 out of 493) owned a phone/smartphone. However, half of the respondents with a phone had non-WiFi data/internet access while they were travelling. Sixty-three percent of the respondents said they used their cell phones for photography. When comparing the non-WiFi data access users with the non-WiFi users, there was a clear connection between the use of their phone with the

lack of data access. For example, more than half of the non-WiFi data access respondents used their phones to look up maps and find restaurants and shops. Over 60% of the users used their phones for transportation and social media. Also, three times the number of respondents with non-WiFi access used their phones to look up tourist information and twice as many used their phones for translations. Visitors who use their phones more at home as part of their everyday behaviour had a higher usage while travelling. These findings also support Wang et al. (2016) regarding the spillover effect of smartphone users having more usage when they travel. Tanti and Buhalis (2017) had similar results indicating that social WiFi and available infrastructure increase the use of technology while travelling.

Vallespin, and Molinillo (2017) conducted a study to explore the predictors of smartphone use for travel planning. They used an online survey of 618 Spanish travellers. They used a hierarchical segmentation analysis using social-demographic variables such as age, education, occupation, marital status and income and behavioural variables such as several trips annually and length of smartphone use. Their findings support the previous studies from (Wang, Xiang, & Fesenmaier, 2016) and (Mang, Piper, & Brown, 2016) that the spillover effect can be identified by the smartphone users' daily use and the amount of travel planning with their smartphone. The higher daily smartphone usage is directly correlated to the amount of smartphone usage while travelling.

In a similar study conducted by Kang, Jodice, and Norman (2020), they studied how tourists' used their smartphones before and during a trip. They conducted an online survey by email to visitors that travelled to South Carolina in October 2014. They had 357 responses and were able to use 288 respondents (80.7%), where the respondent answered that they used smartphones for information searches during their trip to the Carolinas. They found that age was significantly associated with the use of a smartphone while travelling. These results were supported by Tussyadiah's (2016) findings that smartphone usage during travel is greater with younger, educated females with a higher income.

Applications (apps)

Smartphone apps have provided extensive opportunities for smartphone usage during travel. According to Lu, Mao, Wang and Hu (2015), smartphones and applications greatly impact tourist behaviour. Gupta and Dogra (2017) conducted a study on the use of mapping applications (apps) on smartphone usage in India from August to November of 2016. They gained access to Indian travellers from travel agents in India and sent an email with a description of the mapping applications and a survey link. Of the 757 email invitations, 349 surveys were returned, and 284 respondents had used location-based travel applications, representing a 37.5% response rate. It was reported that those respondents over the age of 50 had not used the mapping technology and were not included in the study. The findings indicated that the largest proportion of respondents was between the ages of 20-30 years (44.7%) and 30-40 years (34.5%) and 40-50 years (14.7%), and the lowest demographic was below 20 (6.33%). The key results of this study indicated that the users' habit was the strongest factor affecting the user's use of smartphone mapping apps while travelling.

A study was conducted by Gupta, Dogra, and

George (2018) to identify the factors that affect tourists' intentions to use travel apps on their smartphones. They surveyed 389 participants and used 343 completed surveys. The findings supported Lu, Mao, Wang and Hu's (2015) findings that the user's behaviour was predominantly usage intention, except in the case of habits. The consumer's use of smartphone apps was affected by price-saving, orientation, performance expectancy, social influence, perceived risk, trust, and habit. The results of these studies can have implications for the smartphone and app developers to consider the user's intentions when using their app or smartphone while travelling to enhance the travel experience.

The traveller's experience

Kirova and Thanh (2019) stated that many studies have indicated smartphones are increasing the travellers' experience. They studied theme park visitors, their smartphone use, and their experience visiting a theme park. They used multiple qualitative research methods, including semi-structured interviews, ethnographic approaches, and experience narratives. They sampled 213 participants by answering an online questionnaire. The results were consistent with previous studies by Dickinson et al. (2014) and Tussyadiah (2016), showing that smartphone usage was primarily for utilitarian reasons during travel and Mang et al. (2016) found that they were mostly used for social reasons and to share the travel experience with others. Kirova and Thanh (2019) show that smartphones in theme parks were used for relational reasons for interactions with their friends and family. They also indicated that using smartphones enhanced the customer experience at theme parks, for it decreased the anxiety during long waits in lines and was used predominantly during downtime. Tussyadiah and Wang (2016) conducted a study to investigate the reasons why tourists recommend smartphones while travelling. The findings concluded that most participants used their smartphone as a companion or guide, which made their travel more enjoyable and enhanced their travel experience.

Conclusions of Research Before COVID-19 & Rationale for Current Research:

Before the COVID era, many studies were conducted around the world on smartphone user behaviours in travel in the United States (Kang, Jodice, & Norman, 2020), (Wang, Xiang, & Fesenmaier, 2016), India (Lu, Mao, Wang, & Hu, 2015) Spain (Vallespín & Molinillo, 2017) and in Europe (Mang, Piper, & Brown, 2016) The findings of these studies were consistent around the world. The findings from Wang et al. (2016) identified six reasons consistent across the literature as to why tourists use smartphone technology while travelling. These include the following:

1. Communication
2. Social Activity
3. Information acquisition
4. Information searches
5. Entertainment
6. Facilitation

The primary aim of this study is to determine how tourism consumers use mobile technologies for travel and tourism during the COVID era. This study analysed peer-reviewed scholarly articles that were published during the COVID era (2020-2022). The results were compared to the previous research findings to identify any changes or new themes that emerged during the COVID era.

2. Methodology

A scoping review of the literature was conducted for this study to identify and analyse any relationships, patterns, trends, and gaps that exist in the literature. The research team met multiple times to clarify and define the problem statement based on the previous literature and the inclusion and exclusion of the sources for the scoping review. The researchers developed a structure for the data collection and analysis of data using the Arksey and O'Malley Framework (2005), the Joanna Briggs Institute (JBI) JBI Manual for Evidence Synthesis and the PRISMA-ScR checklist and flowchart (Tricco, 2018).

Based on Arksey and O'Malleys Framework, this study included the following five stages: (1) Identifying the research question, (2) Identifying relevant studies, (3) Study selection, (4) Charting the data, (5) Collating, summarising, and reporting the results.

Stage 1: Identifying the Research Question:

The broad research question guided the Scoping Review, "How do tourism consumers use mobile technologies for travel and tourism during a COVID era?"

Stage 2: Identifying Relevant Studies:

This paper reviewed studies published in peer-reviewed journals from the period of 2020 to 2022. After searching the databases for other scoping reviews, the researchers reviewed Law et al. (2018) "A comprehensive review of mobile technology use in hospitality and tourism". Law's scoping review included data from 2002 – 2017. Therefore, this study further develops the work of Law et al. (2018) on the current knowledge on tourism consumers' use of mobile technologies for travel and tourism from 2000 to 2022. Finally, this time frame was chosen due to rapid advancements in technology and to ensure the literature was relevant to the COVID era.

After initial searches were completed, snowballing and backward snowballing were used to expand the source material being reviewed to ensure a sufficient number of quality references were included in the literature review. The additional sources were used to establish the need and background information on consumer usage before COVID to compare the differences during the COVID era and identify any relationships, patterns, trends, and gaps in the literature.

Stage 3: Study Selection:

Studies were sourced using the keywords smartphone, mobile phone, apps, tourism, tourist, travel and

Covid. The searches were conducted during February and March of 2022 using the databases that were available to the researchers, including Emerald Insight, ProQuest platform, ScienceDirect, Scopus, and Google Scholar. We searched google scholar to ensure comprehensive coverage of the published academic research. By using the Boolean operators of "AND" and "OR" searches were refined to results specific to smartphone technology used by travellers/tourists (e.g. "smartphone" OR "mobile phone" OR "cell phone").

After consultation with three research librarians and extensive trial variations of the Boolean operators in all the databases listed above. The researchers agreed on the final search string criteria as follows:

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(smartphone OR "mobile phone" OR "cell phone")
AND
(tourism OR travel) AND
(Tourist OR traveller) AND
("Mobile apps" OR "travel apps")
AND (Covid OR coronavirus OR "Covid-19")
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The searches of the five databases resulted in 252 peer-reviewed articles on March 10, 2022. We exported the documents into Endnote and deleted the 25 duplicate records leaving a total sample of 227 articles to review. The researchers independently reviewed the titles and the abstracts of the 227 documents to determine if they were eligible to be included in the study based on the Industry, user, and purpose. One hundred and thirty-eight articles were excluded from the study leaving 89 full documents to be retrieved. Fifty-two peer-reviewed articles were not accessible, leaving 37 full reports to review for eligibility. Please refer to Figure 1: PRISMA 2020 flow diagram for the details.

The research team developed inclusion and exclusion criteria based on a specific research question at the outset of the project. The inclusion criteria used in this study included: Type of User (e.g. travel consumer); Purpose of Use (e.g. Smartphones); Relevant Industry (e.g. tourism industry). The researchers applied the inclusion and exclusion criteria to the 37 articles. Using the inclusion and exclusion criteria and the guiding research question, "How do tourism consumers use mobile technologies for travel and tourism during a COVID era?". The following were the exclusion reasons (Figure 1).

Reason 1: Does not relate to the type of user (tourist or travel consumers)

Reason 2: Not related to the purpose of use of a smartphone, mobile phone or cell phone

Reason 3: Not related to Relevant Industry in travel and tourism

Table 1 provides information regarding inclusion and exclusion criteria for the scoping review. Eight articles were excluded due to the Type of User, five were excluded due to the Purpose of Use, and two were excluded due to the non-relevant Industry, leaving 22 studies to be included in the scoping review, as shown in Figure 1.

Once the comprehensive list of articles was identified, the full articles were acquired for review. After the initial searches and evaluation process was completed, the practice of snowballing and backward snowballing was used to expand the source material being reviewed (Wee & Banister, 2016).

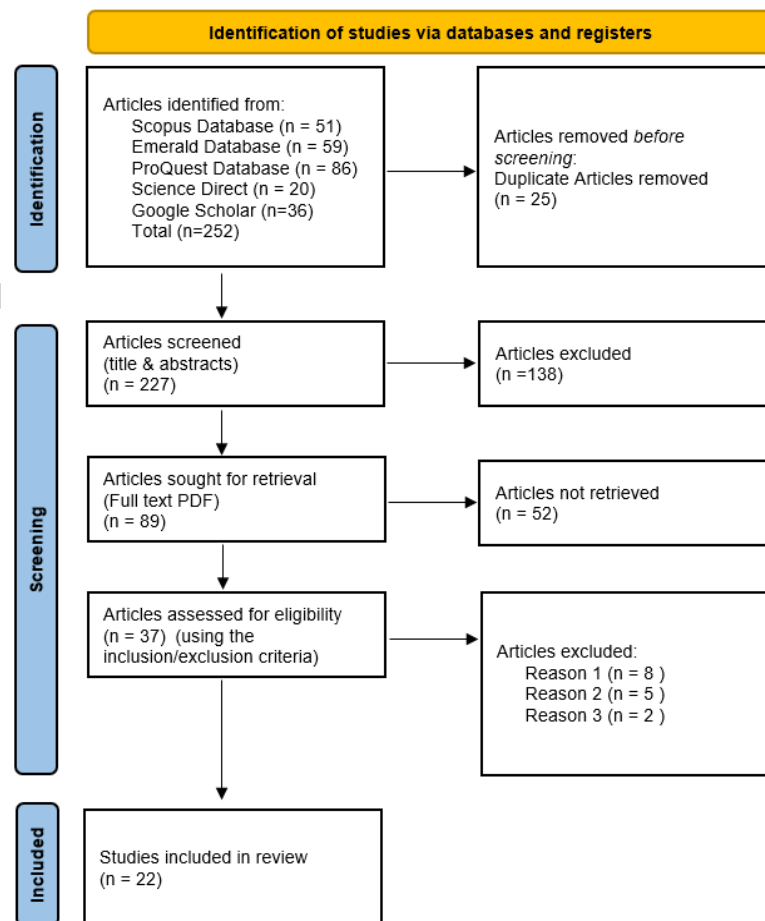


Figure 1- the flow diagram, adapted from PRISMA 2020 flow diagram

Table 1- Inclusion and exclusion criteria for scoping review

Criteria	Inclusion Criteria	Exclusion Criteria
Publication Type	Articles in peer-reviewed academic journals that the researchers have access to.	All other publication venues, including grey literature, book chapters, books, and conference presentations
Dates of Studies	2018-2022	Anything before 2018, unless it is identified as important during the snowballing process. Any articles that were in-press were excluded.
Language	English language only	Any references that are not published in English
Type of User	Tourist or travel consumer	Any articles that are not reporting the tourist or travel consumer
Purpose of Use	Purpose of use of Smartphones	Any articles that do not relate to the use of smartphones (mobile phones or cell phones) in travel or tourism
Relevant Industry	Travel and Tourism Industry	Any articles that do not pertain to the Travel and Tourism Industry

Stage 4: Charting the Data:

The next stage of the research method included charting the data for key issues and themes from the articles. The first round of coding included developing an excel spreadsheet (codebook) to extrapolate general information about the study and specific information such as Author, year, title, and relevant industry themes. This data assisted the researchers in answering the research question, "How do tourism consumers use their mobile technology for travel and tourism during the COVID era? The researchers coded and mapped the key issues and themes from the current articles, compared the findings with the pre-COVID data, and mapped the trends, patterns and relationships between the pre-COVID and COVID eras.

Stage 5: Collating, summarising, and reporting the results:

Endnote was used to collate, store, and screen all the references. When the first round of coding was complete, the full articles were imported into NVivo, and the Key Themes and issues were extracted from the data and reported using an inductive qualitative thematic analysis. A thematic construction and analysis were conducted to present a narrative of the themes and key findings from the literature. The quantity and frequency of the key themes and outcomes identified were collated, summarised, and reported. NVIVO was used to extract themes and identify the quantity and frequency of the key themes.

The researchers used several techniques in NVIVO to increase the confidence of the thematic analysis. First, we conducted a text search using the key search terms from the initial searches, then a word frequency search to determine the most frequently occurring key terms. Second, we conducted a "word frequency" search to identify the top 50 most frequently occurring words from all the sources. We used an "exact match" search and a minimum word length of three characters to ensure the keyword "app" was included. Third, we identified subthemes by investigating keywords and phrases that would fall under the key themes. Fourth, we created word clouds of our themes and sub-themes. Finally, a comparative analysis of the themes from the pre-COVID literature and the COVID era was conducted. The results and discussion section will provide the results of the methods that were used.

3. Results and Discussion:

The first round of coding included the Author, year, title, and relevant industry themes and subthemes. This data assisted the researchers in answering the research question, "How do tourism consumers use their mobile technology for travel and tourism during the COVID era". The researchers mapped out the key themes and issues from the articles. Please refer to Table 2 for the 22 articles that were used in the scoping review and the initial themes and subthemes that emerged from the coding. Please note that the themes are colour-coded, and the subthemes are in black text.

Table 2 shows a total of 22 articles, four from 2020, 16 from 2021, and two from 2022. This represents a balanced view of the study time frame for COVID that was not widely influencing tourism until the second quarter of 2020. Most of the studies were published in 2021, and only two were published in 2022, for this study took place in the first quarter of 2022.

The researchers combined related main themes such as tourism and travel, transportation and airline, the Fourth Industrial Revolution (4IR) and the Internet of Things (IoT). The number of articles mentioned in the table below equals 24 because two articles mentioned dual themes. Please see Table 3 for the Main Themes and Subthemes that emerged from the articles.

There were six main themes, with food being the most common main theme in seven articles representing 31.8% of the literature. An additional 22 sub-themes were originally identified. The researchers combined the related subthemes for a total of eight subthemes. Since several themes and subthemes were identified in multiple articles, the total number of articles was greater than the sample size (n = 22 articles). Table 4 shows the rank order of subthemes from the most frequent to least frequent subthemes.

The most frequently occurring main theme and subtheme involved food and food delivery. This could be due to the spread of COVID-19 and lockdowns requiring people to order food to be delivered and using contactless delivery methods to decrease the spread of COVID. Therefore, one of the main trends during the COVID era was identified as food delivery. This could also be tied to a new trend in contactless delivery due to COVID. However, this study searched for the consumer's use of smartphones, not the motivation for using a smartphone. Therefore, further research is recommended to identify the motivation for smartphone usage during the COVID era.

The researchers used several techniques in NVIVO to increase the confidence of the thematic analysis. To ensure that the selected articles met the search criteria, a text search using the key search terms from the initial keywords used to acquire relevant literature. The researchers ran a word frequency search on the keywords. Please refer to Figure 2 for the most commonly occurring keywords in the 22 articles. Mobile and tourism were the most frequently occurring words with travel, COVID and Apps and smartphone to follow. This test confirmed that the articles met the search criteria that were designated.



Figure 2- Most Commonly Occurring Keywords

Second, authors conducted a "word frequency" search to identify the top 50 most frequently occurring words from all the sources. We used an "exact match" and a minimum word length of three characters. The thematic analysis was based on the guiding research question "How do tourism consumers use mobile technologies for travel and tourism during a COVID era?" To answer this question, the researchers ran a word frequency using NVivo 12 Plus and the following Word Cloud shows the results. Figure 3 shows the results of the Word Frequency Word Cloud.

Table 2- Scoping Review Articles and Relevant Industry Themes and Subthemes

Author	Year	Title	Relevant Industry Themes/subthemes
(Chan, Gao, & McGinley)	2021	Updates in service standards in hotels: how COVID-19 changed operations	Hotel Operations Service standards Crisis management
(García-Milon, Olarte-Pascual, Juaneda-Ayensa, & Pelegrín-Borondo)	2021	Tourist purchases in a destination: what leads them to seek information from digital sources?	Shopping Digital Information
(Kaur, Dhir, Talwar, & Ghuman)	2020	The value proposition of food delivery apps from the perspective of theory of consumption value	Food , Food Delivery Applications (FDA)
(Suk & Kim)	2021	COVID-19 and the airline industry: crisis management and resilience	Airline:Crisis Management and Resilience
(Samoggia, Monticone, & Bertazzoli)	2021	Innovative Digital Technologies for Purchasing and Consumption in Urban and Regional Agro-Food Systems: A Systematic Review	Food , Food delivery
(Abdullah, Nazam, Hussain Shah, Muhammad Ashraf, & Campisi)	2021	Service Quality Assessment of App-Based Demand-Responsive Public Transit Services in Lahore, Pakistan	Transportation, Demand-Responsive Transit (DRT)
(Aguiar-Castillo, Rufo, & Rabadan)	2021	Survey on Optical Wireless Communications-Based Services Applied to the Tourism Industry: Potentials and Challenges	Tourism, Communication, Smart Tourist Destinations (STD)
(Belanche, Flavián, & Pérez-Rueda)	2020	Mobile Apps Use and WOM in the Food Delivery Sector: The Role of Planned Behavior, Perceived Security and Customer Lifestyle Compatibility	Food , Mobile Apps, Food Delivery
(Bellini, Nesi, & Pantaleo)	2022	IoT-Enabled Smart Cities: A Review of Concepts, Frameworks and Key Technologies	Internet of Things (IoT) , Smart city
(Chung, Huang, Weng, & Lin)	2022	The Sustainable Innovation Design in Catering Service	Food , Service Quality
(Drljača, Štimac, Bračić, & Saša)	2020	The Role and Influence of Industry 4.0. in Airport Operations in the Context of COVID-19	Airlines, Fourth Industrial Revolution (4IR)
(Hwang & Kim)	2021	The Effects of Expected Benefits on Image, Desire, and Behavioral Intentions in the Field of Drone Food Delivery Services after the Outbreak of COVID-19	Food , Drone Food delivery
(Lee, William Cannon, & Chung)	2020	Smart Tourism City: Developments and Transformations	Fourth Industrial Revolution, Smart Tourism City
(Macías-Rendón, Rodríguez-Morales, & Barriga-Medina)	2021	COVID-19 lockdown and the satisfaction with online food delivery providers	Food , Online Food Delivery
(MacSween & Canziani)	2021	Travel booking intentions and information searching during COVID-19	Travel, Information
(Sajinčič & Starman)	2021	Use of Smartphone Cameras and Other Applications While Traveling to Sustain Outdoor Cultural Heritage	Travel, Smart Phone Apps
(Sarker, Hoque, Uddin Md, & Tawfeeq)	2021	Mobile Data Science and Intelligent Apps: Concepts, AI-Based Modeling and Research Directions	Internet of Things, Intelligence Apps
(Shamim, Awais Ali, Muhammad Ahsan, Rafique, & Akhunzada)	2021	Ride or Not to Ride: Does the Customer Deviate toward Ridesharing?	Transportation , Demand Responsive Transit (DRT)
(Surya, Sukresna, & Mardiyono)	2021	Factors Affecting Intention To Use Food Order-Delivery Feature Of Ride-Hailing Applications: The Utaut Approach	Food , Food Delivery
(Karopoulos, Hernandez-Ramos, Kouliaridis, & Kambourakis)	2021	A Survey on Digital Certificates Approaches for the COVID-19 Pandemic	Travel, Digital Certificates Smartphone Apps
(Raza, Hamid, & Cavaliere)	2021	The e-tourism beyond covid-19: A call for technological transformation	E-tourism, Technological Transformation
(Sun, Liu, & Zhang)	2021	Mobile Technology and Studies on Transport Behavior: A Literature Analysis, Integrated Research Model, and Future Research Agenda	Tourism, Transport

Note: Only the Main Themes are colour coded. Sub-themes are in black

Table 3- Main Themes and Subthemes

Main Themes	# of Articles for Main Themes	% of Total Articles for Main Themes	Subthemes
Food	7	31.8%	Food Delivery Applications Food Delivery Online Food Delivery Drone Food Delivery Service Quality Mobile Apps
Tourism, Travel and E-Tourism	6	27.3%	Communication Information Smart Tourist Destination Smart Phone Apps Digital Certificates Transport Technological transformation
Transportation and Airline	5	22.7%	Demand Responsive Transit Crisis Management and Resilience Fourth Industrial Revolution
Fourth Industrial Revolution and Internet of Things (IoT)	4	18.2%	Smart City Smart Tourism City Intelligent Apps
Hotel Operations	1	.05%	Service Standards Crisis Management
Shopping	1	.05%	Digital Information
6 Main Themes	24 articles	100.1	22 Subthemes

NOTE: The total number of articles for main themes is 24 because 2 articles mentioned multiple themes.

Table 4- Rank Order of Subthemes from Most Frequent to Least Frequent

Rank Order	Subthemes Titles	Combined Related Subthemes	Total # of Articles
1	Food Delivery	Food Delivery Applications (FDA) (1) Food Delivery (3) Online Food Delivery (1) Drone Food Delivery (1)	6
2	Information	Information (1) Communication (1) Digital Information (1) Technological transformation (1) Fourth Industrial Revolution (1)	5
3	Mobile Apps	Mobile Apps (1) Smartphone apps (2) Intelligent Apps (1)	4
4	Transportation	Demand Responsive Transit (2) Transport (1)	3
5	Smart Tourism Destination	Smart City (1) Smart Tourist Destination (1) Smart Tourism City (1)	3
6	Crisis Management	Crisis Management (1) Crisis Management and Resilience (1)	2
7	Service	Service Quality (1) Service Standard (1)	2
8	Digital Certificates	Digital Certificate (1)	1
Total	Eight subthemes	22 subthemes combined	26



Figure 3- Word Frequency Word Cloud

Food, mobile, and information were the most frequently occurring themes in the word cloud in NVivo. Out of 22 articles, the most frequently used term was food, and the top three subthemes were food delivery, information, and mobile Apps. This is consistent with the researcher's findings of the initial coding of themes and subthemes identified in Tables 3 and 4 and with the NVivo results.

When comparing our findings with the previous literature before 2020, it was apparent that the consumer's use of smartphone technology had changed during the COVID era. Only one of the main themes (transportation) from the current study was mentioned in one of the articles before the COVID era (Mang, Piper, & Brown, 2016). In the current study, the number one theme was food and the subtheme was food delivery. This theme and subtheme were not mentioned in any pre-COVID articles indicating that food delivery was an emerging trend during the COVID era. Please refer to Table 5 for the Comparative Analysis of the pre-COVID and COVID eras themes. Please note the Subthemes have been colour coded to highlight the similar themes between the previous literature and the current study. The authors mapped the trends, patterns and relationships between the previous literature (pre-COVID) and the current literature (COVID era).

Table 5- Comparative Analysis of the themes from pre-COVID and COVID era

Literature Authors	Year/ COVID era VS Pre-COVID	Main Themes	Subthemes that are similar in all studies are color coded
Current Study Myers and Scarinci	2022 COVID era	Food Tourism Transportation Fourth Industrial Revolution Hotel Operations Shopping	Food Delivery Information Mobile Apps Transportation Smart Tourism Destination Crisis Management Service Digital Certificates
Wang et al.	2016 Pre-COVID	Communication Social Activity Information acquisition Information searches Entertainment Facilitation	Communication/Information
Mang et al.	2016 Pre-COVID	Transportation Social Media Tourist Information Translations	Transportation Tourist Information
Kang et al.	2020 Pre-COVID	Information searches	Information Searches
Gupta and Dogra	2017 Pre-COVID	Mapping Applications	
Law et al.	2018 Pre-COVID	Information Acquisition Information Searches Communication through social media	Information (2)

In the pre-COVID era, the prominent research themes were information/communication, social media, social activity, entertainment, translations, facilitation, mapping applications and transportation. Only information and transportation appeared in the COVID era literature. This could indicate that there is a gap in the literature during the COVID era on consumer use of smartphones in social media, social activity, entertainment, translations, facilitation, and mapping applications.

Information was the most frequently accruing subtheme for all but one of the articles before the COVID era. Information was also the second most frequently occurring subtheme in the current study. Based on the findings, the researchers concluded that there is a relationship between the smartphone consumer use of information and transportation in both the Pre-COVID and COVID eras.

The main themes that were in the current study that was not identified in the previous studies were as follows:

1. Food
2. Tourism
3. Fourth Industrial Revolution
4. Hotel Operations
5. Shopping

Before the COVID era, little research focused on the Fourth Industrial Revolution (4IR), relating to food, tourism, hotel operations and shopping. However, food delivery was the most common theme and sub-theme recognised in the current literature, including drone delivery, online delivery and Food Delivery Applications (FDA). Since the onset of COVID 19, 4IR has become a prevalent theme in tourism research due to the increased focus on the use of technology in automation and the application of contactless services. Therefore, further research is recommended on the 4IR and its impact on food and food delivery. Based on the findings, the researcher also recommends further research be conducted in the tourism literature on the application of the 4IR and how it is changing food service, tourism, hotel operations, and shopping. Some questions to consider regarding the smartphone consumers use during and after the COVID era include:

1. Will the food delivery trend continue after the COVID era with Smartphone users?
2. How will the 4IR affect the consumer's use of smartphone technology in tourism?
3. How will hotel operators apply the 4IR technology to enhance the service experience for smartphone users?
4. Will online shopping be an ongoing trend for smartphone users post-COVID?

The most prominent sub-themes in this study were:

1. Food Delivery
2. Mobile Apps
3. Smart Tourism Destination
4. Crisis Management
5. Service
6. Digital Certificates

None of the sub-themes was mentioned in the pre-COVID articles, indicating several emerging themes during the COVID era. Food Delivery and Mobile Apps have become an emerging theme in the literature due to the need for contactless transactions and the 4IRs. Smart Tourism Destinations are an emerging theme in the literature due to the growth of the Internet of Things (IoT) and 4IR. Cities and tourism businesses are investing massive amounts of money into smart initiatives to remain competitive. COVID 19 has made it necessary for all businesses to evaluate their Crisis Management and Resilience plans and develop new safe ways of conducting business. The way we conduct, and experience service is changing due to smartphone technology and the 4IR. The use of smartphone technology has been incorporated to communicate and inform consumers as well as conduct contactless transactions. Before COVID, digital certificates for

travel, tourism and hospitality did not exist. Now it is a way of life. Information communication technology (ICT) has changed how we do business in the hospitality and tourism industry since the COVID era. The 4IR is transforming the tourism market, allowing smartphone users to do business anywhere and anytime.

consider the motives for consumers' use of smartphone technology and the inhibitors that prevent the use.

4. Conclusions and Implications

The Fourth Industrial Revolution is changing how smartphone consumers use their devices for travel and tourism, especially considering COVID-19 and the importance of contactless delivery. The foodservice industry has grown substantially using smartphone apps, drone delivery, online delivery, and contactless delivery. Many smartphone users are getting used to the ease and convenience of food delivery and may want to continue this trend long after the COVID era. This research will benefit tourism operators, policymakers, and researchers to remain competitive in an ever-changing hospitality and tourism environment. Hospitality and tourism operators need to be aware of the fast-growing food, tourism, hotel operations and shopping trends due to the Fourth Industrial Revolution. To remain competitive, tourism operators must consider integrating food delivery, mobile Apps, Smart Tourism, Destination Crisis Management, Service and Digital Certificates.

It is recommended that additional research is conducted on smartphone technology and the traveller's experience. If smartphone technology is found to improve the traveller's experience, this would have a positive implication for travel companies and smartphone businesses to improve their competitive advantage in the 21st century, especially in a Pandemic-Era.

5. Limitations:

One of the limitations of this study is that the data is still emerging regarding the use of smartphone technology during the COVID era. Only 22 articles met the criteria for this study. Additionally, only papers with the keywords smartphone, mobile phone, apps, tourism, tourist, travel and Covid were included in this literature review due to the purpose and research question. Further research on the patterns of behaviour of smartphone users from a psychological perspective may provide further insight into the behaviour of smartphone users while travelling. It is recommended that future studies explore the continued use of smartphones during the next phase of COVID-19 to see if these behaviours change over time.

This study only examined scholarly articles published in the last two years to be relevant to the current Covid era. As research data on this topic continues to emerge, further studies should be conducted to include grey literature, book chapters, books, and conference presentations. Additionally, the limitation of using only hospitality and tourism journals may have unintentionally excluded other relevant literature.

However, this study is one of the first to review the changes in Smartphone use during a pandemic. The use of smartphone technology in food and food delivery is an emerging trend that had not been mentioned in pre-Covid studies. Further research in this area is recommended to determine if this trend will be sustained as travel patterns return to the pre-Covid level. Identifying these changes will provide a useful road map for future research. Further studies could

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