ON-SITE DECISION-MAKING IN SMARTPHONE-MEDIATED CONTEXTS

ABSTRACT

The smartphone has become an indispensable travel companion for contemporary tourists. However, how smartphone use during the trip changes the travel context and related travel decision-making is still unclear. By tracing the in-situ decision-making processes in a real-world setting, this empirical study develops a deep understanding of the role of smartphones in shaping the physical and social contexts within which on-site decisions are made. The findings suggest that smartphones create a complex phygital-social context that triggers and supports the development of new travel plans, re-examination of pre-trip plans, and cancellation of pre-trip plans. Interactions with the smartphone-mediated context facilitate efficient decision-making and enable experience optimization. This study provides implications for decision-making theory in tourism and offers practical implications for destination marketing and management.

Keywords: On-Site Decision-Making, Smartphones, Travel Context, Trip Plan, Unplanned Behaviour

1 INTRODUCTION

The smartphone has become an essential element of the infra-/infostructure for tourists (Buhalis, 2020; Magasic & Gretzel, 2020). The proliferation of smartphone-based communication and the resulting availability of information have amplified smartphones' supporting role in tourism activities (Neuhofer, Buhalis, & Ladkin, 2015). In addition, mobile technology allows the trip context to become increasingly open, fluid, and dynamic (Lamsfus, Wang, Alzua-Sorzabal, Xiang, 2015). Smartphone use during travel alters associations between tourists' objectives, places, and information (Dickinson, Ghali, Cherrett, Speed, Davies, & Norgate, 2014), thus greatly affecting on-site travel behaviour. Importantly, given ubiquitous access to Internet-based information at destinations and the extensive usage of location-based services, tourists can adopt a more flexible approach to trip activities and rely on their smartphones to develop on-site experiences (Wang, Xiang, & Fesenmaier, 2014).

Despite existing conceptualizations of the relationships among smartphone use, travel context, and tourists' on-site decision-making, empirical studies in this area remain scant. Some papers have empirically examined specific consequences of smartphone use during travel (e.g., Chen, Huang, Gao, & Petrick, 2018; Kirillova & Wang, 2016; Lee, Chen, & Su, 2017; Morosan & DeFranco, 2016; Wong, Lai, & Tao, 2020, etc.). These studies highlight both positive and negative impacts on the quality of the tourism experience. However, a comprehensive, empirically grounded framework of the influence of smartphone use on the on-site decisions and subsequent behaviours that shape these experiences is currently missing from the literature. Such a framework is important because it updates existing knowledge on the decision-making processes that drive in-destination travel behaviour, most of which was established before emerging technologies like smartphones started changing the touristic information landscape.

To address the existing knowledge gap, this paper aims to provide an in-depth, nuanced and holistic understanding of the impact of smartphone use on on-site travel decision-making. Theoretical foundations were drawn from literature on environmental psychology and tourists' decision-making and unplanned behaviour during trips. Methodologically, this study follows a call for more naturalistic research approaches which help to explain the way behaviours emerge in real-world settings (Gore, Banks, Millward, & Kyriakidou, 2006; Lipshitz, Klein, Orasanu, & Salas, 2001). Using a qualitative approach including process-tracing applied to a sample of urban tourists, this study investigates how smartphone use during the trip modifies the travel context and, more importantly, how the tourist-context interaction mediated by smartphones shapes tourists' on-site decision-making and the resulting travel behaviours, with a focus on their relation to pre-trip plans. Based on the empirical findings that demonstrate how smartphones support and often trigger on-site decision-making, a framework of smartphone mediated travel contexts is presented and discussed in terms of its theoretical and practical implications.

2 LITERATURE REVIEW

2.1 Travel context and smartphone mediation

Travelling to a destination involves being in contact with, coping with, and adapting to the new, complex destination environment, which is comprised of multiple physical and social objects as well as substantial experiential and affective factors (March & Woodside, 2005). Tourist behaviour takes place in time and space and through interaction with a specific environmental setting (Grinberger & Shoval, 2019; Huang & Wu, 2012). Tourists' behavioural patterns are imprinted with the respective environmental qualities as their behaviours develop (Smallman & Moore, 2010). Tourists' relations and interactions with the dynamic destination environment are, thus, fundamental to understanding the complexity of behaviours while visiting a destination. Previous literature generally suggests that contextual influences on individuals' behaviours originate from physical (e.g., geographical location, ambiance, decor, weather), and social (e.g., interpersonal interactions) aspects of the context, while also depending on the individual's characteristics (e.g., mood, personality, health conditions) (Tombs & McColl-Kennedy, 2003).

In environmental psychology studies, 'context' is interpreted as the specific interdependence among personal, physical, and social-cultural aspects of environments, behaviour settings, and/or situations (Clitheroe, Stokols, & Zmuidzinas, 1998). Prompts from the social or physical components of the context, or an array of extra-contextual sources (e.g., the Internet or popular media), can initiate a psychological and/or behavioural process, resulting in intended or unintended outcomes (Clitheroe et al., 1998). As such, the processes by which tourists interpret, assess, and comprehend aspects of their immediate contexts can lead to a range of cognitions, emotions, perceptions, and feelings, and trigger various information needs and decision-making processes.

Information technology has been recognized to mediate tourist experiences (Tussyadiah & Fesenmaier, 2009). The mediating here refers to facilitating and/or interpreting one's tourism experience (Jansson, 2002). The actor doing the mediating (i.e., the mediator) can be human

or non-human (Jennings & Weiler, 2006). Previous studies identified that people's perceptions of place, distance, sociality, and sense-making are greatly influenced by technological mediation (Jansson, 2007; Tussyadiah & Fesenmaier, 2009). Especially smartphones have been found to affect people's perceptions of place, distance, and meanings of local attractions (Yovcheva, Buhalis, Gatzidis, & van Elzakker, 2014). However, existing literature does not explore how smartphones impact decision-making processes and travel plan actuation.

2.2 Tourists' in-destination behaviour: unplanned behaviours and on-site decision-making

Choosing and purchasing travel involves interrelated, sequential decisions over an extended period (Stewart & Vogt, 1999). Tourists generally research and explore their destinations before the trip. They also acquire new information to formulate a concrete vacation itinerary and consolidate pre-trip plans after arriving at the destination. In research on travel planning and decision-making, travel plans have often been conceptualised as a subset of tourists' pre-trip decisions likely to be acted upon (Cox, Burgess, Sellitto, & Buultjens, 2009). However, significant disparities between pre-trip plans and tourists' on-site behaviours have been widely noticed in previous studies (Becken & Wilson, 2007; Hyde & Lawson, 2003; March & Woodside, 2005; Park & Fesenmaier, 2014).

During their trip, tourists often alter plans developed before the trip, with fewer elements being actuated (Stewart & Vogt, 1999). Many factors can trigger plan changes: shifting circumstances and preferences, exposure to information cues; specific consumption outcomes; constraints related to weather and time; interaction with other social actors; and inconsistencies between previously obtained and new information (Becken & Wilson, 2007). Consequently, pre-trip plans typically change continuously through a cycle of actuation-failure-revision-actuation (Becken & Wilson, 2007).

An integral feature of leisure travel includes open-ended exploration, novelty-seeking, perceived freedom of choice, autonomy over the travel process, and enjoyment of an unpredictable journey (Deci & Ryan, 2000; Hyde & Lawson, 2003). Hyde (2008) noticed that even for the most organized independent tourists, many elements in their vacation itinerary remain unplanned. The experiential nature of tourism consumption (March & Woodside, 2005) implies that leisure tourists wishing to experience something different and adventurous may avoid making precise plans to preserve spontaneity and adventure. As such, tourists often deliberately postpone some decisions until the on-site phase (Decrop & Snelders, 2005; Jeng & Fesenmaier, 2002). The smartphone further encourages such exploration and postponement of decision-making by offering not only easy access to information but also more relevant information through context-awareness (Lamsfus et al., 2015). As a result, various decisions and unplanned behaviours are likely to occur at a destination when travel parties have access to smartphones.

Given the complexity of tourist behaviour, the empirical study of in-destination tourist behaviour and decision-making remains relatively limited (McKercher & Lau, 2008; Huang & Wu, 2012; Smallman & Moore, 2010). Tourism decision-making literature suggests that pre-trip and on-site decision-making follow different processes (Hyde, 2008; Decrop &

Snelders, 2005). On-site decision making is far more complicated and dynamic than pre-trip decision making, contributing to unplanned, hedonic, opportunistic, and impulsive characteristics in tourists' in-destination behaviours (Hyde, 2008). Previous studies have argued that tourists' in-destination behaviours are adaptive and vary depending on contingency factors such as environmental and informational factors (Becken & Wilson, 2007), tourists' socio-demographics (Gitelson & Kerstetter, 1990), psychological factors (e.g. tourists' purpose of visit, tourists' previous knowledge of the destination, tourists' motives) (McKercher & Lau, 2008; Rid, Ezeuduji, & Pröbstl-Haider, 2014), time-space constraints (Hägerstrand, 1970; Grinberger & Shoval, 2019), and the spatial layout of the destination (Lew & McKercher, 2006). This study argues that smartphone use is another such factor that needs to be considered when trying to understand in-destination behaviours, especially in complex urban spaces.

Urban tourism has become a significant tourism-related phenomenon due to the convenience of travel, ease of access, as well as the development of information technologies (Dumbrovská, & Fialová, 2014). The uncomplicated nature of urban travel highlights the spontaneous and in some cases, impulsive aspect of urban tourists' decision-making. Unlike conventional vacation decision-making models which mainly follow extensive, funneling patterns, decision-making regarding urban travel is likely to follow a non-systematic approach, particularly those of a discretionary, opportunistic, or spontaneous nature (Hyde, Decrop, Dunne, Flanagan, & Buckley, 2011). Previous studies have suggested that urban tourist decision-making has distinct characteristics such as short decision-making time frame, limited problem solving, low involvement, last-minute spontaneous behaviours, the heavy use of information technologies, and overlapping or bypassing of different stages which were often featured in traditional models of consumer behaviour (Swarbrooke & Horner, 2007; Hyde et al., 2011). This study therefore focuses on the role of smartphones in urban on-site decision-making.

3 METHODOLOGY

The focus of the present study is on-site tourist decision-making, which involves affective, experiential, spontaneous, and intuitive aspects (Smallman & Moore, 2010; Hyde, 2008). Post-positivism serves as a broad and pragmatic means to examine on-site decision-making by linking theory and practice, recognising the researchers' emotions and commitment to the topic, and legitimizing the potential for using multiple techniques for collecting and analysing data (Ryan, 2006). Following the post-positivism paradigm, this study does not aim to arrive at an overall 'truth' due to the complexity of the web of life and human experience. Rather, the researchers recognise the limits in research to access all areas of human experience and regard the person, experience, and knowledge as multiple and relational. The post-positivism paradigm allows for the use of natural settings and situational/contextual data and recognises a need for other forms of inquiry such as visual analysis (Henderson, 2011), which can provide the most useful information for answering research questions in the current study. Another benefit of post-positivism is that it enables researchers to be reflective; researchers' position regarding a topic aligns with theoretical orientations (Dupuis, 1999). Thus, a well-developed post-positivism approach can uncover more insights into human decision-making, presenting a more reflective way to improve accuracy and avoid biases.

Compared to quantitative research, qualitative research can provide an in-depth picture of real-life and human action by obtaining detailed, rich information that can capture such complexity (Ryan, 2006). A qualitative research design is thus suitable for this study. Specifically, this study employed a process-tracing technique from cognitive psychology using verbal protocols to gain insight into tourists' cognitive processes when making decisions. The protocol method has the advantage that it not only traces steps arriving at a certain behaviour but also provides interpretation (Kuusela & Pallab, 2000). Moreover, this method is particularly suitable in real-time situations with high-time pressure and unfamiliar and complex tasks (Schkade & Payne, 1994).

This research was conducted in a large urban area with hyper-dense information and tourism-relevant products, great Internet connectivity, and a well-developed public transportation system. This study targeted tourists who were (1) free independent tourists since package tourists have limited flexibility and planning needs during trips; (2) first-time tourists since repeat tourists likely have more limited information needs and heavily rely on their previous experience to determine on-site experiences; (3) tourists who had planned at least one day for either sightseeing or shopping or both in the city. Based on the above considerations, an interactive process of theoretical sampling covering several stages was employed to select participants with different travel party sizes, different levels of flexibility, and different levels of access to smartphones. Further participants were selected based on the derived data to build up the emerging categories and theories (Marshall, 1996).

Participants were recruited from online platforms including virtual travel communities (e.g., tripadvisor.com, Ctrip.com), and social media platforms (e.g., Weibo, Douban). These online forums allow registered users to create content related to topics such as films, books, music, and travel. First, a keyword search was conducted on these websites using keywords such as "Hong Kong" and "Hong Kong travel" to find online discussion forums related to Hong Kong travel. Then, we posted participant recruitment information in the forum and some people who had a confirmed plan to visit Hong Kong (e.g., transportation and accommodation booked) approached us and indicated their willingness to join the research.

The researchers anticipated difficulties in recruiting participants because this study required active participation. Therefore, the researchers also collaborated with a five-star hotel in the city to recruit the participants. An invitation letter detailing the study requirements and incentive was placed in the hotel's lounge area. All participants were given a small token of appreciation for their efforts. A total of 30 tourists participated in the study. The number of cases was judged as sufficient for the achievement of theoretical saturation based on continuous data analysis during the data collection process (Guest, Bunce, & Johnson, 2006). The profile of the participants is presented in Table 1.

Table 1 Participant Profile

Participant	Gender	Country of Origin	Size of Travel Party	Age Group
#1	M	China	2	51-60
#2	F	China	1	18–30
#3	F	China	1	18–30

#4	F	China	3	18–30
#5	F	China	1	18–30
#6	M	China	2	18–30
#7	M	Taiwan	4	51-60
#8	M	Australia	5	41-50
#9	F	China	1	51-60
#10	F	China	2	18–30
#11	M	UK	2	31-40
#12	F	Australia	4	41-50
#13	M	UK	5	41-50
#14	F	Austria	2	18–30
#15	M	New Zealand	4	41-50
#16	F	China	1	18–30
#17	F	China	1	18–30
#18	F	China	2	18–30
#19	F	China	3	18–30
#20	F	China	3	18–30
#21	F	Norway	2	31-40
#22	F	Ireland	2	31-40
#23	M	UK	1	41-50
#24	M	Sweden	2	31-40
#25	F	Singapore	4	41-50
#26	F	Switzerland	2	31-40
#27	M	UK	2	18–30
#28	M	France	2	31-40
#29	M	China	1	31-40
#30	F	China	2	18–30

The participants were required to collaborate with researchers for one day (full-day) in sharing their activities and experience. Specifically, a pre-trip interview was conducted before the day-trip (with questions including: *"Who are traveling with you today "Do you have a plan for today?", "Where do you plan to go? And when?"*). Pre-trip interviews helped assess the flexibility of the day trip and were used to identify unplanned behaviours occurring subsequently.

The observational component of the research was designed to be minimally disruptive to the experience. During the day trip, tourists were equipped with small, light and easy to mount wearable cameras (one per travel party) to record their activities. They were instructed to narrate their decision-making processes verbally so the reasoning behind each decision could be captured by the wearable camera. Moreover, a face-to-face and semi-structured interview was conducted at the end of the day at a location convenient for the participants or at breakfast time the next day to review the video, further clarify the decision-making process, and provide an opportunity for debriefing and general feedback. The questions asked included

"Could you please describe the circumstance that you were under?", "Which information source did you use?", "What information did you get from the smartphone?"

Audio recordings of pre- and post-trip interviews, as well as tourists' think-aloud activities from the video recordings, were transcribed. Nvivo 12, a qualitative data analysis software program, facilitated data organisation, preparation, and manual coding. Detailed protocol analysis was employed that allowed for the generation of original, context-based, and process-oriented descriptions and explanations closely linked to the context and on-site behaviour (Strauss & Corbin, 1990). Verbal protocols of the participants were broken down into a sequence of single task-related phrases or statements in a particular context.

The unit of data analysis is the smartphone-mediated on-site decision-making scenario. In total, 51 scenarios were identified. Data coding was undertaken primarily by two researchers and discussed with the third researcher. Data analysis was intended to identify pertinent concepts and the associations among them. The focus of coding was on the context in which the decision occurred and on the decision-making process. The coding process began with code development and concept identification followed by relationship identification (Moustakas, 1994). Table 2 provides an example to illustrate the coding.

Table 2. Example of Scenario Coding

Categories	Code name	Participant No.	Scenario No.
		#29	DM181
Decision	Restaurant Selection	When I was on the Peak, I had no idea about lunch… I saw the Tsui Wah restaurant, which [had been] recommended by a friend yesterday.	
Uses of smartphone	Connected with remote social contacts	Then I posted it on the **WeChat Moment**. I said the Tsui Wah Restaurant seems to be famous here. I have several colleagues who are foodies and they all said that they also ate there when they came to Hong Kong. Two of them who often travel to Hong Kong said that they had eaten in that restaurant, and it was good.	
Consequences or results of the action or inaction	Developing new plans	So I had my lunch at the Tsui Wah restaurant, which is good.	

After the initial scenario-based level of coding, codes were examined to identify concepts as well as their properties and dimensions. For example, the researchers noticed several phrases

that related to objects, resources, infrastructures, or generally tangible elements of the natural or built environment that constitute the context for decisions. These aspects were labeled 'Physical Context' according to previous literature (Bitner, 1992; Scuttari, 2021; Wapner & Demick, 2002;). Physical context was then scrutinized in terms of its dimensionality by classifying all datapoints connected to this concept. As a result of this process, three dimensions of the physical context that were mediated by smartphones emerged and were labeled 'position', 'relative distance', and 'passive context-awareness'. These contextual dimensions could be further broken down into sub-concepts; for example, 'position' was deconstructed into the participant's spatial location and movement. The process ended when no more sub-dimensions could be identified.

The second concept identified in this phase of the coding process was 'Social Context', which includes encounters and negotiations in space (Scuttari, 2021). Social context is described in the literature as interpersonal aspects, such as the number of other players, others' experience or expertise, others' similarity to self, as well as the communication process (Belk, 1975). Following the same process described above, three sub-dimensions emerged and were labeled 'remote social networks', 'local social networks', and 'social media'. Given the discrete, complex, and fragmented nature of data, the first coding phase included several cycles to develop codes and identify concepts. This iterative process maximised optimal fit and minimised bias from preconceived notions.

The second phase of coding focused on the synthesis of the scenario-based findings. Specifically, the contexts identified in the first phase of coding were linked with the decision-making outcomes represented in the scenarios. Figure 1 illustrates how the two context-related concepts were linked with the decision-making outcomes using the example of "Re-examining pre-trip plans".

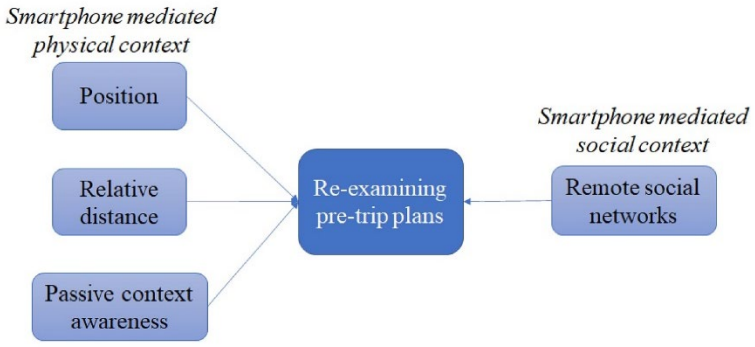

Figure 1 Example of Relationship Identification within the Coding Process

Multiple independent datapoints (i.e., from interviews, verbal protocols embedded in videos of day trips from wearable cameras, notes, and memos from data collection and analysis process) were used to compare one code against another and scrutinise alternative explanations (Mehmetoglu & Altinay, 2006). Consequently, the multiple data collection methods integrated in the research design provided rich information and offered opportunities for data triangulation to minimise subjectivity and maximise trustworthiness. The consistency

of information and overall trustworthiness of findings were enhanced by having two coders independently interpret the same protocols to ascertain inter-judge reliability. The post-trip interview allowed for member checks and thus, further added to the credibility of the findings.

4 FINDINGS

4.1 In-destination context mediated by smartphones

This section describes how smartphone use mediated the in-destination physical and social contexts into which tourists tapped to inform their various on-site travel decisions.

4.1.1 Smartphone-mediated physical contexts

Participants took advantage of the accessibility and convenience of smartphones to understand their physical surroundings while exploring the destination. Smartphones turned the physical world into a multi-dimensional phygital context, playing an active role in mediating the way in which an individual perceives, experiences, and engages in the world (i.e., embodiment) (Scuttari, 2021) and generating individual behaviours and choices along the way (Figure 2).

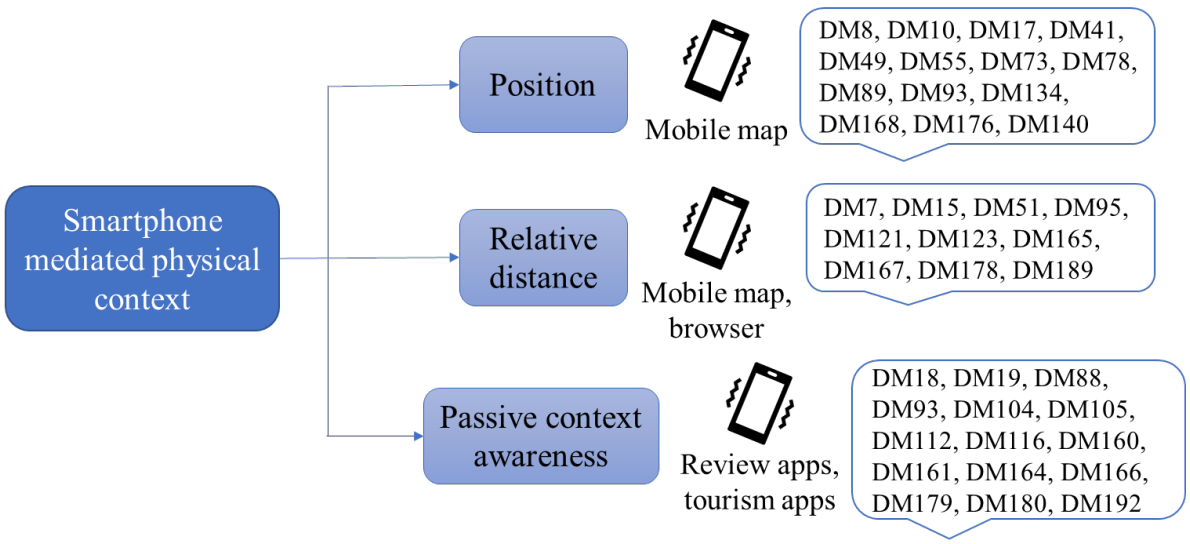

Figure 2 Smartphone-Mediated Physical Contexts

The first dimension of tourists' physical context framed by smartphones is position, which refers to tourists' spatial and geographic positions and movement within places (discussed in 14 scenarios). Smartphones and their geo-based services were frequently used by participants to recognise their positions and movement within the destination. As stated by Participant #23, *"The mobile map is best for showing where you are. You hit the button [and] it shows where exactly you are."*

Recognising position and movement helped participants develop a sense of direction and orientation and find the way when navigating the unfamiliar destination. With the help of the smartphone, participants were able to make decisions about where to go and what to do next.

"*I felt a bit confused. I was thinking 'what shall I do now?'. At that time, I looked at the* ***mobile map*** *about where I am now, what is around.*" *(Participant #16, DM95)*

"When we got to Causeway Bay station, I got it on my ***Internet****… And I used* ***Google Maps*** *… to get me from the station to the shop." (Participant #13, DM73)*

The second dimension of tourists' physical context framed by smartphones is the relative distance, which is related to the association and distribution of places relative to others (10 scenarios). As reported by participants, smartphones were commonly used for examining the distance between places. They were likely to choose service options near their current locations. Understanding the relative distance via smartphones thus affected determining how well a service or attraction suited their needs. For instance, participants reported that relative distance framed by smartphones helped them find nearby points-of-interest such as attractions (e.g., Participant #9, #16), shopping malls (e.g., Participant #2, #3, #26) and restaurants (e.g., Participant #9, #18, #26). Participant #9 explained the process of searching for nearby attractions using the smartphone map:

"I searched 'nearby' on the ***mobile map****, the famous places nearby, to see where I wanted to go, or the [streets] I could walk around…The Red Pavilion, the History Museum, and the Science and Technology Museum are located in the same area." (DM58)*

Participant #29 explained the process of making an on-site decision among three attractions: the Peak and two museums. The final decision was made based on the distance of attractions relative to his current location assessed by the smartphone:

"I searched ***[on the smartphone]*** *the locations of the history museum and art museum while on the go. I went to the Kowloon park and the coffee shop in the morning, which are very close to the subway station. However, the two museums were relatively far from the station, and they were in the opposite direction. Finally, I decided I would rather not go there." (DM178)*

The third dimension of tourists' physical context framed by smartphones is labeled as passive context-awareness, which is associated with the context-aware functionality of various smartphone apps (15 scenarios). Push alerts or recommendations provided by smartphone apps had a large influence on participants' awareness and perceptions of their physical surroundings. For instance, Participant #26 reported receiving suggestions about a shopping mall from a smartphone:

"He (my husband) saw something on the ***[mobile] Internet*** *saying this is the most hip, fashion, trendy mall for young people... You know,* ***the Handy device*** *[i.e., the smartphone provided by the hotel as an incentive for guests], has suggestions. I think he found it there." (DM164)*

4.1.2 Smartphone mediated social contexts

Participants stated they used smartphones to connect and communicate with their social networks while travelling. They also contacted distanced social contacts via smartphones to support their on-site decision-making. Various ways in which sociality was encountered during the trip affected and mediated tourists' perceptions of their social contexts (Figure 3).

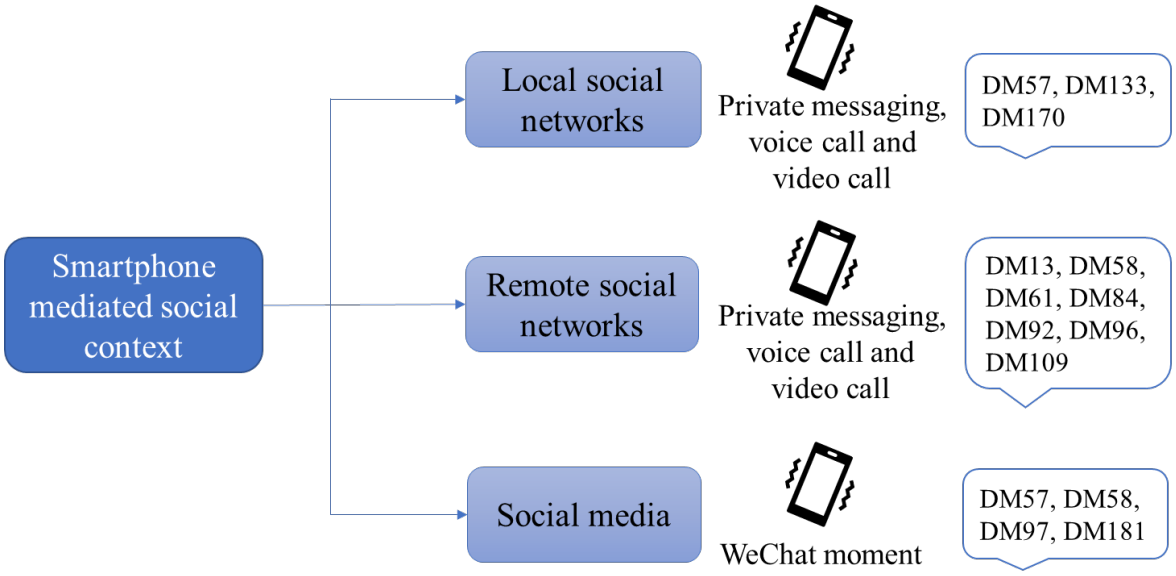

Figure 3 Smartphone-Mediated Social Contexts

First, smartphones enable tourists to connect with their local social networks (3 scenarios). Several participants visited their local friends and relatives during trips, and they used smartphones to arrange schedules in real-time (e.g., Participants #9, #16, #17, #22, #27). Participants also often used their smartphones to consult local friends and relatives when deciding where to go and what to do or eat due to the perceived information quality and reliability. For example, Participant #27 described the process of going to a dim sum restaurant recommended by a local friend that was facilitated by the smartphone:

"We had originally said 6:00 pm, but then we changed the time to 5:00 to move it later. Because we knew it was gonna take us longer to go on the cable car. We said ***[on the smartphone]*** *'we would let you know when we were coming back.'…So we took the metro back. East Tsim Sha Tsui. We went to meet them at the P entrance. We asked our friend to show us some authentic Hong Kong food which we hadn't had before. And dim sum was suggested. We had dim sum before in London, but food in England is different. That dim sum restaurant was very close to the exit" (DM170)*

Participant #22 decided to take the Star Ferry after she asked her cousin, a local resident:

"We got there [the Hong Kong Island] by Star Ferry because my cousin said it was very easy. Yesterday morning, we talked ***on the smartphone****. She just said it would be a good idea.*

Because it was raining. She said the Star Ferry was really nice, so she said you should do that." (DM140)

Second, smartphones enable tourists to connect with remote social networks through private messages (7 scenarios). During the trip, participants constantly communicated with friends and families at home through online chats (e.g., Participants #3, #9, #18, #20, #30), and video calls (e.g., Participant #17). Participant #9 described that she had a chat with a friend via her smartphone to talk about a tourist attraction:

"When I was in the dessert shop, I had a chat with a friend ***on the smartphone****. We just talked about the Peak. He had been to the Peak a long time ago... I chatted with him and asked about it." (DM58)*

Some participants reported buying gifts and souvenirs or making purchases on behalf of others, usually their families and friends. Smartphones played an indispensable role in communicating and exchanging information, thereby assisting in decision making. For instance, Participant #3 described using the smartphones to communicate with a friend for whom the participant was making shopping- and purchase-related decisions:

"*My friend asked me to buy some medicine for her... My friend only gave me the names of the medicine, however, I found there [were] so many different varieties. I asked her when I was not sure. I took a photo and sent it to her* ***[using the smartphone]****. I asked her, 'Is this the one you want to buy?' Also, I told her about the price." (DM13)*

Third, smartphones enabled tourists' connection with unknown others or more distant social relations through social media posts (4 scenarios). Information or ideas generated through those activities reportedly shaped participants' decision-making processes.

For example, Participant #29 mentioned interacting with social media connections while travelling:

"When I was on the Peak, I had no idea about lunch… I saw the Tsui Wah restaurant, which [had been] recommended by a friend yesterday. Then I posted it on the ***WeChat Moment****. I said the Tsui Wah Restaurant seems to be famous here. I have several colleagues who are foodies and they all said that they also ate there when they came to Hong Kong. Two of them who often travel to Hong Kong said that they had eaten in that restaurant, and it was good*." *(DM181)*

4.2 Smartphone empowered tourist on-site decision-making

Data analysis further revealed that smartphone use could lead to various changes in tourists' on-site behaviours in terms of developing new travel plans, re-examining pre-trip plans, and cancelling original plans.

4.2.1 Developing new plans

The data revealed that the use of smartphones for understanding the physical context and interacting with various social contexts often resulted in the development of new travel plans or unplanned behaviours. Understanding their positions and movement, grasping the relative distance between points of interest, and being equipped with passive context-awareness catered to participants' instant needs and facilitated on-site decision-making. At the same time, recommendations through social networks encouraged spontaneous behaviours (Figure 4).

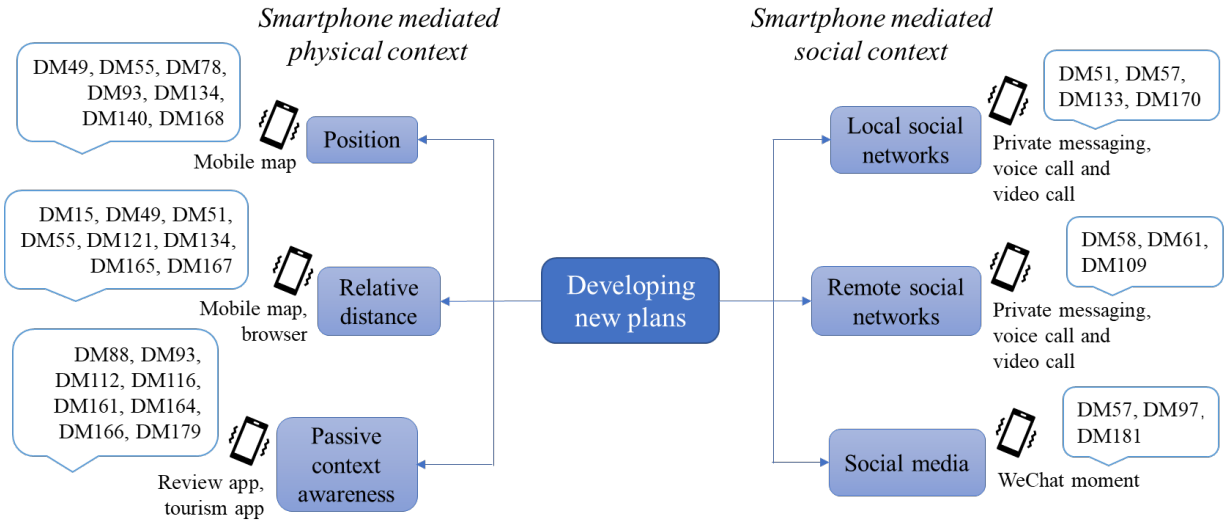

Figure 4 Developing New Plans in the Smartphone-Mediated Travel Context.

Participants were likely to use smartphones to search for nearby attractions (e.g., Participant #4, #9, #22), dining options (e.g., Participant #16, #18, #19, #26) or shops (e.g., Participant #9, #26), and processed the obtained information to make decisions. The relative distance between the service options and participants' locations automatically examined by smartphones thus supports the development of new plans (8 scenarios).

Participant #26 reported using the smartphone to look for alternatives close to their current place. Finally, the smartphone helped them find a bar that they were satisfied with.

"*When we were in Ozone, we didn't really like the organisation of the bar. We didn't like the bar at all actually... So we checked if there's any other restaurants or bars inside of the tower where we would have a nicer drink, you know…So we decided to change. We didn't want to move from the tower. We didn't want to spend time in a taxi or going another place…We* ***checked it with the Handy*** *what options they had inside the Ritz Carlton…We found on the official website, the Ritz Carlton. We found their* ***choice of dining and restaurants and bars****. We saw they had another bar on the 103rd floor*…This second bar was amazing. It was really, really nice.*" (DM165)*

Some participants reported that they happened to see or hear about a tourism product or service for the first time via smartphones. Passive context-awareness provided by

smartphones piqued participants' interest and inspired them to add points of interest to their itineraries, which consequently led to the emergence of various unplanned travel behaviours (8 scenarios).

"We went to the waterfront. To the Harbour. To watch the Laser Show. Because it starts at 8 o'clock… [I knew it] from the same, ***'Things to see in Hong Kong'*** *(i.e., a destination app). We were sort of reading about it as we went around. When we saw it, we decided [to watch the Laser Show]" (Participant #15, DM88)*

Participant #19 reported that when she was waiting for the ferry, she browsed a travel website and saw a restaurant recommendation which inspired her decision to have lunch there.

"*At that time, I used my* ***smartphone*** *to look at the travel website. There is lots of information about where to eat and what to see at the destination... I just had a quick look. I looked at the pictures, this is good… When I was on Lama Island, I went to the restaurant … because the pictures of the seascape of that restaurant were so beautiful. I decided to go there when I first saw them. And we had dinner in that restaurant" (DM116)*

Moreover, recognition of positions and movement by using the geo-based services of smartphones enabled participants to find the way to new places, further encouraging the development of new plans (7 scenarios). For example, Participant #16 described the process of using a review app to find a restaurant for dinner. The smartphone guided her to the restaurant.

"When I was on the bus, I felt very hungry. So I decided to get something to eat. And I did not have any plans for dinner before… After I got off the bus, I looked at the dining options on the ***Dianping app*** *[a popular review site in China] and the* ***Openrice app*** *[a popular review site in Hong Kong] and found a restaurant I liked… Then I went there following GPS.*" *(DM93)*

4.2.2 Re-examining pre-trip plans

Participants tended to have general plans of varied specificity and scope before trips but expected and intended to make the final decision depending on the contextual factors while on site. They were likely to re-exam the items on their plans and complete decision-making processes while on site. Smartphones helped participants evaluate the planned options and make decisions on the go. The use of smartphones for interpreting physical and social contexts helped participants re-examine pre-trip plans, in turn exerting an influence on their on-site behaviours (Figure 5).

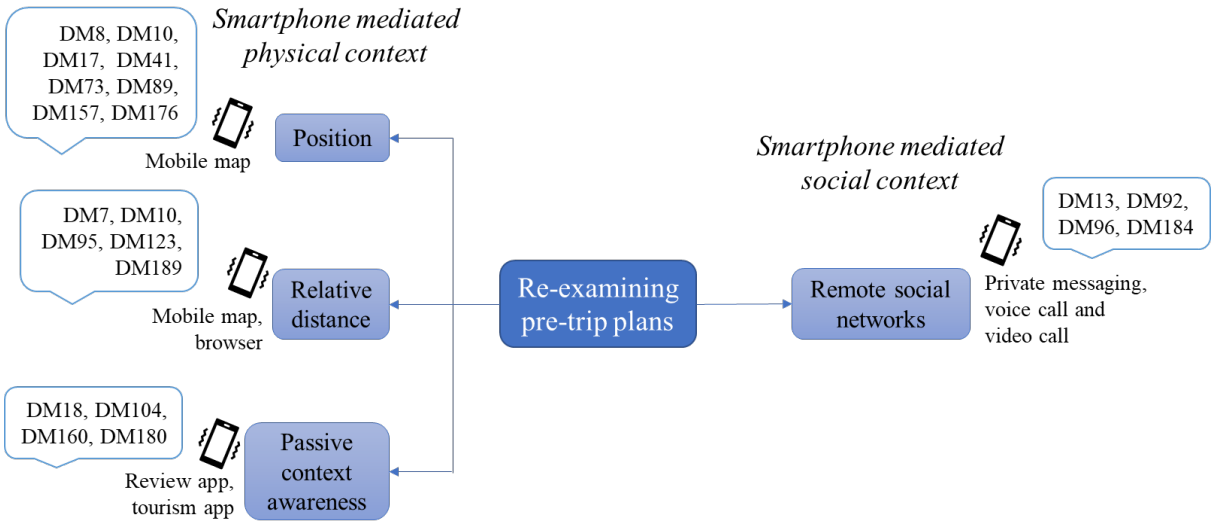

Figure 5 Re-examining Pre-trip Plans in the Smartphone-Mediated Travel Context

Some participants had preliminary plans or intentions for certain items before the trip without deciding the specific time for the implementation of plans. During the trip, they were likely to use smartphones for examining the relative distance, thereby making decisions and re-organising the planned items in their travel itineraries (5 scenarios).

Participant #20 described having made shopping plans beforehand but completing them onsite:

"There were quite a lot of shopping malls around us, and we could just stroll around and see if we could find something to buy. When I made the travel plan, I saw the Long Cheng Shop from the website... It was said that the cosmetics there are very cheap... I was interested to go there. I searched on the ***smartphone map*** *and found it was close." (DM123)*

Participants #30 described that she had a general plan before the trip. The information provided by the smartphone had substantially influenced her final decision:

"Before the trip, my friend told me that if you go to Harbour City, the Muji store there is the biggest and very cheap…When I was in the hotel, I searched how to get to Lama island via ***smartphone****. And I noticed that Harbour City was located at Tim Sha Tsui where I would take the ferry to the Lama island... Actually, I had intended to go there [the Muji store]. Since we would be around there during these days, we can go there on any day…Since it is close [to the ferry station], I decided to go to the Muji store before visiting Lama island. So I changed the route." (DM189)*

Moreover, smartphones helped participants navigate crowds and find the way to places in their travel plans by allowing for the recognition of their positions, thus supporting plan realization (8 scenarios).

Participant #2, a food lover, mentioned having made three contingency plans about local food and restaurants. After selecting one option from the planned list based on the information obtained from the smartphone, the participant used the smartphone map to get to the restaurant:

*"I had three plans of the Steamed Rice in Clay Pot, two in Yau Ma Tei, and one in Sheung Wan. I found from the **smartphone map** that the subway to Sheung Wan was not convenient. So I went to Yau Ma Tei following the **smartphone map**. Finally, I went to the one on the right." (DM10)*

Participants also suggested passive context-awareness provided by smartphones helped them re-assess their pre-trip plans, consequently supporting the fulfillment of the plans (4 scenarios). For example, Participant #3, who planned to buy cosmetics of a particular brand, explained how the reviews of the product obtained from the smartphone influenced the final decision:

"*In SOGO, I saw the counter of Sofia. I have friends who have used this brand. So I wanted to buy that. She [the staff] introduced three products with different functions. Since I was not sure about the differences between the products, I could not decide to buy which one...Then I read some user reviews provided by those who had used the products on my smartphone. And then I noticed a cosmetic shop on the other side. So I walked across, and I found this brand. Finally, I bought it*." *(DM18)*

Smartphones also supported communication and discussions with remote social networks, which was essential to realizing plans (4 scenarios).

*"My friends asked me to buy lipsticks. I had been talking with them **via smartphone.** They asked me to try the lipsticks and show them the photos…" (Participant #16, DM92)*

4.2.3 Canceling pre-trip plans

This study found that the use of smartphones for understanding physical contexts could lead to the cancellation of pre-trip plans (Figure 6).

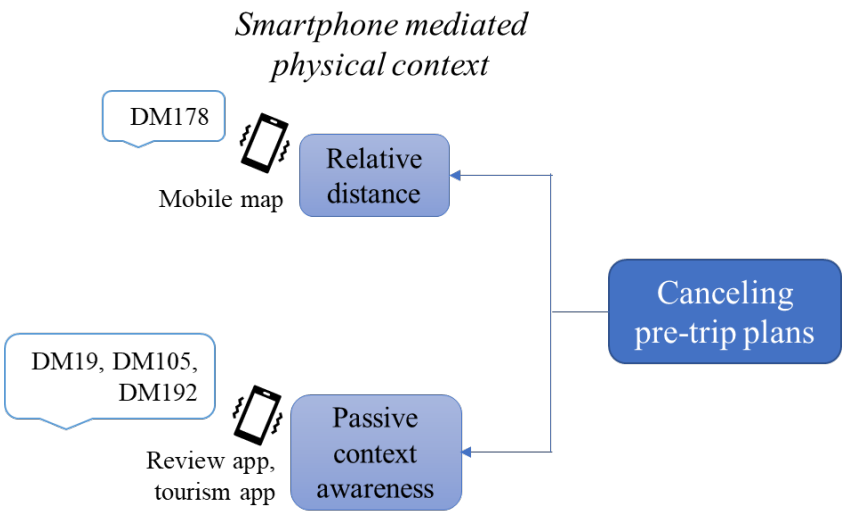

Figure 6 Re-examining Pre-trip Plans in the Smartphone-Mediated Travel Context

Participant #29 had planned to go to the history museum and art museum but decided to cancel the plan. The participant used the smartphone map to assess the distance, direction, and orientation of the attractions. Doing so changed his mind.

"When I was planning my trip, I thought History museums and art galleries were places I must visit. In the morning, I originally wanted to find the subway station to go to the places. However, the more I walked, the more tired I got. I thought I need find a place to have some snacks and drink first because I did not have breakfast…I searched ***[on the smartphone]*** *the locations of the history museum and art museum while on the go. I went to the Kowloon park and the coffee shop in the morning, which are very close to the subway station. However, the two museums were relatively far from the station, and they were in the opposite direction. Finally, I decided I would rather not go there." (DM178)*

Some participants reported that passive context-awareness provided by smartphones supports the evaluation of planned items, which informed the cancellation decision (3 scenarios). Participant #18 had planned to go to a restaurant before the trip. The information obtained from a review app resulted in abandoning the plan:

"I wanted to go to Lu Yu Teahouse…I looked at ***Dianping [app]*** *when I was in another restaurant because I wanted to know if there is any dish in the restaurant that particularly attracted me. Usually, I prefer not to do the information search in advance because I think the amount of information is quite large on a daily basis… I found the dishes were mainly the same as what I had, nothing looked new. Given the consideration of the time, I decided not to go there." (DM105)*

5 CONCLUSION & DISCUSSION

This study empirically investigated travelers' on-site decision-making in contexts mediated by smartphone use. The results reveal that smartphone use during the trip influences tourists'

cognitive representations of the physical environment and increases the interactions with their physical and social contexts. The smartphone also actively changes the context. Specifically, on the one hand, the smartphone turns the physical world into a multi-dimensional phygital context by recognising tourists' position and movement within the destination, assessing the relative distance between tourists and places, and providing passive context-awareness. On the other hand, the smartphone extends the social scope and interaction frequency by enabling ubiquitous connections with a variety of social contexts (local and remote personal social networks as well as distant social media users). As a result of the interactions with the phygital world and the augmented social contacts, travelers develop new plans, re-examine pre-trip plans, and cancel or change pre-trip plans as necessary. Smartphones, thus, act as multifaceted decision aids that support but also initiate on-site decision-making processes. Rather than just providing access to information as discussed in previous research (Kang, Jodice & Norman, 2020), this study found smartphones to be active mediators of decision-making contexts by expanding and changing perceptions, drawing attention to specific context elements, triggering decision processes, facilitating decision-making, and guiding decision implementation.

Figure 7 visualizes the on-site decision-making in the smartphone-mediated travel context established through the empirical findings. It shows the complexity of the smartphone-mediated context, indicates direct effects on behaviours, and suggests that smartphone use empowers and initiates on-site decision-making in critical ways through interactions with the smartphone-mediated context. These interactions with the smartphone-mediated context not only lead to more on-site decisions but also less decision-making effort while simultaneously offering greater potential for optimal experiences as fit with personal needs within a concrete physical and social context is ensured.

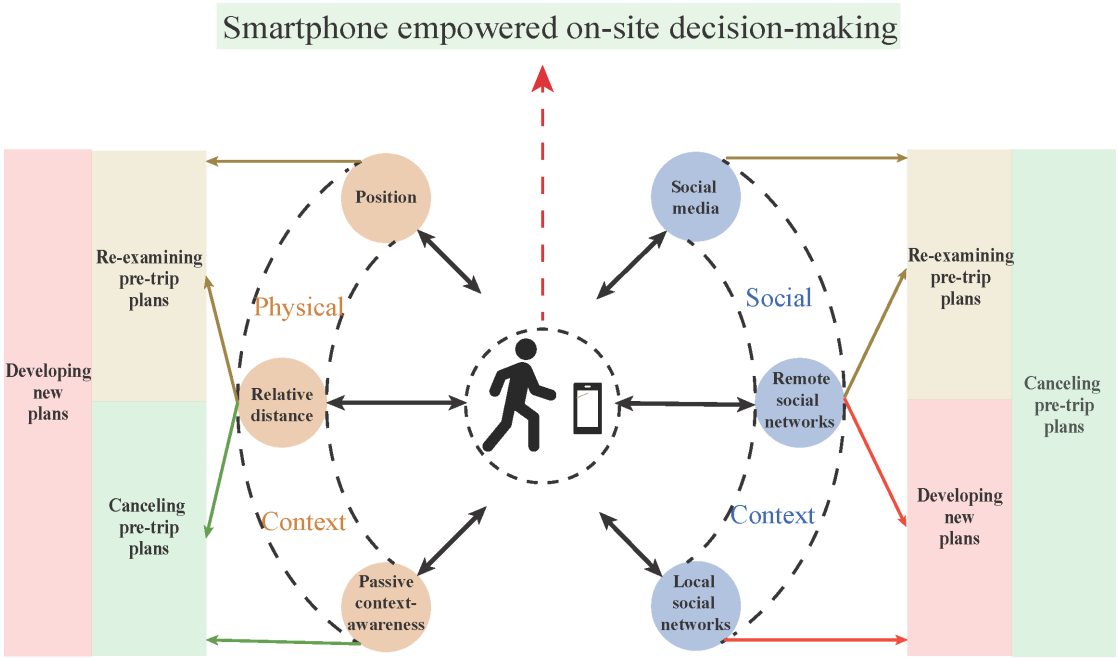

Figure 7 Smartphone-mediated travel context and on-site decision-making.

This study echoes previous studies suggesting that tourism decision-making is an evolutionary process, and that the interplay between travel plans and contextual factors can lead to substantial revisions of plans (Hyde & Lawson, 2003; Hwang & Fesenmaier, 2011; March & Woodside, 2005; Park & Fesenmaier, 2014; Stewart & Vogt, 1999). Previous studies have noticed the impact of elements in the external environment of the destination on tourists' perceptions and behaviours (Clitheroe et al., 1998; Lamsfus et al., 2015; Stokols, 1978). Clitheroe et al. (1998) suggested that an array of extra-contextual sources such as the Internet or popular media could initiate psychological and/or behavioural processes. The findings of this research suggest that the smartphone is not only a tool to explore the context but actively shapes it. Specifically, it creates a context that invites plan confirmation, plan development, plan revision and outright plan abandonment by providing relevant, real-time physical and social cues.

Based on the investigation of tourists' actual behaviours in light of their pre-trip planning, the present study reveals that smartphone-mediated physical and social contexts exert substantial influences on tourists' on-site behaviours. This study finds that smartphones can encourage the re-examination and re-arrangement of pre-trip plans by enabling ubiquitous access to information about physical and social contexts. Consequently, it could induce changes in the sequence of the planned activities in tourists' travel itineraries or the time for executing the planned activities, as well as affecting the final choice among several alternative options in the pre-trip plans. Moreover, smartphones seem to play a particularly significant role in

recognising time-space constraints (Hägerstrand, 1970) and allocation decisions regarding time and space resources (Grinberger & Shoval, 2019), which often lead to the cancellation of plans. Thus, smartphone use can exert a strong influence on spatial-temporal patterns of tourist behaviour within the destination (such as which activities tourists participant in and where; how tourists sequence their visits; and, how long tourists stay in each site) (Grinberger et al., 2014).

This study contributes to the discussion on the influence of mobile technology on travel and tourism. Previous research has indicated that information technology allows the decision-making process to be completed at various places and times, in turn increasing dissociation between decision-making activities and locations and times at which an activity takes place (Couclelis, 2009; Hubers, Schwanen, & Dijst, 2008; Line, Jain, & Lyons, 2011). In contrast, smartphone use seems to reverse this effect by making physical and social contexts explicit and by enabling decision-making in much closer proximity to the time and location of the activity. Smartphones, however, seem to encourage "fragmentation" (Couclelis, 2009) of the decision-making process; that is, the decision-making process is divided into several smaller pieces or fragments distributed across places and over time. Smartphones enable tourists to initiate, conduct and complete the decision-making process at different stages of travel and support on-the-go decision-making to be performed at multiple locations, thus leading to both temporal fragmentation and spatial fragmentation of the process (Couclelis, 2009; Hubers et al., 2008) and potential interruptions of ongoing experiences. This study's findings reflect the fragmentation concept, moreover, providing in-depth insights into the forms in which such fragmentation occurs by linking pre-trip travel planning and on-site decision-making. For example, even when the smartphone is not used to create or change a plan during the trip, it is often used to confirm previously made plans. Consequently, a decision-making process can span pre-trip and on-site phases, with little bursts of decision-related activities happening throughout.

Consistent with previous studies (Decrop & Snelders, 2005; Jeng & Fesenmaier, 2002; Wang et al., 2012; Wang et al., 2014), this study demonstrates that tourists are likely to postpone at least some aspects of decision-making until on-site and rely on their smartphone to determine on-site behaviours. Moreover, this study demonstrates that the passive context-awareness provided by smartphones and the social activities supported by smartphones may trigger a need or remind tourists of a vague goal, thereby initiating a decision-making process. The results show that the non-systematic, spontaneous, and in some cases, impulsive features of urban tourists' decision-making can become increasingly prominent in the smartphone-mediated travel context.

This study supplements previous studies on impulsive consumption and unplanned behaviour by providing a substantive understanding of the influence of smartphones on tourist behaviour. Previous studies argued that the development of e-commerce and new information technologies encourages unplanned behaviours due to increased accessibility to product or service information (Strack, Werth, & Deutsch, 2006). Consistent with related studies in tourism contexts (Chung & Koo, 2015; Kah & Lee, 2014), this study demonstrates that tourists often undertake unplanned behaviours when they receive push messages (e.g., pop-up advertisements) for products and services or navigation aid from smartphones during trips.

However, Kang (2015) argued that tourists who do not use smartphones appear to be less organised and more flexible, and they tend to engage in more unplanned behaviours compared to tourists who use smartphones. This can be explained by this study's results in that smartphones could encourage the development of new plans. Smartphone use also leads to the re-arrangement and the cancellation of planned activities by highlighting particular aspects of the multi-dimensional physical context. Moreover, smartphones help tourists fulfill planned arrangements by facilitating navigation and wayfinding. As such, smartphones indeed help with plan realization, as well as plan formation and plan changes. Thus, different results in previous studies may be attributed to the different ways in which the influence of smartphone use materializes. In sum, smartphones support both planned and unplanned tourist behaviours.

6 IMPLICATIONS & FUTURE RESEARCH

This study has several important implications for theory. First, previous research on the impact of smartphone use in travel mainly focused on the general influence of smartphones on travel experiences. This study expands the existing body of knowledge by empirically demonstrating the effect of smartphone use in terms of travel context and on-site decision-making. Second, this study provides a new, comprehensive and empirically grounded understanding of the smartphone-mediated travel context that relates more readily to contemporary tourist behaviour patterns in the mobile Internet era than existing theories of tourists' on-site behaviours.

Furthermore, this study enriches the literature by not only identifying specific dimensions of context but linking it to decision-making processes and behavioural outcomes. Based on the empirical results, this study integrates smartphone use, physical and social context, and tourist on-site and pre-trip decision-making into a single, general framework. Thus, this study facilitates further theorizing about the role of smartphones in travel but also supports the development of mobile applications that seek to optimize on-site decision-making by emphasizing specific context dimensions that seem to have particular impact in urban travel contexts.

Third, this study investigates the interactive adjustment process of travel planning and decision-making in real-world settings. This study contributes to knowledge development by considering the complex destination environment, the actuation and revision of pre-trip plans, and the spontaneous nature of some travel behaviours (e.g., unplanned behaviours) as a direct result of smartphone interaction. Prior studies have extensively investigated the process of planned behaviour, yet few studies discuss the process and variables of unplanned behaviour. The findings empirically demonstrate that tourists' behaviours are a function of factors generated from tourists' interaction with contexts while on site. Smartphones not only change the contexts but also afford new interaction possibilities and new opportunities for optimizing trip experiences.

In practical terms, the findings of this study offer several insights for destination marketing and management, particularly when designing travel information services. This study's findings demonstrate that tourists generally make pre-trip plans, even if they are not finalized plans. They also revise pre-trip plans and make new decisions after arriving at their

destination. Many spontaneous needs and behaviours emerge while tourists explore a destination and smartphones are regularly consulted to address them. Therefore, tourism marketers can greatly influence tourists' choices and behaviours through an effective presence on map and travel planning applications. Even when offline stimuli are encountered, smartphones are consulted to verify the information. Consequently, search engine optimization and online reputation management continue to be critical for tourism businesses.

The research also informs the design of context-aware mobile applications by highlighting that both physical and social contexts need to be considered when making recommendations. It further demonstrates that, within the infinitely complex destination environment, position and relative distance emerge as particularly influential dimensions. Moreover, tourists frequently relied on pushed information and recommendations made by mobile applications, suggesting that tourists are comfortable with the influence these tools exercise on their decision-making processes.

This study has several limitations that merit attention and should be addressed in future research. Considering the qualitative nature of this research, interpretations of this research are context-specific, which means that they pertain to independent travel within urban destinations with a high density of points-of-interest and pervasive Internet connectivity (Magasic & Gretzel, 2020). It is important to note that this study was intended for exploration rather than prediction. Future research should explore additional types of physical and social travel contexts and compare and contrast smartphone-mediated on-site decision-making with non-mediated settings.

Research has suggested that tourists' decision-making is influenced by individual and trip characteristics (Hwang & Fesenmaier, 2011; Hwang, 2010; Schunn & Reder, 2001). Although this study attempted to collect and analyse relevant data, there is insufficient evidence to demonstrate how these variables affected tourists' decision-making. Besides the variables proposed in this study, researchers could explore other antecedents related to on-site decision-making. While the research included Eastern and Western tourists, the study did not focus on cultural differences in individuals' use of smartphones during their travel processes. Future research could consider sociocultural variables (e.g., social norms, individualism vs. collectivism, and risk aversion) when conducting cross-cultural comparisons. Future research could also adopt quantitative techniques to examine the antecedents and consequences of specific smartphone uses within the presented framework.

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