When Cell Phones Become Travel Buddies: Social Attribution to Mobile Phones in Travel

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Abstract

Applying the computing technology continuum of perspective model into mobile technology, this study investigates tourists' social attribution to mobile phones while travelling. The tendency to place social attribution to and interact socially with mobile phones in the context of travel is influenced by tourists' perception of the positive social characteristics of mobile phones (i.e., object attribution) and the intensity of mobile phone use for travel-related purposes at tourism destinations (i.e., circumstance attribution). It was found that tourists' core self-evaluation did not exert an influence in the process of social attribution to mobile phones. This supports the importance of anthropomorphism in the designing of mobile technology for tourists, in that more intelligent and social phones are potentially more persuasive to influence tourists' behaviour regardless of their personality.

Keywords: mobile technology, social attribution, anthropomorphism, CASA, continuum of perspective

1 Research Background

Tourists make an increasing use of mobile technology to assist them while traveling. The ability of mobile technology to facilitate communication and exchange a large amount of data and information has allowed mobile devices to be widely used in the tourism industry as mobile guides, recommender systems, as well as location-based services (Edwards et al., 2006; Rasinger, Fuchs & Höpken, 2007). In fact, numerous studies have supported the importance of mobile phones for tourists in terms of their roles to support tourism experiences (Wang, Park & Fesenmaier, 2011). According to the concept of "functional triad" suggested by Fogg (1998), mobile technology can have three different roles for its users: as tools, as media, and as social actors. The roles of mobile technology as tools and media have been widely researched in the context of travel and tourism (see Gretzel, 2011; Kabassi, 2010; Martin, Alzua, & Lamsfus, 2011). However, their role as social actors (i.e., to provide social support for tourists on the move) has yet to be explored. It is posited that, as tourists are displaced while travelling, it is important to investigate how mobile phones could give the needed social support while experiencing tourism destinations.

The idea that people have social perceptions of and relationships with technology has been around since the early 1980s (Turkle, 1984). In the context of human-computer

interaction (HCI), the paradigm of Computers as Social Actors (CASA) suggests that users respond socially to computing technology in the same manner as they respond to other people (Nass, Steuer, & Tauber, 1994; Nass et al., 1995), even when they know they should not have to (Reeves & Nass, 1996). As computing technology fills the role traditionally held by humans, CASA researchers identify a tendency that users treat the social relationships between them and the technology devices as literal (Nass & Moon, 2000). Hence, the persuasive effects of mobile computing on consumers' opinion and behaviour can be comparable to those of human contacts. Therefore, it is important to understand the social support that mobile computing can provide to tourists on-the-go that may lead to some forms of travel behaviour.

From the technology design perspective, studies on computing technology as social actors cannot be separated from the concept of anthropomorphism, which is the attribution of humanlike traits to non-human agents (Guthrie, 1993) typically to simplify people's understanding of technology. Sundar (2004) suggests that anthropomorphic behaviour is, in fact, responsible for users' social responses to technology. Anthropomorphism has been an integral part of the design and use of technology (Marakas, Johnson & Palmer, 2000), including those of mobile devices. As a matter of fact, a considerable amount of researchers have focused their emphasis on designing mobile devices to have humanlike characteristics (Lee, 2010; Schmeil & Broll, 2007). Most recently, in 2011 Apple, Inc. introduced Siri (i.e., speech interpretation and recognition interface), a feature on their iPhone 4S devices that resembles a personal assistant. Siri is capable of speaking, hearing and understanding commands, as well as completing delegated tasks (Apple, Inc., n.d.). This prompts the significant potential social cues that people receive from mobile technologies that might lead them to interact socially with these devices on a daily basis.

From the users' perspective, there has been an increasing interest in studying social attribution to computing technology. Drawing from CASA researchers, Marakas, Johnson and Palmer (2000) developed a model called computing technology continuum of perspective (CP) in an attempt to explain the social roles of computing technology in the society at large. The continuum is considered to be anchored by individuals with a locally simplex perspective at one end (i.e., users see computers as mere tools) and with a globally complex perspective at the other (i.e., users believe computers have agency and can influence their lives). They suggest that most people interacting with computers do not reside at the extremes of the continuum, but somewhere in between (Johnson, Marakas, & Palmer, 2008). The application of computing technology CP in the context of mobile phones has not been explored. As mobile devices are often considered the most familiar technology for people, due to its portability and capability in supporting complex tasks for daily activities, testing the applicability of computing technology CP for mobile phones is considered important.

The outcome of social attribution to mobile phones can be both positive and negative for users. Anthropomorphic behaviours among tourists may lead to higher interactions in terms of processing information, which may result in a greater confidence in decision making processes. However, tourists with unrealistic expectations toward the

social support from mobile phones may find themselves too reliant on the devices and, hence, make the decision making processes more problematic. Therefore, the goal of this study is to investigate the social attribution of mobile phones in the context of travel by applying the computing technology CP model (Johnson, Marakas & Palmer, 2006; 2008; Marakas, Johnson & Palmer, 2000). The results of this study provide an understanding of the social attribution to mobile technology and the potential social interactions between tourists and mobile devices at the destinations.

2 Computing Technology Continuum of Perspective

People's daily communication with technology has been highly formalized by the metaphor personification of computers. People anthropomorphize computers in order to use them comfortably for work, so as to increase productivity, as well as for other daily activities. While CASA researchers provide a considerable amount of evidence showing the social relationships between users and computers, one of the main critiques is the fact that most of their studies are experiments conducted in laboratory settings. Hence, it is difficult to assume the applicability of their findings to a general use situation in the real world (Hall & Henningsen, 2008). To this end, Marakas, Johnson, and Palmer (2000) conceptualize a continuum of perspective with regards to computing technology in social settings that is anchored by two different viewpoints. At one end, there are those who view computing technology as locally simplex; they see computers as just machines, which are programmable, alterable, and controllable by humans. At the other end, there are people who perceive computing technology as globally complex (i.e., incomprehensible); they see computers as outside entities that have agencies and autonomy. People with locally simplex perspective are likely to carry their perspectives when interacting with technology and view themselves as an agent of causation of their behaviour. On the other hand, people with globally complex perspectives are likely to view the technology as responsible for their behaviour.

Furthermore, using attribution theory (i.e., a theory that focuses on how individuals interpret and ascribe causality to events) as their theoretical lens, Marakas, Johnson, and Palmer (2000) argue that social attribution to computing technologies can be caused by the characteristics of the object (i.e., stimulus attribution), themselves (i.e., person attribution), the circumstances (i.e., situation attribution), and some combination of these. Hence, they suggest that the degree to which certain perspective in the computing technology CP dominates is influenced by four factors: (1) the social characters of the computing technology, (2) the core self-evaluation of users, (3) the context and nature of interactions with computing technology, and (4) the presence or absence of attribution information cues.

To support the applicability of the concept, Johnson, Marakas and Palmer (2008) developed a scale to measure the computing technology CP in order to understand the diverse set of users' beliefs toward technology. They argue that in order to fully understand the continuum, a deeper investigation toward the dimensions of users' beliefs of the characteristics of computing technology is necessary. Based on previous

literature (e.g., Turkle, 1984; Sproull et al., 1996), they identify four dimensions of technology characteristics: perceived socialness, intelligence, emotions, and control. Perceived socialness occurs when users interacting with computers sense that the technology is responding to their action. Perceived intelligence explains users' perception toward knowledge within technology. Perceived emotion occurs when users sense an emotional reaction from the technology. Finally, perceived control occurs when users perceive that their interaction with technology is directed or supervised by the technology. However, their scale development study tested 13 items representing three dimensions to explain the dimensions of computing technology CP as previously suggested by Johnson (2001): perceived socialness, intelligence, and control. An additional dimension, called perceived control of rights, emerged from the analysis (Johnson, Marakas & Palmer, 2008).

Since the model was introduced in 2000, there has been a limited application using empirical data to test the conceptualized relationships between computing technology CP and the other factors influencing social attribution of technology. A study from Johnson, Marakas and Palmer (2006) tested the relationship between social characters of computing technology, computing technology CP, core self-evaluation, and attribution. Their study suggests than people who interact with an interface with stronger social characteristics as well as those in the position closer to the globally complex perspective in the continuum tend to make more social actor attribution to technology. Additionally, people who evaluate themselves negatively tend to have a globally complex, hence, make more social actor attribution to technology. In summary, their study provides empirical support for the social attribution to technology, in that people utilize the same processes to explain their interactions with technology as they do with human beings (Johnson, Marakas & Palmer, 2006).

To date, the context of computing technology CP research has been "the interaction between a person and some computing technology in a computer-mediated activity" (Johnson, Marakas & Palmer, 2008, p. 169). However, as mobile technology has becoming more and more prevalent in the society, it is of a great importance to investigate the applicability of this model to explain the social attribution to mobile phones. Specifically, travel and tourism provides a context for various interactions between tourists and mobile phones that might result in decision making activities and behaviours that are important for tourism organization. To that end, this study attempts to apply the technology CP to mobile computing (i.e., cell phones) and test the hypothesized relationships among mobile technology CP and tourists' social attribution to mobile phones while traveling. Specifically, the following hypotheses are proposed in this study:

H1: People's perception on the social characteristics of mobile phones has an impact on their social attribution to mobile phones while traveling. (*Object Attribution*)

H2: People's self-evaluation has an impact on their social attribution to mobile phones while traveling. (*Person Attribution*)

H3: The intensity of use of mobile phones for travel has an impact on their social attribution to mobile phones while traveling. (*Situation Attribution*)

3 Methodology

3.1 Measures

Social Characteristics of Mobile Phones. The 13 items measuring computing technology CP developed in the study by Johnson, Marakas and Palmer (2008) were modified, reworded, and applied into mobile computing. After the pilot study, confirmatory factor analysis was conducted to test the multidimensionality of the Mobile Technology CP (MTCP). The items loaded into three dimensions labelled perceived intelligence, socialness, and control. Three items with factor loadings lower than .6 were excluded from further analysis; 10 items were retained.

To capture the perceived emotion of mobile technology, 20 participants in a series of focus group discussions about mobile technology were asked to describe the emotional characteristics of their mobile phones. This resulted in 32 keywords expressing positive and negative personal characters of mobile phones (e.g., arrogant, humble) instead of emotional expressions (e.g., angry, happy). All keywords were integrated into the first draft of questionnaire. After an evaluation by experts in tourism and technology and the pilot study, the list was shortened using random generator into 15 keywords in order to increase responses in the main survey. The items loaded into two constructs: Positive Characters and Negative Characters.

Self-Evaluation. *First,* the construct of neuroticism was used to represent core self-evaluation using eight items from Eysenck personality inventory neuroticism scale (Eysenck & Eysenck, 1968). *Second*, seven items measuring locus of control from Levenson's (1973) scale were adopted, but two items were dropped due to substantially low factor loadings. *Third*, seven items measuring the generalized computing self-efficacy (GCSE) (Marakas, Johnson & Palmer, 2000) were reworded and adapted into mobile context.

Intensity of Use of Mobile Phones for Travel. To measure the intensity of use of mobile phones while traveling, four items measuring the frequency of use of mobile phones were developed based on a previous study by Tussyadiah and Zach (2012) on the use of geo-based technology for travel. These items correspond to the functionalities and applications of mobile phones typically used for direction and navigation, information search, social networking, and general communication. The items were measured by 5-point scale from Never to Always.

Social Attribution to Mobile Phone. The social attribution of mobile computing was measured using three items that describe the social roles of mobile phones for tourists on the move, which include a companion (i.e., who accompanies), a personal assistant (i.e., who gives assistance), and a personal guide/mentor (i.e., who gives guidance)

tourists to experience tourism destinations. All items were presented in 5-point Likert-type scale with Agree–Disagree anchor statements.

3.2 Data Collection

A pilot study to test the reliability of measurement items was conducted from December 21 – 31, 2011 with convenience sampling through social media channels resulted in 111 respondents. After accommodating some necessary adjustments to the questionnaire, the main survey was conducted from March 20 – 30, 2012. An invitation to participate in the survey was distributed to 10000 email addresses of American travellers who have requested travel-related information through *vacationfun.com*, resulting in 355 completed responses (a total of 3.5% response rate).

3.3 Participants

The majority of respondents were female (71%) and older, with 29.1% between the ages of 55 – 64 years, 27.7% between 45 and 54 years old; only about 31% respondents were younger than 45 years old. Respondents were highly educated, with 34.6% holding Graduate or Advanced Degree and 30.6% Bachelor's Degree. Most respondents (84%) have been using a cell phone for more than five years. In terms of mobile devices, 54.2% respondents use smart phones (e.g., iPhone, Android, Blackberry, etc.) and the rest of them use traditional cell phones.

3.4 Data Analysis

To measure the simultaneous effects of the mobile technology continuum of perspectives, the perceived social characters of mobile phones, core self-evaluation, and the use of mobile phones for travel-related activities on the social attribution of mobile technology while traveling, path analysis was conducted using Mplus software (Muthén & Muthén, 1998-2011). Several model fit indices were consulted: Comparative Fit Index (CFI) and the Tucker-Lewis Index (TLI) of .90 or higher (Hu & Bentler, 1999), root mean square error of approximation (RMSEA) up to .08 (Bagozzi & Yi, 1988).

4 Results

The constructs' composite reliabilities (CR) and the average variance extracted (AVE) were calculated to assess internal consistency, reliability, convergent validity and discriminant validity of the construct measurements. As seen in Table 1, composite reliability scores for every construct are well above .70, which is the suggested benchmark for acceptable reliability (Chin, 1998). Additionally, the AVEs of all constructs are also above the cut-off point of .50, which is an indication of convergent validity (Dillon & Goldstein, 1984). All of the items have loadings at .60 or above with *t*-statistic significant at $p \leq .01$. These results indicate that the measurement model displays both internal consistency reliability and item convergent validity. The scale items loadings on their assigned construct are larger than their

loading on any other latent variable, which support discriminant validity (individual factor loadings are not reported due to space limitation). Additionally, AVE square roots that appear in the diagonal in Table 2 are larger than any correlation between the associated construct and any other construct (Chin, 1998), which suggests that the measurement model displays discriminant validity.

Table 1. Internal Consistency, Composite Reliability and Average Variance Extracted

Construct	Number of Items	Mean (SD)	Chronbach 's Alpha	CR	AVE
Perceived Intelligence	5	3.59 (0.80)	.84	.75	.53
Perceived Socialness	3	2.17 (0.98)	.86	.90	.79
Perceived Control	2	3.00 (1.24)	.87	.93	.86
Positive Characters	7	2.20 (1.03)	.96	.94	.88
Negative Characters	8	1.83 (0.90)	.98	.96	.93
Neuroticism	8	2.25 (0.85)	.91	.85	.68
Mobile Self-Efficacy	7	3.63 (0.92)	.92	.89	.76
Locus of Control	5	2.16 (0.79)	.86	.85	.69
Mobile Use for Travel	4	2.24 (1.29)	.93	.94	.87
Social Attribution	3	2.75 (1.19)	.92	.92	.83

Table 2. Correlations and Square Roots of AVE

Construct	1	2	3	4	5	6	7	8	9	10
(1) Perceived Intelligence	**.73**									
(2) Perceived Socialness	.48	**.89**								
(3) Perceived Control	.27	.15	**.93**							
(4) Positive Characters	.33	.63	.22	**.94**						
(5) Negative Characters	n.s.	.26	.30	.55	**.96**					
(6) Neuroticism	n.s.	.12	.14	n.s.	.14	**.83**				
(7) Mobile Self-Efficacy	.41	n.s.	n.s.	.16	n.s.	-.13	**.87**			
(8) Locus of Control	n.s.	.23	.23	.22	.27	.47	-.16	**.83**		
(9) Mobile Use for Travel	.37	.21	n.s.	.27	n.s.	n.s.	.45	n.s.	**.93**	
(10) Social Attribution	.54	.48	n.s.	.47	.16	n.s.	.33	.12	.73	**.91**

Note: the diagonal represents square roots of AVE

The CP model suggests that the data should follow a normal distribution. However, from Shapiro-Wilk test of normality, the *p*-values of all 10 constructs of MTCP were less than .05, indicating that the data do not have an approximate normal distribution.

Most items measuring Perceived Intelligence and Perceived Control are negatively skewed, indicating that the majority of respondents lie closer to the globally complex perspective. On the other hand, items measuring Perceived Socialness are positively skewed, indicating that the majority of respondents lie closer to the locally simplex perspective. In other words, the majority of respondents perceive mobile phones as smart and capable of infringing the users' rights, but less social. The perception toward social characteristics of mobile phones is also quite low, indicating that the majority of respondents did not see their cell phones as showing emotional characters.

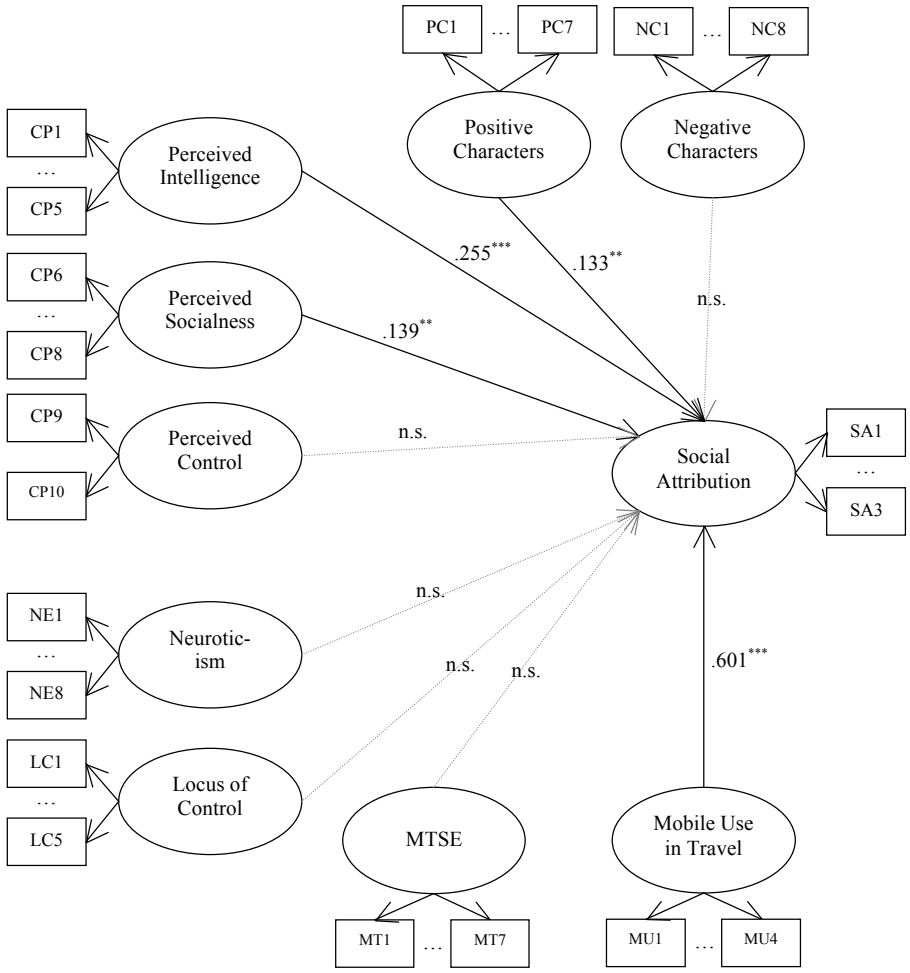
In terms of self-evaluation, the majority of respondents evaluated themselves quite high in terms self-efficacy related with mobile technology (i.e., they know how to use mobile phones to their fullest capacity), relatively low in neuroticism (i.e., they are more emotionally stable and less reactive to stress), and relatively low in locus of control, which suggests low external orientation (i.e., they are less likely to attribute the outcomes of events on external circumstances). Finally, in terms of mobile phones use, most respondents indicated they used mobile phones less frequently to assist them during traveling.

As shown in Table 2, correlations were identified among the different constructs measuring a broader concept. For example, the perceived social characteristics of mobile phones are correlated with most constructs measuring MTCP. Also, the three constructs representing self-evaluation are significantly correlated. Interestingly, mobile use for travel is positively correlated with perceived intelligence, perceived socialness, perceived positive characters and mobile technology self-efficacy. In other words, respondents who are highly capable in working with mobile phones and perceived that their cell phones are intelligent and social may use their cell phones more frequently when they travel.

The full model to test the hypothesized effects of perceived social characteristics of mobile phones, self-evaluation and mobile use for travel on the social attribution of mobile phones is presented in Fig. 1. For legibility of the figure, correlations among dependent variables are not pictured (referred to in Table 2). The fit of this model is good with CFI = .914, TLI = .908, RMSEA = .058, and SRMR = .049. Significant positive effects were identified from perceived intelligence (β = .255, p < .005), perceived socialness (β = .139, p < .05), positive characters (β = .133, p < .05), and mobile use for travel (β = .601, p < .005).

This shows that people tend to place social attribution to mobile phones if they perceived that the mobile phones are intelligent (i.e., capable of providing information and knowledge) and are able to facilitate positive social interactions. People who perceived their mobile phones are polite, persuasive, friendly and kind tend to place social attribution to their phones when traveling. In other words, friendly and intelligent phones have a higher tendency to be considered travel buddies by tourists. This supports the supposition of object attribution (Hypothesis 1 was partially supported).

None of self-evaluation constructs showed significant effects on social attribution to mobile phones (Hypothesis 2 was not supported). This indicates that people's personality has no influence on their perception and behaviour toward mobile technology, specifically in the context of travel, which does not support the supposition of person attribution. This also suggests that regardless of their emotional stability, capability, and orientation of control, people may or may exhibit a tendency to anthropomorphize technology as long as the design of the technology and the circumstances allow.



Note: χ^2 = 2704.633, *df* = 1229, *p* = .000, *CFI* = .914, *TLI* = .908, *RMSEA* = .058, *N* = 355, β was significant at *<.1, **<.05 ***<.01, n.s. = not significant, correlations between independent variables not pictured (please refer to Table 2).

Fig. 1. Model of Social Attribution to Mobile Phones in Travel

Lastly, social attribution to mobile phones in the context of travel is highly affected by the intensity of use of mobile phones for travel-related activities. The more the tourists turn to mobile phones to assist them with various tasks at a destination (e.g., give them direction and information, navigate them around, etc.), the more they tend to interact socially with their mobile phones, which leads to social attribution (i.e., mobile phones as travel buddies or personal travel guides). This supports the concept of circumstance attribution, in that tourists have social interactions with mobile phones due to the situational context of travel (Hypothesis 3 was supported).

5 Conclusion

This study provides empirical evidence supporting the application of computing technology CP model to mobile technology. The MTCP captured users' position in the continuum that stretches between locally simplex to globally complex perspectives, with the assumption that the majority of them would lie in the middle of the continuum. Even though the data do not show a normal distribution, the mean scores for most items measuring MTCP are indicative of this suggestion with the majority of them lie closer to the median value. Most respondents perceive their mobile phones as highly intelligent (i.e., closer to globally complex perspective), but relatively low in terms of socialness (i.e., closer to locally simplex perspective). Further, the majority of respondents also indicated a lower perception towards the social characters of mobile phones, which are the approximation of perceived emotion in this study. In summary, there is a partial support towards groups of people who regard their mobile phones as having humanlike characteristics, which confirms the previous studies on CASA and computing technology CP.

Furthermore, this study also tested the effects of MTCP and the perceived social characters of mobile phones, respondents' core self-evaluation, and the intensity of use of mobile phones for travel on social attribution to mobile phones while traveling. The results provide a deeper understanding on what prompted people to respond socially to mobile technology in the context of travel. The results demonstrate that social attribution to mobile phones during traveling is influenced by the perceived intelligence of the mobile phones (i.e., the capability of mobile phones to provide intelligent support), the perceived socialness of the mobile phones (i.e., the capability of mobile phones to provide social cues), the positive social characters of mobile phones (i.e., the phone's positive humanlike characteristics) and the frequency of use of mobile phones for different purposes while traveling. To put it briefly, people anthropomorphize and react socially to smart, social phones and regard them as social companions while traveling. Drawing from attribution theory, social attribution to mobile phones while traveling occurs by object attribution (i.e., the cell phones are "social") and situation attribution (i.e., the context of travel allows tourists and cell phones to interact more intensely). However, self-evaluation constructs were not significant in affecting the social attribution to mobile phones.

As a theoretical contribution, this study supports and extends the results from CASA researchers by applying the concepts outside the laboratory settings into real use

situations (i.e., the travel context) using commonly-used consumer devices (i.e., cell phones), hence adds to the generalizability of the results. The findings emphasize the importance of the technology characteristics and use situation to stimulate social interactions between users and technology, regardless of users' personality or characteristics. It is important to note that the demographic characteristics of respondents in this study are slightly different to the previous studies on CASA or social attribution to mobile phones; most respondents in previous studies were younger (i.e., college students), while most respondents in this study were older. However, statistical tests showed no significant effects of age and other demographic characteristics on mobile computing CP and social attribution to mobile phones. Future research should capture general demographic characteristics to support generalizability of the findings.

As for managerial implications, the results support the relevance of attaching humanlike characteristics in the designing of mobile technology devices, applications, and features, as well as different functionalities of mobile technology for tourism and travel contexts. Consequently, destination marketers embracing mobile technology for persuasion, especially in influencing on-site consumption decisions, should consider designing mobile technology and applications that suggest high intelligence, socialness, and express positive characters. In other words, smart mobile devices that act as travel companions should be developed to provide social support and increase the persuasive power of mobile phones for tourists.

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