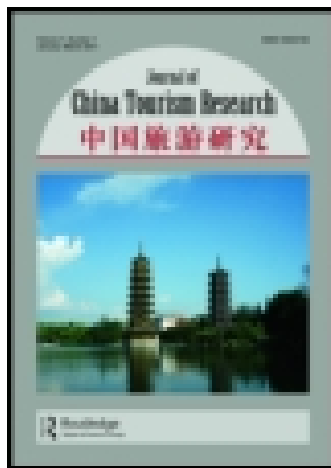


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Smartphone Adoption amongst Chinese Youth during Leisure-based Tourism: Challenges and Opportunities

智能手机在中国青年休闲旅游的采用：挑战和机遇

MICHAEL O' REGAN 
HE CHANG

With the spread of Information communications technology (ICT) in China, the tourism industry has come to recognize the importance of examining the factors that influence adoption of smartphones during leisure-based tourism among Chinese youth, a vital segment in what the world's greatest domestic, inbound, and outbound tourism market will be by 2020. Using data collected from undergraduate students at a university in China, this study, based on the technology acceptance model (TAM) and theory of reasoned action (TRA), found that an extended model can predict travelers' intentions. A detailed profile of Chinese youth and their smartphone usage is provided, and the managerial implications of increased adoption of Internet-capable smartphones during leisure-based tourism are also explored.

KEYWORDS. Smartphone adoption, leisure-based tourism, perceived usefulness, perceived ease of use, emotional attachment, social influence

随着信息和通讯技术（ICT）在中国的推广，旅游业界已认识到研究哪些因素影响中国青年在休闲旅游期间对智能手机的采用的重要性，这将会是 2020 年全球最大的国内及出入境旅游市场。从一所中国大学在读的本科生所收集的数据，并基于技术接受模型（TAM）和理性行为理论（TRA），本研究发现扩展模型能够预测旅客的意图。本文提供了中国青年在智能手机应用的详尽资料，并探讨了旅游业界就可上网智能手机在休闲旅游的加强运用可作的经营策略调整。

关键词：智能手机采用，休闲型旅游，感知有用性，感知易用性，情感依恋，社会影响力

Introduction

Information and communications technology (ICT) has become a significant transforming element in a rapidly moving, global, and competitive tourism marketplace (Buhalis & Law, 2008). In particular, smartphones with advanced operating systems (OS), fast processors, large high-resolution screens, Wi-Fi, and Global Positioning System (GPS) capabilities have come to represent an important contemporary ICT affecting the tourism

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industry. As businesses and travelers interact through location-based interactive devices and downloadable applications (apps), smartphone diffusion offers both opportunities and challenges for businesses linked to leisure-based tourism (Clawson, 1963). This is especially true in China, where smartphone users exceed the number of users in the United States and Europe combined, with approximately 500 million smartphone users (China Internet Network Information Center [CNNIC], 2014). Served by China Mobile, China Unicom, and China Telecom, smartphone usage is believed to be rapidly altering the way people live, work, travel, learn, and play. These developments are creating unprecedented economic and social consequences both in China and globally.

The link between leisure-based tourism and ICT, whilst always strong, changes with every new generation of technologies, as well as with people, location, and culture. While businesses have long recognized travel and tourism as information-based and information-intensive (Sheldon, 1997), individuals are seeking a higher level of involvement and control (Buhalis, 1999), as well as demanding greater convenience and flexibility (No & Kim, 2014; Rusu & Cureteanu, 2009). As traveler preferences and behaviors shift from standardized packages to individualized products and services (O'Regan, 2014; Osti, Turner, & King, 2009), a new generation of travelers are expected to plan, book, and interact through smartphones devices (Karanasios, Burgess, & Sellitto, 2012). The upsurge of smartphones, travel and tourism apps, along with the availability of 3G/4G connectivity and Wi-Fi have made it much easier to source information, plan, and book anytime and anywhere, whilst on the move, with less friction than was ever before.

Studies on smartphones are varied, and include the identification of the mobile services valued by tourists (Rasinger, Fuchs, & Höpken, 2007), effect of smartphone apps on traveler experiences (Kramer, Modsching, Hagen, & Gretzel, 2007), and the smartphone as an indispensable item for travelers (Langelund, 2007). Even though scholars have recognized the potential influence of smartphones in the tourism, hospitality, and leisure industries, little research has attempted to interpret travelers' attitudes and adoption of smartphones outside western contexts or use theoretically based models to sustain claims about the inevitability of smartphone usage during leisure-based travel. Tourism in China was worth \$376 billion in 2012, with 3 billion domestic trips and 83 million overseas trips worth \$100 billion. The need to accurately understand Chinese tourists is of growing importance to businesses, which can be hesitant to invest in "apparent" consumer ICT adoption and usage. There is a need to understand the key influence factors and influence mechanisms that affect adoption as well as smartphone user profiles. For example, a recent study indicated that despite widespread smartphone diffusion, cultural issues led to low figures of online bookings in Germany and Brazil (Beccari & Maillard, 2014).

The purpose of this paper is to examine and identify the factors that influence Chinese youth attitudes and intentions with regard to smartphone usage during leisure-based tourism. Drawing upon the technology acceptance model (TAM), the paper will develop and test a conceptual model built on TAM constructs (perceived usefulness and perceived ease of use), and add two other factors (emotional attachment and social influence). While the TAM is a robust model with high-predictive validity, additional factors are added as the TAM does not provide a complete understanding of the phenomenon studied in some contexts and circumstances (Yousafzai, Foxall, & Pallister, 2007). Focusing on young travelers, the paper tests the extended model using data collected over a 2 month period at a university in North-eastern China. The study explores how "perceived usefulness" and "perceived ease of use" influence smartphone adoption and use during leisure-based tourism. Secondly, the study introduces two additional factors: emotional attachment and social influence. In this way, the study seeks a deeper

understanding of the factors that influence Chinese traveler's attitudes and intention to use smartphones. Without theoretically backed research, management may decide not to invest in mobile applications or may feel that they lack knowledge about Chinese smartphone usage and consumption. After profiling smartphone users and exploring usage, the paper will end with an analysis and implications within the context of China, which will remain the largest and fastest growing smartphone and tourism market in the world for the foreseeable future.

Literature Review

From widespread use of the telephone in the 1920s to desktop computers in the 1990s, information and communications technology (ICT) has had an ongoing influence on travel and tourism. From challenging and changing business practices, strategies, functions, processes, as well as industry structures, ICT has helped the tourism industry to become one of the most dynamic industries in the contemporary information age. Given that the nature of the tourism product is highly experiential, intangible, and heterogeneous, the tourism industry has been at the forefront of adopting and utilizing ICT. Buhalis and Law (2008) argue that the development of ICT has also greatly changed consumer relationships with the industry. Desktop-accessed Internet, for example, has been successfully utilized to enable more effective and efficient searches for information and to enable better access to product-related messages. However, the intangibility, perishability, inseparability, and heterogeneity of tourism has led consumers to demand more personalized options; with smartphones increasingly satisfying consumer needs for mobility, availability, and convenience .

A smartphone can be described as a pocket/handheld mobile phone with stronger computing capabilities, larger screens, reliable Internet access, and location-based support (Want, 2009). Smartphones such as iPhone and Blackberry have become popular smartphone brands, whilst Android has become the most widely used operating system in the world. Based on the four unique characteristics—ubiquity, personalization, flexibility, and dissemination (Siau, Lim, & Shen, 2001)—smartphones have become an essential consumer tool. Using touchscreen technologies, built-in and downloadable apps, as well as Internet access, individuals can utilize a wide range of functions such as mapping, web browsing, searching, voice commanding, social networking, camera, and GPS navigation. Given the rapid diffusion of smartphones, increased usage, and the availability of travel and tourism related apps during a time of greater mobility, there appears to be a significant impact on the tourism industry (Liu & Law, 2013). While often narrowly seen as a source of information and entertainment, the ripple effects of smartphone adoption and usage are yet to be fully felt.

Given few people in China access the Internet via traditional desktop computers, laptops, or notebooks, the growing number of smartphone users and a wide variety of emerging apps are driving new patterns of online and offline behavior. These developments are creating consequences both for Chinese and global tourism; as a new middle class travel for leisure and tourism. From Internet access, mapping, messaging, to electronic payments, the possible implications for buying behavior, decision making, information search, and management are receiving more attention from businesses, destinations, and scholars (Wang, Park, & Fesenmaier, 2011). From brand awareness, pre-purchase research, price comparison, to social media distribution of content, smartphones are set to fundamentally alter travel and tourism (Dickinson et al., 2014). However, research on the adoption and intention to use within the context of travel and

tourism remains limited. This is especially true when seeking knowledge about the new generation of travelers taking flight within China.

Research (Conceptual) Model and Hypothesis

The determinants of Information Systems (IS) usage and acceptance behaviors have long been an issue for researchers, with the technology acceptance model (TAM) (Davis, 1989) becoming the most widely used model in exploring the determinants of technology usage. The TAM, adapted for IS, is itself an adaptation of the Theory of Reasoned Action (TRA) (Ajzen & Fishbein, 1980) which originates from social psychology. The TRA suggests a user's specified behavior will be determined and influenced by a user's behavioral intentions. TAM has assumed a strong position as an IS theory given it is a well-researched and validated measurement instrument that models how users come to accept and use a technology. The model suggests that when users are presented with a new technology, behavioral intention to use and their actual use is mediated by perceived usefulness and perceived ease of use (Davis, Bagozzi, & Warshaw, 1989).

Studies related to information technology adoption and diffusion have come to depend heavily on the TAM with extensive empirical studies ranging from acceptance of Personal Digital Assistants (PDAs) by physicians (Dee, Teolis, & Todd, 2005) to smartphone acceptance in a delivery service company in Taiwan (Chen, Chen, & Yen, 2011). However, the original TAM model has been criticized for its generalizability and failure to sufficiently predict in specific contexts and circumstances. Therefore, researchers have sought to extend the TAM model by adding additional factors or combining the model with other ICT acceptance models so as to modify and enhance its specificity and explanatory utility (Szajna, 1996). Researchers have extended the TAM model by adding variables such as self-efficacy (Chen et al., 2011), consumer perceptions (Moore & Benbasat, 1991), and gender (Gefen & Straub, 1997). Resulting theories, once formulated and tested, have addressed a number of drawbacks related to TAM's generalizability.

The model used in this study will introduce two key determinants—perceived usefulness and ease of use—based on the TAM, and add two additional factors—emotional attachment and social influence. The model will follow the TRA in selecting travelers' attitudes and intention to use as dependent variables. The model will also test how travelers' attitudes to smartphones influence intention to use within a travel and tourism context. The conceptual model is shown in [Figure 1](#).

Dependent and Independent Variables

Attitudes and Intention to Use

Behavioral intention is regarded as one of the most powerful predictors of behavior, with Oh, Lehto, and Park (2009) noting that a positive relationship between behavioral intention and use behavior lends support to the assumption that intention to use can be used as an important proxy of travelers' future device use. The assumption is that a person's acceptance of a technology is generally determined by his or her own positive or negative intention toward using that technology (Yousafzai et al., 2007). Validated by Venkatesh, Morris, Davis, and Davis (2003), intention to use should be regarded as an important factor in forecasting travelers' future device use behavior. For the purpose of this study, a

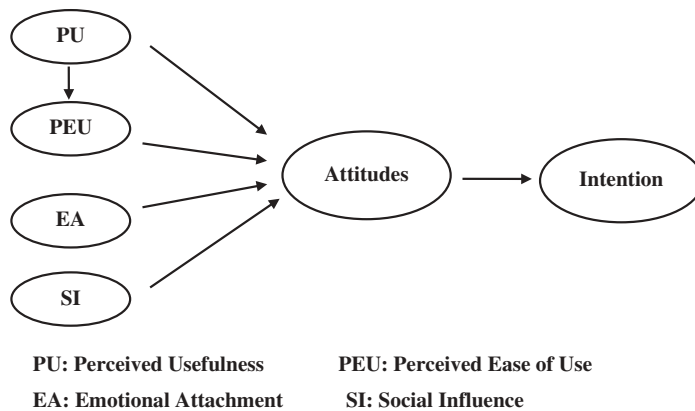


Figure 1. The conceptual model.

person's attitude toward smartphones is therefore based on the respondents' feelings and beliefs on using a smartphone during leisure-based tourism.

Perceived Usefulness and Perceived Ease of Use

Based on the TAM, perceived usefulness is defined as “the degree to which a person believes that using a specific application system would increase job performance” (Davis, 1989, p. 320). Perceived usefulness is a strong determinant of users' adoption and behavior, as the user believes it will lead to a positive use-performance relationship. Another important factor identified in the TAM is perceived ease of use, which refers to “the degree to which a person believes that using a particular system would be free of effort” (Davis, 1989, p. 320). Subramanian (1994) argues that perceived usefulness is a primary determinant while perceived ease of use is a secondary determinant of intention to use technology. In addition, Yousafzai et al. (2007) find that perceived usefulness is directly influenced by perceived ease of use. Due to a technical and interactive characteristic of smartphones, their use requires cognitive effort. Therefore, the easier the smartphones' operations are, the more users will likely to perceive its benefit.

Emotional Attachment

Emotional attachment theory (EAT) is used to explain variations in emotion regulation, interpersonal relations, and mental health (Mikulincer, Hirschberger, Nachmias, & Gillath, 2001), with researchers noting how attachment patterns have profound consequences for a person's sense of security (Bowlby, 1979) as well as for emotions and interpersonal relationships (Feeney, 1999). Licoepe and Heurtin (2001) propose that individuals feel anxiety without their mobile phones on hand, given that emotional attachment is viewed as a relationship-based structure that reflects a linkage between human beings and a material object that may have utilitarian or hedonic value. In the context of technology acceptance, an individual's emotional attachment toward their smartphones and smartphone usage may play a determinant role in predicting users' behavioral intentions and attitudes.

Social Influence

Social influence is defined as “the degree to which an individual perceives that important others believe he or she should use the new system” (Venkatesh et al., 2003, p. 451). Social influence is an important determinant of behavioral intention when roles and norms are regarded as common standards for group members’ behavior (Ellis & Fisher, 1994). Within any given social system, individuals will find their roles and behaviors influenced by other members (Hsu & Lin, 2008) as subjective norms influence perception and behavior (Mathieson, 1991). Based on the TRA and Theory of Planned Behavior (Ajzen, 1991), empirical studies have found that social influence can have a direct impact on behavioral intentions and attitudes (Teo & Pok, 2003).

Hypothesis

ICT researchers have recognized that emotional attachment and social influence have significant impacts on technology acceptance. We found after a focus group and a literature review that, in the context of Chinese cultural values, it is reasonable to suggest that emotional attachment and social influence can affect traveler attitudes and intentions to use smartphones. Therefore, the following hypotheses were developed and examined:

- H1a:** Perceived usefulness has a positive effect on intentions to use smartphones.
- H1b:** Perceived usefulness has a positive effect on attitudes to use smartphones.
- H2a:** Perceived ease of use has a positive effect on intentions to use smartphones.
- H2b:** Perceived ease of use has a positive effect on attitudes to use smartphones.
- H2c:** Perceived ease of use has a positive effect on perceived usefulness.
- H3a:** Emotional attachment has a positive effect on intentions to use smartphones.
- H3b:** Emotional attachment has a positive effect on attitudes to use smartphones.
- H4a:** Social Influence has a positive effect on intentions to use smartphones.
- H4b:** Social influence has a positive effect on attitudes to use smartphones.
- H5a:** Positive attitudes to using smartphones have a positive effect on intentions to use smartphones.

Research Methods

The study was based on the data collected from a self-administrated questionnaire distributed to undergraduate students at a large university in the northeast of China over a 2-month period between May 2013 and June 2013. The questionnaire was initially designed in English and translated into Chinese (and translated back for accuracy). The rationale behind choosing university students as the target population for this survey is based on the rapid diffusion of smartphones amongst students and, more generally, amongst the youth in China. Given the higher trust in the Internet and greater expectation about the value of smartphones and apps to deliver experiences, it is not surprising that

84% of Chinese youth use smartphones beyond voice and text messages (Gahran, 2010). Convenience sampling was adopted, given that students were approachable before classes, and purposeful, given that the self-administered questionnaire was given to students who owned and used a smartphone as their primary information and communications device, and had used their device during domestic leisure-based travel in the preceding 12 months.

Prior to designing the survey instrument, a focus group was conducted with a group of eight male and female undergraduate and postgraduate students from different years of study and majors who had used their smartphones during leisure-based tourism (Huang & Xiao, 2000) in the preceding 12 months. The focus group discussion explored issues associated with smartphone adoption and use. It was from this focus group discussion, the analysis of the recorded transcript and the subsequent rereading of literature that the antecedents of “emotional attachment” and “social influence” became significant factors. While these factors are often neglected in TAM and standardized research methodologies, culture is now recognized as a significant construct impacting ICT adoption (Straub, Keil, & Brenner, 1997; Zhang & Prybutok, 2005). Therefore, the survey was comprised of four sections: (1) demographic information; (2) smartphones experience and use; (3) general attitudes regarding the use of smartphones; and (4) the six constructs in an extended TAM (perceived usefulness, perceived ease of use, emotional attachment, social influence, attitudes and intentions). The survey instrument was pre-tested to avoid unforeseen errors and “opt-in consent” was requested. The questionnaires were completed anonymously to reduce self-report bias.

Each construct was measured with multiple items either drawn from extant literature with only minor adjustment so as to fit to the context of the study or developed through the focus group. All items were measured on a five-point scale (1 = strongly disagree, 5 = strongly agree). A total of 220 numbered questionnaires were distributed to undergraduate students who attended nine separate classes, with 194 qualified completed questionnaires collected for analysis (88.2% response rate). Using SPSS 2.0, data analysis was conducted in three stages. First, a frequency analysis was conducted to provide baseline descriptive statistics, including a demographic profile of respondents and characteristics of smartphone ownership. Secondly, a factor analysis was performed to examine internal consistency, reliability, and construct validity. Thirdly, a regression analysis was conducted to evaluate interrelationships and explain the causal relationships within the proposed model. The model examined all the hypothesized relationships simultaneously and interpreted the structural direct and indirect relationships among variables.

Results

Profile of Respondents

Sample characteristics of the respondents are presented in Table 1. There were 194 respondents in the survey, in which females made up of 72.2%. As is generally reflective of tourism undergraduates in China, the sample was skewed toward females. Given the respondents were students, 96.9% of the respondents were between 18 and 25 years old and over 90% of respondents were unmarried. All respondents had leisure-based tourism experiences in the preceding 12 months, with 73.2% of the respondents traveling more than once. As highlighted in Table 2, the respondents were far more likely to have friends or families accompany them on journeys.

Table 1. Profile of Respondents.

Characteristics	Number	Percentage (%)
Gender		
Female	140	72.2
Male	54	27.8
Age (Years)		
18–21	118	60.8
22–25	70	36.1
26–29	6	3.1
Marital Status		
Single	190	97.9
Married	4	2.1
Number of leisure trips in the preceding 12 months		
One	52	26.8
Two	76	39.2
Three to four	54	27.8
Five or more	12	6.2

Table 2. Travel Patterns of Respondents.

Travel Pattern	A Great Deal	Much	Somewhat	Little	Never
Alone/Self	14	16	42	60	62
Friend(s) Only	54	57	57	24	2
Family Only	48	61	50	27	8
Tour Group	25	21	40	65	43

Table 3 profiles smartphone ownership among the respondents: 48.5% of the sample own an Apple iPhone, compared with 20.1% who own a Samsung device; 20.1% use other Chinese brands such as Xiaomi, Lenovo, and Huawei. Accordingly, smartphone users primarily use Apple's iOS and Google's Android operating system. Approximately 80% of the respondents had used smartphones for less than three years; 41.8% of respondents actively "used" their smartphones between 1 and 4 hours a day, with 33% using it between 5 and 8 hours a day. The expansion of 3G and particularly Wi-Fi in China provides increasing availability of Internet access for smartphone users.

Table 4 shows the frequency of smartphone usage in specific locations and situations during leisure-based tourism. 85% of the respondents use smartphones "greatly and much" during idle time, whilst 80.9% and 73.7% use smartphones at the accommodation and on public transport, respectively. While the results show that respondents tend to use their device in most contexts and circumstances, our study indicates less use in other locations or situations, such as walking (26.8%), during social gatherings (35.6%), at the tourism attractions (25.8%), and dining (37.6%).

Table 3. Smartphone Usage.

Item	Number	Percentage (%)
Smartphone Brand		
Apple	94	48.5
Blackberry	7	3.6
Samsung	39	20.1
Motorola	5	2.6
LG	2	1
HTC	8	4.1
Others	39	20.1
Operating system		
Android	96	49.5
Windows	5	2.6
iOS	90	46.4
I don't know	3	1.5
Duration of Smartphone Use		
Less than 12 months	40	20.6
1–3 years	115	59.3
4–5 years	26	13.4
More than 5 years	10	5.2
Average Daily Usage		
1–4 hours	81	41.8
5–8 hours	64	33
9–12 hours	34	17.6
13–16 hours	10	5.1
More than 17 hours	5	2.5
Methods of data access (can choose more than one)		
2G	71	
3G	102	
Wi-Fi	117	

Table 4. Smartphone Usage in Different Locations/Situations.

Location/Situation	Greatly	Much	Somewhat	Little	Never
During idle time	101	64	21	7	1
Walking somewhere	17	35	68	59	15
Social gatherings	14	55	78	41	6
Public transport	66	77	29	19	3
Tourism attractions	17	33	52	81	11
Accommodation	63	94	23	9	5
Eating out	24	49	68	43	10

Table 5 shows that the respondents use smartphone applications “greatly and much” for communication (84.5%), social networking (80.9%), and weather updates (71.1%). They are also likely to use a smartphone for mapping/navigation (54.6%), entertainment

Table 5. Use of Smartphone Applications during Leisure-based Tourism.

Type of Apps	Greatly	Much	Somewhat	Little	Never
Dining/restaurant	17	45	57	50	25
Sports	0	8	30	74	82
Shopping/retail	22	63	57	35	17
Video/movies	31	53	55	39	16
Travel	20	42	66	43	23
Communication	103	61	16	8	6
Lifestyle/health	7	17	49	66	55
Social networking	99	58	18	24	5
Weather	65	73	38	13	5
Mapping/navigation	37	69	61	22	5
Entertainment	59	61	47	18	9
Music	59	71	35	18	10
News	28	39	63	48	16
Camera	62	67	42	14	9
Banking/finance	13	30	35	53	63

(61.9%), music (67%), and taking pictures (66.5%). The study found that respondents did not use smartphones and related apps for sport (4.1%) and lifestyle/health (12.4%) purposes. The results illustrate that smartphones are not only a communications tool but also an entertainment device, a vehicle for sharing, and a navigation device. It also shows that apps had mixed leisure, work, study, and play uses.

Factor Analysis and Validity Check

Internal consistency reliability was measured with Cronbach's alpha. The values of Cronbach's alpha in the value of perceived usefulness, social influence, and attitudes to use are shown in Table 6. The minimal Cronbach's alpha value of 0.6 suggested by Robinson, Shaver, and Wrightsman (1991) means that the three constructs are acceptable. Although Cronbach's alpha values for the constructs, perceived ease of use, emotional attachment, and intentions to use, are low, Sprotles and Kendall (1986) argue that Cronbach's alpha coefficient values of 0.4 or higher should be considered acceptable. All factors except emotional attachment exceeded 0.4 and the

Table 6. Reliability of Construct.

Construct	Variable items	Eigenvalue	% of variance	Cronbach's alpha
Perceived usefulness	3	1.958	65.264	0.725
Perceived ease of use	3	1.675	55.823	0.559
Emotional attachment	2	1.532	51.083	0.539
Social influence	2	1.369	68.453	0.690
Attitudes to use	3	2.246	74.871	0.830
Intentions to use	3	1.432	47.717	0.403

emotional attachment factor also exceeded 0.4 when item EA2 (i.e., “I can’t imagine the leisure trip without a smartphone”) was removed. Following other studies (such as Ngai, Poon, & Chan, 2007), we also found that TAM may not be a suitable approach to assess specific behavioral intentions due to the future unknown nature of the considered services and their interpretation.

Hence, whilst at the lower limits of acceptability, the constructs indicate internal consistency and the precision of the measurement instrument and satisfy adequacy and reliability.

Factor analysis is a statistical method used to study interrelationships among dependent variables and explain the variables’ common underlying dimensions so as to find the most important factor. To determine the factorability of the data, the Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy and Bartlett’s Test of Sphericity were checked. According to Kaiser (1974), an acceptable minimum KMO value is 0.50. Results in Table 7 shows that factors were extracted with eigenvalues higher than 1, and factor loading is larger than 0.4.

Table 7. Factor Analysis of Construct.

Item	Factor loadings
Perceived Usefulness	
Smartphone enables me to fulfill leisure trips more effectively	0.729
Smartphone enables me to have more convenient leisure trips	0.850
Smartphone increases my leisure trips’ productivity	0.839
Perceived Ease of Use	
Using smartphones is easy for me	0.714
It does not take me a lot of effort to become skillful in using smartphones	0.658
My interaction with smartphones is clear and understandable	0.855
Emotional Attachment	
My smartphone is more important than any other objects during leisure trips	0.827
I feel safer with a smartphone during leisure trips	0.827
Social Influences	
People who are important to me think that I should use a smartphone during leisure trips	0.874
People who influence my behavior encourage me to use a smartphone during leisure trips	0.874
Attitudes toward Use	
I like leisure trips more with smartphones	0.816
Using smartphones during leisure trips is always a good idea	0.890
Using smartphones is beneficial to my leisure trip	0.887
Intentions toward Use	
I intend to use a smartphone during my next leisure trip	0.734
I intend to recommend using a smartphone to my friends/relatives for future leisure trips	0.596
I intend to purchase products/ service using a smartphone during leisure trips in the future	0.733

Regression Model

The regression model summarized in Table 8 demonstrates how the intention to use smartphones was affected by five independent variables: perceived usefulness ($\beta = 0.605$, $t = 10.515$), perceived ease of use ($\beta = 0.512$, $t = 8.260$), emotional attachment ($\beta = 0.508$, $t = 8.181$), social influence ($\beta = 0.218$, $t = 3.100$), and attitudes to use ($\beta = 0.719$, $t = 14.344$); while attitudes to use also was influenced by perceived usefulness ($\beta = 0.681$, $t = 12.886$), perceived ease of use ($\beta = 0.515$, $t = 8.318$), emotional attachment ($\beta = 0.489$, $t = 7.760$), and social influence ($\beta = 0.346$, $t = 5.104$). Smaller values of significance and larger t -values indicate those predictors that are significantly contributing to the model.

The model used in this study indicates that all factors were significant predictors of attitudes and intentions to use a smartphone. More specifically, the study found that perceived usefulness and perceived ease of use had greater impact than emotional attachment and social influence; the larger the magnitude of the t -value, the stronger evidence of difference. After exploring the relationship between intentions to use and the five factors (including attitudes to use), we found that apart from social influence, the other four factors have a high impact on intentions to use. In addition, when the model investigates how the three factors (except social influence) impact intentions to use, we see that (positive) attitude to use has a stronger indirect influence (the value of beta is small), while the positive relationship between emotional attachment and the intention to use is proved by the direct influence of attitudes to use (the values of beta and t -value are negative and the value of p is of no significance). Perceived usefulness was also found to be directly influenced by perceived ease of use.

Table 8. Summary of Regression Model.

Hypotheses	Direct	Indirect	t -value	Sig.
Perceived usefulness → Attitudes to use	0.681		12.886	0.000
Perceived usefulness → Intentions to use	0.605		10.515	0.000
Perceived usefulness → Attitudes to use → Intentions to use	0.214	0.574	3.199	0.002
Perceived ease of use → Attitudes to use	0.515		8.318	0.000
Perceived ease of use → Intentions to use	0.512		8.260	0.000
Perceived ease of use → Attitudes to use → Intentions to use	0.193	0.620	3.389	0.001
Perceived ease of use → Perceived usefulness	0.540		8.888	0.000
Emotional Attachment → Attitudes to use	0.489		7.760	0.000
Emotional Attachment → Intentions to use	0.508		8.181	0.000
Emotional Attachment → Attitudes to use → Intentions to use	0.206	0.618	3.706	0.000
Social Influence → Attitudes to use	0.346		5.104	0.000
Social Influence → Intentions to use	0.218		3.100	0.002
Social Influence → Attitudes to use → Intentions to use	-0.034	0.731	-0.643	0.521
Attitudes to use → Intentions to use	0.719		14.344	0.000

Managerial Implications

This study proved the validity of an extended TAM model in explaining smartphone adoption and intention to use during leisure-based tourism. In terms of implications, adoption and use was not only affected by perceived usefulness and ease of use, but also by emotional attachment. This study indicates that the way Chinese youth adopt and use their smartphones is distinct in some ways from that of youth travelers in other countries. In the United Kingdom and United States, for example, the penetration rate of laptops and desktops per capita is high, but smartphone penetration is low. In addition, while in the United States television continues to dominate advertising, digital advertising has surpassed television advertising in China. Consistent with other technology adoption studies, which showed that Chinese users' attitude reflects subjective norms such as emotional attachment and social influence (Park, Yang, & Lehto, 2007), we argue that China is culturally and economically different. This demands unique business response strategies suited to the market and in particular consumer behaviors. Emotional attachment has strong motivational and behavioral implications, given it is tied to a person's self-concept. It may lead to proximity maintenance (keeping a phone close for psychological protection), separation distress, and a willingness to invest in the attachment object (e.g., purchasing apps, covers, and insurance). While emotional attachment may in some cases lead to addiction, a one-sided relationship with a phone merely reflects the tendency to value objects more when we feel ownership over it.

As travelers have a strong attachment to smartphones while on the move, businesses should make use of this opportunity to connect with smartphone owners as they move rather than merely connect before travel as they would with desktop owners. Businesses need to integrate mobility into their overall strategy so as to respond to changing customer interests and deliver the right product or service at the right time. They need to do so during all parts of the journey, from initial booking until after the travelers return home. Businesses seen as more customer-centric give them an advantage in the marketplace. The findings also indicate how smartphones are changing many aspects of the tourism business, with respondents using smartphone apps for a broad range of functions. Businesses need to consider optimizing these functions for their mobile offerings. From hotel bookings to restaurant reservations, businesses need to extend their sites and booking capabilities to mobile users through the Chinese language (traditional and simplified) medium. Businesses should also explore building their own iOS and Android-based apps, as well as ensuring the ongoing quality of those apps. Apart from reservations and booking assistance services, they should also take advantage of smartphones to advertise and push contents that can be shared and interacted with.

Accommodation providers may be in a primary position as they can offer highly targeted, data-driven offerings to their guests from pre-departure to post-stay, and stand the best chance of creating more precise offers for their guests in "real time" and therefore gain ancillary revenue. They need to offer access to power outlets and Wi-Fi, and provide guests with such services as wireless printing. They could also give out coupons for one-time incentives (e.g., complimentary breakfast), use QR codes and "push" mobile ads via apps and Short Message Service (SMS). Targeting mobile Internet users while they are "on the go" will provide an advantage over businesses that rely only upon traditional marketing approaches. From phone check-ins (and check-outs), keyless room entry, to exclusive deals and finding out about the local weather and events, the opportunities to engage with guests are endless. Our findings indicate that new approaches could also be taken by attractions, airports, and train stations. Smartphones enable travelers to receive

updates on transportation, pay for cabin upgrades, and enhance “selfie” opportunities for Chinese visitors at attractions, airports, train stations, and hotels. Such locations serve travelers who want to buy goods and services on the go and those who are often time-poor. Businesses should connect to travelers while on the move (i.e., utilizing Wi-Fi on buses and trains) and offer incentives for tagging their brands and sharing updates.

Businesses also need to explore the popular Chinese search engines and app stores, given that the search and apps market in China is growing rapidly with visitors utilizing China specific stores as they travel. Since Baidu, Qihoo 360, and Sogou are the leading Chinese search engines, business needed to fulfill specific Search Engine Optimization (SEO) requirements while also ensuring their apps are available on Android's app stores such as Anzhi, Wandoujia, and Xiaomi as well as the Baidu app store. Businesses should exploit e-commerce apps such as Taobao, social networking sites such as Sina Weibo, communication platforms such as Weixin, as well as payment platforms such as Alipay. They should also note that within China, access to certain web sites such as Facebook, YouTube, and Google are restricted; even when travelers are using a roaming service abroad. Businesses should also court Chinese travelers with large numbers of social networking “followers” and online “clout”. They can use mobile platforms to maintain communications after a specific visit or journey so as to undertake surveys and encourage travelers to write reviews on China-specific review websites such as Ctrip as well as TripAdvisor.

Smartphones are a new distribution channel for travel information, travel-related products and services; and from the consumer's point of view, differ remarkably from desktop devices. Given the right timing, opportunities, and offers, smartphones are effective tools to satisfy desires for additional information related to travel activities and to use as a means to purchase and upgrade. Travelers who experience the effectiveness and usefulness of smartphones will most likely be using them again during leisure-based tourism and influencing others to do the same. Therefore, to provide high-quality experiences for travelers, tourism businesses and destination marketing organizations have to make an effort to improve the accuracy, reliability, assurance, tangibility, empathy, and responsiveness of their mobile offerings; and navigate the fast-changing smartphone market as wireless mobile payments, location-based marketing, and online shopping take off.

Limitations and Future Research

While the emotional attachment created through individuals forming bonds with their smartphones (an inanimate object) was found to be an important factor, further research should be carried out to extend the original TAM, given its focus on cognition at the expense of consumer emotion (Read, Robertson, & McQuilken, 2011). In particular, there needs to be a further analysis of moderating variables (gender, previous ICT experience) and an exploration of the importance of facilitating conditions (the degree to which an individual believes that an organizational and technical infrastructure exists to support the use of smartphones). Other variables on travelers' intention to adopt and use smartphones may include personal value and restricted factors (e.g., the price of 4G, Wi-Fi coverage, and payment plans). Because all the respondents were undergraduate students from one university in North-eastern China, future research should seek to increase the size and scope of the sample.

Conclusion

Mobile technologies offer both opportunities and challenges for the tourism industry as it struggles to retain customers and attract new ones. Given the rapid diffusion of

smartphones, it is essential that businesses adapt to mobile technologies. Given the growth of the domestic and outbound market, the need to understand Chinese travelers' adoption and use of smartphones has become of vital importance to a global industry. This study, in examining young Chinese traveler's attitudes and intentions to use smartphones during leisure-based tourism, succeeded in developing and testing an extended model by adding two additional factors (emotional attachment and social influence). The study found that perceived usefulness and perceived ease of use were the most important factors. Since perceived usefulness is an important guiding factor in acceptance and use, there is an ongoing need for effective smartphone functions as well as travel- and tourism-related apps. Within the Chinese context, emotional attachment was in particular found to be an important factor influencing attitudes and intention to use smartphones. Based on the analysis, we believe that Chinese travelers' relationship with their smartphones will have unprecedented economic as well as social consequences for the world's largest service sector industry in terms of international trade; and therefore requires a managerial-led strategy for mobile users to be put in place.

Disclosure statement

No potential conflict of interest was reported by the authors.

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