Airline passengers' continuance intention towards online check-in services: The role of personal innovativeness and subjective knowledge

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Abstract

This study integrates the individual psychology constructs (personal innovativeness and subjective knowledge) with the Technology Acceptance Model to develop and test a model of airline passengers' continuance intention towards online flight check-in services. Predictions were tested with data from a sample of airline passengers in China who have experienced the online check-in service. The findings of this study demonstrate that airline passengers' innovativeness and subjective knowledge have a direct effect on continuance intention, and an indirect effect through partial mediation of perceived ease of use and perceived usefulness. Theoretical and managerial implications are discussed.

Keywords: Technology-based self check-in services; personal innovativeness; subjective knowledge; Technology Acceptance Model; airline passenger.

1. Introduction

There has been a surge of online self-services in the transport industries, including services such as online ticket booking, online check-in services; online live services updates, and the like (Lu, Chou, & Ling, 2009). Successful implementation of online self-services helps transport firms to standardize service delivery, reduce labor costs, and expand the options for service delivery. Self-service check-in (including web, kiosk and mobile phone-based) is one of key components of International Air Transport Association (IATA) Fast Travel Program. Online check-in service provides more choice and control for passengers, and lower costs for the industry with annual savings of up to US$ 2.1 billion (IATA, 2015a). Motivating passengers to use online self-services can be challenging because they require passengers' willingness to learn the new systems and additional resources to use them (Curran & Meuter, 2005).

Lu et al. (2009) investigated airline passenger intention to use airport self-service check-in kiosks and indicated that passenger behavior regarding the use of other self-service check-in options, such as internet-based options, have not been well understood. Moreover, extant research into the diffusion of new technology has mainly focused on the initial adoption, ignoring what happens next (Wang, Harris, & Patterson, 2013). According to Roger Rogers (1995), the process of innovation diffusion goes through six stages: awareness, investigation, evaluation, trial, *repeated use*, and commitment. As the process of innovation diffusion moves from initial trial, users' perceptions change over time as they gain more experiences of the technology (Karahanna, Straub, & Chervany, 1999; Lee, Hsieh, & Hsu, 2011). However, little is known whether the two key Technology Acceptance Model (TAM, Davis, 1989; Davis, Bagozzi, & Warshaw, 1989) variables, namely perceived ease of use (PEOU) and perceived usefulness (PU) predict continuance intention. Additionally, scholars

have suggested extending TAM in order to include more possible constructs such as individual psychological factors that could better explain technology use behavior (Lu et al., 2009). However, despite the growing importance of online self-services in the aviation industries, there has been little research on the effect of passengers' psychological factors on continuance intention towards online self-services (e.g. Kokkinou & Cranage, 2013).

The specific purpose of this study is to provide a better explanation of passengers' intention to continue the use of online check-in service. We integrate two psychological constructs, namely personal innovativeness and subjective knowledge with the two TAM factors, i.e. PEOU and PU to develop a conceptual model of passenger continuance intention towards online check-in services. The proposed model was tested by means of a web-based survey questioning members of an online passenger community in China who have experience using online check-in services. Partial least squares structural equation modeling (PLS-SEM) was adopted for data analysis. The remaining sections of paper are organized as follows. In the next section, we discuss the conceptual background for the research. In the subsequent sections, we present the research model and hypotheses, methodology, and results. Finally, the managerial and theoretical implications as well as the limitations and future research suggestions are discussed.

2. Conceptual Background and Hypotheses

2.1. Theories of personal innovativeness and subjective knowledge

Personal innovativeness is a personality trait that refers to an individual's tendency to willingly embrace change and try new things (Chau & Hui, 1998; Cotte & Wood, 2004; Roehrich, 2004; Thatcher & Perrewe, 2002), which can be further defined at either global trait level, or domain-specific level (Hirunyawipada & Paswan, 2006). Domain specific innovativeness is defined by the virtue of identifiable characteristics and actual acquisition of new information, ideas and products (Hirschman, 1980; Midgley & Dowling, 1978).

Studies of e-commerce and online booking of travel services (e.g. San Martín & Herrero, 2012) usually adopt the definition of innovativeness in the domain of information technology (Agarwal & Prasad, 1998). In contrast, this study adopts the definition at global trait level, because the personal innovativeness is a predisposition towards innovation across different products and services (Goldsmith & Hofacker, 1991), and this global conception has been widely accepted in psychology to identify the innovative characteristics of individuals (Im, Bayus, & Mason, 2003). As a personality trait, personal innovativeness shapes individuals' perceptions of their capabilities (Thatcher & Perrewe, 2002) to understand and apply complex technical knowledge, and to cope with the uncertainty of new technology (Rogers, 1995). Given its generalized definition, personal innovativeness has also been termed as "innate innovativeness" (Hirschman, 1980), or "innovative predisposition" (Midgley & Dowling, 1978).

An individual's knowledge can be either subjective or objective (Brucks, 1985; Flynn & Goldsmith, 1999), the former pertains to an individual's perception of the amount of information about a product or service stored in his or her memory, while the latter refers to

the actual amount of accurate information stored in his or her memory (Packard & Wooten, 2013; Park, Mothersbaugh, & Feick, 1994). Subjective knowledge is a self-concept (Markus & Wurf, 1987). Self-concept refers to *the totality of the individual's thoughts and feelings having reference to himself as an object* (Sirgy, 1982, p. 287). Self-concept is an important contributor to global evaluations of the self (Marsh, 1986; Tafarodi & Swann, 1995), and self-evaluation is an important source of intrinsic motivation (Shamir, House, & Arthur, 1993). People are motivated to perform activities that enhance their self-esteem while they try to maintain a consistent view of their self-concept over time (Gecas, 1982; Packard & Wooten, 2013). Subjective knowledge as a self-concept interprets and organizes self-relevant actions and experiences, therefore it has motivational consequences on behavior (Markus & Wurf, 1987; Myers & Twenge, 2013). Both subjective knowledge (what we think we know) and objective knowledge (what we actually know) are partially the result of experiences, yet they are different constructs (Flynn & Goldsmith, 1999), and have different effects on consumption behavior (Brucks, 1985). Experience is associated more with subjective knowledge than objective knowledge, and subjective knowledge has a stronger influence on consumption behavior than objective knowledge (Packard & Wooten, 2013). By accumulating experiences individuals develop a knowledge base on the new technology and on how to use it. This study thus focuses on airline passenger subjective knowledge, i.e. the perception or belief of one's own level of knowledge on online self-service, how to use it, and their level of expertise.

2.2. Hypothesis development

Individuals who possess the personality trait of innovativeness have greater willingness to experiment with new ideas, they are eager to try new products earlier than their peers, and they tend to seek information before using the service; all of these make these consumers

more knowledgeable than others on new technologies (Engel, Kegerreis, & Blackwell, 1969). Therefore, we hypothesize that:

H1. Personal innovativeness positively influences subjective knowledge.

In the context of self-services, Meuter, Bitner, Ostrom, and Brown (2005) suggested that consumers who view themselves as knowledgeable will be more self-confident of using self-services, will perceive the use of online self-services as easy, and will recognize more of the benefits associated with self-service use. Thus, we hypothesize:

H2. Subjective knowledge positively influences the perceptions of ease of use (**H2a**) and usefulness (**H2b**).

As innovators love to try new things and are more knowledgeable about technologies than non-innovators, they are also more likely to perceive self-services as easy to use as well as to appreciate their usefulness (Cotte & Wood, 2004; Roehrich, 2004). Innovative individuals tend to be more risk-taking, which means that they will be more eager to try new technologies (Agarwal & Prasad, 1998). Empirical results on the role of innovativeness on PEOU and PU have been inconsistent. On the one hand, Agarwal and Karahanna (2000) found that personal innovativeness was not a significant predictor of PEOU and PU of the World Wide Web; on the other hand, Lu, Yao, and Yu (2005) in a study on adoption of wireless Internet services via mobile technology found that innovativeness had a strong influence on PEOU and PU. For a technology like online flight check-in, in line with Lu et al. (2005), we expect that an innovative individual is generally more curious about knowing the benefits emerging from adopting a new technology. Moreover, innovative people are more confident about their capability to handle and use a new technology, which should lower the perceived difficulty in using a new technology like online flight check-in. Thus, we

hypothesize:

> **H3.** Personal innovativeness positively influences the perception of ease of use (**H3a**) and usefulness (**H3b**).

Previous studies have employed and extended the TAM to explain consumer intention to adopt self-services (Curran & Meuter, 2005; Dabholkar, 1996; Meuter, Ostrom, Roundtree, & Bitner, 2000; Pikkarainen, Pikkarainen, Karjaluoto, & Pahnila, 2004). For instance, Meuter et al. (2000) identified usefulness, ease of use, availability and convenience as important factors that lead to satisfaction or dissatisfaction with online self-services adoption. Dabholkar (1996) identified control, performance, ease of use, need for human interaction, reliability and speed as critical variables in the usage of online self-services. Pikkarainen et al. (2004) found that PU of information and amount of information on online banking influenced consumer acceptance of online self-services, while ease of use, enjoyment, and security and privacy did not affect online banking use. Lu et al. (2009) use TAM to investigate Taiwanese airline passengers' intention to use self-service kiosk check-in while considering additional factors such as external stimuli, perceived service quality, perceived behavioral control, need for service, and perceived risk. They found that although PEOU and PU are positively related to attitude towards technology use, they do not seem to predict behavioral intention to use the technology, whereas attitude and external stimuli were strong predictors of behavioral intentions to use the self-service check-in kiosks.

It appears that prior research has paid little attention to the influence that TAM factors play on the intention to repeat use after initial adoption of a new technology (Wang et al., 2013). This study aims to test whether the PEOU of a technology and its PU can explain consumers' continuance intention. Hence, we hypothesize:

H4a. Perceived ease of use positively influences continuance intention.

H4b. Perceived usefulness positively influences continuance intention.

Innovative consumers have the predisposition to try new technologies (Steenkamp, Hofstede, & Wedel, 1999), but it is not yet known whether they will continue using them after initial trial. Previous research suggests mixed results on the role of consumer innovativeness in the adoption of online self-services. For instance, Lassar, Manolis, and Lassar (2005) reveal that domain-specific consumer innovation significantly and positively affects the adoption of online banking andLu et al. (2005) found that personal innovativeness does not significantly predict wireless internet service via mobile technology adoption. While Liljander, Gillberg, Gummerus, and van Riel (2006) found that consumer (general) innovativeness had only a marginal effect on attitudes towards online or phone flight check-in, and Jackson, Yi, and Park (2013) found that personal innovativeness had no influence on the intention to adopt e-commerce purchasing systems. In this study, we argue that innovative individuals will be eager to repeat a behavior once they have acknowledged the benefits provided by a specific technology. Moreover, they will also repeat the usage of a new technology in order to keep up with their lifestyle (how other see them) and with their self-image concept. Therefore, we hypothesize:

H5. Personal innovativeness positively influences continuance intention.

People are motivated to maintain consistency between self-concept and behavior (Gecas, 1982). For example, previous research suggests that customers are more likely to choose products that match their perceived knowledge in that domain (Burson, 2007; Moorman, Diehl, Brinberg, & Kidwell, 2004; Park et al., 1994). They are also motivated to maintain and enhance the sense of competence over time (Gecas, 1982), therefore it is possible that

customers will continue to use a technology if it matches their perceived level of knowledge. In a study on consumer consumption of genetically modified food, Klerck and Sweeney (2007) found that subjective knowledge reduces psychological risk of the technology, which further influences the propensity to search for and buy genetically modified foods. After initial trial of a new technology, consumers can become more self-confident and knowledgeable about the technology, and continuing to use it enhances their self-concept of being knowledgeable. Moreover, the more they feel knowledgeable about a technology, the lower the perceived cognitive effort that is needed to use the technology again will be. Thus, we hypothesize as follows:

H6. Subjective knowledge positively influences continuance intention.

Figure 1 depicts the research model with hypotheses for this study.

[Figure 1 about here]

3. Methodology

3.1. Research setting

Airlines were early adopters of information and communication technologies in comparison to many other travel and tourism businesses (Buhalis, 2004). We selected China's airline market as the study's field context for several reasons. China's air transport market has been seen as the growth 'engine' for the global airline industry (IATA, 2015b) and the country has one of the largest internet populations in the world. In 2013, it has an internet penetration rate of 45.8%, with a total of over 618 million internet users, a growth of 9.5 percent over 2012, and the trend of growth continues thanks to the increasing popularity of mobile internet (CNNIC, 2014). The 'Big Three' airlines in China (Air China, China Southern and China Eastern) all have online check-in facilities, including the use of smartphone for check-in service. Passengers can now check-in online by logging in the airline's website through a computer or a smartphone, or using the airline's smartphone applications. Some companies even provide check-in facility for passengers through mobile application for online check-in service (Wechat has over 400 million users in China, CARNOC, 2013).

3.2. Sample and procedure

Data were collected using online survey with a web-based questionnaire hosted by a commercial market research website (www.diaochapai.com). Online survey is especially suitable for this research as we investigate online service, and online surveys have been widely adopted in recent research on online user behavior (Ayeh, Au, & Law, 2013). An invitation to participation to the study was sent to a convenience sample of airline users by means of a post advertised in an online air traveler community in China (bbs.feeyo.com).

There are two reasons for adopting this approach. First, the target population of this study is passengers who are also online check-in users. To reach online users, it is particularly relevant and appropriate to approach the sample via online community (e.g. Ayeh et al., 2013; Casaló, Flavián, & Guinalíu, 2011; Hung & Law, 2011; Steenkamp & Geyskens, 2006). Second, online traveler community is also a community of practice (Wasko & Faraj, 2005), within which knowledge is created, stored and disseminated through members' information and experience sharing activities, essential for the diffusion of airline online self-services.

In order to focus only on those travelers who had previous experience with using the online check-in service, a screening question was set to confirm that respondents have used online check-in facility at least once in the last 12 months. As an incentive, participants were offered a summary of the results automatically generated by the survey hosting website at the end of the survey. The questionnaire was first developed in English and then translated into Chinese by one of the researchers. To assure context validity, we asked six airline managers and two research colleagues in China to comment on the appropriateness of the wording of each item, and we further pre-tested the questionnaire with a small sample of members of online traveler community (n=20) before launching the main survey. The Chinese final version of the questionnaire was translated back into English by an independent professional translator.

We received 264 usable responses. There was a total of 1015 visitors click through the link to the survey site, hence a completion rate of 26%. Table 1 presents the demographics of the sample. The sample was about equally split between female (47%) and male (53%)). Unlike the profile of general internet users in China (CNNIC, 2014), the majority respondents of our sample (58%) were in the age bracket between 30 and 39 years old (c.f. 20-29 years old for general internet users), and had a tertiary education qualification (76%, c.f. 10.8% for

general internet users). They were mainly white-collar workers such as businesspersons (30%) and professionals (21%), while the general internet users were mainly students (26%), self-employed (19%) or unemployed people (10%). Despite the differences of time, place and media used for respondent recruitment, our sample is highly comparable to that of Lu et al.'s (2009) whose survey was conducted at Taipei Son Shan Airport, Taiwan.

[Table 1 about here]

4.3 Measures

Innovativeness was measured using three items adapted from Goldsmith and Hofacker (1991). Subjective knowledge was measured with three items based on Flynn and Goldsmith (1999). Three items measuring perceived ease of use were adapted from Davis (1989), while PU was operationalized to fit the specific context of online flight check-in. Finally, the two items measuring continuance intention of online check-in were adapted from Blodgett, Hill, and Tax (1997). A five-point Likert-type scale was used for the measurement of the above constructs (1 = strongly disagree; 5 = strongly agree). The specific items measuring the latent constructs along with the values of their loading, mean and standard deviation are presented in Appendix 1.

4. Results

Partial Least Square structural equation modeling (PLS-SEM) was chosen to estimate the conceptual model for its capability to maximize the explained variance of the dependent latent variables (Hair, Ringle, & Sarstedt, 2011). PLS-SEM is particularly suitable for this study, because PLS-SEM has the capability of using path modeling to establish causal relationships; there is no assumption of normal distributions of scale items; and it is a powerful method for collecting data with a relatively small sample size. Recently an increasing number of scholars in tourism have used PLS-SEM (e.g. Escobar-Rodríguez and Carvajal-Trujillo (2014). The software used in this study is Smart PLS 2.0 (Ringle, Wende, & Will, 2005). As suggested by Hair et al. (2011), the t-statistics were computed by using 5000 bootstrap samples with 264 cases. The model estimation followed a two-step approach: measurement models followed by structural model.

5.1 Measurement model

All of the item loadings are above the recommended 0.7 and are significant (Hair et al., 2011), except the item of 'PEOU3, Online check-in operation is simple and easy to understand' being 0.649. Given that several authors have used the recommended cut-off of 0.5 (e.g. Chen & Tsai, 2007; Filieri, 2015) and a factor loading of 0.649 is still relatively high, item was kept for further analysis. The composite reliability (CR) exceeds the recommended threshold of 0.7 (the lowest is 0.853), and the average variance extracted (AVE) values are above the recommended level of 0.5 (Hair et al., 2011), with the lowest value of 0.663 (see Appendix 1 for more details).

To confirm the discriminant validity of the latent constructs, cross loadings were examined (see Appendix 2) and square roots of the AVE and latent variables compared

(Table 2, Fornell & Larcker, 1981). The results show that all of the item loadings on their respective construct are greater than their loadings on other constructs, and the square roots of the AVEs exceed the correlations between every pair of latent variables. Therefore, discriminant validity is established.

[Table 2 about here]

As all the items are stated in a positive manner anchored on a same Likert style scale, which could be a source of method biases (Podsakoff, MacKenzie, Lee, & Podsakoff, 2003). To determine the presence of common method variance bias among the study variables, we followed the procedure for PLS suggested by Liang, Saraf, Hu, and Xue (2007). We created a common method factor in the PLS model by including all the principal constructs' indicators and calculated each indicator's variances substantively explained by the principal construct and by the method. The results were presented in Appendix 3, which show that most method factor loadings are marginally or not significant, and the ratio of average substantive variance ($R1^2 = 0.718$) to average method variance ($R^2 = 0.007$) is about 103:1. Thus, common method bias is unlikely to be a serious concern.

5.2 Structural model

Table 3 illustrates the model estimation results, which indicate that the aggregate PLS path coefficients are statistically significant. The value of explained variance (R^2) for continuance intention is 33%, which is a moderate value (Chin, 1998). Blindfolding was run to obtain cross-validated redundancy measures for each construct. These results indicate that all Q^2 values are larger than zero, suggesting that the exogenous constructs have predictive relevance for the endogenous construct under consideration (Hair et al., 2011).

[Table 3 about here]

The path coefficients for each of the six hypotheses are presented in Table 4. All the hypotheses are confirmed. Consumer innovativeness has a strong impact on consumer knowledge, supporting H 1. Support was also found for H 2a and H 2b, which suggest the positive relationships between knowledge and the perceptions of ease of use and usefulness. Consistent with H 3a and H 3b, innovativeness was found to have a positive relationship with perceived ease of use and usefulness. Support was found for H 4a and H 4b too: both perceptions of ease of use and usefulness significantly predict continuance intention, with PU having a stronger predictor power than perceived ease of use. Both user innovativeness and user's knowledge have direct effect on continuance intention, although the effect of knowledge is rather weak, supporting H 5 and H 6.

We also examine whether innovativeness and knowledge have an effect on continuance intention mediated through perceived ease of use and PU. The results as shown in Table 4 indicate that both innovativeness and knowledge have direct and total effect on continuance intention, indicating that the effect is partially mediated through perceived ease of use and PU. Among the control variables, although some variables (gender and internet use frequency) have significant effect on continuance intention, their effects are rather marginal.

[Table 4 about here]

5. Discussion and Conclusions

By integrating the TAM with two psychological factors (personal innovativeness and subjective knowledge), this study investigates the model of passenger's continuance intention of online flight check-in technology. By doing so, we fill the research gap regarding the role of psychological factors on continuance intention of online self-service technologies (e.g. Kokkinou & Cranage, 2013). Moreover, this is one of the first studies that have investigated the influence of TAM factors play on the intention to repeat use after initial adoption of a new technology (Wang et al., 2013).

Findings demonstrate that PU is a strong predictor of continuance intention towards online check-in services, which agrees with a number of previous TAM researches (Davis, 1989; Davis et al., 1989; Lu et al., 2005). Interestingly, the importance of the role played by ease of use and usefulness slightly contrasts with a previous study's findings on adoption of kiosks for flight check-in (Lu et al., 2009), where both perceived ease of use and PU explained less than 15% of variance (they explain 33% in this study). However, this divergence of findings might be explained by the fact that online flight check-in can be perceived as a more convenient and useful than airport kiosks. For adopting the latter technology, consumers have to drive to the airport, locate the kiosks, bring the check-in code with them, and sometimes wait for other people to check-in before being able to do it themselves. Instead, online check-in is easier as passengers can do it in the comfort of their home and at the time that best suits them.

This study contributes to the literature by integrating two psychological constructs – a personality trait (personal innovativeness) and a self-concept (subjective knowledge) to predict continuance intention. Interestingly, passengers' innovativeness and subjective

knowledge were found to have a direct effect on continuance intention, and an indirect effect through partial mediation of perceived ease of use and PU on continuance intention towards online check-in services. The influence played by passengers' innovativeness on perceived ease of use and usefulness supports the findings of previous studies in other contexts (Lu et al. 2005) but disagree with others who did not find the existence of a relationship between general innovativeness and consumer adoption of technologies (Liljander et al., 2006; Roehrich, 2004). The findings of this study contribute to this debate by showing that in the context of online flight check-in and for predicting continuance intention, innovativeness along with subjective knowledge both exert a significant influence on continuance intention both directly and indirectly.

5.1. Managerial implications

The findings of this study provide several implications for managers in the transport industries. Managers of transport companies should identify and target innovative passengers and enhance their subjective knowledge perception, so as to encourage repeated usage. In addition to members of online traveler community, the younger members of frequent flyer clubs are often the innovators and early adopters of new technology. For instance, airline companies could develop their own virtual passenger community, which could ease the identification of opinion leaders (generally considered as highly innovative individuals). Once identified, these innovators could be encouraged to keep using the online self-service and spreading the knowledge about its benefits and usefulness through means of incentives such as extra mileage award points every time they book a ticket and check-in online. These incentives could further enhance electronic word of mouth about the PU and ease of use of online flight check-in. Additionally, innovative passengers because of their knowledge of the online self-service technology, could be asked to provide insight of how to improve the online

check-in service.

Furthermore, as subjective knowledge is important for continuance , online service designers could implement some user-support tools to help customers create and disseminate their knowledge, such as ‘live-chat’ technical support, video demonstration tutorials, and e-manuals. In the meantime, airline companies could also encourage innovative customers to produce their own versions of ‘user support’ contents, for example holding best user-generated contents awards and videos competition, or set up a monthly top-ten expert users and content contributor award, so as to gather and exploit knowledge of innovative passengers. Finally, the mediating role of perceived usefulness and ease of use indicate that online services design should aim to add more value for the users while simplifying the online service process.

5.2. Limitations and further research

Although the results of this study provide new insights, there are several limitations associated with it, which introduce future research opportunities. First, although the sample is quite well spread out demographically, it is a self-selected sample of online flyers, which could be considered as a limitation because respondents may be positively biased towards online check-in systems. Future research should sample passengers at the airport in order to generalize the results of our study.

Second, the study marks one of the first attempts in the transport literature to consider the effect of traveler’s innovativeness and subjective knowledge on the continuance intention. Nevertheless, the level of explained variance of our model was moderate, which is probably due to the limited number of antecedent variables included in the model. In agreement with Lu et al. (2009) we suggest considering more constructs that could better explain passengers’

adoption behavior of technologies. For instance, additional psychological antecedents could be used in future research, such as self-concept constructs and other personality traits such as those in the five-factor model (Digman, 1990), i.e. openness, conscientiousness, extraversion, agreeableness, and neuroticism. Testing the moderating effect of those variables could provide additional insights.

Third, the context of this study was limited to online flight check-in service. The mixed results obtained in different research call for a comparative study on different types of self-service technologies (i.e. check-in kiosks, online check-in using computer and mobile check-in). Moreover, future research could compare the research model in the contexts of different types of online self-services adopted in transport industries, such as online booking systems.

Fourth, this study employed a cross-section survey; future research might collect longitudinal data which should provide better estimation of the effects of TAM variables on user behavior change over time. Although one of the merits of the study is to focus on Chinese traveler behavior with online self-services, caution must be exercised in generalizing the results to other populations. Thus, future research may replicate this study in other contexts and with larger sample size.

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Tables

Table 1. Profile of respondents

	Frequency	Percentage (%)	CNNIC Report 2014 (%)	
Age				
18-29	27	10.2	(20-29)	31.2
30 to 39	154	58.3		23.9
40 to 49	46	17.4		12.1
50 to 59	31	11.7		5.1
60 and over	6	2.3		1.9
Gender				
Male	141	53.4		56
Female	123	46.6		44
Education				
Up to secondary school	67	25.4		89.1
Bachelor degree	137	51.9		10.8
Postgraduate degree and above	60	22.7		0.1
Annual Income (CNY10,000)				
Less than 5	90	34.1	(Less than 6)	87.2
5-10	66	25.0	(6-9.6)	7.7
11-15	40	15.2	(9.6 and above)	5.1
16-20	26	9.8		
21-25	26	9.8		
26 and above	16	6.1		
Occupation				
Office worker	26	9.8		11.4
Civil servant	43	16.3		4.8
Professional	56	21.2		6.6
Businessperson	80	30.3		n.a.
Service worker	8	3		3.8
Homemaker	1	0.4		
Student	38	14.4		25.5
Others	12	4.5	(Self-employed) (un-employed)	18.6 10.2
Internet use frequency				
A few times in a month or less	10	3.8		
A few times in a week	50	18.9		
About once a day	60	22.7		
Several times on each day	144	54.5		

Table 2. Construct Correlations & Square Roots of AVE

	KN	IN	PEOU	PU	CI
KN	**0.831**				
IN	0.512	**0.818**			
PEOU	0.433	0.412	**0.814**		
PU	0.512	0.403	0.508	**0.847**	
CI	0.387	0.380	0.402	0.512	**0.884**

Notes: Boldface numbers on the diagonal are the square root of the average variance extracted. KN = Knowledge, IN= Innovativeness, PEOU = Perceived Ease of Use, PU = Perceived Usefulness, CI = Continuance intention.

Table 3. Results of Hypothesis Testing

Hypotheses	Path	Coefficient	Supported?
H 1	Innovativeness → Subjective Knowledge	0.512**	Yes
H 2a	Subjective Knowledge → Perceived ease of use	0.302**	Yes
H 2b	Subjective Knowledge → Perceived usefulness	0.190**	Yes
H 3a	Innovativeness → Perceived ease of use	0.258**	Yes
H 3b	Innovativeness → Perceived usefulness	0.416**	Yes
H 4a	Perceived ease of use → Continuance intention	0.140**	Yes
H 4b	Perceived usefulness→ Continuance intention	0.335**	Yes
H 5	Innovativeness → Continuance intention	0.147**	Yes
H 6	Subjective Knowledge → Continuance intention	0.079*	Yes (weakly)

Note: *$p < .05$; **$p < .01$

Table 4. Total effect

	CI	
	Direct	Total
IN	0.147**	0.380**
KN	0.079**	0.261**
PEOU	0.140**	
PU	0.335**	
Control variables		
Age	0.002	
Gender	0.074*	
Education	-0.037	
Income	-0.012	
Internet use frequency	-0.066*	

Note: *$p < .05$; **$p < .01$; IN= Innovativeness, KN = Knowledge, PEOU = Perceived Ease of Use, PU = Perceived Usefulness, CI = Continuance intention.

Figure 1.

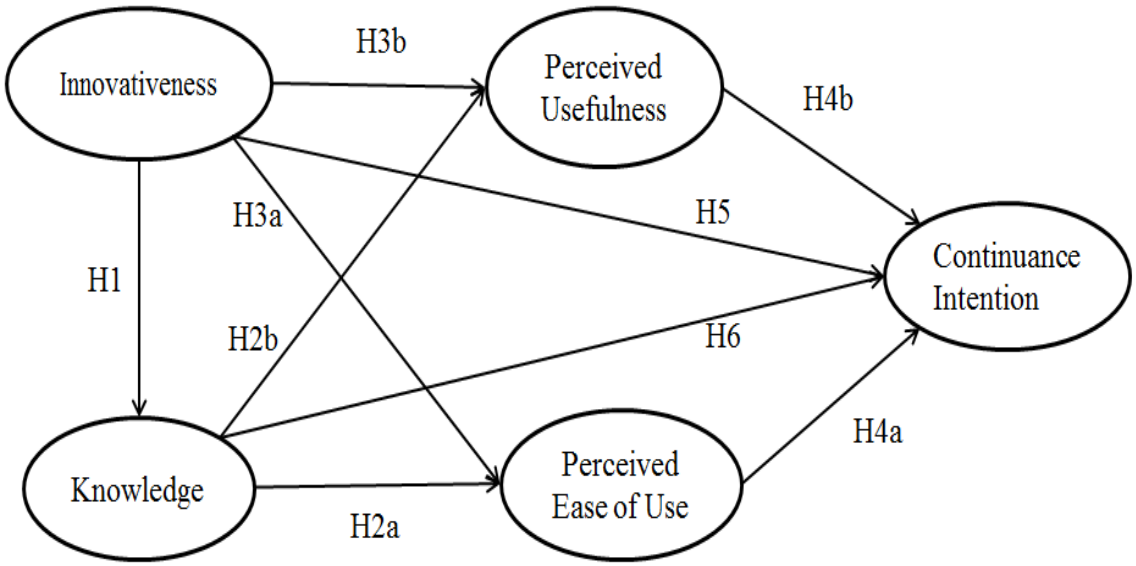

Figure 1. Conceptual model

Appendices

Appendix 1. Scale Items & Convergent Validity

Constructs/Items (5-point scales)	Loading	Mean	SD
Personal innovativeness(IN, CR= 0.858; AVE= 0.669)			
IN1 I like to experiment with new ways of doing things.	0.793	3.55	0.950
IN2 I like to try new products.	0.820	3.58	0.868
IN3 I am among the first in my circle of friends to use new technologies	0.840	3.57	0.860
Knowledge (KN, CR= 0.870; AVE= 0.690)			
KN1 I know pretty much about airline websites.	0.820	3.70	0.926
KN2 I am an expert user of online check-in service	0.849	3.63	0.885
KN3 I know pretty much about how to use online check-in service	0.823	3.75	0.953
Perceived ease of use (PEOU, CR= 0.853; AVE= 0.663)			
PEOU1 Online check-in requires little effort.	0.853	4.27	0.867
PEOU2 The process of online check-in is clear.	0.917	4.14	0.845
PEOU3 Online check-in operation is simple and easy to understand.	0.649	4.04	0.936
Perceived usefulness (PU, CR= 0.884; AVE= 0.717)			
PU1 It saves me time for not having to queue at the airport.	0.864	3.91	0.808
PU2 It is useful for selecting the seat I prefer.	0.845	3.92	0.890
PU3 It is useful, as I can either print out boarding pass or have it on my smartphone.	0.831	3.81	0.836
Continuance intention (CI, CR= 0.878; AVE= 0.782)			
CI1 I would use online check-in service next time I travel.	0.873	3.75	0.790
CI2 It is likely that I will use online check-in service again.	0.896	3.94	0.963

Notes: All loadings are significant at p<.01 level; SD=Standard deviation; CR = composite reliability, AVE = Average variance extracted.

Appendix 2. Cross Loadings

	KN	IN	PEOU	PU	CI
KN1	**0.820**	0.394	0.339	0.392	0.335
KN2	**0.849**	0.431	0.361	0.416	0.301
KN3	**0.823**	0.448	0.379	0.467	0.328
IN1	0.383	**0.793**	0.235	0.298	0.315
IN2	0.448	**0.820**	0.311	0.289	0.294
IN3	0.425	**0.840**	0.446	0.391	0.323
PEOU1	0.314	0.325	**0.853**	0.369	0.279
PEOU2	0.407	0.447	**0.917**	0.496	0.441
PEOU3	0.334	0.175	**0.649**	0.355	0.212
PU1	0.453	0.357	0.430	**0.864**	0.44
PU2	0.396	0.289	0.429	**0.845**	0.36
PU3	0.445	0.367	0.431	**0.831**	0.486
CI1	0.383	0.376	0.328	0.410	**0.873**
CI2	0.305	0.300	0.381	0.493	**0.896**

Notes: Boldface numbers are loadings of indicators to their own construct; other numbers are the cross loadings. KN = Knowledge, IN= Innovativeness, PEOU = Perceived Ease of Use, PU = Perceived Usefulness, CI = Continuance intention.

Appendix 3. Common Method Variance Test

Construct	Indicator	Substantive Factor Loading (R1)	$R1^2$	Method Factor Loading (R2)	$R2^2$
Innovativeness	IN1	0.849**	0.721	-0.065**	0.004
	IN2	0.865**	0.748	-0.051*	0.003
	IN3	0.745**	0.555	0.110**	0.012
Subjective Knowledge	KN1	0.854**	0.729	-0.038	0.001
	KN2	0.877**	0.769	-0.033	0.001
	KN3	0.761**	0.579	0.071**	0.005
Perceived ease of use	PEOU1	0.936**	0.876	-0.100**	0.010
	PEOU2	0.785**	0.616	0.150**	0.023
	PEOU3	0.730**	0.533	-0.080	0.006
Perceived usefulness	PU1	0.849**	0.721	0.023	0.001
	PU2	0.967**	0.935	-0.131**	0.017
	PU3	0.725**	0.526	0.109**	0.012
Continuance intention	CI1	0.874**	0.764	0.014	0.000
	CI2	0.895**	0.801	-0.014	0.000
Average		**0.844**	**0.718**	**-0.002**	**0.007**

Notes: *$p < .05$; **$p < .01$.