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Barriers Affecting the Acceptance of Tourism Apps Among Tourists

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Abstract

The development of technology applications has brought many benefits to users. However, users face certain risks when adopting new technology applications. This leads to barriers affecting the acceptance of new technology applications. The study was carried out to identify the barriers affecting the acceptance of tourism apps by tourists. Research data were collected by the method of quota sampling, with a sample size of 222 tourists who have visited and experienced tourism services at famous destinations in Vietnam. Qualitative research methods and quantitative research methods are both applied to test the research hypotheses. The structural equation modeling (SEM) has demonstrated that insecurity and discomfort positively affect tourists' perceived risk of tourism apps. Also, insecurity, discomfort, and perceived risk negatively affect tourists' acceptance of travel apps.

Keywords*:* barrier, acceptance, usage intention, tourism apps, tourist.

INTRODUCTION

The rapid development of mobile technology and smartphone apps has spurred the tourism industry to thrive (Buhalis & Law, 2008). Travel apps can be a great tool for destination marketing. Some researchers (O'Brien & Burmeister, 2003; Rasinger et al., 2007) argued that travel apps allow tourists to access a variety of information related to travel or destinations conveniently. Travel apps help travelers get the information they need, save money, and make traveling easier and more enjoyable (Wang et al., 2016; Pradhan et al., 2018). Tourists often have demands to search for tourist information, destination reviews, price comparisons, room booking, air ticket booking, and online payment (Pradhan et al., 2018; Khoa et al., 2021). However, tourists are still hesitant to use technology due to the security and safety of personal information, concerns about providing information to service providers, and the inconvenience of using new technologies in the wrong way (Jarrar et al., 2020; Abumandila et al., 2020). Many studies point out many barriers affecting the acceptance of technology apps by users, including security, insecurity, inconvenience, complexity, and perceived risk (Chathoth et al., 2014; Yoo et al., 2017; Abumandila et al., 2020; Lama et al., 2020; Jarrar et al., 2020). The majority of studies have been conducted in developed countries while few studies have been conducted in developing countries with similar contexts to Vietnam. Especially in the field of tourism, few studies measure the barriers affecting the acceptance of tourism apps. Therefore, this study will demonstrate the factors impacting the acceptance of tourism apps by Vietnamese tourists. The research results will provide a useful reference for tourism service administrators and smart tourism application developers.

THEORETICAL FRAMEWORK AND RESEARCH HYPOTHESES

Theoretical framework

Tourism apps

A tourism application is a mobile information system that combines information and physical infrastructure to create new tourist experiences (Gretzel et al., 2015; Koo et al., 2016; Yoo et al., 2017). According to Gretzel et al. (2015), travel apps are a new trend in the tourism industry, with three main components: smart destinations, smart business ecosystems, and smart experiences, all based on data collection, data exchange, and data process. Tourism apps attract tourism stakeholders and visitors based on integrated information and communication technology platforms, such as the Internet, cloud computing, artificial intelligence, mobile technology, big data, virtual reality, and conversational robots (Zhang et al., 2012; Li et al., 2016; Wang et al., 2016; Abumandila et al., 2020; Naramski, 2020). Travel apps have made changes in visitor needs and behavior, improved tourist satisfaction, provided visitors with a seamless travel experience, and efficiently manage tourism resources (Buhalis & Law, 2008; Pradhan et al., 2018; Jarrar et al., 2020).

Perceived risk

Perceived risk is defined as the uncertainty that a customer may incur the loss of financial, performance, or privacy when they cannot foresee the consequences of using the service (Bashir & Madhavaiah, 2015). Perceived risk refers to a negative consequence arising from the purchase of a new product or service (Dholakia, 2001; Karjaluoto et al., 2014). According to Wang & Wang (2010), perceived risk affects customers' perceived value when using products/services. Perceived risk consists of two essential components: uncertainty (likelihood of adverse consequences) and loss (severity of consequences). According to Kasilingam (2020), perceived risk impacts the acceptance and adoption of new technologies.

Usage intention

According to Ajzen (1991), intention is described as a person's willingness to engage in a particular behavior. Kwok & Gao (2005) argued that individuals are more likely to engage in a certain behavior if their intention towards that behavior is positive and vice versa. According to Venkatesh & Zhang (2010), the intention decides whether an individual will or will not take an action in the future. Intention to use can be understood as the future acceptance of the technology (Holden & Karsh, 2010). Intention to use is seen as a predictor of the likelihood that a person will adopt a technology (Shanmugam et al., 2014). Intention to use mobile apps is the ability that the user regularly and continuously use apps on mobile devices in the future (Webster et al., 1993; Venkatesh & Davis, 2000).

Research hypotheses

Relationship between insecurity, perceived risk, and intention to use

Insecurity is the distrust feeling of technology and still skeptical about its ability to function properly (Parasuraman, 2000; Chen & Chen, 2009). Customers may reject new technology if they have a negative view of that technology and accept that the advancement may be unsafe or even harmful (Kleijnen et al., 2009). One of the main concerns of users of technology apps is information security and privacy (Pradhan et al., 2018; Masseno & Santos, 2018; Jarrar et al., 2020; Yang et al., 2022). Personal information and privacy are some of the barriers to travel technology adoption (Yoo et al., 2017; Pradhan et al., 2018; Masseno & Santos, 2018). Security risk is an important component of perceived risk, which inhibits potential customers' intention to adopt new technologies (Yoo et al., 2017; Pradhan et al., 2018; Yang et al., 2022). Issues of security and insecurity affect perceived risk and the intention to use tourism technologies (Pradhan et al., 2018; Abumandila et al., 2020; Jarrar et al., 2020). Therefore, the study proposes the following hypotheses H1: Insecurity positively affects tourists' perceived risk about tourism

apps; H2: Insecurity negatively impacts tourists' intention to use tourism apps.

Relationship between discomfort, perceived risk, and usage intention

Discomfort is the lack of control over technology and the feeling of being overwhelmed by technology (Parasuraman, 2000; Tsikriktsis, 2004; Wang et al., 2016). Discomfort is produced when there is a conflict between thoughts and actions that leads to unpleasant feelings of stress (Williams & Aaker, 2002; Giebelhausen et al., 2014). Discomfort represents the degree to which an individual feels anxiety about technology-related products or services (Guhr et al., 2013). Some technology apps are too complicated to use, and people who are new to smart devices may run the risk of misusing them (Park et al., 2013; Park & Tussyadiah, 2017; Pradhan et al., 2018; Jarrar et al., 2020). Poor connection to bandwidth and the inconvenience of smartphones are factors that increase customers' negative emotions and perceived risk (Buhalis & Amaranggana, 2013; Park & Tussyadiah, 2017; García -Milon et al., 2020; Jarrar et al., 2020). Numerous studies have shown that anything that creates positive emotions is optimistically rated, while anything that creates negative emotions is evaluated as unpleasant when using new technologies (Michalkó et al., 2015; Yeh et al., 2017; García-Milon et al., 2020). Discomfort creates negative emotions, forming barriers to the intention to use technology apps (Yeh et al., 2017; Melián-González et al., 2021). Hence, the study proposes the following hypotheses H3: Discomfort positively affects tourists' perceived risk about tourism apps; H4: Discomfort negatively influences the intention to use tourism apps of tourists.

Relationship between perceived risk and intention to use

Perceived risk becomes more and more essential in the tourism context thanks to the intangible nature of tourism services (Ruiz-Mafé et al., 2009). Risk manifests itself in the form of security, safety, and privacy issues (Belkhamza & Wafa, 2009; Marafon, 2018). Perceived risk is an individual's assessment based on risk-related factors involved in performing an action, which harms the intention to use a technology app (Belkhamza & Wafa, 2009; Nguyen & Nguyen, 2017; Marafon, 2018; Jarrar et al., 2020). In a research in 2005, Cunningham et al. argued that perceived risk plays a significant role in the context of tourists using online services. Despite the benefits brought by using new technological applications, the risks of using them outweigh the benefits (Nguyen & Nguyen, 2017; Pradhan et al., 2018; Marafon, 2018; Belkhamza & Wafa, 2009). Thus, the study proposes the following hypothesis: H5: Perceived risk negatively affects tourists' intention to use tourism apps.

Based on the literature review and the above research hypotheses, the study used participatory rural appraisal (PRA) with the participation of 6 tourists who have travel experiences and 4 tourism experts. The group discussion helped identify the appropriate scales for the research model. The research model is set up as follows:

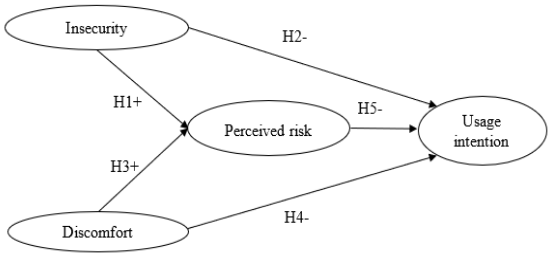

Figure 1: Proposed research model

Table 1: Interpretation of observed variables in the research model

Factor	Observable variable name	The scale	Reference source
Insecurity	IN1: It is unsafe to provide personal information through travel apps.	Likert 1-5	Yang et al. (2022), Jarrar et al. (2020),

Factor	Observable variable name	The scale	Reference source
(IN)	IN2: If the information is provided through a travel app, I am concerned that it is not going to the right place.	Likert 1-5	Pradhan et al. (2018), Masseno and Santos (2018); Yoo et al. (2017)
	IN3: Using location for travel made me uncomfortable because I felt like I was being followed.	Likert 1-5	
	IN4: I don't feel safe paying my travel expenses online.	Likert 1-5	
	IN5: I feel insecure when using travel services that interact on travel apps only.	Likert 1-5	
Discomfort (DI)	DI1: I find it difficult to install and use a new technology app.	Likert 1-5	Jarrar et al. (2020), García-Milon et al. (2020), Pradhan et al. (2018), Park & Tussyadiah (2017), Park et al. (2013)
	DI2: Travel app instructions are explained using technical and difficult-to-understand terms.	Likert 1-5	
	DI3: Simple travel apps are more convenient for me than apps with extra features.	Likert 1-5	
	DI4: The support feature on the travel app explains unrelated matters to the issue I am encountering.	Likert 1-5	
	DI5: I think using travel apps is quite inconvenient.	Likert 1-5	
Perceived risk (PR)	PR1: Using travel apps hinders the enjoyment of the trip.	Likert 1-5	Jarrar et al. (2020), Yang et al. (2022), García-Milon et al. (2020), Pradhan et al. (2018), Yoo et al. (2017), Park and Tussyadiah (2017)
	PR2: Using travel apps carries financial risks (Internet fees, device loss)	Likert 1-5	
	PR3: Using travel apps carries privacy risks (data sharing, location sharing)	Likert 1-5	
	PR4: Travel apps do not work well when I move to another area.	Likert 1-5	
	PR5: During the trip, there is no timely support when the travel apps fail.	Likert 1-5	
Intention to Use (IU)	IU1: I feel that integrating travel devices and applications into travel is interesting.	Likert 1-5	Yeh et al. (2017), Melián-González et al. (2021), Pradhan et al. (2018), Marafon (2018)
	IU2: I will learn about travel apps for future trips.	Likert 1-5	
	IU3: I will use travel apps for my next trip.	Likert 1-5	
	IU4: I intend to use travel apps in the future.	Likert 1-5	

RESEARCH METHODOLOGY

Analytical methods

Qualitative research methods and quantitative research methods are used to test the research hypotheses. For the qualitative method, the PRA was performed to identify appropriate scales for the research model. A panel discussion with 6 tourists who are experienced in traveling and 4 experts in technology adoption was organized. For quantitative analysis, the order of analysis includes testing the reliability of the scale by Cronbach's alpha coefficient, exploratory factor analysis (EFA), confirmatory factor analysis (CFA), and structural equation modeling (SEM).

Data collection method

To ensure the reliability of the SEM test, the sample size needs to be large because it is based on the theory of sample distribution (Raykov & Widaman, 1995), a sample size

from 100 to 200 is accepted (Hoyle, 1995). According to Bollen (1989), the ratio needed to design a sample size should be at least five observations per measurement variable (5:1). Hoelter (1983) indicated that a reasonable sample size must be at least 200 observations in the SEM model. Therefore, this study aims to collect at least 200 observations.

A pilot survey was conducted in January 2023 to examine the structure and content of the questionnaire. Subjects selected for the trial survey are tourists (10 domestic tourists and 05 international tourists) who come to visit and experience tourism services in Phu Quoc City. Respondents were asked to answer all questions, then provide comments on the overall structure and clarity of each question. The result of the pilot survey has shown that most questions were clearly understood and answered. Respondents agreed with the research scales. After the pilot survey, the study conducted an official survey from February 2023 to March 2023. Survey subjects are tourists who have visited and experienced tourism services at famous destinations in Vietnam (Phu Quoc, Nha Trang, Hoi An, Da Nang, Da Lat, and Ha Long). The study used quota sampling to collect data. The grouping criteria include the type of tourist, gender, occupation, education level, and age. An online interview using Google Forms was used to collect detailed information. The number of questionnaires achieved was 230, after removing unsuitable ones (lack of reliability), a total of 222 valid questionnaires were used to test the research hypotheses.

Table 2: Sample structure (n = 222)

Type of tourist	**Frequency**	**%**	**Education level**	**Frequency**	**%**
International	68	30.63	Middle school	45	20.27
Domestic	154	69.37	High school	68	30.63
Gender	**Frequency**	**%**	College	16	7.21
Male	115	51.80	University	71	31.98
Female	107	48.20	Postgraduate	22	9.91
Age	**Frequency**	**%**	**Occupation**	**Frequency**	**%**
16 - 30	60	27.03	Manager	30	13.51
31 - 45	67	30.18	Office staff	64	28.83
46 - 60	48	21.62	Public sector	37	16.67
Above 60	47	21.17	Student	52	23.42
			Freelance	39	17.57

Table 2 shows the demographic characteristics of the study sample. International visitors account for 30.63%, while domestic tourists account for 69.37%. The proportions of male and female tourists in the survey are almost equal (51.8% of males compared to 48.2% of females). Regarding the age of the respondents, the 31 - 45 age group accounts for the highest proportion (30.18%), followed by the 16 - 30 age group (27.03%). Most respondents graduated from high school (30.63%) and university (31.98%). Regarding occupation, survey respondents have diverse types of jobs, the highest percentage is office staff (28.83%). The diverse demographic characteristics of the respondents show the high representativeness of the research sample size.

RESEARCH RESULTS AND DISCUSSION

Analytical results

Reliability of research scales

Cronbach's alpha test is used to eliminate inappropriate observed variables (Hair et al., 2010). Variables with an item-total correlation less than 0.3 will be excluded, observed variables will also be excluded if this increases the Cronbach's alpha value (Nunnally, 1978; Peterson, 1994, Slater, 1995). The scales ensure reliability if Cronbach's alpha values reach 0.6 or higher (Nunnally & Bernstein, 1994). Next, the study carried out exploratory factor analysis (EFA), the scales are accepted if (i) KMO (Kaiser Meyer Olkin) is greater than 0.6 and Bartlett's test has statistical significance (Sig. < 0.05) (Hair et al., 1998); (ii) observed variables have factor loading greater than 0.5 (Hair et al., 1998); and (iii) the cumulative variance test reach 50% or more (Anderson & Gerbing, 1988).

Table 3: Scale reliability test result

Observed variable name	Mean	Standard deviation	Factor loading	Cronbach's alpha
Insecurity (IN)				**0.916**
IN1	3.37	1.076	0.851	
IN2	3.29	0.974	0.831	
IN3	3.32	1.059	0.815	
IN4	3.26	0.991	0.838	
IN5	3.26	0.963	0.769	
Discomfort (DI)				**0.895**
DI1	3.32	0.884	0.646	
DI2	3.23	0.834	0.738	
DI3	3.33	0.895	0.871	
DI4	3.24	0.814	0.890	
DI5	3.30	0.878	0.748	
Perceived risk (PR)				**0.900**
PR1	3.32	0.887	0.791	
PR2	3.42	0.867	0.654	
PR3	3.37	0.931	0.752	
PR4	3.43	0.999	0.873	
PR5	3.29	0.951	0.894	
Intent to Use (IU)				**0.894**
IU1	3.05	1.041	0.856	
IU2	3.07	0.853	0.626	
IU3	2.99	1.013	0.858	
IU4	2.97	0.866	0.695	

The above table shows that all research scales have Cronbach's alpha values between 0.894 and 0.916. All observed variables have the item - total correlation greater than 0.3. Hence, all research scales meet the reliability requirement. The EFA result shows that the model's suitability test is guaranteed with KMO = 0.921 and the Sig. = 0.000; Factor loading of observed variables meets the requirements, with Factor loading > 0.5. The cumulative variance test reaches 74.82%, higher than 50%. This shows that the observed variables have a suitable explanatory capacity. So 4 factors were created from 19 observed variables, ensuring convergent and discriminant validity.

Confirmatory factor analysis (CFA) tests the theoretical structure of the scale and the relationship between a research concept and other concepts (Steenkamp & Van Trijp, 1991). The model is considered compatible and suitable with the research data if the TLI (Tucker & Lewis index) and CFI (Comparative Fit Index) values from 0.90 to 1.00, the Chi-squared divided by the degree of freedom CMIN/df reached the value < 3.00, the RMSEA (Root Mean Square Error Approximation) reached the value < 0.08. Besides, Hair et al. (2010) said that a scale ensures reliability if the standardized regression weight λi > 0.50 (ideally from 0.70 or more) and composite reliability (CR) > 0.70, achieving convergent if AVE (Average Variance Extracted) > 0.50. These numbers are used to evaluate the research scales.

Table 4: CFA and SEM analysis results

Evaluation criteria	CFA	SEM	Comparative index	Resources
χ^2/df	2.393	2.393	≤ 3	Gerbing & Anderson (1988), Hu & Bentler (1999)
P-value	0.000	0.000	< 0.05	
TLI	0.921	0.921	≥ 0.9	
CFI	0.933	0.933	≥ 0.9	
RMSEA	0.079	0.079	≤ 0.08	

Based on Table 4, the measurement criteria are suitable (CMIN/df = 2.393 < 3.00, CFI = 0.933 > 0.90, TLI = 0.921 > 0.90, RMSEA = 0.079 < 0.08) (Bentler & Bonett, 1980; Carmines, 1981; Steiger, 1990). This proves that the model fits the research data.

Table 5 below shows that the composite reliability (CR) and average variance extracted (AVE) all meet the requirement. CR values (minimum 0.895) and AVE (minimum 0.631) all achieve statistical validity (Jöreskog, 1971; Fornell & Larcker, 1981). So, all the factors in the research model meet the requirements in terms of validity and reliability, so all scales are suitable to be used for the SEM analysis.

Table 5: Research scale testing result

Factor	Number of observed variables	Composite reliability CR	Average Variance Extracted AVE	Resources
Insecurity (IN)	5	0.916	0.687	Jöreskog (1971), Fornell & Larcker (1981)
Discomfort (DI)	5	0.895	0.631	
Perceived Risk (PR)	5	0.900	0.644	
Intent to Use (IU)	4	0.898	0.688	

Test the research hypotheses

Based on the test results in Table 6, the hypotheses H1, H2, H3, H4, and H5 are accepted with a 99% confidence interval. It indicates that insecurity and discomfort are positively correlated with perceived risk at the 1% statistical significance level. Besides, insecurity, discomfort, and perceived risk negatively affect the intention to use tourism apps of tourists with a statistical significance level of 1%.

Table 6: Research hypothesis testing result

Relationship	Unstandardized			Standardized Estimated Value	Significance	Hypothesis
	Estimated value	Standard Error SE	Critical Ratio CR			
PR <-- IN	0.284	0.070	4.055	0.298	***	H1: accepted
IU <-- IN	-0.212	0.070	-3.042	-0.224	***	H2: accepted
PR <-- DI	0.523	0.085	6.157	0.488	***	H3: accepted
IU <-- DI	-0.244	0.088	-2.763	-0.230	***	H4: accepted
IU <-- PR	-0.388	0.086	-4.494	-0.393	***	H5: accepted

Discussion

Hypothesis H1 and H2: The estimation results in Table 6 point out that insecurity positively affects perceived risk with a standardized estimated value of 0.298 and reached statistical significance p = 0.000. Also, insecurity negatively affects the intention to use tourism apps with the standardized estimated value of -0.224 and reached statistical significance p = 0.000. If visitors feel unsafe while using the travel app or have doubts about the functioning of the app, the perceived risk about the travel app will arise, thereby restricting the acceptance of travel apps by visitors. This result supports the view of paying special attention to information security and user privacy when accepting new technology applications (Pradhan et al., 2018; Masseno & Santos, 2018; Jarrar et al., 2020; Yang et al., 2022). In the tourism sector, personal information and privacy are barriers to the adoption of travel technology (Yoo et al., 2017; Pradhan et al., 2018; Masseno & Santos, 2018). The study results are consistent with studies proposed by Pradhan et al. (2018), Abumandila et al. (2020), and Jarrar et al. (2020).

Hypothesis H3 and H4: Hypothesis H3 is accepted after considering the standardized estimated value of 0.488 and the statistical significance p = 0.000. Hypothesis H4 is accepted with the standardized estimated value of -0.230 and the statistical significance p = 0.000. When tourists find that travel apps are uncomfortable, it increases their perceived risk about travel apps and creates barriers to travel app adoption. The truth is, some new technology apps are too complicated and requires great effort to use; therefore, users will feel uncomfortable and create perceived risk (Park et al., 2013; Park & Tussyadiah, 2017; Pradhan et al., 2018; Jarrar et al., 2020). This finding supports the perception that new technology apps create discomfort (Michalkó et al., 2015; Yeh et al., 2017; García-Milon et al., 2020), thereby shaping barriers to new technology adoption (Yeh et al., 2017; Melián-González et al., 2021)

Hypothesis H5: Perceived risk negatively affects the intention to use tourism apps of tourists. The estimation results in Table 5 show that perceived risk negatively affects the intention to use tourism apps, with a standardized estimated = -0.393 and reaching statistical significance p = 0.000. Perceived risk becomes more important in the tourism context thanks to the intangible nature of tourism services (Ruiz-Mafé et al., 2009), especially when travelers use online services (Cunningham et al., 2005). Along with the

benefits brought by using new technology applications, users have to face many risks. Increasing perceived risk negatively affects user intention to use new technologies (Nguyen & Nguyen, 2017; Pradhan et al., 2018; Marafon, 2018; Belkhamza & Wafa, 2009). The research result is consistent with several studies in the field of tourism by Belkhamza & Wafa (2009), Nguyen & Nguyen (2017), Marafon, (2018), and Jarrar et al. (2020).

CONCLUSION

Overall, the study has achieved the set goal, which is to demonstrate the barriers affecting the acceptance of tourism apps by tourists. Research results have shown that insecurity and discomfort positively influence tourists' perceived risk for tourism apps. Besides, insecurity, discomfort, and perceived risk negatively affect tourists' acceptance of tourism apps. The study has also confirmed that the acceptance of technology apps, especially tourism apps always face barriers of insecurity and user discomfort. The research results provide a useful reference for technology managers in the tourism sector and researchers on technology acceptance.

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