Smart Tourism (2022) Volume 3 Issue 2, *7 pages.*
doi: 10.54517/st.v3i2.2149

ORIGINAL RESEARCH ARTICLE

Research on the application behavior of smart tourism of tourists in the context of pandemic prevention and control

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ABSTRACT

The outbreak of the COVID-19 has severely damaged the tourism industry. However, smart tourism has become a new support for the development of the current tourism industry by virtue of its advantages in epidemic prevention and control and tourism format innovation. Tourists are the core of smart tourism services. Therefore, based on UTAUT theory, this paper discusses the application behavior of tourists' smart tourism during the epidemic. The factors that affect the application willingness of tourists' smart tourism are perceived security, effort expectation, performance expectation and social impact. The impact of the epidemic has a positive effect on the social impact and performance expectation, which makes more people familiar with, affirm and promote smart tourism, thus enabling the transformation, upgrading and development of the tourism industry, making rational tourism planning.

Keywords: smart tourism; use behavior; COVID-19 UTAUT model; PLS structural equation

1. Introduction

The concept of "smart tourism" is derived from the concepts of "smart earth" and "smart city". The so-called smart tourism is a systematic and intensive management reform based on the new generation of information technology (also known as information communication technology, ICT) to meet the personalized needs of tourists, provide high-quality and high satisfaction services, and achieve the sharing and effective use of tourism resources and social resources[1]. China's tourism informatization started relatively late, and smart tourism is still in the primary stage in general, and is led by the government to promote its orderly development. The National Tourism Administration has written "smart tourism" into the "12th Five Year Tourism Development Plan", and has carried out the department of smart tourism pilot work, and determined Zhenjiang, Jiangsu Province, as the "national smart tourism service center". Since 2010, Nanjing, Suzhou, Yangzhou, Wenzhou and Beijing have announced the development strategy of building "smart tourism cities". The General Administration of Tourism of the People's Republic of China has designated 2014 as the Year of Smart Tourism, accelerated the promotion of online tourism services, online marketing, online booking, online payment and other smart tourism services, formulated standards for the construction of smart tourism scenic spots, and continued to promote the construction of smart tourism enterprises, smart tourism scenic spots, and smart tourism cities. In the guidance on the development of global tourism, it is pointed out that the development and construction of

ARTICLE INFO
Received: September 8, 2022 | Accepted: October 15, 2022 | Available online: October 28, 2022

CITATION
Bian W, Zhou L. Research on the application behavior of smart tourism of tourists in the context of pandemic prevention and control. Smart Tourism 2022; 3(2): 7 pages.

intelligent tourism service systems such as consultation, guided tour, guided tour, shopping guide, navigation and sharing evaluation should be carried out, and modern information technologies such as cloud computing, Internet of Things and big data should be more widely used in the tourism industry.

2. The necessity of this study

The outbreak of the COVID-19 in 2020 is a "great change not seen in a century", which has had a significant impact on the political and economic structure of the world. In this epidemic and even under the normalization of epidemic prevention and control, smart tourism has played a positive role in the resumption of production of the tourism industry by virtue of its technological advantages. However, some problems have also been exposed in the application process of smart tourism. For example, two small videos that have attracted social attention recently show the embarrassing experience of two elderly people when they ask for password scanning and mobile payment. In the torrent of the COVID-19 and the information age, information technology should have served people, but sometimes it can also restrain people. Application is the starting point and foothold of smart tourism construction, and tourists are the main body of tourism activities[2]. Only by effectively connecting tourists with smart tourism applications in tourism activities can tourism suppliers better use modern information technology to serve tourists[3]. Therefore, from the perspective of smart tourism system and tourists, this paper introduces the external change of epidemic impact.

It is of great theoretical and practical significance to explore quantitatively the behavior of tourists using smart tourism applications under the COVID-19 pandemic and put forward suggestions for the construction of smart tourism under the epidemic and even after the pandemic.

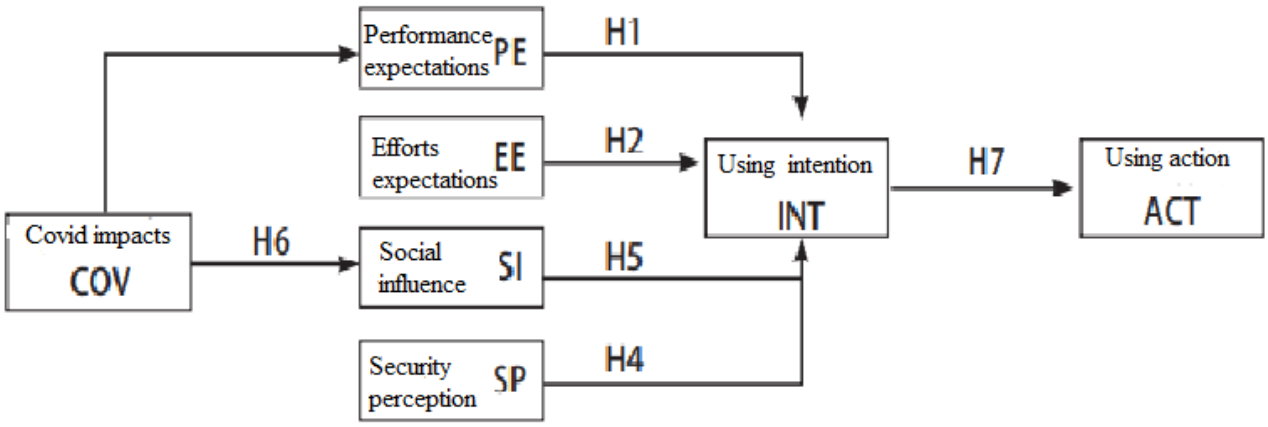

Figure 1. Hypothetical model of smart tourism application behavior under epidemic situation.

3. Introduction of research methods

At present, most of the research on smart tourism application behavior in China is conducted using statistical methods of structural equation model. The research objects, theories and perspectives of intelligent tourism application behavior in foreign literature are more extensive, and more statistical methods of multiple linear regression are used.

In the context of the COVID-19, the hypothetical model proposed by this paper in combination with UTAUT and perceived risk theory is shown in **Figure 1**.

In UTAUT, performance expectation refers to the extent to which users believe that the information technology system can help them achieve better performance in their work, while effort expectation refers to the extent to which users believe that the information technology system is easy to use, and

these two factors have a positive effect on the use intention[4]. Performance expectation is similar to the perceived usefulness in TAM and the outcome expectation in SCT. In this paper, it is mainly manifested in the help of smart tourism applications to tourists' tourism activities, and makes tourists gain in time, money and knowledge. In previous studies, performance expectation is the best predictor of willingness to use[4]. While efforts are expected to be similar to the perceived ease of use in TAM and the complexity in MPCU, this paper mainly shows whether it is easy and simple for tourists to use smart tourism applications.

To sum up, the following assumptions are given:

H1: Performance expectations have a positive impact on willingness to use

H2: Effort expectation has a positive impact on willingness to use

Tourism activities often lead to many population movements, which will inevitably be detrimental to the prevention and control of the epidemic. Therefore, all sectors of society have made various restrictions on tourism activities. At this time, the smart tourism application can provide a good solution, and its functional advantages are constantly highlighted. Providing epidemic dynamics, unmanned ticket buying and ticket checking, journey code scanning, etc. will help tourists make travel plans, reduce queues, help destinations control the flow of people and exclude tourists from risk areas. In addition, cloud tourism in smart tourism

The form meets the tourism needs of people who stay at home due to the epidemic, and brings new tourism consumption mode[5]. Based on this, this paper introduces the epidemic impact variable to measure the impact of the epidemic on tourists, and makes assumptions:

H3: Epidemic impact has a positive impact on performance expectations

The theory of perceived risk was put forward by Bauer[6], who believed that the good or bad results of any user's decision-making behavior could not be predicted, and would affect different users to varying degrees. Therefore, this unpredictable uncertainty is perceived risk. Perceived risk has two dimensions, namely, the uncertainty of use results and the severity of use consequences.

Brenda[7] divides user risk into functional risk, social risk and financial risk. Risk is an inherent attribute of science and technology. Many IT users will consider its security, especially many applications of smart tourism often involve electronic payment. Chen confirmed that perceived security has a positive effect on the use intention of WeChat payment users[8]. In addition, users of smart tourism applications will also question the authenticity of information on the network and worry about the leakage of personal privacy information. To sum up, the variable of perceived security is introduced, that is, the degree of security that tourists think about using smart tourism applications, and it is assumed that:

H4: Perceived security has a positive impact on willingness to use

In UTAUT, social impact refers to the extent to which users think other important people think they should use the new information system, which has a positive effect on the use intention[4]. Social impact is similar to the subjective norms in TRA and the social factors in MPCU. As human beings in society, their behavior decisions will also be affected by social norms. In addition, because of the epidemic prevention and control, the government and society strongly advocate that tourists use smart tourism applications in their tourism activities. Wu[9] and Le[10] believed that all tourism enterprises under the epidemic situation should achieve the goal of epidemic prevention and control and self-help by improving the unmanned level and developing online tourism products. The Ministry of Culture and Tourism has also issued a document emphasizing that modern information technology should play a full role in ticket booking, information release, flow control, diversion and safety inspection of the scenic spot to help prevent and control the epidemic

situation in the scenic spot and resume production. Based on the assumptions given above:

H5: Social impact has a positive impact on willingness to use

H6: Epidemic impact has a positive impact on social impact

Application conditions in UTAUT refer to the extent to which individuals believe that infrastructure and organizational measures support their use of information technology systems. Venkatesh proved that the effect of application conditions on the willingness to use is through effort expectation, so application conditions directly affect the use behavior in UTAUT[4]. However, some studies show that the effect is not significant, so this paper considers that application conditions will largely affect the willingness to use through other factors and then affect the use behavior, so this variable is not introduced. In addition, in UTAUT, intention to use has a positive impact on use behavior[4], and this relationship exists in TRA, TAM and other theories.

To sum up, the following assumptions are given:

H7: Use intention has a positive impact on use behavior

4. Questionnaire collection and analysis

In this study, five-point Likert scale was used to collect variable information, mainly using questionnaire stars to collect questionnaires on the Internet, and a total of 1,061 valid questionnaires were collected. The proportion of men and women is 60% and 40% respectively. The age distribution mainly concentrated in 19–44 years old. The educational background is mainly distributed in college and undergraduate. The income is mainly distributed between 4,000 and 8,000.

4.1. Measurement model

Through SMARTPLS to analyze the data, it is concluded that Cronbach's Alpha>0.7, CR>0.7, AVE>0.5, and loading>0.7 for each question, indicating that the reliability and convergence validity of the questionnaire are good. The square root of AVE of each dimension obtained in the Fornell test of differential validity is greater than the correlation coefficient between this dimension and other dimensions, indicating that there is good differential validity between each dimension[11].

4.2. Structural model

In SMARTPLS, set the sample to be sampled 5,000 times to run bootstrapping, and get the test results of direct effects. The upper and lower limits of Bias corrected test for each direct path do not contain 0, that is, the direct effect has reached a significant level. Run blindfolding again to get f^2 of each path (representing the influence of the independent variable on the dependent variable), as shown in **Table 1**.

Table 1. Basic hypothesis path test table

Hypothesis	Direct path	Coefficient	Bias-corrected 95%		f^2
			2.50%	97.50%	
H3	COV -> PE	0.349	0.278	0.417	0.139
H6	COV -> SI	0.336	0.264	0.4	0.127
H2	EE -> INT	0.274	0.204	0.345	0.076
H7	INT -> ACT	0.611	0.554	0.661	0.595
H1	PE -> INT	0.216	0.141	0.29	0.049
H5	SI -> INT	0.102	0.037	0.166	0.012
H4	SP -> INT	0.279	0.21	0.346	0.09
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Table 2. Model interpretation ability and prediction correlation

Latent variables	R Square	R Square Adjusted	Q^2
ACT	0.373	0.372	0.249
INT	0.536	0.534	0.347
PE	0.122	0.121	0.078
SI	0.113	0.112	0.071

Table 2 shows R^2 and Q^2 of each endogenous variable. First, Q^2 of each endogenous variable is greater than 0. Secondly, in R^2, COV's ability to explain PE and SI is relatively weak, because the epidemic impact is one of the many factors that affect performance expectations and social impact, and there are other factors that do not.

It is considered that PE, EE, SP, SI have medium ability to explain INT and INT to ACT[11]. To sum up, the model has certain prediction and interpretation capabilities.

5. Data analysis description

From the above data analysis results, it can be seen that:

The willingness of tourists to use smart tourism applications has a positive correlation with perceived security, effort expectation, performance expectation and social impact, which is consistent with the hypothesis, with f^2 of 0.09, 0.076, 0.049 and 0.012 respectively. The reason for this result is that the smart tourism application based on electronic information technology has always exposed the problem of security, which is the first consideration when people make decisions. Secondly, if it is difficult to learn how to use smart tourism applications, it will frustrate the enthusiasm of tourists, and efforts to expect that it can be used. If there is no hardware equipment, let alone the intention of use, the so-called "a skillful woman cannot make bricks without straw". The effect of performance expectation on willingness to use is weaker than that of the first two factors. This paper believes that the main functions of smart tourism applications are embodied in purchasing, ticket checking, navigation and information query, which play an auxiliary role in tourism activities. Its functionality is not enough to make tourists use it regardless of its safety and use difficulties. At present, young and middle-aged people with good information education are the main users of smart tourism applications, while older tourists do not use many of them due to difficulties in use, lack of intelligent devices, insecurity, fear of operating errors and other reasons. Finally, the social impact belongs to the role of the external environment and will not play a decisive role in the will. In the field survey, although the scenic spots and the government require tourists to use some applications of smart tourism due to the epidemic, many respondents are not aware of this impact. The possible reason is that most users are young and middle-aged, and they often have a high awareness of electronic information technology, and there are few barriers to use, so we will unconsciously use smart tourism applications in tourism activities. This is consistent with the results of UTAUT model that age and voluntariness play a regulatory role in the impact of social impact on willingness to use.

The epidemic impact has a positive effect on both social impact and performance expectation. Its f^2 is 0.127 and 0.139, respectively. The impact is close to medium, consistent with the assumption. It can be seen that although the epidemic has greatly affected people's production and life, especially the tourism industry has suffered a major blow, challenges and opportunities coexist: People's positive perception of the application of smart tourism due to the epidemic will certainly encourage more and more people to contact, get familiar with, affirm and promote it, thus enabling the transformation, upgrading and development of the tourism industry.

The f^2 of use intention on use behavior is 0.595, which has a great impact. Most of the intentions are

transformed into use behavior, while a few of them are not transformed, which may be since the epidemic situation has somewhat limited the tourist activities.

6. Policy recommendations

Through the analysis and discussion of the results, in order to better build smart tourism and promote the application of smart tourism, this paper gives the following suggestions.

6.1. Improving the security of smart tourism applications requires "three-pronged approach"

In the future, the security of smart tourism applications and systems should be ensured from three aspects. Technically, technical precautions should be taken to prevent unnecessary losses to tourists due to information theft and operational errors. In terms of management, it is necessary to supervise the information release on smart tourism applications in real time, especially important information such as epidemic information. Wrong information will have a negative impact on society. In law, relevant regulations should be formulated to regulate the behaviors that endanger the network information security from the source. The country began to implement the Cyber Security Law of the People's Republic of China in 2017, so far, the information security of the smart tourism system with big data as the core has been legally guaranteed. The main task at present is to supervise whether the law has been strictly implemented.

6.2. Develop user friendly applications and popularize information equipment and education

In the aspect of smart tourism application development, we should adhere to the principle of simplicity, easy to learn and easy to use to develop user friendly applications. Secondly, we should popularize the hardware equipment and network infrastructure of smart tourism applications. In recent years, the country has issued relevant policies to promote the construction of smart tourism, which emphasize the full coverage of communication signals, free WIFI and video surveillance in tourism sites. However, at present, there is a lack of policies on the popularization of intelligent devices for tourists. Especially for the vulnerable groups of information technology, such as the middle-aged and elderly, urban low-income people, rural people, etc., the state should also introduce incentives such as preferential purchase of machines to improve the ownership of intelligent devices for such groups. In addition, the government and society should also actively help the disadvantaged groups of information technology to learn to use information technology, and encourage them to use smart tourism applications. Community universities can be set up to regularly carry out tourism information education for the competent elderly in the area, and pay attention to the teaching of smart tourism application practice. Finally, the government and scenic spots should also actively solve the problems of tourists in the use process. Special instructors, guidance phones, training materials, etc. can be provided at the use site, or regular lectures can be held for centralized training.

6.3. Focus on enriching the functionality of smart tourism applications

In recent years, most of the policies issued by the state support the informatization construction of scenic spots in ticket purchasing, ticket checking, information release, etc. In the future, we should pay more attention to the diversification of application functions in the construction of smart tourism, and analyze the needs of tourists with the help of big data technology to make the application functions more targeted. In addition, the tourism experience, interest, knowledge and other aspects should also continue to be further cultivated to make up for its shortcomings. Finally, smart tourism applications can launch some new functions in combination with the epidemic situation, such as using geographic information technology to analyze and evaluate the travel risks of tourist destinations by using epidemic situation, people flow, space and other information, and automatically screen out areas with lower risks for

tourists to help them make travel planning and decision-making.

6.4. The society and the government should continue to promote the use of smart tourism applications

In the future, the government or scenic spots can formulate corresponding regulations to require competent tourists to use smart tourism applications. Especially under the normalization of epidemic prevention and control, smart tourism applications should play a positive role in epidemic prevention and control. As early as October 2017, the Forbidden City cancelled on-site ticket sales, fully implemented online ticket sales, and gradually realized the ticket reservation system. The Opinions on Further Stimulating Cultural and Tourism Consumption Potential also pointed out that the construction of smart scenic spots should be strengthened and the ticket reservation system should be promoted. At present, the ticket reservation business is mainly completed on the application of smart tourism. Based on the reservation system, the government and scenic spots should also come up with more comprehensive measures to meet the needs of the information technology disadvantaged groups to buy tickets. In addition, the society should cultivate an atmosphere of attaching importance to science and technology and using science and technology to create a good environment for the use of smart tourism applications.

Conflict of interest

The authors declare no conflict of interest.

References

1. Zhang L, Li N, Liu M. On the basic concept of smarter tourism and its theoretical system. Tourism Tribune 2012; 27(5): 66–73.
2. Zhang H, Li L. Intelligent Tourism Management and Practice. China: Beijing Institute of Technology Press; 2017.
3. Ning Z, Li J, Chen W. Zhihui lvyou de guanjian shi lvyouzhe yu zhihui yingyong de youxiao xianjie (Chinese) [The key to smart tourism is the effective connection between travelers and smart applications]. China Tourism News, 2019 Sept 10. Available from: http://www.ctnews.com.cn/paper/201909/10/node_3.html.
4. Viswanath V, Michael MG, Davis GB, et al. User acceptance of information technology: Toward a unified view. MIS Quarterly 2003; 27(3): 425–478.
5. Wang S. "Cloud tourism" under the background of COVD-19 pandemic: Reflections and opportunities. Journal of Three Gorges University (Humanities & Social Sciences) 2020; 42(5): 50–53.
6. Bauer E, Williams BA, Bosch MW, et al. Differences in microbial activity of digesta from three sections of the porcine large intestine according to. Journal of the Science of Food and Agriculture 2004; 84(15): 2097–2104.
7. Kirchhoff BA, Anderson BA, Smith SE, et al. Cognitive training-related changes in hippocampal activity associated with recollection in older adults. Neuro Image 2012; 62(3): 1956–1964.
8. Chen J, Zhu X. Research on impacting factors of user behavior of WeChat payment based on UTAUT and ITM. Journal of Modern Information 2015; 35(4): 35–40.
9. Wu L. Miandui yiqing lvyou jingqu ying ruhe zijiu (Chinese) In the face of epidemic, tourist attractions should actively save themselves. China Tourism News, 2019 Mar 2. Available from: http://www.ctnews.com.cn/paper/202003/02/node_3.html.
10. Le Y. Yiqing zhixia de lvyou chanye ruhe zhuanweiweiji (Chinese) [How to turn crisis into opportunity in the tourism industry under the epidemic]. China Business News, 2020 Feb 25. Available from: https://www.yicai.com/epaper/pc/202002/25/node_A09.html.
11. Hair JF, Sarstedt M, Ringle CM, et al. An assessment of the use of partial least squares structural equation modeling in marketing research. Journal of the Academy of Marketing Science 2012; 40(3): 414–433.