Research on the Adoption of Mobile Hotel Reservation Based on TTF and UTAUT

Pucong Li*, Wenliang Zhou and Weijing Kong
School of Software and Internet of Things Engineering, Jiangxi University of Finance and Economics, Jiangxi, China

*Corresponding author. Email: lipucong@jxufe.edu.cn

Abstract. It is of great significance for the promotion and popularization of tourism e-commerce to study the factors influencing the adoption of mobile hotel reservation. From the perspective of user experience, taking TTF and UTAUT as the theoretical framework, four external variables including situational awareness, user experience, perceived risk and perceived cost are added to build a mobile hotel reservation adoption model. Based on the fact that senior college students have more travel needs, this paper takes college students as an example to make an empirical analysis. The results show that: task technology matching, situational awareness, effort expectation and performance expectation have a significant impact on user experience, and then affect user behavior intention; social impact, perceived risk and perceived cost also have a significant impact on user behavior intention, among which social impact has the strongest impact on college students’ mobile hotel reservation intention. Combined with the analysis of empirical results, some suggestions are put forward for the development and operation promotion of mobile hotel reservation application.

Keywords: mobile hotel reservation, user experience, TTF, UTAUT, behavior intention.

1. Introduction

The popularity of mobile internet and smart phones has accelerated the migration of tourism e-commerce to the mobile terminal, and mobile tourism commerce has attracted more and more attention from all walks of life. At present, the industry and academia have carried out a lot of practice and research on mobile tourism business, such as the research and development of tourism e-commerce platform, user satisfaction and user adoption. However, in some subdivisions of mobile tourism e-commerce, such as booking rooms and meals, line planning and other user adoption related research involves less. Booking is an activity that people must carry out when they go on business trips, travel, visit friends and so on. More and more people begin to use mobile phones to book rooms. However, from the user feedback, the satisfaction and willingness of users to use mobile phones to book rooms are not high, and there is still much room for improvement. Therefore, this study intends to take senior college students with more needs as an example, from the perspective of user experience, combined with internal and external factors, to study the user adoption behavior of mobile hotel reservation, according to the results of empirical analysis, to provide some constructive suggestions for the application development and operation of mobile tourism e-commerce platform, in order to promote the improvement and perfection of mobile tourism business platform.
2. Analysis of the characteristics of mobile hotel reservation
There is a wide demand for hotel reservation. College students, especially senior college students, have a wide range of travel needs, such as graduation to find a job, participate in discipline competitions and so on; Vulnerable to the influence of people around. College students are willing to share, pursue fashion and conform to the trend. They are easily influenced by their classmates, friends and teachers; Price sensitive. College students have no fixed source of income and limited economic ability. As a large expenditure activity, hotel reservation is undoubtedly an important factor affecting users' behavior intention.

3. Model construction and hypothesis
Previous studies have shown that the integrated model is more objective and scientific than a single model, and can effectively predict users' use of information systems [1]. Therefore, based on the analysis of the characteristics of college students' mobile hotel reservation, this study integrates the relevant theories of TTF, UTAUT, user experience, perceived risk, situational awareness and perceived cost from the perspective of user experience to study the adoption behavior of mobile hotel reservation, so as to analyze the key factors affecting the adoption of mobile hotel reservation.

3.1. User experience
User experience is the decisive factor to win over competitors, which is a very important link for app operation. Deng Chaohua and Lu Yaobin [2] empirical research on user satisfaction of e-commerce websites shows that user experience such as interface design, ease of use and usefulness of functions of websites significantly affects user satisfaction, thus affecting users' willingness to continue to use. Therefore, we propose the following assumptions:

H1: User experience significantly affects the behavior intention of mobile hotel reservation;

3.2. Task-technology fit (TTF)
TTF is originated from the theory of perceived fit and is widely used in the study of it user adoption. Li Pucong et al [3] integrated TTF and TAM to conduct an empirical study on the adoption behavior of offline mobile O2O businesses. The results show that task characteristics and technical characteristics have a significant impact on task technology matching, and thus significantly affect the use intention of offline mobile O2O businesses. Zhang Kun et al [4] integrated UTAUT and TTF to study the influencing factors of tourism app users' use, and found that task characteristics and technical characteristics significantly affected task technology matching. In the mobile internet environment, a better matching degree of task technology can better meet the demand of mobile hotel reservation, thus improving the user experience. Therefore, we propose the following assumptions:

H2: Task characteristics significantly affect task technology matching;
H3: Technical characteristics significantly affect task technology matching;
H4: Task technology matching has a significant impact on user experience.

3.3. The unified theory of acceptance and use of technology (UTAUT)
UTAUT model is widely used in behavioral, sociological and other disciplines, mainly used to explore the user's willingness to use an information system and use behavior preferences [5]. In the UTAUT model, there are three factors that affect user adoption behavior: performance expectation, effort expectation and social influence. Performance expectation refers to the degree to which users improve their performance by adopting new technologies or services, which is similar to perceived usefulness. Effort expectation refers to the degree of effort that consumers need to make to use new technologies or services. The less efforts users make to learn new technologies, the more willing they are to use new technologies [6]. Social impact refers to the degree of influence that individuals feel from the surrounding groups. For college students, whether they use mobile phones to book a room is easily affected by the surrounding people (classmates, friends and teachers). In the mobile internet environment, the improvement of user's work performance is reflected in that it is more convenient.
than the traditional reservation, and the user feels that it is more effective to use the mobile phone for hotel reservation, while the mobile hotel reservation software is simple and easy to use, which makes the user feel that the effort to pay is low, so as to improve the user experience. Therefore, we propose the following assumptions:

H5: Performance expectations significantly affect user experience;
H6: Effort expectations have a significant impact on the user experience.
H7: Social influence significantly influences behavioral intention.

3.4. Situational awareness
The biggest feature of mobile hotel reservation is anytime and anywhere, which meets the demand of people in the process of mobile hotel reservation. At present, most of the mobile hotel reservation software can track and obtain the user's scene information in real time through smart sensors, positioning technology and other means, predict the user's next action according to the user's preference, and recommend the booking information to the user in time, which is conducive to improving the user's experience. Based on the above analysis, we propose the following assumptions:

H8: Situational awareness has a significant impact on user experience.

3.5. Perceived risk
Mobile internet is convenient for us, but it also brings some risks. Because the mobile intelligent terminal carries a large number of user sensitive information, and the internet as an open platform, it creates the possibility of privacy disclosure for users. Users may have some unforeseen consequences while trading, which brings risks to users. Based on the above analysis, we propose the following assumptions:

H9: Perceived risk is negatively related to mobile phone reservation users' intentions.

3.6. Perceived price
Perceived cost refers to the cost that users feel when they get the demand, including time, money, physical strength, energy, psychology, etc [7]. As a cost sensitive group, college students' perceived cost is an important factor influencing their decision-making. Based on the above analysis, we propose the following assumptions:

H10: The perceived cost is negatively correlated with the behavioral intention of mobile hotel reservation.

Figure 1. Mobile hotel reservation adoption model.

In conclusion, the adoption model of mobile hotel reservation for college students is shown in Figure 1.
4. Questionnaire design and data collection

4.1. Questionnaire design
In order to verify the adoption model of mobile hotel reservation, this study uses questionnaire survey to collect data and measure the constructs involved in the model. In order to ensure the content validity of the scale, most of the index questions are adapted with reference to the existing literature, and a number of experts in the field of mobile commerce are invited to review and test the designed questionnaire, and then the pre-test is carried out in some doctoral students, master students and senior undergraduate students with mobile hotel reservation experience in a university in Jiangxi Province, according to their feedback opinions and suggestions. Finally, a questionnaire including 11 constructs and 35 questions was formed.

4.2. Data collection
After the expert evaluation and prediction, the final modified questionnaire was used to sample data in several colleges and universities in Jiangxi Province. All questionnaires were sent out in the form of online electronic questionnaires, with 214 invitations. Delete the questionnaires with obvious inconsistencies between the data. 184 valid questionnaires are finally obtained, with an effective recovery rate of 85.98%. Finally, SPSS statistical software is used to analyze and process the collected data.

5. Data analysis and processing

5.1. Modeling method selection
Structural equation based on covariance method (CB-SEM) and partial least square method (PLS-SEM) are widely used structural equation models at home and abroad. In comparison, PLS-SEM has no strict requirement on the probability distribution of data, and the requirement on sample size is lower, so it can get ideal results under the condition of small sample. In this study, PLS-SEM is used to process the data, and SmartPLS3.0 path modeling tool is used to analyze the data.

5.2. Results of data analysis
Structural equation model analysis includes the inspection of measurement model and structural model. Among them, reliability and validity are the tests of measurement model, while goodness of fit significance of path coefficient are the tests of structural model.

5.2.1. Reliability test and validity test. In this study, SPSS software was used to test the overall reliability and validity of the recovered data. In the aspect of reliability test, SPSS software is used for exploratory factor analysis. The results show that the Cronbach’s α parameter of the whole questionnaire is 0.906, which indicates that the reliability of the questionnaire is good. Construct validity is tested by convergent validity and differential validity. The results show that: KMO value is 0.816, indicating that it is suitable for exploratory factor analysis, and the chi square value of Bartlett's spherical test is 3412.101, the degree of freedom is 595, the corresponding significance is 0.000, all indexes pass Bartlett's spherical test, and this sample is suitable for factor analysis; Principal component analysis was carried out again for 35 measurement items. 9 factors with eigenvalues greater than 1 were extracted from the sample data. The total variance interpretation rate of this sample was 66.345%. Except for individual factors, all factors had good differential validity, which may be caused by the factor itself having certain correlation. The analysis results of this study are similar to those of literature [8], so it is reserved for subsequent analysis; the correlation of this study is measured by three indicators: outer weight, outer loading and Ave. All indicators pass the test, indicating that the convergence validity of each construct is good; the commonly used methods to evaluate the differential validity are the Fornell Larcker criterion [9] and the cross load criterion. The Fornell Larcker criterion requires that the square root of the ave value of each factor is greater than the
correlation coefficient between each factor and other factors in the model. In this study, the average square root of each factor is greater than its correlation coefficient with other factors, indicating that the differentiation validity of each factor is better.

5.2.2. PLS path modeling results. After the validation of the external model, we use SmartPLS to calculate the internal model reflecting the relationship between the latent variables. As can be seen from Figure 2 and Table 1, all assumptions are supported. The goodness of fit R² of task technology matching, user experience and behavior intention were 47.8%, 34.8% and 39.5% respectively. In the field of consumer behavior research, if R² is greater than 0.2, the model fitting degree is better; in the field of marketing research, if R² is greater than 0.75, the model fitting degree is better [9]. This study belongs to the field of consumer behavior, and R² values are greater than 0.2, so the results of this study have good goodness of fit.

| Path | Hypothesis | Path Coefficient | P-value | Significance | Remarks |
|------|------------|------------------|---------|--------------|---------|
| UE→BI | H1 | 0.116 | 0.019 | ** | Supported |
| TAC→TTF | H2 | 0.178 | 0.011 | ** | supported |
| TEC→TTF | H3 | 0.575 | 0.000 | *** | Supported |
| TTF→UE | H4 | 0.086 | 0.082 | * | Supported |
| PE→UE | H5 | 0.113 | 0.077 | * | Supported |
| EE→UE | H6 | 0.305 | 0.000 | *** | supported |
| SI→UE | H7 | 0.319 | 0.000 | *** | Supported |
| SA→BI | H8 | 0.379 | 0.000 | *** | Supported |
| PR→BI | H9 | -0.207 | 0.002 | *** | Supported |
| PC→BI | H10 | -0.294 | 0.000 | *** | Supported |

Figure 2. Model hypothesis test result.

6. Results and conclusion
Based on the above analysis results, it can be found that:

User experience (β = 0.116, p < 0.05) significantly affected behavioral intention. It can be seen that with the improvement of people's living standards, users no longer simply pursue low-level
availability, and they will pay more attention to deep-level spiritual needs when purchasing products or services. Therefore, when designing and developing the software, the mobile hotel reservation service provider should not only meet the basic needs of customers, but also fully consider the user experience. By improving the function and personalized service of the mobile hotel reservation software, the usability, convenience and ease of use can be integrated into the booking software, so as to enhance the user experience and improve the user behavior intention. Task characteristics ($\beta=0.178$, $\rho<0.05$) and technical characteristics ($\beta=0.575$, $\rho<0.01$) significantly affect task technology fit and user experience ($\beta=0.086$, $\rho<0.1$). Task technology fit has always been a key factor affecting user adoption. From this study, task technology fit affects user behavior intention through influencing user experience. It can be seen from table 1 that the impact of technical features is significantly greater than task features. It can be seen that in the design and development process of mobile hotel reservation application, on the basis of understanding user tasks and user needs, more advanced technical means should be used to solve user problems and meet user needs. When the technology is realized, more attention should be paid to user experience needs from the perspective of user experience, think about how to achieve the adaptation of tasks and technologies.

Effort expectation ($\beta=0.305$, $\rho<0.01$) significantly affects user experience. Effort expectation refers to the difficulty of users using new technology. At present, many mobile hotel reservation software will be mixed with some useless information, which brings trouble to users' operation and seriously affects users' experience. Therefore, mobile hotel reservation operators should improve the intuitiveness of the interface, reduce the complexity of the interface, reduce the difficulty of software operation, and deeply understand the user's usage habits, so that users can feel convenient, fast and simple when using the software. Situational awareness ($\beta=0.379$, $\rho<0.01$) significantly affects user experience. It can be seen that the use of mobile hotel reservation app has a great relationship with the user's use scenarios. For example, when the user makes a reservation, the system can obtain the current scene information of the user through various technical means, such as geographic location, movement, weather information, etc., and accurately push the hotel information that most conforms to the user's wishes to the user in combination with the user's previous preferences, which will greatly improve the user experience and promote the user's adoption. Therefore, in the design and development process of mobile hotel reservation application, we should fully consider the user's use scenarios, and realize scenario awareness through corresponding technical means. Social influence ($\beta=0.319$, $\rho<0.01$) significantly affected behavioral intention. It can be seen that user behavior is easily affected by the surrounding people, reflecting certain group characteristics. Therefore, mobile hotel reservation operators should pay attention to word-of-mouth effect and brand promotion of user's circle of friends in the operation promotion process. For example, operators can promote the rapid spread of application software by recommending instant coupon for friends. Perceived risk ($\beta=-0.207$, $\rho<0.01$) significantly affected behavioral intention. At present, all kinds of information security risk events occur from time to time, and users' awareness of information security is also increasing. More and more attention is paid to risk prevention in the process of using information system. A large number of important personal sensitive information, such as identity information, bank account information, communication information, etc, are involved in the process of mobile hotel reservation. Therefore, in the design and operation of mobile hotel reservation software, special attention should be paid to the protection of personal sensitive information of users, to relieve users' concerns, to eliminate users' insecurity, and to construct users' mobile hotel reservation from two aspects of technology and brand technology trust and service provider trust can reduce users' perceived risk and enhance users' willingness to adopt. Perceived cost ($\beta=-0.294$, $\rho<0.01$) significantly affected behavioral intention. In order to reduce the perception of extra cost in the process of users' use, mobile booking operators should make reasonable pricing, make small profits but quick turnover. They should attract users by providing some concessions that other channels do not have. At the same time, they should strive to improve the user's operating experience, reduce the time cost of user search, and thus enhance users' willingness to use.
Acknowledgement
This study was supported by Science and Technology Project of Jiangxi Provincial Department of Education (Project No. GJJ 160432), and Special Fund for Visiting Scholars of the Young and Middle-aged Teacher Development Program for General Undergraduate Colleges in Jiangxi Province, China.

References
[1] Dishaw M T, Strong D M. Extending the technology acceptance model with task-technology fit constructs [J]. Information & Management, 1999, 36(1): 9-21.
[2] Deng C, Lu Y. Research on the influence of perception factors on satisfaction and behavior of e-commerce website users [J]. Library and information work, 2008 (05): 70-73 + 89.
[3] Li, P, Zhong, Y. 2014. A Study of Offline Merchants’ Acceptance of Mobile O2O Commerce. Contemporary Finance. (Sept. 2014), 102-111.
[4] Zhang K, Zhang P, Zhang Y. Research on the Influencing Factors and Behaviors of Tourism App Users Based on the Theory of UTAUT and TTF [J]. Enterprise Economy, 2016 (09): 150-156.
[5] Xu L, Wang J, Cha J. Research on the adoption behavior of e-commerce of micro enterprises based on UTAUT [J]. Journal of Central University of Finance and economics, 2014 (07): 107-112.
[6] Venkatesh V, Davis F D. User Acceptance of Information Technology: Toward a Unified View[J]. Mis Quarterly 2003, 27(3): 425-478.
[7] Yin Y, Li L. A Study on the Influencing Factors of Hotel Online Direct Customers' Booking Intention [J]. Tourism Forum, 2011,4 (01): 28-32.
[8] Hair, J. F., Ringle, C. M., and Sarstedt, M. 2011. Pls-sem: indeed a silver bullet. Journal of Marketing Theory & Practice. 19 (Feb. 2011), 139-152.
[9] Fornell C, Larcker D F. Evaluating structural equation models with unobservable variables and measurement error[J]. Journal of Marketing Research(JMR), 1981, 18(1): 39-50.