

Research on Hotel Guests' Acceptance of Face Recognition Systems Based on the UTAUT

Yunrou Lin*, Yifei Huang, Yuanhang Li

Guangdong Polytechnic, Foshan 528000, Guangdong, China

**Author to whom correspondence should be addressed.*

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Abstract: Integrating emerging technologies into the accommodation industry can provide tourists with a better experience. This paper focuses on guests' acceptance of face recognition systems in hotels and studies the influencing factors that affect guests' choice of staying in hotels with face recognition systems. Through research and analysis, hotels can understand the needs of different guests, make improvements, and more accurately explore relevant markets. At the same time, developers of face recognition systems can also understand the market demands of the accommodation industry, providing professional advice for their entry into the tourism service industry. This paper first reviews the application of face recognition systems in the tourism industry. By combing through relevant literature on the technology acceptance model, the research model of this paper is determined, and hypotheses are proposed. Meanwhile, based on existing literature on face recognition systems, the variable of privacy and security is added to form a research model for the influencing factors of guests staying in hotels with face recognition systems. Finally, development suggestions are put forward for hotels with face recognition system technology based on the research results.

Keywords: Biometric system; Face recognition system; UTAUT; Privacy concerns

Online publication: March 26, 2025

1. Introduction

With the development of society and the continuous update and iteration of emerging technologies, the current era relies on intelligent technology. Intelligent technology has a wide coverage, including content in fields such as the Internet of Things, big data, biometrics, and artificial intelligence. Höjer et al. ^[1] believe that intelligence is not just the independent progress of a certain technology but the result of the joint composition and collaborative use of many technologies. The development of emerging technologies has changed business models and the structures of some industries to a certain extent.

The development of the tourism industry and technological progress are usually inseparable. Since the 1980s, the continuous development of information and communication technology has been changing the development and innovation of the global tourism industry. Since 1995, consumers have increasingly relied on the Internet to obtain travel information. From the traditional tourism industry, combined with comprehensive and complex technological capabilities, it has transformed into today's smart tourism.

The hotel industry is an important part of the tourism industry. With the development of technology, the software and hardware in hotels have been upgraded to a certain extent. Hotels upgraded by technology are collectively referred to as smart hotels. The emergence of smart hotels not only changes the traditional hotel industry model and brings guests a better accommodation experience but also improves hotel management efficiency and reduces human resource costs [2]. Building intelligent hotels is a necessary way to adjust the structure of China's hotel industry and can also enable its sustainable development [3]. It can be seen that smart hotels will occupy a broader space in the future hotel market. Therefore, this paper will conduct research on face recognition systems in the direction of smart hotels in smart tourism.

2. Concept and related applications of face recognition systems

Biometric features are the automatic recognition of a person's identification or a form of identity verification. The research of many scholars divides biometric features into physiological features, such as fingerprints, pupils, irises, faces, etc. Or behavioral features, such as signature handwriting, voices, etc. These biometric features have personal attributes, are unique, and difficult to replicate.

Face recognition technology is a specific branch of the biometric system. Face recognition technology creates a "template" of a face image based on the human face and compares it with previous face images. It identifies and verifies a unique person based on the facial contour of the human body. Different from other biometric information, such as fingerprints, face recognition technology can be used to "passively" identify users. This feature makes it more convenient to collect facial information. Moreover, people feel more relaxed when using face recognition for biometric identification.

Although most biometric systems are for employees, tourism service providers such as the Disney World Resort provide face recognition systems for their guests. In the catering industry, many fast-food restaurants such as McDonald's, Burger King, and Dunkin Donuts have experimented with face recognition systems, aiming to improve their human resource management and provide convenience for employees. Face recognition systems have also been used in the recruitment of the tourism and hotel industries. By identifying the facial expressions of candidates, their emotions can be inferred, and their emotional intelligence can be evaluated. Some scholars have also researched the intention to use face recognition technology in fast-food restaurants and indicated that customers' hedonic motivation has a certain impact on their use of face recognition technology. Compared with the fingerprint recognition system, which was more acceptable to users before and was added to door locks to open hotel rooms, the face recognition system can better avoid contact between customers and items, as well as between employees and customers. At the same time, the face recognition system can more actively capture user information and improve work efficiency.

3. UTAUT technology acceptance model

The Unified Theory of Acceptance and Use of Technology (UTAUT) was developed by Venkatesh et al. [4] based on

eight basic models, including the Task-Technology Fit Model (TTF), Innovation Diffusion Theory (IDT), Theory of Reasoned Action (TRA), Theory of Planned Behavior (TPB), Motivational Model (MM), the Composite Model of TAM and TPB (C-TAM-TPB), Model of PC Utilization (MPCU), and Social Cognitive Theory (SCT). The UTAUT technology acceptance model mainly includes five variables: performance expectancy, effort expectancy, facilitating conditions, social influence, and behavioral intention. The UTAUT model is mainly applicable to exploring why and how individuals use emerging technologies or tools.

Lai ^[5] added two variables, informativeness and entertainment, based on UTAUT to study the usage intention of mobile-terminal tour guide software users. Xu used UTAUT to explore the usage intention of users of UGC (User Generated Content)-type smart tourism service platforms ^[6]. At the same time, according to the research needs, the influencing variable of trust level (TR) was added. Araújo, Vila et al. ^[7] studied spa tourism in Spain based on the UTAUT2 model derived from UTAUT. Some scholars have also researched the intention to use face recognition technology in fast-food restaurants based on UTAUT. Hateftabar ^[8] used the UTAUT model with personal innovation as a moderating variable to study the effective factors of consumers' intention to book online travel products .

The above-mentioned research results show that the UTAUT model can be well-adapted to the research on users' acceptance and usage intention of emerging technology products in tourism. After comprehensively considering the advantages and disadvantages of each model, this paper selects the UTAUT model to study guests' acceptance of face recognition systems in smart hotels.

3.1. Privacy and security

Through the search and collation of literature, it is found that in the research literature on biometrics and face recognition systems, many scholars have added privacy and security as variables affecting usage intention to adjust the UTAUT model and verified that privacy and security are one of the considerations affecting users' use of emerging technologies. Some research indicates that citizens in different countries and regions have similar concerns about face recognition technology, that is, its convenience and enhanced security.

Morosan ^[9] proposed that for smart hotels to survive and develop better, one of the basic goals related to consumers that must be achieved is to protect the safety and personal privacy of consumers, that is, hotel guests. In the research on existing literature using the UTAUT model as the research model, it is also found that many scholars will also adjust the original UTAUT model by adding external variables suitable for the research object, according to the specific needs of the research object. Since the research object of this paper is smart hotels with face recognition, based on previous literature research, this paper explores the impact of privacy and security on the usage intention of biometric systems or face recognition systems. Therefore, privacy and security are added as variables affecting usage intention to adjust the UTAUT model, improving the accuracy of the research.

3.2. Research methods and design

This paper uses the research methods of literature research, questionnaire survey, and the combination of theoretical and empirical analysis for investigation and research. Based on the summary of literature review materials and the application of relevant theories combined with the basic framework of the integrated technology acceptance model, four variables affecting guests' intention to use the face recognition system in hotels are constructed, namely

performance expectation (PE), effort expectation (EE), social influence (SI), and facilitating condition (FC). At the same time, through the analysis and research of the literature on face recognition technology, it is found that many scholars regard privacy and security as one of the important variables affecting users' experience of face recognition technology. Therefore, based on the framework of the integrated technology acceptance model (**Figure 1**), this paper adds the explanatory variable of privacy concerns (PC) to test and analyze guests' intention to choose hotels with face recognition technology.

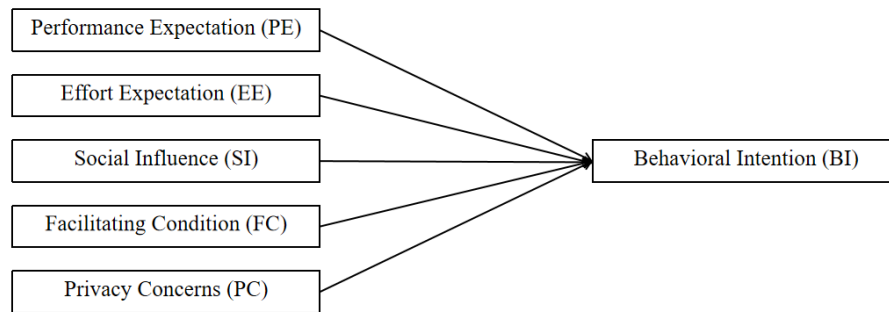


Figure 1. Framework of integrated technology acceptance model.

This study uses the questionnaire survey method for data collection and investigation. The structure and questions of the questionnaire are designed with reference to existing literature. The questionnaire is generally divided into three parts: questionnaire introduction, a scale for measuring the influencing factors of guests' acceptance behavior of face recognition systems in smart hotels, and a survey of the respondents' personal basic information.

3.3. Statistical results and analysis

According to the research object of this paper, the survey objects are determined to be guests who have stayed in smart hotels in Guangzhou that use face recognition systems for room unlocking. This paper conducted a pre-survey in November 2023 and then conducted a questionnaire survey from January to May 2024. The questionnaires were mainly collected through on-site surveys and online surveys using Wenjuanwang. The questionnaires were distributed through travel platforms (Ctrip, Fliggy, Tongcheng Travel) and mainstream social media. A total of 318 questionnaires were collected, with 308 valid questionnaires, and the effective recovery rate was 96.68%.

The data collected were analyzed using SPSS 26.0. The data were analyzed through descriptive analysis, reliability analysis, validity analysis, correlation analysis, regression analysis, and an independent-sample T-test. Under the background that the reliability analysis and validity analysis of this study passed the test and each scale had a good correlation, regression analysis was carried out on the five independent variables of performance expectation (PE), effort expectation (EE), social influence (SI), facilitating conditions (FC), and privacy concerns (PC) on the dependent variable of behavioral intention (BI) using SPSS 26.0. The analysis results are as follows:

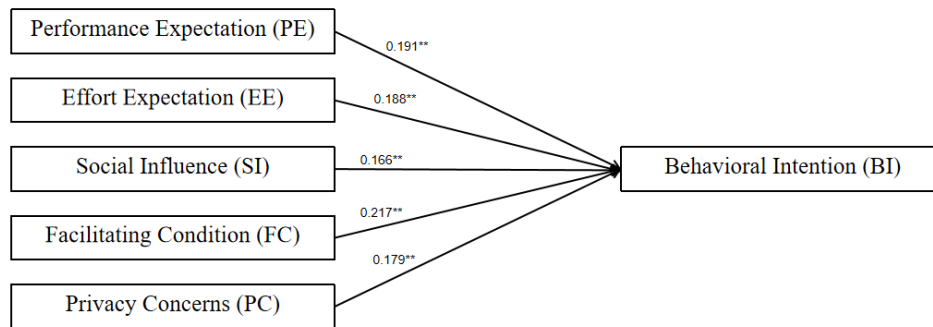


Figure 2. Analysis result of behavioral intention.

The non-standardized coefficients B of all variables are greater than 0, indicating that the five independent variables of performance expectation (PE), effort expectation (EE), social influence (SI), facilitating conditions (FC), and privacy concerns (PC) all have a significant positive impact on the dependent variable of behavioral intention (BI).

4. Conclusions

This paper is based on the UTAUT model scale and adds the impact of privacy and security on usage intention according to the research object of this paper to form the research model and scale of this paper. According to the cultural background of the survey objects, the questionnaire of this paper was formed. The data collected were tested using the analysis software SPSS 26.0, indicating that the scale used in this paper has good reliability and validity. Therefore, it can be proved that the UTAUT model, plus the factor of privacy and security, applies to the research on the usage intention of face-recognition-enabled smart hotels.

Combined with the research results of this paper, it shows that performance expectancy, effort expectancy, social influence, facilitating conditions, and privacy and security are all closely related to guests' choice of staying in smart hotels with face recognition systems. Based on the research objectives and survey results, management suggestions are put forward for current smart hotels with face recognition technology and developers of face recognition technology in subsequent operations.

4.1. Attach importance to the development and research of face recognition technology

Through the analysis of the statistical results of this study, it is found that performance expectancy, effort expectancy, and facilitating conditions all have a positive impact on guests' intention to stay in smart hotels with face recognition systems. It is also found that the variable of facilitating conditions has the greatest positive impact on usage intention. This indicates that the facilitating conditions brought by the face recognition system during hotel check-in account for a relatively large proportion in guests' choice of the hotel. When guests use the face recognition system during

check-in, they need to provide fewer hardware conditions themselves, mainly using the hardware facilities provided by the smart hotel itself. Therefore, if smart hotels hope to attract more guests or increase the repeat-stay rate of guests, they should pay attention to selecting the face recognition technology system and hardware facilities of the hotel, making the technology used in the hotel convenient and fast and in line with customers' usage habits. At the same time, attention should be paid to maintaining the hardware and software facilities of the equipment to ensure the ease of use for customers during the use process, improve guests' satisfaction with the face recognition system, and thus ensure that the face recognition system can meet the usage needs of guests and enhance their willingness to use it.

4.2. Attach importance to the social influence and market promotion of hotels

The survey results of this paper show that social influence has a significant positive impact on the usage intention of smart hotels with face recognition. Therefore, smart hotels should pay attention to the publicity and promotion of this emerging face recognition technology in the hotel to attract more potential customers. Through the research results, it can be found that the age group of guests who have stayed in smart hotels with face recognition systems is concentrated between 18 and 39 years old. This group of young people is the group most affected by social media. Hotels can take advantage of this by launching corresponding promotional activities. For example, launching activities that encourage guests to upload information such as usage evaluations and photos of the face recognition system in smart hotels to online social media or OTA platforms in exchange for coupons and other preferential offers, to encourage guests to share their hotel experiences, which will virtually promote the smart hotel. At the same time, hotels can add the highlight of the face recognition system to various travel reservation platforms and OTAs, so that potential guests interested in the face recognition system can learn about this information and increase their willingness to choose smart hotels. Developers of face recognition technology can also promote their own technology to more hotels with intelligent upgrade needs through the relevant promotion of smart hotels, thereby expanding their business volume.

4.3. Improve the privacy and security of face recognition systems

According to the research results of the newly added moderating variable of privacy and security on usage intention, it shows that the factor of privacy and security has a significant positive impact on users' usage intention in the use of face recognition in smart hotels. If smart hotels want guests to be willing to choose the face recognition system for check-in, they first need to address guests' concerns about personal privacy security leaks. Hotels can communicate with guests during check-in, providing a personal privacy protection agreement or commitment of the hotel's own face recognition system, so that customers can perceive that the system is safe and secure. At the same time, during the guests' use process, the face recognition system must ensure that it operates correctly and does not allow guests to enter a room that does not belong to them. If such an error occurs, the smart hotel must have corresponding remedial measures. In addition, hotels can choose system platforms that guests trust, such as Alipay and WeChat. Using platforms that already archive and use the face information of most people for interactive authentication can reduce guests' concerns.

Disclosure statement

The author declares no conflict of interest.

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