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Customers' Acceptance of Automated Hotel

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ABSTRACT

Hotels moved in the direction of intelligentization, network connection and sharing of travel modes in the 21st century. Automation, robotics, and artificial intelligence (AI) are expected to promote significant changes to hospitality and tourism sectors. Hotels that take advantage of these technological advances would benefit from this new business model as they can differentiate themselves from competitors who fail to adopt these new innovations. In the traditional hotel industry, guests are not served by automated technologies. Nowadays, non-human based business-models and service innovations have become the latest business strategy choice in the hospitality and tourism industry, especially during the current COVID-19 pandemic. Traditional hotels face complications such as long wait times, management inefficiency, and customer privacy. This thesis focuses on testing the efficacy of the modified Technology Acceptance Model (TAM) that is traditionally used to predict potential consumers' acceptance and explores the reasons for acceptance of this novel and innovative service model. The basic tenets of the UTAUT posits that Perceived Usefulness (PU), Perceived Ease of Use (PE), Subjective Norm (SN), and Facilitating Conditions (FC) impact potential customers' acceptance of the automated hotel. Data from a convenient sample of 256 customers were collected using Mturk, a crowdsourcing marketplace. The thesis further explores the effects of moderators like age, gender and culture.

The findings of this thesis reveal that PE, SN and SE have significant relationships with Attitude (A). Trust (T) and Attitude (A) have significant relationships

with Behavioral Intention (BI). Moreover, there is no moderating effect of culture and age. Gender interferes with the relationship between A and BI.

Keywords: automated hotel, performance expectancy, effort expectancy, subjective norm, facilitating conditions, acceptance, TAM

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LIST OF ABBREVIATIONS

Constructs

A ..... Attitude

BI ..... Behavioral intention

EE ..... Effort Expectancy

FC ..... Facilitating Conditions

PBC ..... Perceived Behavioral Control

PU ..... Perceived Usefulness

PEOU ..... Perceived Ease of Use

PE ..... Performance Expectancy

SI ..... Social Influence

SN ..... Subjective Norm

Models

C-TAM-TPB ..... Combined TAM and TPB

IDT ..... Innovation Diffusion Theory

MM ..... Motivational Model

MPCU ..... Model of Personal Computers utilization

SCT ..... Social Cognitive theory

TAM ..... Technology Acceptance Model

TRA ..... Theory of Reasoned Action

TTF ..... Task-technology Fit

TPB .... Theory of Planned Behavior

CHAPTER 1

INTRODUCTION

1.1 Introduction

In the era of information explosion, what Schwab (2016) calls a fourth industrial revolution, people are no longer satisfied with traditional service patterns and service delivery. New technological innovations cause an increase in people's desire to try services that they would have otherwise during their leisure. As innovated hospitality firms offer more touchpoints in their service design and employ Technology based Self-Services (TBSSTs) and Robots, Artificial Intelligence and Service Automation (RAISA) in hospitality and tourism sectors, consumers are now faced with a myriad of technology-based service delivery options where they are indirectly interacting with service firm employees (Dabholkar & Bagozzi, 2002; Agah, Cabibihan, Howard, Salichs, & He, 2016; Ferreira, Sequeira, Tokhi, Kadar, & Virk, 2017; Talwar, Leonhard, Scott, Murphy, Pearson, Goodrich, & Chace, 2015). "Technology based Self-Services (TBSSTs) includes Internet-based services, airline kiosks, automated hotel check-in and checkout, automated teller machines (ATMs), self-scanning merchandise checkout stations, or automated phone systems (Dabholkar & Bagozzi, 2002, P.184)." Anima-technology or animatronics, a part of RAISA allows consumers to interact with each other using natural speech in different languages. Face recognition technology, non-inductive intelligent unlocking technology, intelligent robot technology, face capture tracking technology, and

robot voice interaction technology are innovations that allow service providers to track customers and improve the efficiency of their services (Agah et al., 2016; Ferreira et al., 2017; Talwar et al., 2015).

Experts agree that automation substitutes have already influenced the hospitality and tourism industry and will shift more tasks away from humans to automaton technology. The automation substitutes for labor means the development of RAISA combined with the rapid rise of automation in communities around the world are reshaping the lives of homo-economicus. With the arrival of the COVID-19 pandemic, the demand for contactless services and fully automated services have risen even more, making people feel more at ease when utilizing hotels, restaurants, and supermarkets. According to a contemporary geographer Harvey (1999), these services broke through the true realm of time and space integrating the daily life of users, and even reducing the gathering of people which in turn reduces the risk of cross infection during the COVID-19 pandemic era.

The integration of technological innovations leads to the progress of the entire hospitality and tourism industry. Therefore, hotel industries are considering introducing "Robotic Hospitality" where robots, rather than people, deliver products to satisfy customers' needs. Hotel industries are struggling with spreading, introducing, and increasing the number of users to experience the self-service and usage of automated hotel systems. According to Ivanov & Webster (2017), the application of the automated hotel system would benefit the hospitality and tourism industry because of reduced labor cost. To be considered as an automated hotel, the customers would have no contact with employees and all service are provided by smart devices. Automated hotels do not require

manual operation but instead apply a variety of technological innovations to improve hotel services which will in turn increase the hotel's production cost and the hotelier's perceived quality of their stay; these benefits make these hotels most efficient.

Automation services attract tourists to lodge in hotels for two reasons. First, hoteliers use the technology as a marketing strategy to sell services at a lower cost. However, applying RAISA means alleviating the basic cost of a hotel workforce (the humanized operating system), however intelligent technology equipment comes with a high initial cost. Second, using RAISA promotes the development of contactless economy. Especially the sudden COVID-19 pandemic has accelerated this process. An important measure for COVID-19 prevention is people avoiding crowded places and keeping social distance. Thus, the contactless economy has played a major role in the service industry. Subsequently, new formats such as the automated car, delivery service, retail, supermarket and restaurant firms have been launched in Asia, creating new consumption scenarios. Hotels that have RAISA can transmit information quickly, enable contactless services, and implement online management. Online management of hotels has allowed hotelier to apply programs to design personalized services in order to meet the basic needs of customers. With the integration of RAISA in hotels, the Automated Hotel model is relatively new and impressive, solving the problem of homogenization of some hotels and driving potential financial benefits. The problem of hotel homogeneity refers to the fact that the hotel does not create a personalized hotel, but blindly mimics technologies of the smart hotel and upgrades its technology. Automated hotels also stimulated the revival of the economy and promoted the overall development of the hospitality and tourism industry. The adaptation of automated hotels brings a host of both

opportunities and challenges for hotel managers, employees, and for the customers themselves. However, in hotels combined with Artificial Intelligence (AI), consumers receive greater personalization at faster speed (Kazandzhieva, Ilieva, & Filipova, 2017). Under the COVID-19 pandemic, the idea of contactless service has obtained new developments and gradually became a popular demand for hotels and customers. At the same time, automated hotels not only reduce the overhead of labor and operating costs, but also makes hotel management more scientific and refined. By extension, based on customers' consumption levels, hotel target groups, and hotel needs, hoteliers choose to upgrade or transform hotels.

1.2. Research Purpose

This thesis investigates factors that influence a customers' choice of an automated hotel and discusses potential implications and strategies for practitioners who are interested in developing fully automated service.

The main purpose of this thesis is: (1) to explore a few selected critical factors that influence customers to lodge in automated hotels; (2) to evaluate customers perceptions of automated hotels; (3) to develop a theoretical model incorporating trust and self-efficacy on behavioral intention; and (4) to test the effect of technology related factors on customers' acceptance of automated hotels. Despite the notable advancements in RAISA, the research tested the behavioral intention of hotel guests whether they will accept such business, if they will desire to stay in such hotels, and even what particular aspects of these hotels could cause scrutiny in AI hotels. It is intriguing to study the development of AI hotels and the way customers respond because of the state of the world during a pandemic time and the reliability of people is not as consistent, so AI is a

great alternative to meet needs. In advancing technology, AI systems need to be upgraded on a consistent basis to meet cultural standards. Because of the growth of rapid advancements, the upgrades for technology will become a burden financially for a hotelier. Because of robotic labor, significant jobs are being cut, so this affects the hospitality and tourism industry.

1. Understanding the factors affects the behavioral intention of customers to select the automated hotel as their choice of accommodation;
2. Exploring the interaction between TAM variables and the behavioral intentions and willingness of automated hotel staying;
3. Based on the TAM model and add trust and self-efficacy to analyze the effects on behavioral intention;
4. Exploring the effects of those moderators (age, gender, and culture) influences consumers' willingness to lodge in an automated hotel.

1.3 Significant of Research

The “self-service” tendency is changing the face of customer service in the hospitality and tourism industry. From the perspective of guest experience, this thesis is important for hoteliers to consider whether automated hotels can be implemented and further promoted. It is important for hoteliers, researchers and scholars to consider both individual and global attitudes so that appropriate efforts can be made to bring all pertinent positive attitudes to bear on the consumer’s evaluation of the automated hotel model. Will the self-service strengthen consumers’ travel modes? Will the hotel group use unexpected funds to upgrade directly to high-end hotels? The significance is the customers’ demand and response that determines the success and positioning of the future

of automated hotel. I expect to find out that the four key determinants of performance expectancy (PE), effort expectancy (EE), social influence (SI), facilitating conditions (FC) and corporate with Trust (T) and Self-efficacy affect the willingness of an automated hotel staying. Furthermore, in terms of age, the elderly population are generally less technologically skilled as their millennial counterparts who have considerable familiarity with automated services. Therefore, automation is designed to be simple and convenient; easy to operate and use. The easier automated technology will have a significant effect on increasing a consumer's willingness to use such technology. Because automatic check-in and checkout or face-scanning check-in as a promotional tool is not popular, consumers living outside of modern Asian countries are generally less familiar with the process. Therefore, if non-human based business-models and service innovations can provide assistant in use, or strengthen the promotion of this promotional tool, it will greatly increase a customer's willingness to use it, and will help improve the sales performance of the hospitality and tourism industry in the future. Nevertheless, the service concept of automated hotels will likely be adopted by innovative leaders in the hospitality and tourism industry.

Trust and Self-efficacy are expected to have a direct effect on the lodging intentions of existing users. Self-efficacy is defined as "people's judgment of their capabilities to organize and execute course of action required to attain designed types of performance (Bandura, A, 1986)". Now customers are using new technological systems to perform most tasks that involve sensitive information and include all of the steps of the lodging process like bookings, to check-ins (Figure 1.1 flow chart of self-check-in system) to check-outs.

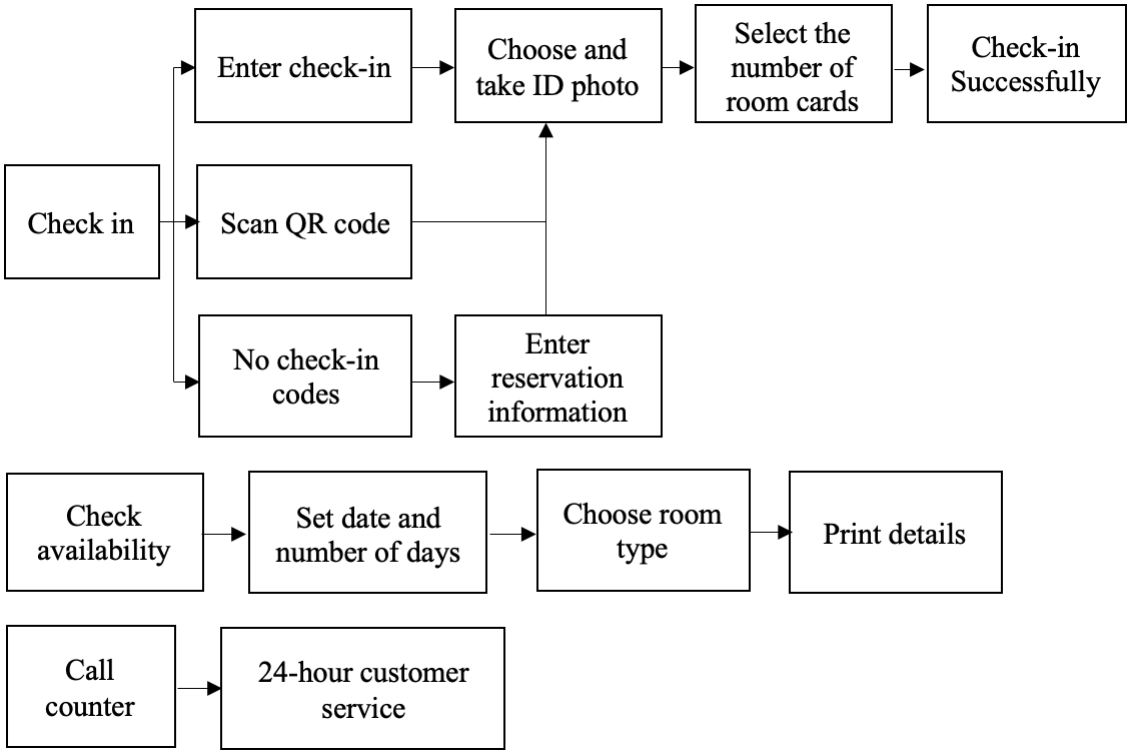

Figure 1.1 Flow chart of self-check-in system

Therefore, hoteliers can increase their sense of trust, and loyalty of current customers by strengthening self-efficacy of existing users. Furthermore, this research differs from past studies as followed:

First, little is known regarding customers use of fully self-service process and the variables that influence the acceptance or rejection of automated hotel technologies.

Second, the study is to address the gaps by developing an innovative model that predicts customer behavior intention with an automated hotel staying and the willingness to recommend automated hotels to others.

Thirdly, a further contribution of the paper is that the ETAM (Extended Technology Acceptance model) (Davis, 1996) has been extended with additional variables, relevant for use in an automated hotel context.

To explore the willingness to use automated technology, the Extended Theory of Technology Acceptance Model (TAM) can be used to test the adoption of the automated technology. RAISA is a tool for information technology applications. If the tools are easy to use in the daily life of consumers, they will be used at increased rates in the future. Many scholars have continued to modify the original model to increase its explanatory power. This thesis enriches the TAM by incorporating two constructs, namely trust and self-efficacy in order to explain error variation in TAM. Furthermore, this research contributes by examining age, gender, and cultural demographics to further investigate their combined effect on people's choice for automated hotels.

The next section builds an Extended Theory of Technology Acceptance model (ETAM) to explain the impacts on acceptance for potential customers and proposes research hypotheses. The third part presents results of hypothesis conducted in the

context of the automated hotel model to test proposed hypotheses. The results of thesis will be partly discussed in relation to the implication of practical areas, followed by a test of effects of attitude toward technology in an automated hotel and future behavior intention of lodging in an automated hotel through the examination of the ETAM.

CHAPTER 2

LITERATURE REVIEW

Evolution of new technologies in hotels since 2014 are changing from keyless entry, wearable apps, robots, virtual reality, to room alterations (Kazandzhieva et al., 2017). Table.1 is adopted from (Meuter, Ostrom, Roundtree, & Bitner, 2000) examples of SSTs across the purpose and types of technology that firms are using to interface with customers in self-service encounters. The types of technology interfaces (the columns in Table 2.1) include telephone-based technologies and various interactive voice response systems, direct online connections and Internet-based interfaces, interactive free-standing kiosks, and video or compact disc (CD) technologies (Meuter et al., 2000). Online banking technology represents a variety of different services ranging from (Kolodinsky et al., 2004): the common automatic teller machine (ATM), services and direct deposit to automatic bill payment (ABP), electronic transfer of funds (EFT), phone banking and computer banking (PC banking). Some of these RAISA technologies have already changed the way the customer experiences the banking industry and changed the workforce of banking. Curran, Meuter, & Surprenant (2003) revealed that at least two forces that can move people to use a technology in the service encounter, one being the consumer's attitude toward employees (both individual and global attitude toward the service firm) and the second being the attitude toward SSTs (both specific SST of interest and global attitude toward service technologies). Curran's intention-attitude model

demonstrates that people can feel negatively toward service employees, which then negatively influences the more general attitude toward the provider's service. This negative attitude is shown to increase SST usage (for the ATM). Alternatively, customers may be attracted to the perceived positive features of the SST, thus increasing their positive attitude toward the specific SST and general attitude toward service technologies. Kinard, Capella, & Kinard (2009) found out younger respondents are more confident in their ability to use self-service checkout system than older respondents.

In light of the trend in integrating artificial intelligence and robotics into tourism and hospitality operations, it is important to understand how consumers think about automated hotels. Although hospitality is supposed to be a keyword for showing interpersonal service, replacement of human labor could enhance profit. The "fully-automated" travel mode refers to which automated technologies are able to handle tasks without customers manually operate. This travel mode that could potentially replacement of the human labor in travel and hospitality industries does invest a lot financial costs on initial costs, including acquisition costs, installation costs, maintenance costs, software update costs, costs for adapting the premises to facilitate robot's mobility, costs for hiring specialists to operate and maintain the robots/kiosks/chatbots, and costs for staffing training to guarantee secure, effective, and efficient work with the robots/ kiosks/chatbots (Ivanov & Webster, 2017). After reveal some of these financial costs, travel, tourism, and hospitality companies will be hindered by the adoption of "fully-automated". However, the nature of "fully-automated" is to replace labor. Business and industry leaders and the stock market all recognize the fact that profits go up as labor costs go down when people

are replaced by machines (Pierce, 2015; Andrew, 1984). When RAISA productivity per dollar is

higher than the labor productivity per dollar, companies will be more willing to use RAISA, instead of human employees (DeCanio, 2016).

Table 2.1: Categories and Examples of SSTs in use

Interface/ purpose	Telephone/ Interactive Voice Response	Online/Internet	Interactive kiosks	Video/CD
Customer service	• Telephone banking • Flight info • Order status	• Package tracking (ex. Federal Express package tracking) • Account info	• ATMs • Hotel checkout	
transactions	• Telephone banking • Prescription refills	• Retail purchasing • Financial transaction	• Pay at the pump • Hotel checkout • Car rental	
Self-help	• Info telephone line	• Internet info search (ex. online brokerage services) • Distance learning	• Blood pressure machines • Tourist info	• Tax preparation software • TV/CD-based training

Table 2.2. Summary of Methodological Review of UTAUT Research

Authors	Setting	Methodology	New Construct	Sample	Results
Alaiad & Zhou (2013)	Healthcare robots	UTAUT	Trust	96(50 valid) patients	PE, EE, SI, and Trust→ BI FC→BI
Al-Gahtani, Hubona, & Wang (2007)	Information technology (IT)	UTAUT and Hofstede's cultural dimensions		722 knowledge workers using computer Non-western culture Saudi vs north U.S.A	PE, EE, SI, FC → BI (R^2 = 0.391) →Use Behavior (R^2 = 0.421) Moderator: Age experience
Curran, , Meuter, & Surprenant, (2003)	Banking self-service technologies (SSTs)	TAM			Attitude toward staff, ATMs, bank by phone, Online Banking -->global attitude toward firm, SSTs --> intention to use ATMs, bank by phone, Online Banking
Chiu & Wang (2008)			computer self-efficacy	207 MBA	Statistic software self-efficacy, computer attitude, statistical anxiety→PU, PEOU→BI

					Task value, task cost, and computer self-efficacy
Carter & Schaupp (2008)	E-file	UTAUT		260 MBA	PE, EE, SI, Trust of E-file, Web self-efficacy, E-file last year→Intention to use
Kinard, Capella, & Kinard (2009)	Self-service checkout	Experimental test based on customer familiarity			Emotional responses (confidence, accomplishment, pressured) and behavioral intentions (use self-service check out again in future, recommend self-service checkout use to others) --> TBSS use
Dabholkar, P. A., & Bagozzi, R. P. (2002)	Technology Based Self Service (TBSS)	TAM			ease of use(E) (self-efficacy, inherent novelty seeking, need for interaction, self-consciousness), performance (perceived waiting time, social anxiety), fun--> attitude toward using TBSS-->Intention to use TBSS
Dabholkar, P. A. (2003)	Self-scanning checkout	In-store interview			Awareness, past use, attitude, intentions Speed, control, reliability, ease of use, enjoyment, and preference--> consumer motivation and behavior

Ghazizadeh, Lee, Boyle (2012)	Automation	Extended TAM	Compatibility, trust		Compatibility, trust →PU, PEOU→A→UB→Actual system use
Im, Hong, & Kang (2011)	MP3 player	UTAUT		501 (363 Korea, 138 U.S.)	PE, EE, SI→ BI → UB FC→ UB Culture
Ivanov, & Webster (2017)	Robot, artificial intelligence and service automation (RAISA)				Identify the potential benefits and costs with adoption of RAISA
McKenna, Tuunanen, & Gardner (2013)	Information services	UTAUT and TOIS (theory of organizational information services)			Adaptive Service Components, Computational Service Components→SE→BI→UB Collaborative Service Components→ SI→UB Networking Service Components→FC→UB Self-efficacy
Oh & Yoon (2014)	Online information services (E-learning vs online gaming)	UTAUT	Trust, and Flow experience	104 students	PE, EE, SI, Trust, and Flow experience→ BI →UB FC→UB Moderators: E-learning/ Online Game
Venkatesh & Zhang (2010)	Business analysis	UTAUT		450 (149 Americans, 201 Chinese)	Culture (U.S. vs China)

Wang, Townsend, Luse, & Mennecke, (2012)	E-commerce	UTAUT	Trust	51	PE, EE, SI, and Trust→ BI to use recommender system
Weerakkody, El-Haddadeh, Al-Sobhi, Shareef, & Dwivedi (2013)	E-government	UTAUT	Trust of Internet and trust of Intermediaries	502	PE, EE and Trust of Internet→ BI FC→ UB
Yuen, Yeow, Lim, & Saylani (2010)	Internet Banking	UTAUT	Attitude, anxiety, perceived credibility, and self-efficacy	766 (developed (the U.S. and Australia and developing Malaysia)	PE, EE, SI, FC, Anxiety, Perceived Credibility, Attitude toward Using Internet Banking Service, Self-efficacy→ User Acceptance of Internet Banking Service Culture (Hofstede Culture Factors)

This thesis is based on Unified Theory of Acceptance and Use of Technology (UTAUT) Extensions developed by Venkatesh, Morris, Davis, and Davis (2003). This thesis seeks to determine the four key dimensions with two additional constructs, namely, self-efficacy and trust and apply an instrument to measure customer perceptions so that further work can then test the adoption of automated technology effect on customer responses and subsequent behaviors. As table 2.2 shows, a

comprehensive literature review has revealed the four key dimensions, including Performance Expectancy (PE), Effort Expectancy (EE), Social Influence (SI), and Facilitating Conditions (FC), in various service setting. Many UTAUT studies incorporated new variables (for example, perceived value, habit, satisfaction, trust, self-efficacy, computer self-efficacy, compatibility, attitude, and so on) predicting behavior intention (BI) and actual technology use. In this thesis, performance expectation (PE) refers to the extent to which customers subjectively believe that they can enjoy quality service in the experience of an automated hotel. Effort expectancy (EE) is defined as the extent to which consumers believe they can save their efforts by lodging in the automated hotel. Social influence (SI) refers to the perceived feelings of learners, which is the degree of influence of surrounding groups. Facilitating conditions (FC) refers to the extent to which consumers feel the support of automated hotels in terms of technology and equipment. Some of UTAUT studies included new moderators tested in conjunction with new independent variables. For instance, individual differences (gender, age, experience, and voluntariness of use, Venkatesh et al., 2012), technology characteristics (type of recommender system Wang et al, 2012), culture differences (Saudi vs. USA, Al-Gahtani, Hubona, and Wang（2007); developed vs developing country, Yuen, Yeow, Lim & Saylani , (2010); Korea vs. USA, Im et al. (2011)). Cultural differences have been confirmed as an important role of UTAUT. To explain the cultural differences that affect the acceptance of technology, studies include methodology, Tiandis's (Triandis, 1982) and Hofstede's national culture dimensions and social identify theory are to identify and measure cultural dimension. Al-Gahtani et al. (2007) found most UTAUT validated in western nations so that they tend to validate a UTAUT model in Saudi Arabic. Thus, Al-

Gahtani et al. (2007) included Hofstede's cultural dimensions to explore the impact of cultural differences on information technology acceptance between Saudi Arabia and North America. Then they found that culture is a significant moderator of the UTAUT model. Venkatesh & Zhang (2010) examined the cultural differences between the U.S. and China, with a particular focus on individualism/collectivism. Yuen et al. (2010) also applied Hofstede's national culture dimensions to examine the culture factors affecting the acceptance of Internet banking system between developed (the U.S. and Australia) and developing (Malaysia) countries.

This thesis adds a trust construct to examine the role of trust in mediating relationship between people and the use of RAISA technologies. Trust influences rely on RAISA technologies; therefore, the RAISA technologies are be considered both trustworthy and trustable (Ghazizadeh et al, 2012). For example, people consider privacy and security as major factors in the information technology system. Because people cannot control personal information online, Oh & Yoon (2014) added trust as new construct to ensure their privacy and safety and found that trust had a significant effect on use behavior but without the moderating role of demographic variables. Alaiad & Zhou (2013) assessed the patients' perception of health robots, an information technology application, by using UTAUT model. After literature search and semi-structure interview, the author decided to only add trust without considering other moderating constructs. Wang, Townsend, Luse, and Mennecke (2012) state that trust affects people to the acceptance of two recommender systems. Weerakkody, El- Haddadeh, Al-Sobhi, Shareef, and Dwivedi (2013) combined trust of the Internet and trust of Intermediary to highlight

the importance of trust in adoption of e-government services but without any moderator variables.

In order to develop a better model of acceptance of automated hotel, self-efficacy is introduced to explore the integrated influences. Chiu and Wang (2008) introduced the online learner's personality traits computer self-efficacy as an explanatory variable to explain the usage of statistical software. Since confidence can exert influence on the acceptance of technology, Yuen et al. (2010) added self-efficacy to measure user confidence of interacting with Internet banking system.

2.1 Automated hotel

Automated hotels are a new type of "sci-fi sensation" built in China, Japan, Taiwan, Germany, and Norway. Automated hotels have been quietly risen and quickly become a new fashion place to stay when people are traveling. Automated hotels use "autonomous" and service innovation as novel features to attract crowds and also involves food & beverage, accommodation, travel, education, and entertainment as the hospitality and tourism industry. 'Automated hotel' literally means that there is no employee in the lobby but RAISA is used as tool to interact with guests and gradually realizes perception-understanding-understand guests. A series of services from booking to checkout can be customized by customers. Compared to the traditional hotel, automated hotel has a lot of RAISA although it reduces human resource management. The following is for countries and regions where automation has developed and the market is mature, such as: China. Taiwan, Japan and others.

2.2 Status of automated hotels in Asia

China

Smart LYZ hotel is an automated hotel in China. Single room prices range from $94 to $408 listed in online travel agency. It advocates the concept of "life with technology to make life full of freedom," which greatly simplifies the accommodation process compared to traditional hotels (Taylor, 2018). From reservation, check-in to departure, guests can complete the whole process through a mobile app and smart device without contact any staff, which save a lot of cumbersome procedures. The whole process is as free as going back to their own home. FlyZoo Hotel uses a smart robot that welcomes and guides consumers. Consumers can check-in on the mobile phone with electronic ID card or self-check in the lobby, and enter the room by face scanning (Taylor, 2018). Based on the guest identification covering the entire scene in the hotel, the non-inductive ladder control and the non-touch door control will automatically perform face recognition, intelligently lighting the guest's room floor and automatically opening the room door. With the non-inductive control positioning system, when guests leave the room, in that moment, the elevator will also automatically respond. After judging the intention of taking the elevator, it automatically turns on and is transferred to the floor to be checked in. After guests arrive at the door of the room, the door recognition device will recognize the identity of the guest. After determining that guests intend to enter the room, the door will automatically open. The air conditioning, lighting, curtains and other equipment in the room are all not manually operated but instead give instructions to the T-mall Elf.

Taiwan

Chase Hotel in Taiwan uses advanced technology where guests can self-check-in, self-check-out, and has a Swiss industrial ABB robot which automatically measures luggage size, weight and deposits it (Liyan, 2016).

Japan

Henn-na Hotel was built at a resort facility and opened in July 2015. The hotel maintains 80 robots, including arm robots that store and carries luggage, porter robots, a female robot and a dinosaur robot at the reception desk, a communication robot, agent "Tulie," and robotic cleaners (Iki Tseng, 2017). The robots are equipped with voice synthesizers and optical sensors. Robots will increasingly encroach upon the hospitality and tourism industry, doing the tasks that had previously been done by humans. Whether guests will react as favorably once the robotics of automated hotel wears off is a question that needs to be explored in this research.

2.3 The difference between traditional and automated hotels

Traditional hotels are facing the following problems: 1. the process of check-in and check-out; 2. the internal management efficiency of the hotel; 3. the comprehensive energy-saving efficiency; 4. waiting time during the peak hours; the hotel members operate model; 5. cases of revealing the privacy of users.

Compared with the traditional hotels, automated hotels that offer fully self-service is also facing the following: 1. Guests do not encounter any hotel staff during their stays; 2. Provide novel, fun, attractive environment that induces curiosity while offering innovative technology such as smart check-in and checkout methods through apps or a website; 3. Guests use facial recognition machines to enter their rooms to

include high security for self and belongings, no need for third-party device operation (such as room card, mobile phone); 4. a robot equipped with motion sensors guide guests; 5. 24-hour online customer service; 6. equipped with all-around smart accommodation technology such as door-locks, lighting, air conditioning, TV, network, electric curtains; 7. use image recognition, big data analysis and other technologies to automatically monitor public areas; 8. a robot provides customers immediate detailed information, including the hotel, nearby attractions, transportation and restaurants or tickets to events (Liyan, 2016; Iki Tseng, 2017; Taylor, 2018).

2.4 Customer acceptance of RAISA in automated hotels

Robotics in RAISA technology implies substituting a fixed capital expense for human labor expense. It would have positive effect when booking is high, otherwise may have negative effect. In the past, much of back of house robotics are invisible, the question remain how consumers would react to robotics when they arrive automated hotel. If the quality and process are marketed correctly, customers will react favorably. In food service operation, Pieska et al., (2013) proposed service robots used in to both public and private environment are acceptable, mainly for elderly or disabled persons. Customer volume increased when introducing robot waiters. In the hotel sector, Henn-na Hotel was built at a resort facility and opened in July 2015. The hotel maintains 80 robots, including arm robot that store and carries luggage, porter robots, a female robot and a dinosaur robot at the reception desk, communication robot agent “Tulie” and robotic cleaners. The robots are equipped with voice synthesizers and optical sensors. Robots will increasingly encroach upon the hospitality and tourism industry, doing the

tasks that had previously been done by humans. Whether guests will react as favorably once the robotics of automated hotel wears off is a question that needs to be explored.

2.5 Technology-Related Theories

The Theory of Reasoned Action (TRA)

Almost five decades ago, pioneering researchers Fishbein & Ajzen (1975) proposed and tested a model to predict and explain an individual's intentions and behaviors. The authors' model encompasses two antecedents: the first is the emotion or attitude toward a particular behavior, and the second antecedent is the subjective norm (SN), as shown in Figure 2.1. The so-called Behavioral Intention Model posits that individuals' perception of others' beliefs will determine whether or not they engage in specific behaviors. A later modified vision of the model, Theory of Reasoned Action (TRA), explains that a person performs a particular behavior as function of their behavioral intention (BI), their personal attitudes toward behavior (A), and subjective norm (SN) decisions. In other words, in case of this thesis, consumers' willingness (choice behavior) to stay in an automated hotel is mainly influenced by personal attitudes and others' opinions, and then BI affects their behavior.

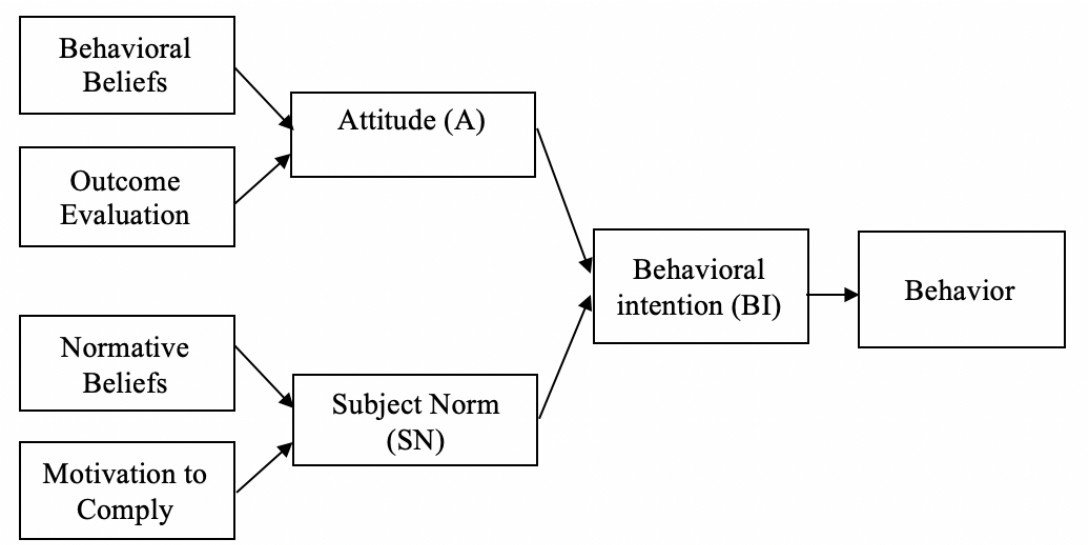

Figure 2.1 The Theory of Reasoned Action (TRA) (Fishbein & Ajzen,1975)

Innovative Diffusion Theory (IDT)

Rogers (1995) defines innovation in the theory of innovation diffusion as "An innovation is an idea, practice, or project that is perceived as new by individuals or other unit of adoption" (Rogers, 1995). In general, the innovation refers to all newly discovered or newly invented things that were not available in the past and are often dominated by scientific and productive things. Kanter's definition (1983, p.20) of innovation: "Innovation refers to the process of bringing any new, problem-solving idea to use" (Sundbo, 1998). Among them, the innovative diffusion characteristics include relative advantage, compatibility, complexity, observability, and trialability. Based on the innovation diffusion theory proposed by Rogers, we can predict whether consumers will adopt new service products or new things, whether they have innovative characteristics. Automation emerging as a promotional method, so automation is an innovation. Then

Innovation Diffusion Theory can be applied to explores consumer behavior, adoption rates and predict the likelihood of innovation acceptance.

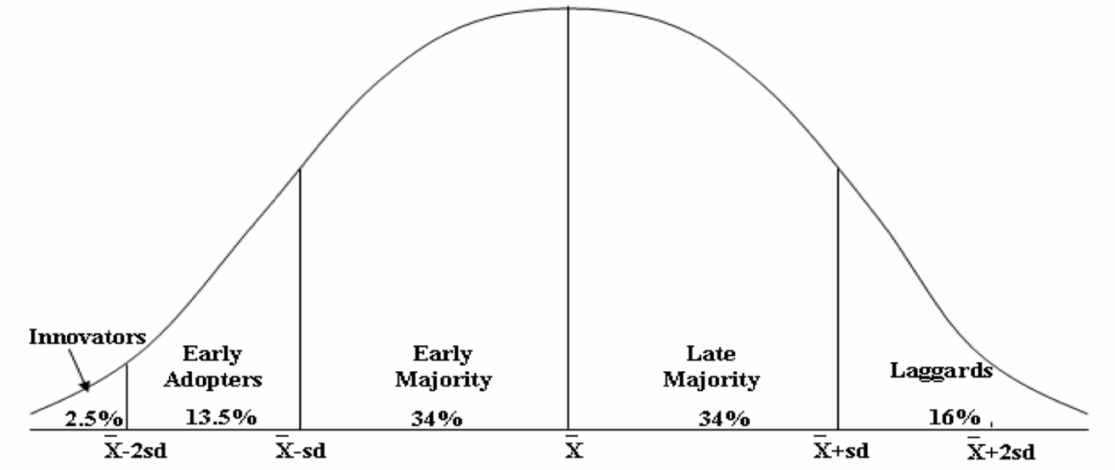

Figure 2.2 Diffusion of Innovations (Rogers, 1983)

The Theory of Planned Behavior (TPB)

The planned behavior theory (TPB) is derived from the theory of reasoned action, which cannot give a reasonable explanation for behaviors who are not completely controlled by the individual's will. Therefore, Ajzen (1985) proposed the TPB, adding the perceived behavior control (PBC) to the original structure, and believed that PBC predicts the accuracy of the behavior, which depends on one's behavioral control. The higher the control of the behavior the person has, the more likely the intentions will be so the behavior can be predicted. The premise of the theory is that people are rational individuals and believe that when people have time to think about the behavior they are going to perform, BI is the best way to predict the behavior. This theory is closer to the state of actual behavior than the TRA. That is, if consumers have more control over the automated service in automated hotel, the higher their willingness will be to use it.

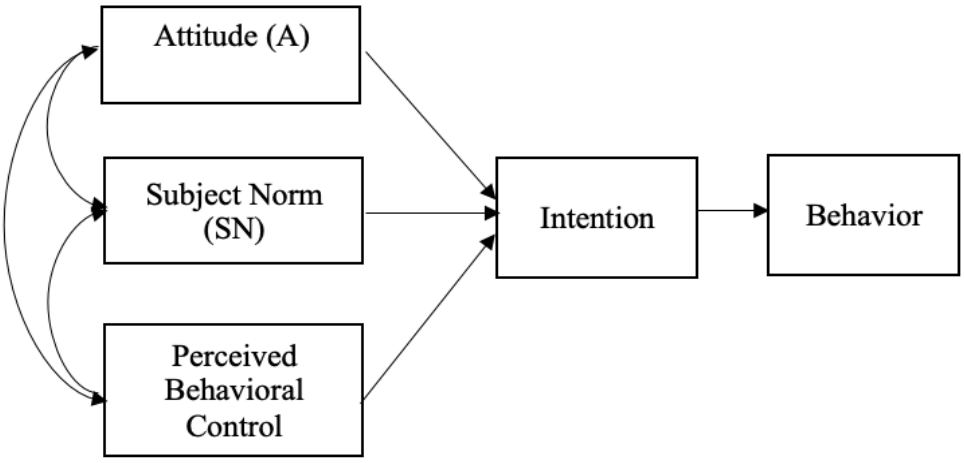

Figure 2.3 The Theory of Planned Behavior (TPB) (Ajzen, 1985)

Social Cognitive Theory (SCT)

The theory of social learning combined with behaviorism, proposed by the American psychologist Bandura (1986), is a widely accepted and empirically validated theory. Social cognitive factors include environmental impacts (e.g., social stress, overall social environment), individual perceptions and personal factors (e.g., personal motivation, personal attitudes), and behavioral interactions. These three factors interactively affect each other. However, whether an individual will perform a certain behavior is affected by the individual goal and the individual's self-efficacy in performing the behavior. If the individual believes that performing a certain behavior is in line with its goal and has strong self-efficacy, then the individual will perform the act. This theory explains human behavior in a dynamic environment. The Triadic Reciprocality (Bandura, A, 1986) is shown as below.

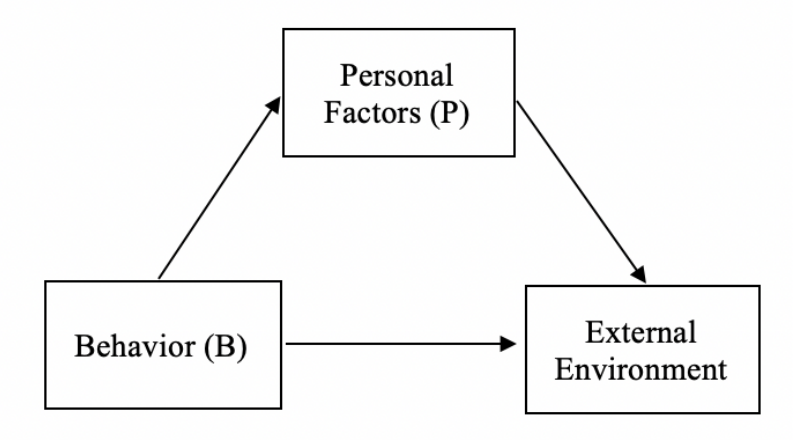

Figure 2.4 Social Cognitive theory (SCT) (Bandura, A, 1986)

The Technology Acceptance Model (TAM)

The technology acceptance model (TAM) was revised by the TRA proposed by Fishbein & Ajzen (1975). The TAM was proposed by Davis in 1986. Its purpose is to unify existing theories into one that explains the most salient factors of users' acceptance of information technology, and use theory to test and explain most of the adoption and usage of new technology. The rationale is based on understanding the influence of external factors on the beliefs, attitudes, and intentions of users, and the internal factors that further influence the use of technology (Davis, 1989; Davis, Bagozzi & Warsaw, 1989). Robots, Artificial Intelligence and Service Automation (RAISA) is a tool for information technology applications. If the tools are useful and easy to use in the daily life of consumers, they will be willing to use and will be used more in the future (Fishbein & Ajzen, 1975).

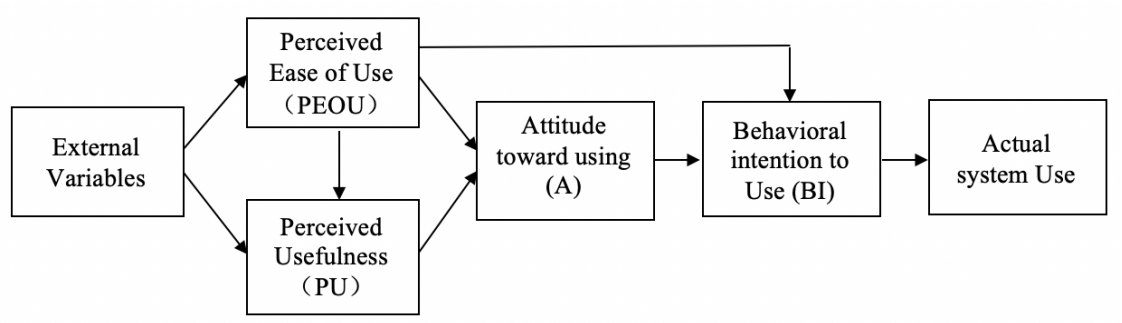

Figure 2.5 TAM (Davis,1989)

Model of Personal Computers Utilization (MPCU)

In 1971, social psychologist Triandis proposed the Theory of Human Behavior (THB). The basis of his theory is that the factors that determine individual behavior include attitude, social norms, habits, and the expected impact of this behavior, and personal attitudes include cognition, affective, and behavioral. Based on the THB, Thompson, Higgins, & Howell (1991) advanced the Model of PC Utilization (MPCU) to improve the explanatory power of existing models of personal computer use. Accordingly, the use of personal computers is influenced by social factors, complexity of PC use, job-fit with PC use, and long-term outcomes consequences of PC use, affect towards PC use, and facilitating conditions for PC use, as shown in Figure 2.6.

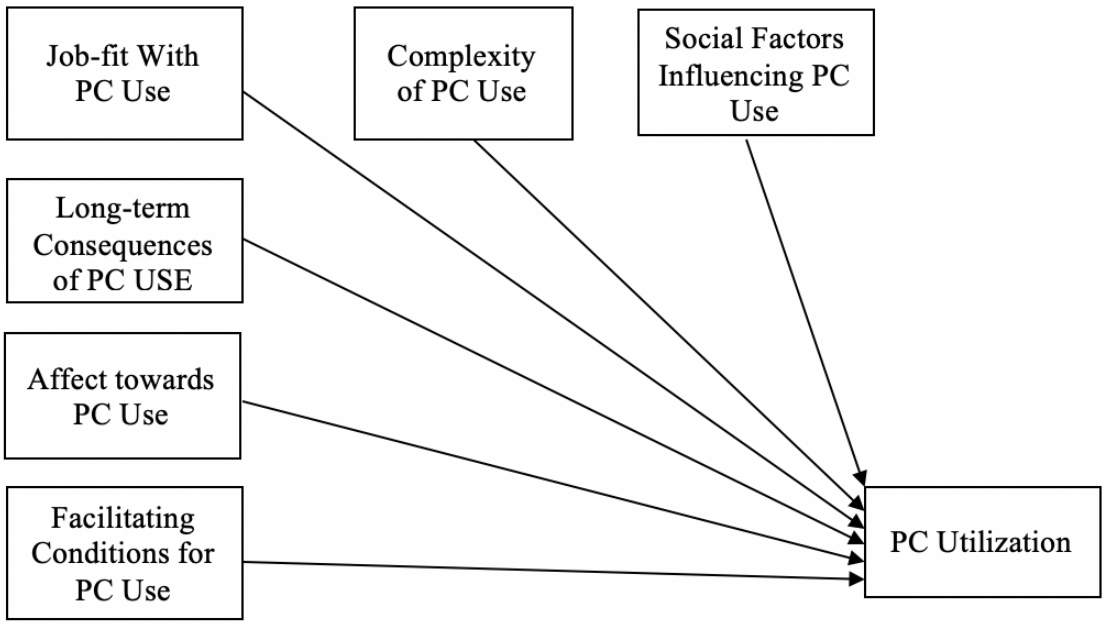

Figure 2.6 Model of Personal Computers utilization (MPCU) (Thompson et al.,1991)

Motivation Model (MM)

Drucker (1954) argues that motivation itself is not only a static psychological construction, but a dynamic process, a "continuing process of launching and facing the goal" included includes the origin of the launch, the state of the launch, and the performance after the launch (Davis, Bagozzi, & Warshaw, 1992). Therefore, motivation refers to the result of a psychological process before the individual is stimulated by the internal and external environmental factors of the individual. When the result of the process is accumulated to a certain level, it is embodied as actual behavior or eliminate the occurrence of an actual behavior. If the source of the stimulus is provided by the individual or the work itself, for example: personal interest, risk-taking, or challenging work, it is called "intrinsic motivation"; otherwise, if the stimulus is mainly from others except the individual or work, for example: motivation, position, or power, the

motivation of behavior caused by these stimulating sources is called "extrinsic motivation" (Amabile, Hill, Hennessey, & Tighe, 1994).

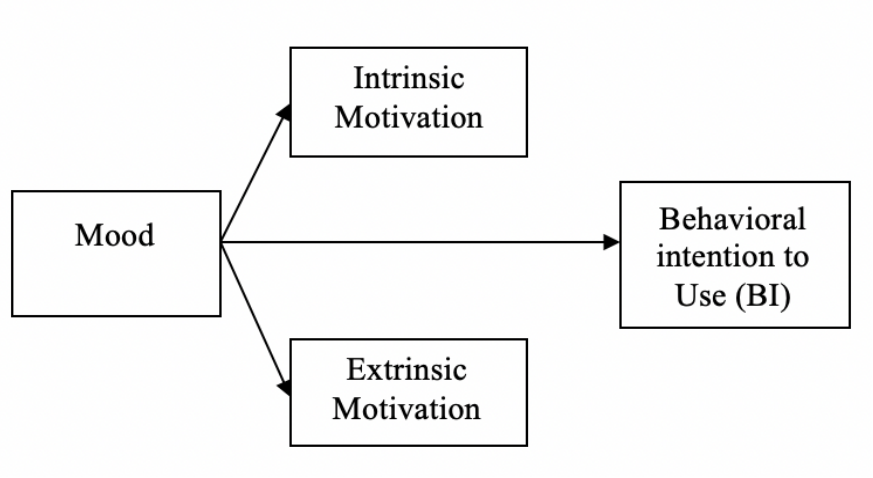

Figure 2.7 Motivational Model (MM) (Davis et al., 1992)

Task-Technology Fit (TTF)

TAM does not consider the adaptability between users and tasks, tasks and technology in practice. Therefore, to examine the relationship between technology and user task requirements in specific environmental tasks, Good Hue and Thompson et al. (1995) proposed the Task-Technology Fit (TTF) model. To evaluate and predict the utilization efficiency of workplace technology adoption, the dual factors of information system function and user task demand can be considered more realistically, and the impact on individual's performance while adopting technology.

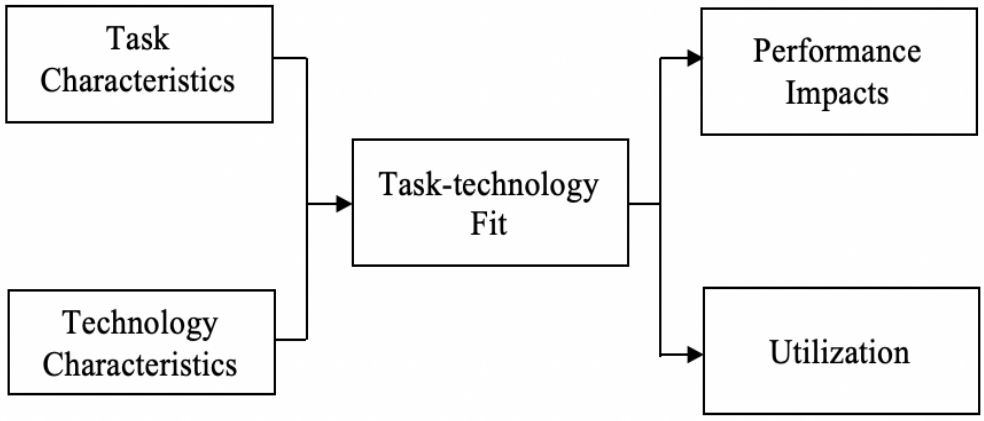

Figure 2.8 Task-technology Fit (TTF) (Goodhue & Thompson, 1995)

Combined TAM and TPB (C-TAM-TPB)

Taylor & Todd (1995) combined the attitude (A) and subjective norms (SN) in the TRA and TPB, and perceived usefulness (PU) in the TAM, which provides a mixed mode for combined TAM and TPB mode (C-TAM-TPB), as shown in Figure 9 below. Based on the empirical results of the final study, it was found that the C-TAM-TPB model combined with the TAM and the TPB has a high degree of compatibility with the interpretation of the use of new technologies by users. Taylor and Todd added user experience in the study, grouping users according to their experience. And the results showed that experienced users were more explicit in behavioral intension than inexperienced users. For experienced users, cognitive behavioral regulation significantly affects behavioral intentions more than perceived usefulness. Inexperienced users have a significant influence on behavioral intentions in perceived usefulness.

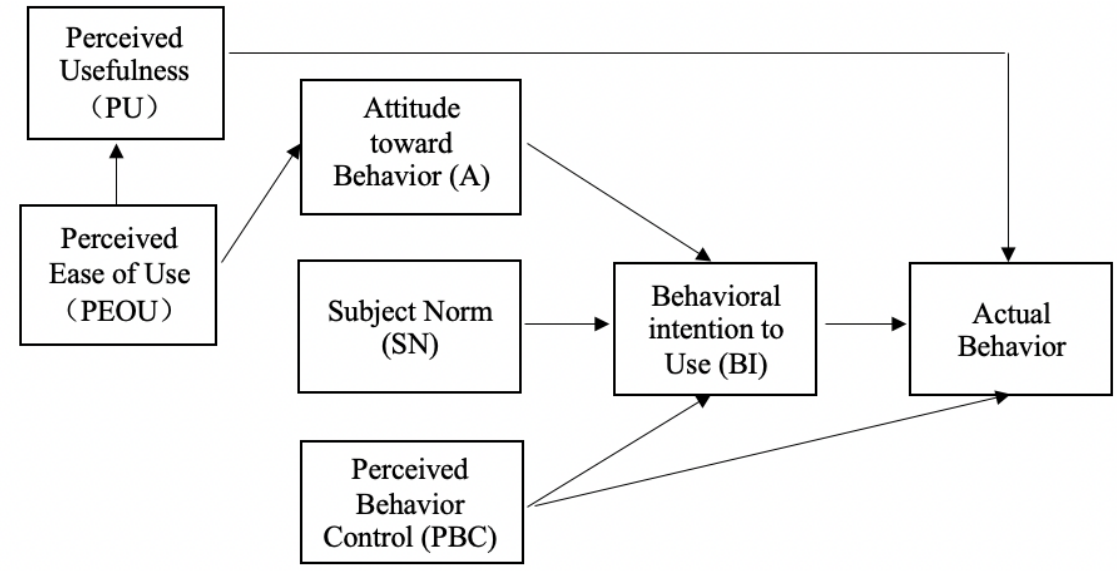

Figure 2.9 Combined TAM and TPB (C-TAM-TPB) (Taylor & Todd, 1995)

Unified Theory of Acceptance and Use of Technology (UTAUT)

Venkatesh & Davis (2003) reviewed and integrated a variety of existing theories that attempted to explain people's acceptance of Information Technology acceptance. Combining the elements of eight well-known technology acceptance models, the authors coined their model as the unified theory of Acceptance and Use of Technology (UTAUT) (Table 2.3 lists the theories used to advance the UTAUT).

Table 2.3 Technology acceptance model and theory

Year	Author	Theory
1975	Fishbein & Ajzen	Theory of Reasoned Action (TRA)
1983	Rogers	Innovation Diffusion Theory (IDT)
1985	Ajzen	Theory of Planned Behavior (TPB)
1986	Bandura	Social Cognitive theory (SCT)
1989	Davis et al.	Technology Acceptance Model (TAM)
1991	Thompson et al.	Model of Personal Computers utilization (MPCU)
1992	Davis et al.	Motivational Model (MM)
1995	Goodhue & Thompson	Task-technology Fit (TTF)
1995	Taylor & Todd	Combined TAM and TPB (C-TAM-TPB)
1996	Venkatesh & Davis	Final version of Technology Acceptance Model (TAM)
2000	Venkatesh & Davis	Technology Acceptance Model 2 (TAM2)
2003	Venkatesh & Davis	Unified Theory of Acceptance and Use of Technology (UTAUT)
2008	Venkatesh & Bala	Technology Acceptance Model 3 (TAM3)

The theory proposed four facets that affect behavioral intention (BI), including performance expectancy (PE), effort expectancy (EE), social influence (SI), and facilitating conditions (FC), which are respectively affected by four modes of gender, age, experience, and voluntariness of use (Venkatesh et al., 2003). UTAUT was able to explain 70% of the variance in intention, which is more effective than any model known in the past (Venkatesh et al., 2003).

Final version of Technology Acceptance Model (TAM)

Davis (1989) believes that the attitude is only the preference of information technology reflected by the user's emotions, and cannot fully convey the influence of perceived usefulness (PU) and perceived ease of use (PEOU) on behavioral intention (BI). For example, if a user in the workplace uses a certain technology because of the pressure of the supervisor, and the technology itself may be abhorrent to the users, the behavior of the user in the workplace does not mean that he has a positive attitude on the behavior. TAM has slightly advantage over TPB in explaining error variance. Compared to theory of planned behavior (TPB) (Ajzen, 1985), which is generally used to predict behavior and also used to predict intention (Mathieson, 1991). TAM is more useful and has been shown to better predict customers behavior intention on information system (IS) use. Davis (1996) made a correction which is different from Davis (1993) by abandoning the attitude (A) of the system in the original model and was able to increase the explanatory power of the model to about 40%. (Venkatesh et al., 2003; Venkatesh & Davis, 2000)

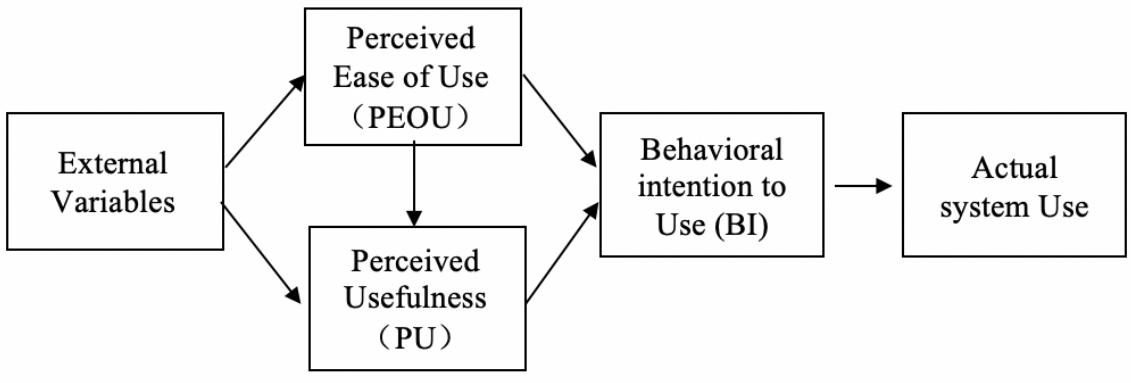

Figure 2.10 TAM (Davis, 1996)

The Technology Acceptance Model 2 (TAM2)

Technology Acceptance Model 2 (TAM2) eliminates the use of attitudes. Venkatesh and Davis incorporates social influence process and cognitive instrumental process into TAM2. Venkatesh and Davis (2000) consider these two processes, which are the two main variables that affect PU. The social influence process refers to subjective norms (SN), voluntariness and image; the cognitive instrumental process includes job relevance, output quality, results demonstrability, and original perceived ease of use (PEOU) in the TAM. Compared to the TAM in 1993, the attitude has been abandoned by TAM2; TAM2 expands the relative factors of social influence and involves cognitive instrumental process. The TAM in 1993 eliminates the influence of social factors in TRA. Thus, the explanatory power of PU has reached 51%, while the entire model has 49% of explanatory power for BI, as shown in Figure 2.11:

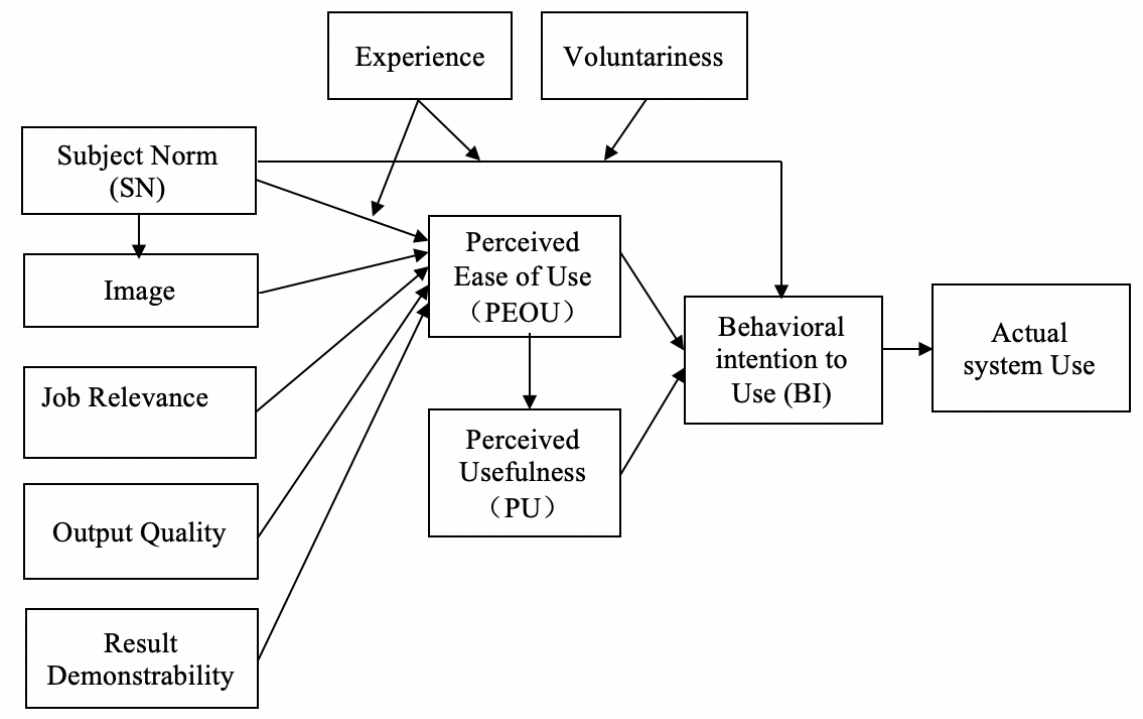

Figure 2.11 TAM2 (Venkatesh & Davis, 2000)

The Technology Acceptance Model 3 (TAM3)

The Technology Acceptance Model 3 integrated TAM2 (Venkatesh & Davis, 2000) and control (Computer Self-efficacy and facilitating conditions), intrinsic motivation (computer playfulness), and emotion (computer anxiety) (Venkatesh & Davis, 2000). TAM3 is more refined by including the influencing factors of PU and PEOU. Computer self-efficacy, external control perception, and computer anxiety are variables that affect PEOU. In addition, experience and voluntariness are added as control variables. Hackbarth, Grover, & Mun (2003) revealed that due to the popularity of computer and network technology, computer preferences and computer anxiety are related to PEOU; experience is a significant antecedent of PEOU but it has no effect on PEOU. The explanatory power of PU has 52% to 67%, while the TAM3 has 40% to 53% of explanatory power for BI, as shown in Figure 2.12.

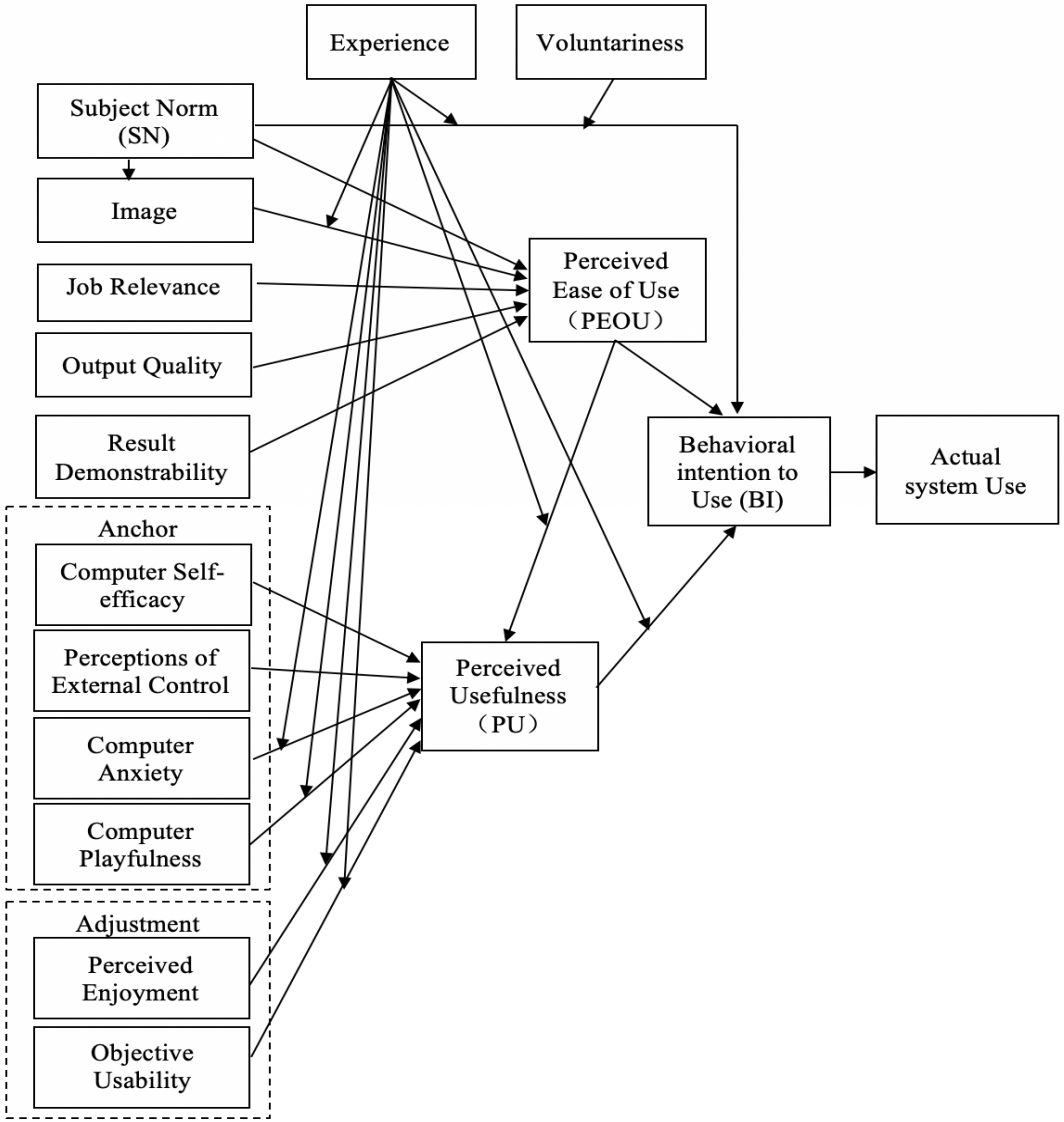

Figure 2.12 TAM3 (Venkatesh and Bala, 2008)

CHAPTER 3

MODEL AND HYPOTHESES

The basic rational of acceptance model is when individuals are faced with a new technology, their reactions to using the automated technology system will affect their intention to use (Behavioral Intention or BI henceforth) in an automated hotel, and attitude toward technology use (A) in an automated hotel will be affected by BI. This thesis is based on the adoption of individuals and applied Unified Theory of Acceptance and Use of Technology (UTAUT). Extensions developed by Venkatesh & Davis (2003) to predict the likelihood of technology use while staying in an automated hotel. The model mainly posits that the seven facets of performance expectancy (PE), effort expectancy (EE), social influence (SI), and facilitating conditions (FC), Trust (T), and Self-efficacy (SE) affect the willingness of users of lodging in an automated hotel. As briefly discussed above, a hypothesized model was constructed based on literature review and model extension (Figure 3.1), as shown in Figure 3.2.

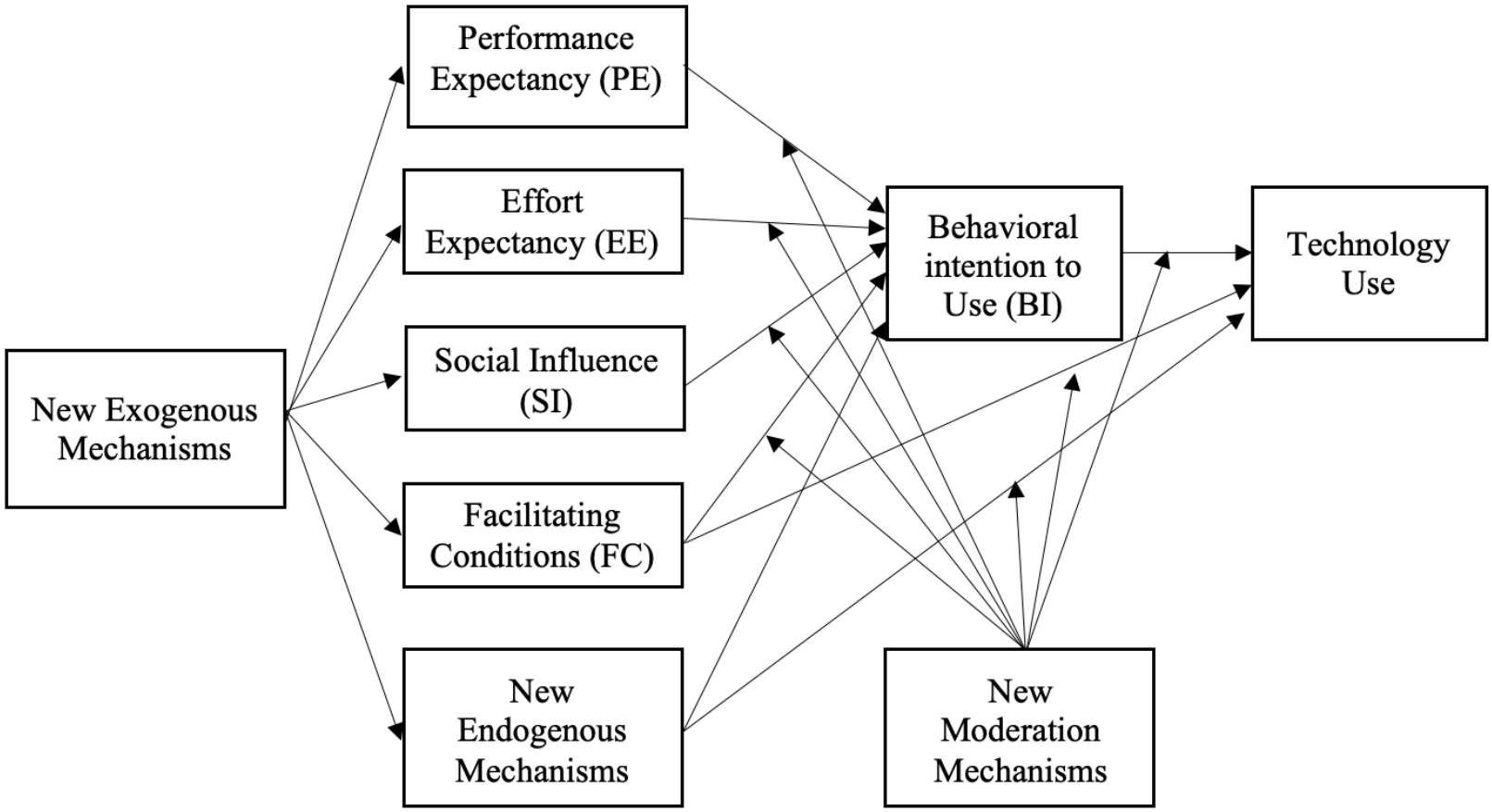

Figure 3.1 Model Extension

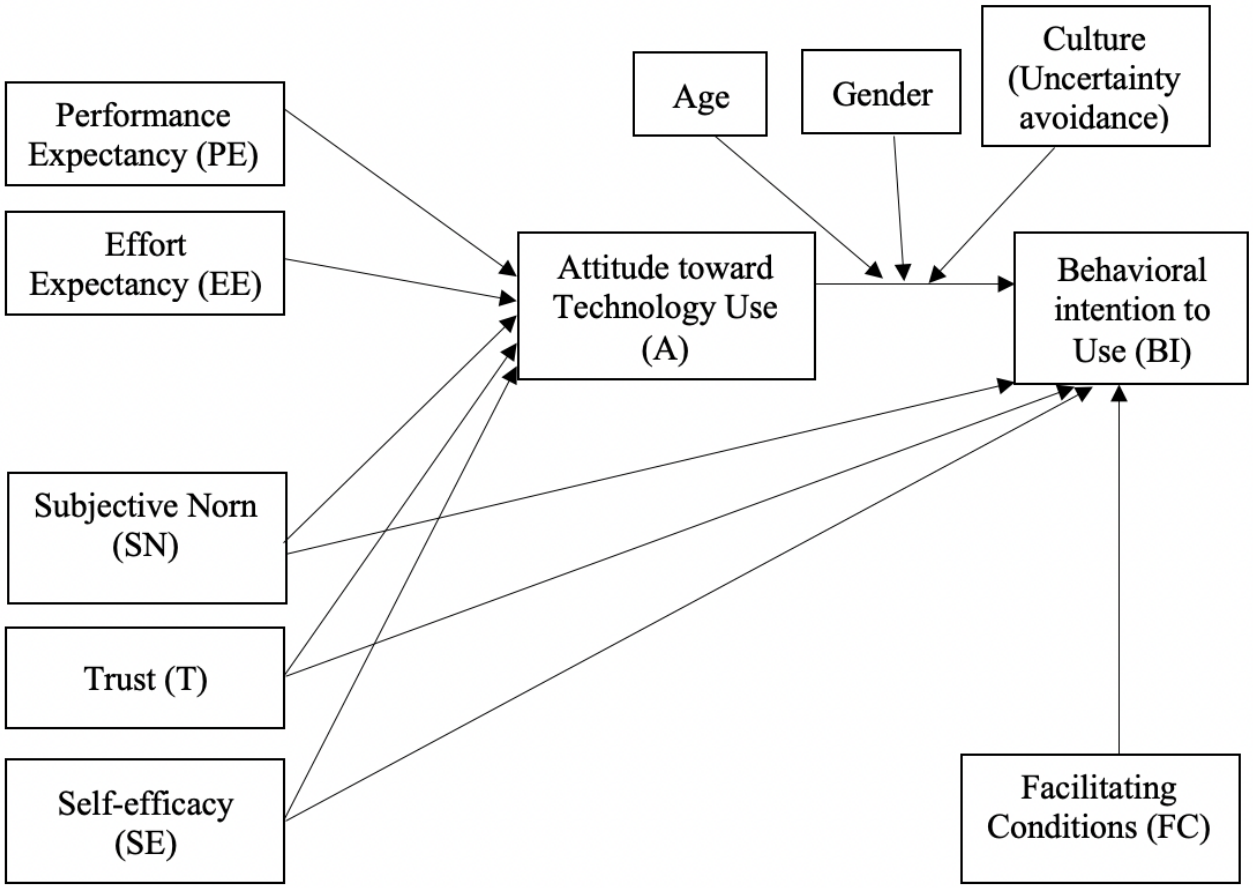

Figure 3.2 Proposed Hypothesized Model

The following hypotheses were set:

H1: Consumers' performance expectation is positively associated with the attitude toward technology use in an automated hotel.

H2: Consumers' effort expectancy is positively associated with the attitude toward technology use in an automated hotel.

H3: The subjective norm of consumers is positively associated with the attitude toward technology use in an automated hotel.

H4: The subjective norm of consumers is positively associated with the behavioral intention of technology use while staying in an automated hotel.

H5: The facilitating conditions of autonomous is positively associated with the behavioral intention of technology use while staying in an automated hotel.

H6: The consumers' trust in adopting RAISA technologies is positively associated with the attitude toward technology use in an automated hotel.

H7: The consumers' trust in adopting RAISA technologies is positively associated with the behavioral intention of technology use while staying in an automated hotel.

H8: The consumers' self-efficacy to adopt RAISA technologies is positively associated with the attitude toward technology use in an automated hotel.

H9: The consumers' self-efficacy to adopt RAISA technologies is positively associated with the l behavioral intention of technology use while staying in an automated hotel.

In terms of age, Venkatesh et al. (2003) have found that different ages have a significant difference in the impact of four moderating variables. In addition, Venkatesh et al. (2003) believe that the impact of the system's "ease of use" on "willingness to use" varies with age, and usually the older one has more significant impact. Secondly, Venkatesh et al. (2003) believe that the relationship between "social influence" and "behavior intention" is determined by age, and older workers are more likely to be affected by society than younger workers.

H10: Age moderates the attitude toward technology and the behavioral intention of technology use while staying in an automated hotel.

H11: Gender moderates the attitude toward technology and the behavioral intention of technology use while staying in an automated hotel.

Customers are the actual dissemination objects and absorbers of innovative resourses. Service innovation activities are a way for customers to recognize new products and services, as well as an important consideration for consumer purchase decisions (Danneels & Kleinschmidt, 2001). Consumers in different nations respond differently to service innovation in an automated hotel, including software and hardware, the image of an automated hotel and 24 hours customer service, robotic arm and self-check-in and self-check-out system, low-cost business strategy in human resources, differentiated operating strategy in corporate image and marketing, and customers absolute autonomy. Hence, it is crucial to obtain the moderation effect of culture on this research. Hofstede's uncertainty avoidance as moderator on the model to enhance the understanding of influencing customers' behavior intention. Uncertainty avoidance is defined as "the degree of how societies accommodate high levels of uncertainty and ambiguity in the environment" (Hofstede, 1984). The uncertainty behaviors do not have clear or firm goals before the transaction. To minimize the occurrence of unknown and unusual circumstances, customers will understand the automated technology or learn some related information. If customers encounter interesting and suitable projects, they will intend to lodge in an automated hotel.

H12: Culture differences moderate the attitude toward technology and the behavioral intention of technology use while staying in an automated hotel.

H13: The attitude toward technology in an automated hotel is positively associated to the behavioral intention of technology use while staying in an automated hotel.

3.1 Performance Expectancy (PE)

Venkatesh et al. (2003) defined the performance expectation as the degree to which "an individual's perception of the use of the system can improve job performance" and that is influenced by previous constructs of perceived ease of use (Davis, 1989). The concept of performance expectation (PE) includes five constructs: the perceived usefulness (PU) in the Technology Acceptance Model (TAM), the extrinsic motivation (EM) in the Motivation Model (MM), the task-technology fit and relative advantage in the Innovation Diffusion Theory (IDT), and the outcome expectation in the Social Cognitive Theory (SCT) (Venkatesh et al.,2003). Perceived usefulness (PU) is the user's subjective perception that this system will enhance their performance (Davis,1989); external motivation is the user's feelings of affecting their achievements, joys and honors due to their behavior (Davis et al., 1992); job fit is when an individual thinks that using a computer can improve his job performance (Thompson et al., 1991); relative advantage refers to innovative services or products that are considered to be better than comparing other technology (the more the relative advantage that the adopter can recognize, the faster the speed is adopted and the faster the diffusion rate); outcome expectation refers to what users think the system can achieve (Compeau et al., 1999). The moderator of gender and age moderate the effect of performance expectation on behavioral intention (Venkatesh et al., 2003).

In this thesis, performance Expectation (PE) refers to the extent to which customers subjectively believe that customers can enjoy quality service in the experience

of an automated hotel. PE is measured by a 5-point Likert scale from strongly disagree (1) to strongly agree (5). The following statement are added to the survey instrument to measure PE:

Questions in the scale of Likert 5 are: 1. I find automated technology useful in an automated hotel. 2. Using automated technology in an automated hotel would enable me to accomplish tasks more quickly. 3. Using automated technology in an automated hotel would improve the quality of my hotel stay. 4. Using automated technology in an automated hotel increases my productivity.

3.2 Effort Expectancy (EE)

Venkatesh et al. (2003) defined the effort expectancy as "the effort that individuals must make to use the system". The concept of effort expectancy (EE) includes three constructs: the perceived ease of use (PEOU) in Technology Acceptance Model (TAM, TAM2 and TAM3), the complexity in the Model of Personal Computers utilization (MPCU) and the ease of use in the Innovation Diffusion Theory (IDT) (Venkatesh et al.,2003). Perceived Ease of Use reflects that individual considers it easy to use a specific system without physical or mental effort (Davis, 1989); the complexity of the system is the degree to which the innovative products are considered to be relatively difficult to understand and adopt (Thompson et al., 1991); ease of use refers to how difficult people feel the system is to use (Davis, 1989). The moderator of gender, age and experience adjusted the effect of the effort expectancy on behavior intention. In particular, women have their expectation use the technology system, which drive them have strong behavioral intention. The longer the length of use, the more experience, and

the more accumulated experience, the less effect on behavior intention will have (Venkatesh et al., 2003).

In this thesis, “effort expectancy” is defined as the extent to which consumers believe they can save their efforts while lodging in the automated hotel. EE is measured by a 5-point Likert scale from strongly disagree (1) to strongly agree (5).

Questions developed on the scale of Likert 5 are: 1. It will be impossible to use automated technology in automated hotels without expert help. 2. Learning to operate automated technology systems will be easy for me. 3. It would take too much time to learn how to use automated technology systems in automated hotels. 4. My interaction with the automated technology system in an automated hotel is clear and understandable. 5. Interacting with the automated technology systems in automated hotels doesn’t require a lot of mental effort. 6. If I already use automated technology, it will be easy for me to become skillful at using automated technology systems in an automated hotel. 7. If I use automated technology, it will be easy for me to remember how to use automated technology systems in an automated hotel.

3.3 Subjective Norm (SN)

Venkatesh et al. (2003) defined the degree of social influence as “an individual feel influenced by the surrounding people”. The social influence (SI) is comprised of the subjective norm (SN) in the Theory of Reasoned Action (TRA) (Ajzen & Fishbbein, 1980), Theory of Planned Behavior, and Combined TAM and TPB (TRA, TAM 2, TAM3, TPB, C-TAM-TPB), social factors in the Model of Personal Computers utilization (MPCU), and image in the Innovation Diffusion Theory (IDT) (Venkatesh et al.,2003). Subjective norm is a salient influence. Subjective norm explains that the

opinions and influences of important related people or groups believe that they are or are not perform certain behaviors. And Ajzen & Fishbein believed that user behavior is affected by social environmental pressure (Ajzen & Fishbein, 1975); social factors refer to the internalization and organization agreement of the individual to the team culture (Thompson et al., 1991); image refers to the individual's belief that an image helps to enhance or consolidate him or her identity in the group; a good impression increase the behavioral intentions (Moore & Benbasat, 1991). The moderator of gender, age, experience and voluntary use adjust the effect of social influence on behavior intention. The older women are especially affected by others. The accumulation of experience gradually decreases behavioral intentions (Venkatesh et al., 2003).

In this thesis, subjective norm refers to the perceived feelings of learners, which is the degree of influence of surrounding groups. SN is measured by a 5-point Likert scale from strongly disagree (1) to strongly agree (5).

Questions in the scale of Likert 5 are: 1. People who influence my behavior think that I should use automated technology in an automated hotel. 2. People who are important to me think that I should use automated technology in an automated hotel. 3. People whose opinions that I value recommend that I use automated technology in an automated hotel.

3.4 Facilitating Conditions (FC)

Venkatesh et al. (2003) defined facilitating conditions as the degree to “which an individual believes that his or her organization is supporting the change”. The facilitating conditions (FC) is equivalent to the perceived behavior control in the Theory of Planned Behavior and Combined TAM and TPB (TPB, C-TAM-TPB), the self-efficacy in the

Social Cognitive Theory (internal perceptual behavior control), the facilitating conditions in the Model of Personal Computers utilization (MPCU), the compatibility in the Innovation Diffusion Theory (IDT). Perceived behavior control is the extent to which the user is embarrassed or difficult to perform (Ajzen, 1985; Taylor & Todd, 1995); the facilitating conditions provides technical assistance for the objective environment (Thompson et al., 1991); Compatibility is the adoption of new technology or new things and the past experience and values of consumers, and the degree of knowledge, which of them is consistent (Moore & Benbasat, 1991). The facilitating conditions will vary depending on the age and have a direct effect on actual technology use (Venkatesh et al.,2003). Therefore, more attentions are be placed on elders who are more dependent on the help from the external environment (Venkatesh et al., 2003).

According to Taylor & Todd (1995), and based on the restrictions on the use of automated hotel for personal use, there is no direct relationship with the user's working environment. Therefore, the "compatibility" facet is excluded, leaving these two facets "perceived behavior control" and "System Support".

In this thesis, facilitating conditions refers to the extent to which consumers feel the support of automated hotels in terms of technology and equipment. FC is measured by a 5-point Likert scale from strongly disagree (1) to strongly agree (5).

Questions were developed on the scale of Likert 5: 1. I think that I would be able to use automated technology systems in an automated hotel. 2. I think that using automated technology systems in an automated hotel would be entirely within my control. 3. I think that I have the resources, knowledge, and ability to use automated

technology systems in an automated hotel. 4. I think that using automated technology systems in an automated hotel is compatible with my lifestyle.

3.5 Trust (T)

In the context of social learning theory, Rotter (1967) defined "trust as a generalized expectancy held by an individual that the word, promise, oral or written statement of another individual or group can be relied on". Trust has been considered as an important determinant of technology acceptance research (Alaiad & Zhou, 2013; Carter & Schaupp, 2008; Oh & Yoon, 2014; Wang & Townsend & Luse & Mennecke, 2012; Weerakkody et al., 2013). Prior works have studied more on the significant role of usefulness in developing trust into the acceptance of e-commerce (Benamati, Fuller, Serva, and Baroudi, 2010). Although the importance of the concept of trust between humans and technologies has been stated in much of the research, it has yet to be systematically studied in automated hotel domain.

Trust (T) is measured by a 5-point Likert scale from strongly disagree (1) to strongly agree (5). Questions developed on the scale of Likert 5 are: 1. I think that the information offered by the automated technology system is sincere and honest. 2. The automated technology system is characterized by the frankness and clarity of the services that it offers to the consumer. 3. I think that automated technology systems are capable of carrying out their work. 4. Automated technology systems have enough safeguards to make me feel comfortable interacting with them. 5. I feel assured that legal and technological structures adequately protect me from problems with automated technology systems.

3.6 Self-efficacy (SE)

Various types of self-efficacy in information systems, including Internet self-efficacy (ISE) (i.e. general Internet self-efficacy (GISE) and Web-specific self-efficacy (WISE)) (Eastin and LaRose, 2000), computer self-efficacy (Compeau & Higgins, 1995; Chiu &Wang, 2008) (i.e. general computer self-efficacy (GCSE) and software-specific self-efficacy (SSE)) (Agarwal, Sambamurthy, &Stair, 2000). Self-efficacy is defined as "people's judgment of their capabilities to organize and execute course of action required to attain designed types of performance (Bandura, A, 1986)". In this thesis, self-efficacy (SE) is defined as an individual assessment of his or her ability to use automated technology to complete a particular job or task in automated hotel. Empirical study indicates that self-efficacy has a positive effect on behavioral intention (McKenna, Tuunanen, & Gardner, 2013). However, SE was not considered as a significant factor since users are experienced internet banking (Yuen et al., 2010). For researching adoption of automated hotel, SE was perceived as an important determinant of behavioral intention and use automated technology because it related the causal link between them. Users will perceive automated technology to be easy to use and use it more frequently when they recognize that they have a high self-efficacy (Bandura, A, 1982). As the UTAUT, were conceived to explain and predict the behavioral intention and technology use, its extended model is very well suited to further our understanding of automated hotel acceptance due to its strong theoretical anchors and its inclusion of self-efficacy.

Self-efficacy (SE) is measured by a 5-point Likert scale from strongly disagree (1) to strongly agree (5). Questions developed on the scale of Likert 5 are: 1. I could complete most tasks using automated technology systems if there was no one around to

tell me what to do as I go. 2. I could complete most tasks using automated technology systems if I could call someone for help if I got stuck. 3. I could complete most tasks using automated technology systems if I had a lot of time to complete the job for which the software was provided. 4. I could complete most tasks using automated technology systems if I had just the built-in help (speak to robot) facility for assistance.

3.7 Behavioral Intention (BI)

Ajzen (1991) found the construct of behavioral intention have a direct effect the actual technology use. In this thesis, behavioral intention is defined as the degree to which customers intend to use technology in automated hotel.

Behavioral intention (BI) is measured by a 5-point Likert scale from strongly disagree (1) to strongly agree (5). Questions developed on the scale of Likert 5 are: 1. I intend to use automated technology systems in an automated hotel in the next few months. 2. I predict I will use automated technology systems in an automated hotel in the next few months. 3. I plan to use automated technology systems in an automated hotel in the next few months. 4. I will strongly recommend for others to use automated technology systems in an automated hotel. 5. I always try new advanced technology. 6. I will not regret spending money to stay in an automated hotel.

CHAPTER 4

RESEARCH METHODOLOGY

4.1 Research Design

The survey instrument is designed to include a two-part questionnaire, including constructed items and sociodemographic information. The first part of questionnaire includes six latent constructs, namely, performance expectancy (PE), effort expectancy (EE), subjective norm (SN), facilitating conditions (FC), trust (T), and self-efficacy (SE). The second part of the questionnaire contains the demographic characteristics of the sample. All of the measurement items are adopted from previous literature and then adapted into this thesis to preserve the content validity. Thus, the following measurement scales were used: performance expectancy (PE) contained four items and was measured with two dimensions: perceived usefulness and relative advantage. The perceived usefulness dimension consisted of one item, while relative advantage dimension consisted of three items (Venkatesh et al., 2012; Roger, 1995). Effort expectancy (EE) was measured with two dimensions: perceived ease of use and ease of use (Moon & Kim, 2001). Perceived ease of use contained four items, while ease of use contained three items. Subjective norm (SN) was measured with three items (Ajzen, 1991; Fishbein & Ajzen, 1975; Venkatesh & Zhang, 2010). And facilitating conditions (FC) was measured with two dimensions: perceived behavior control and compatibility. The perceived behavior dimension consisted of three items, while compatibility dimension consisted of

one item (Wu I-L, ChenJ-L., 2005; Giovanis, Binioris, & Polychronopoulos, 2012). Trust (T) was measured with five items, which were adapted from Doney and Cannon (1997), Kumar, Scheer, and Steenkamp (1995), Roy, Dewit, and Aubert (2001), and Weerakkody et al. (2013). Self-efficacy was measured with four items adapted from Compeau & Higgins (1995), and Venkatesh & Zhang (2010). Attitude toward Technology Use (positive or negative of feelings about appliance of the technology) has four items, which were measured with four items adapted from Venkatesh et al. (2012). Finally, Behavioral intention (BI) was measured with six items adapted from Ayeh et al. (2016), Venkatesh et al. (2003), and Venkatesh et al. (2012).

Therefore, all scales in the first part of questionnaire was measured with 5-point Likert-type scales, ranging from strongly disagree (1) to strongly agree (5). The second part of questionnaire included basic sociodemographic information. The questionnaire was developed and administered in English. The survey questionnaire is shown in Appendix B.

4.2 Data Collection

Data was collected using an online software company, Qualtrics that administrated surveys (https://uofsc.co1.qualtrics.com/jfe/form/SV_dm0wYe3czlnt2hD). Further, the questionnaires were distributed on Amazon's Mechanical Mturk, a crowdsourcing marketplace which recruits individuals for their marketplace. The workers from Mturk can accept and complete surveys for researcher-paid financial incentives for Human Intelligence Tasks (HIT) completion (Buhrmester, Talaifar, & Gosling, 2018). The first part of questionnaire was based on a 5-point Likert scale ranging from 1=Strongly Disagree to 5=Strongly Agree. A total of 500 questionnaires were distributed

and 256 were returned, accounting for 51.2% return rate. This survey targeted general customers' opinions of automated hotels as they would be expected to vary in their behaviors. To ascertain that all respondents had a sufficient understanding of the automated hotel concept, a cover letter and one-minute video about Flyzoo Hotel concerning how to check-in and check-out of the automated hotel was included in the survey. In addition, screening questions were used to ensure that only respondents who chose three correct answers after watching the short video in the survey were able to continue the survey. After incomplete responses were removed, a total of 105 was used for data analysis.

The sample structure presented in percentages, including demographic variables such as gender, age, and education level. The descriptive analyses were used to describe characteristics and summary statistics of the variables involved in this thesis; they are as follows: the influence of Performance Expectancy (PE), Effort Expectancy (EE), Subjective Norm (SN), Facilitating Conditions (FC), Trust (T) and Self-Efficacy (SE), and the interference effect of Age, Gender, Culture, Income and Marital status. Because both independent variables and dependent variables are measured with the same tool (questionnaire), in which it is important to differentiate the variance of dependent variables.

4.3 Methods

Pilot test

A pilot test was conducted using Qualtrics, obtaining 45 usable responses. Faculty members and students, known to the authors, completed the online survey and offered feedback to the investigators about the survey items. After the first draft of the

questionnaire was completed, the survey items were refined through the pilot test to check the reliability of constructs and the transparency of the questions. The survey was reviewed by expert professors in Information Technology, in International Tourism and in Sustainable Tourism. The majority of participants expressed no difficulties in understanding the statements. The questions in the survey were further modified, refined and issues stemming from directions, formatting and grammar were further ironed out and face-validity established by my committee chair, and member professors of my thesis committee and a select few students of Hotel, Restaurant and Tourism Management at the University of South Carolina, a middle size South-Eastern university.

Separate regression models, both for main effects and interactions, were run across each dependent variable and independent variables involved in the study controlling for the influence effect of the moderators. The initial, more comprehensive structural equation model that tests all relationship between IVs (Independent Variables) and DVs (dependent variables) simultaneously was abandoned because of the inadequate observations in the sample. Confirmation of factor structures were also abandoned because of the same problem, Instead, calculated composite indices were used as the factors or the IVs. Historically, such method is present in the relevant literature. One of the limitations of this study is exactly the failure or not being able to confirm the factor structure of the variables involved in the study. Separate regressions run the risk of committing Type I error more frequently than if all variables were to be included in the study simultaneously. Nonetheless, this explanatory study can reveal important relationships that can be further studied by a larger more representative sample in the future.

4.4 Data Analysis

In terms of sample characteristics in Table 4.1, males account 55.2% for of the participants in the total sample. In terms of age distribution, respondents range from 35 to 44 years old, accounting for 37.6% of the total sample. In terms of educational level, the majority of respondents have college degree, accounting for 58.1%. In the distribution of ethic group, Asians are at the top of the list with 56.2% and then white account for 32.4%. In terms of marital status, participants married with children have the highest percentage, accounting for 49.5%. Regarding of income, participants who earn more than $50,001 are at the highest percentage, accounting for 25.7%. Even though the sample is a convenient sample, the compositions seem to reflect the general population. If there was a bias stemming from the composition of the sampling frame, these numbers could eliminate our concern to some degree.

Table 4.1 The Demographic Characteristics of Sample

		n=105
	Count	Percent (%)
Gender		
Male	58	55.2
Female	47	44.8
Age		
18-24	4	4.0
25-34	34	33.7
35-44	38	37.6
45-54	12	11.9
Over 55	13	12.9
Education		
Senior high school diploma or below	12	11.4
Associate Bachelor degree in college (2-year)	8	7.6
Bachelor's degree in college (4-year) (e.g., BA, BS)	61	58.1
Master's degree (e.g., MA, MS, MEd	22	21.0
Doctorate degree (e.g., PhD, EdD) or Professional degree (JD, MD)	2	1.9
Other (please specify)		
Ethnic group		
White	34	32.4
Hispanic or Latino	3	2.9
Black or African-American	5	4.8
American Indian or Alaska	3	2.9
Asian	59	56.2
Other (Please specify)	1	1.0
Marital status		
Single	30	28.6
Married without children	14	13.3
Married with children	52	49.5
Divorced/Separated/Widowed	8	7.6
Living with partner	1	1.0
Income		
less than $10,000	19	18.1
$10,001 to $20,000	17	16.2
$20,001 to $30,000	15	14.3
$30,001 to $40,000	13	12.4
$40,001 to $50,000	14	13.3
50,001 and above	27	25.7

Table 4.2 illustrates all the descriptive statistics for this thesis before all constructed items were coded in positive sentences. Table 4.2 also listed the percentage of answering from strongly disagree=1 to strongly disagree=5 for each item. The mean statistics for all constructed items are between 3.4 and 4.2, which implies that most of participants' responses were "somewhat agree" with the statement.

Table 4.2. All Items' Descriptive Statistics

	Items	N	Mean	Std. Deviation	From Strongly Disagree=1 to Strongly Agree= 5 %				
					1	2	3	4	5
PE	Grand mean: 16.43 Mean: 4.108			Grand Std. Deviation: 3.858 Std. Deviation: 0.908					
	PE1	139	4.13	0.908	2.2	5.0	7.2	48.9	36.7
	PE2	136	4.33	0.895	1.5	2.9	11.0	30.1	54.4
	PE3	139	4.01	1.042	2.2	9.4	12.2	37.4	38.8
	PE4	139	3.96	1.013	2.2	7.2	18.7	36.7	35.3
EE	Grand mean: 31.8 Mean: 3.975			Grand Std. Deviation: 7.066 Std. Deviation: 0.883					
	EE1	138	2.80	1.330	21.7	26.1	11.6	31.9	8.7
	EE2	138	4.20	0.827		3.6	15.2	39.1	42.0
	EE3	138	3.33	1.292	9.4	21.0	18.8	28.3	22.5
	EE4	138	4.12	0.796		3.6	15.2	46.4	34.8
	EE5	138	3.95	0.954	0.7	10.9	10.9	47.8	29.7
	EE6*	138	4.98	0.190			0.7	0.7	98.6
	EE7	138	4.14	0.851		5.1	14.5	41.3	39.1
	EE8	138	4.28	0.826		4.3	10.9	37.7	47.1
SN	Grand mean: 10.35 Mean: 3.45			Grand Std. Deviation: 3.429 Std. Deviation: 1.143					
	SN1	136	3.42	1.099	8.1	9.6	28.7	39.7	14.0
	SN2	136	3.40	1.176	6.6	16.9	26.5	30.1	19.9
	SN3	136	3.53	1.154	7.4	11.0	23.5	37.5	20.5
FC	Grand mean: 16.78 Mean: 4.195			Grand Std. Deviation: 3.549 Std. Deviation: 0.887					
	FC1	136	4.38	0.741	0.7	2.2	4.4	43.4	49.3
	FC2	136	4.07	0.944	0.7	8.8	10.3	43.3	36.8
	FC3	136	4.22	0.908	2.2	3.7	8.1	41.9	44.1
	FC4	136	4.11	0.956	2.2	5.1	11.8	41.2	39.7

T	Grand mean: 20.77 Mean: 3.462			Grand Std. Deviation: 5.718 Std. Deviation: 0.953					
	T1	136	3.89	0.956	2.9	5.9	16.2	49.3	25.7
	T2	136	4.05	0.905	1.5	5.1	14.0	45.6	33.8
	T3	136	4.10	0.926	2.2	4.4	11.8	44.9	36.8
	T4*	136	1.21	0.818	93.4	0.7	0.7	2.2	2.9
	T5	136	3.78	1.016	4.4	7.4	16.2	50.0	22.1
	T6	136	3.74	1.097	5.1	8.8	19.1	41.2	25.7
SE	Grand mean: 15.83 Mean: 3.96			Grand Std. Deviation: 3.869 Std. Deviation: 0.967					
	SE1	136	3.95	0.961	2.2	8.8	8.8	52.2	27.9
	SE2	136	4.02	0.977	0.7	8.8	15.4	37.5	37.5
	SE3	136	3.88	0.992	2.9	8.1	14.0	48.5	26.5
	SE4	136	3.98	0.939	2.2	5.9	14.0	47.8	30.1
BI	Grand mean: 25.22 Mean: 3.603			Grand Std. Deviation: 7.771 Std. Deviation: 1.110					
	BI1	132	3.27	1.354	17.4	9.1	22.0	31.8	19.7
	BI2	132	3.18	1.380	18.9	12.1	18.9	31.8	18.2
	BI3	132	3.28	1.437	18.9	9.1	23.5	22.0	26.5
	BI4*	132	4.00	0.124			0.8	98.5	0.8
	BI5	132	3.76	1.243	6.8	9.8	21.2	25.0	37.1
	BI6	132	4.01	1.052	2.3	10.6	9.1	40.2	37.9
	BI7	132	3.72	1.181	7.6	8.3	16.7	39.4	28.0
A	Grand mean: 15.3 Mean: 1.325			Grand Std. Deviation: 4.39 Std. Deviation: 1.098					
	A1 (AtB)	105	4.09	0.921	2.9	2.9	12.4	46.7	35.2
	A2 (AtU)	106	4.19	1.025	3.8	4.7	7.5	36.8	47.2
	A3 (AtB)	106	2.92	1.529	27.4	17.9	9.4	25.5	19.8
	A4	106	4.10	0.915	1.9	2.8	17.0	39.6	38.7

*Screening question.

Table 4.3 illustrates the descriptive statistics for this thesis after all items were coded in positive sentences. The valid number is 105, in which participants answered questions and chose the correct answer for the screening questions. With exception of EE, A, and BI, all of the item's mean statistic matches the grand mean in Table 4.2.

Table 4.3 Descriptive Statistics

	N	Mean	
	Statistic	Statistic	Std. Error
Performance Expectancy	136	16.53	.262
Effort Expectancy	138	24.66	.219
EEv1	138	3.20	.113
EEv3	138	2.67	.110
EEv5	138	2.05	.081
Subjective Norm	136	10.35	.267
Facilitating Conditions	136	16.78	.235
Trust	136	19.55	.340
Self-efficacy	136	15.82	.247
Attitude toward Technology Use	105	15.47	.329
Av3	106	3.08	.148
Behavioral Intention to Use	132	20.02	.354
BIv7	132	2.28	.103
Valid N (listwise)	105		

Table 4.4. Model 1 Regression and Hypotheses Results

Model		Standardized Coefficients	t	Sig.	ANOVA[a]	
		Beta			F	Sig.
1	(Constant)		2.809	.583	45.788	.000[b]
	Performance Expectancy	.621	6.350	.000*		
	Effort Expectancy	-.097	-1.528	.130		
	Subjective Norm	-.208	3.021	.003*		
	Trust	.040	.428	.670		
	Self-efficacy	.156	2.323	.022*		

a. Dependent Variable: Attitude toward Technology Use
b. Predictors: (Constant), Word of Mouth, Effort Expectancy, Self-efficacy, Subjective Norm, Trust, Performance Expectancy
c. R Square=0.836, Adjusted R Square=0.683, N=105
*α=0.05

Accordingly, Model 1 evaluates the effects of UTAUT factors (Performance Expectancy, Effort Expectancy, Subjective Norm) and added constructs (Self-efficacy and Trust) on Attitude Toward Technology Use in an automated hotel. As Table 4.4 shows, Model 1 is significantly based on ANOVA results. The beta coefficients in the table indicate the relative value (importance in social science research) of the predictors. F-test results indicate that the null hypothesis is rejected because the p-value is far less than 0.05. There is sufficient evidence to conclude that at least one of the betas is not equal to zero. R-square indicates that Model 1 can explain 83.6% of the error variance that determines Attitude, also known as the dependent variable.

Regression Analysis of Model 1 with its predictors are EE, SE, SI, Trust, PE for Attitude. Assume the multiple regression equation as follows:

$$\text{Attitude}=\beta 0 + \beta 1(\text{PE}) + \beta 2(\text{EE}) + \beta 3(\text{SN}) + \beta 4(\text{T}) + \beta 5(\text{SE}) + \varepsilon i$$

I propose the hypothesis:

H0: $\beta 0 = \beta 1 = \beta 2 = \beta 3 = \beta 4 = \beta 5 = 0$

Ha: $\beta i \neq 0$

The estimated full regression model is as follows:

Attitude^= 0.621(PE) - 0.097(EE) + 0.208 (SN) + 0.040(T) + 0.156(SE)

In Model 1, independent variables PE (F (1,105) =45.788, p=0.000), SN (F (1,105) =45.788, p=0.003) and SE (F (1,105) =45.788, p=0.022) have a statistically significant impact on Attitude in an automated hotel setting. Therefore, H1, H3 and H8 are accepted. The PE index increased by a value of one for every one unit of change for PE, the dependent variable "Attitude (A)" increases 0.621. One unit increases in SN, while the dependent variable Attitude increases 0.208. One unit increases in SE, while the dependent variable Attitude increases 0.156. The results show that the more people find automated technologies are useful and easier to use, the more they like working with the automated technology systems in automated hotels.

Table 4.5. Model 2 Regression and Hypotheses Results

Model		Standardized Coefficients	t	Sig.	ANOVA[a]	
		Beta			F	Sig.
1	(Constant)		2.769	.031	15.603	.000[b]
	Trust	.260	1.338	.036*		
	Self-efficacy	-.113	-.110	.235		
	Facilitating Conditions	-.012	-.798	.911		
	Attitude toward Technology Use	.478	2.332	.000*		

a. Dependent Variable: Behavioral intention to Use
b. Predictors: (Constant), Attitude toward Technology Use, Facilitating Conditions, Self-efficacy, Trust
c. R Square=0.620, Adjusted R Square=0.360, N=105
*α=0.05

Model 2 evaluates the effects of Subjective Norm, Facilitating Conditions and two added constructs (Self-efficacy and Trust) on BI. As Table 4.5 shows, Model 2 is significant based on ANOVA results. F-test results indicate that the null hypothesis is rejected because the p-value is far less than 0.05. There is sufficient evidence to conclude that at least one of the betas is not equal to zero. R-square indicates that Model 2 can explain 62% of the error variance that determines the dependent variable of BI.

Regression Analysis of Model 2 with its predictors are T, SE, FC and A for Behavioral intention. Assume the multiple regression equation as follows:

Behavioral intention=$\beta 0 + \beta 1(T) + \beta 2(SE) + \beta 3(FC) + \beta 4(A) + \varepsilon i$

I propose the hypothesis:

H0: $\beta 0 = \beta 1 = \beta 2 = \beta 3 = \beta 4 = 0$

Ha: $\beta i \neq 0$

The estimated full regression model is as follows:

Behavioral intention^= 0.147 (T) - 0.113 (SE) - 0.012 (FC) + 0.478(A)

In Model 2, independent variables T (F (1,105) = 15.603, p=0.036) and A (F (1,105) = 15.603, p=0.000) have a statistically significant impact on BI. Therefore, H7, and H13 are accepted. The Trust index increased by a value of one for every one unit of change for T. It increases 0.260 in BI. One unit increases in A, while the dependent variable BI increases 0.478. As the results show, most people want security from check-in and check-out process in automated hotels and believe the automated technology system to be sincere and trustworthy, more of them will intend to lodge in an automated hotel in the future.

Table 4.6. Moderator Regression and Hypotheses Results

Model		Standardized Coefficients	t	Sig.	ANOVA[a]	
		Beta			F	Sig.
1	(Constant)		3.918	.000	21.731	.000[b]
	Attitude toward Technology Use	0.422	1.462	.000*		
	gender	-1.155	-2.381	.019*		
	A*gender	.968	1.982	.050*		
2	(Constant)		1.623	.108	13.051	.000[c]
	Attitude toward Technology Use	.374	1.183	.240		
	gender	-1.097	-2.118	.037*		
	A*gender	.917	1.766	.081		
	Age	-.144	-.266	.791		
	A*Age	.075	.132	.896		
2	(Constant)		1.991	.049	11.260	.000[d]
	Attitude toward Technology Use	.018	.045	.964		
	Gender	-.988	-1.960	.053		
	A*Gender	.845	1.676	.097		
	Age	-.411	-.742	.460		
	A*Age	.402	.677	.500		
	Culture	-.201	-.367	.714		
	A*Culture	.497	.820	.414		

a. Dependent Variable: Behavioral intention to Use
b. Predictors: (Constant), Predictors: (Constant), A*gender, Attitude toward Technology Use, Gender
c. Predictors: (Constant), A*gender, Attitude toward Technology Use, Gender, Age, A*age
d. Predictors: (Constant), A*gender, Attitude toward Technology Use, Gender, Age, A*age, Culture, A*Culture
e. Model 1 R Square=0.634, Adjusted R Square=0.383
Model 2 R Square=0.638, Adjusted R Square=0.376
Model 3 R Square=0.677, Adjusted R Square=0.418
*α=0.05

As Table 4.6 shows, the moderator regression is significantly based on ANOVA results. The regression Analysis of the moderator effects with its predictors are A, Gender, A* Gender, Age, A* Age, culture and A*culture for BI. F-test results indicate

that the null hypothesis is rejected because the p-value is less than 0.1. There is sufficient evidence to conclude that at least one of the betas is not equal to zero. R-square indicated that model 1 can explain 63.4% of the error variance that determine the dependent variable of BI.

Assume the multiple regression equation as follows:

$A=\beta 0 + \beta 1(A) + \beta 2(culture) + \beta 3(age) + \beta 4(gender)+ \beta 5(A*culture) + \beta 6(A*age) + \beta 7(A*gender) + \varepsilon i$

I propose the hypothesis:

$H0: \beta 1= \beta 2 = \beta 3 = \beta 4 = \beta 5 = \beta 6 = \beta 7 =0$

$Ha: \beta i \neq 0$

The estimated full regression model is as follows:

Behavioral intention^= 0.018(A) – 0.201(culture) – 0.411(age) – 0.988(gender)+ 0.497(A*culture) + 0.402(A*age) + 0.845(A*gender)

Gender (p=.019) and A*gender (p=0.05) has a significant impact on BI. Gender is negatively related to BI. However, the interaction between A and gender become more positive. For age and culture, there is no sufficient evidence to conclude that at least one of the betas is not equal to zero. Thus, culture and age do not impact the relation between A and BI. Culture and age do not impact A. Gender has the function of a moderator.

The findings show that PE, SN, and SE have significant relationships with Attitude. T and A have significant relationships with BI. Culture and age do not have moderating effect. Gender interferes with the relationship between A and BI.

CHAPTER 5

CONCLUSION, LIMITATIONS, AND SUGGESTIONS FOR FUTURE RESEARCH

5.1 Conclusion

The findings of this thesis illustrate the relevant literature of automated technology and related theories regarding user acceptance patterns, constructing a consumer attitude framework, and explores the attitudes and behavior patterns of the customer's willingness to use automated technology while staying in an automated hotel during the current COVID-19 pandemic. In order to understand and explain the use of automated technology systems, integrated technology acceptance theory in information systems was used as the theoretical base that puts forward six dimensions: Performance Expectancy (PE), Effort Expectancy (EE), Subjective Norm (SN), Facilitating Conditions (FC), Trust (T), and Self-Efficacy (SE). Based on the theory of integrated technology acceptance and use, a hypothesized model of respondent's behavior and willingness to use automated technology was developed. Furthermore, efforts were made to explore the effects of interference (or moderator) variables, such as age, gender, and cultural demographics on the use/acceptance of automated hotels by the tourist/customer groups.

According to Venkatesh et al. (2003), UTAUT was able to explain 70% of the variance in behavioral intention, which is more effective than any model known in the past. But there is scant UTAUT-based research in the field of tourism and hospitality related to automated hotels in general, and acceptance models in particular. Based on the

feedback from 256 respondents from Mturk, this thesis indicates that the variances of customer attitude and intention can be significantly explained by the extended UTAUT. As table 4.4 and 4.6 shows, the model was able to explain 83.6% of the error variance in attitude and 62% of the error variance in behavioral intention.

By adding T and SE constructs to the UTAUT, this thesis reflects that PE, EE, SN, T, and SE were five factors in predicting attitude and T, SE, FC, and A were four factors in predicting customers' intention on lodging in automated hotels. In Model 1, findings show that PE, SN, and SE have a significant impact on the users' attitude of lodging in an automated hotel, with PE being the highest, followed by SN, and then SE. In Model 2, I found that T and A have significant relationships with BI. There is no moderating effect of culture and age. But gender has the function of a moderator.

There is sufficient evidence proving that PE has a statistically significant influence on attitude toward use of the automated technology in an automated hotel. This thesis is consistent with studies that assert PE had significantly impact on use (Venkatesh et al., 2012). This finding implies that customers believe they can enjoy the quality of service in the experience of an automated hotel. To increase performance expectancy, hoteliers should provide customers with appropriate knowledge of the automated service content. In this way, customers can express their opinions quickly.

In contrast to Venkatesh et al. (2003), there is no supporting evidence that EE has a significantly impact on customers' Attitude toward Use of the automated technology. However, Alaiad & Zhou (2013) assert that EE significantly influences people toward healthcare robots and Oh & Yoon (2014) reveal that EE influences people toward online information services. This finding implies that consumers concern whether they can save

their time and efforts while lodging in the automated hotel, suggesting that hoteliers should design a clear and understandable automated technology system. This effective technology would be a motivation for customers to stay.

In the era of the internet economy, the way for customers to obtain information have become more diversified. Besides asking familiar family and friends, the public's word-of-mouth can also produce great benefits through mass media and the internet. SN has a significant positive effect on attitude toward use of automated technology, consistent with the finding of Oh & Yoon (2014) on online information services. The findings of this thesis imply that customers are likely affected by the feelings of surrounding groups and suggest that the hospitality and tourism industry can invite social influencers to establish the trend of lodging in automated hotels and promote it to everyone. Based on the cultural differences, hoteliers should share more information about automated hotels in an intangible and indirect way. This management modus operandi can increase the number of users who experience the self-service and personal use of the automated hotel systems. Thus, hoteliers are advised to enhance the use of media and the internet to promote automated hotels.

The findings of this thesis have shown that facilitating conditions do not have a significant influence on behavioral intention when the effects of trust and self-efficacy are included in the model. The findings in this thesis are consistent with the findings of Al-Gahtani et al. (2007) regarding Information Technology. In order to improve the willingness of lodging in an automated hotel, it is recommended that the hospitality and tourism industry design with simplicity, convenience, and ease of use. Doing so enables consumers to have the support of an automated hotel in terms of the functionality and

affordability of automated technologies. It is important for hoteliers to pay more attention to functionality (e.g., robot arm, robot delivery, and self-check-in and self-checkout machines). Hoteliers consider the carrying capability of the robot arm, robot delivery route, and accuracy of uploading information in self-check-in and self-checkout machines.

Trust has a significant influence on behavioral intention. It means that trust affected the intention of customers' choice of accommodation. Findings in this study indicate that customers can take risks to have an experience of an automated hotel stay. Findings in this thesis are also consistent with the finding of Alaiad & Zhou. (2013) on healthcare robots, the finding of Ghazizadeh et al. (2012) on on-board monitoring systems, and the finding of Wang et al. (2012) on the hybrid recommender systems. A possible reason consumers hesitate to use these hotels can be due to their concerns regarding the security of the check-in and checkout process. This outcome supports that it is necessary to investigate trust and its effect on attitude and behavioral intention.

Carter & Schaupp (2008) contended that self-efficacy is a key factor in determining E-file adoption. McKenna et al. (2013) indicates that self-efficacy has a positive effect on behavioral intention on information services. This thesis also revealed that self-efficacy is a significant influence on attitude. This finding supports Carter & Schaupp (2008) proposition on E-file adoption and McKenna et al. (2013) study on information services. A possible reason is that automated hotels have advanced in automated technology and such technologies and automated services in hotels have evolved for short period of time. As a result, customers have rich experiences using the internet and their cell phones, which increases the effect of self-efficacy.

Moreover, findings in this thesis show that there are no moderating effect of culture and age between attitude and behavioral intention, which goes against Venkatesh et al. (2003), Venkatesh & Zhang (2010), Al-Gahtani et al. (2007), Yuen et al. (2010). According to Venkatesh et al. (2003) and Venkatesh & Zhang (2010), the effect of PE, EE, and SI on BI was moderated by age and gender and the effect of FC was moderated by age. Venkatesh & Zhang (2010) focused on individualism/collectivism between the U.S. and China. Al-Gahtani et al. (2007) examined the cultural differences between American and Saudi. Yuen et al. (2010) also tested cultural differences in the developing country and developed country. All of them assert that culture is an important determining factor in technology adoption. Because of the inadequate observations in the sample, the further research should gather more to determine the effect of moderator.

Summation

In conclusion, this thesis provides a better understanding of customers' opinions of automated hotels and adoption intention. For hoteliers, automated technologies can strengthen consumers' travel desires. It is important for hoteliers to consider that automated hotels can be implemented and further marketed for consumer growth. Hoteliers should consider both individual and global attitudes so the appropriate efforts can be made to bring together all pertinent positive attitudes to bear on the consumers' evaluation of the automated hotel model.

First, the significance is the customers' demand and response that determines the success and the position of the future of the automated hotel. Hoteliers should upgrade and reform hotels after they have a clear understanding of automation based on customer consumption levels, target groups, and hotel needs. Based on research, as potential future

customers of automated hotels, understand the interaction between AI and the customer, there is a direct correlation between positive responses of their experience to build rapport among peers to increase the response to invite more customers to choose an automated hotel experience.

Secondly, it is important to continue to observe and calculate the ways in which automated technologies are being evaluated by customers since automated technologies replace functions which would otherwise be performed by the hotel staff. In response to continue this research, hoteliers must create check out surveys for their guests, to understand their customer's individual feedback about their experience in their automated hotel. In the light of changes automated hotels can provide a unique, enjoyable, and interesting accommodation experience all the while keeping customers and belongings secure through AI technology, such as facial recognition. Thus, it is crucial that hoteliers should ensure customers feel secure, enjoy their experience and meet individual needs to perceive the hotel automated technologies to enhance the full hotel experience.

Thirdly, hoteliers need to increase people's awareness about the usefulness and value of using an automated service and increase awareness of epidemic prevention. Automated hotels satisfy the demand for contactless services, which reduces the risk of cross infection during the COVID-19 pandemic era. Due to the rapidly rising infections, customers are more willing to lodge in such a hotel, avoiding crowds and minimizing the degree and possibility of contamination caused by manual operation. It is also an advantage of using AI technology for the hotelier especially since hotels and restaurants have been understaffed due to the pandemic and post pandemic repercussions. Although

immediate impacts of the COVID-19 pandemic are still present, long-term effects are likely that people will continue to act cautiously when traveling and lodging.

Automated hotels are a great place to promote a reduction in labor cost, solve staffing issues and security. In the future, artificial intelligence will be a leading trend in the hospitality and tourism industry because automation maximizes efficiency and saves the customers' time and effort. The automated technologies can quickly complete information transmission, track customers' behavior, and design personalized services to make hotel management more scientific and refined. Even if the COVID-19 gradually disappears, one of the long-term effects caused by the trauma of the pandemic is customers will continue to appreciate the minimization of exposure to diseases. Customers expect to receive the value of lodging in automated hotels. Automated technologies should be designed with simplicity, convenience, and ease of use for customers, so they can experience more convenience and high-quality intelligent service for their stay in an automated hotel.

5.2 Limitations

This research adopts a quantitative research method to explore potential customers' acceptance of automated hotel practices. Some research aspects of automated hotels are restricted by commercial secrets (e.g., core manufacturing technology, equipment research and development and expenses), and this thesis cannot obtain any more completed information. An automated hotel's low-cost business strategy and service innovation in software and hardware equipment have an impact on people's choices. One example is the choices of the low-cost management strategy of an automated hotel relates to new service concepts, new customer interfaces, new service delivery systems, and

technology choices in service innovation. Therefore, there are some limitations to the discussion of each relevant facet, which play a strong part in the inner workings of a hotel.

The subject discussed in this thesis is the case of combining the automated technology with the hospitality and tourism industry, focusing on an automated hotel. This type of hotel is a fairly novel operation method in the world. Due to the limitations of resources and data collection, similar cases in other countries cannot be obtained. The sample size used can be enlarged to achieve more generalizable results. As the object of case comparison, the scope of this thesis used only one introduction of an automated hotel in China.

5.3 Suggestions for Future Research

This thesis adopts quantitative research methods to deeply explore the acceptance of the business model of an automated hotel. A larger or more representative sample will need to be collected in the future. Combined quantitative and qualitative research and analysis can be carried out for hoteliers to obtain hotel consumers' opinions. Utilizing these opinions to compare and improve the service in an automated hotel is important, so that one continues to obtain stronger research results.

This thesis only uses an automated hotel as the object of case study to explore the relationship between the application of new technology to the hospitality and tourism industry's business strategy and service innovation. In the future, the scope of research can be expanded, and traditional hotels can be added as comparative objects for case studies to study the application of new technologies. Hoteliers consider whether to further transform hotels to artificial intelligence hotels. In addition, moderating and mediating variables (e.g., experience) can be added to the model in order to further evaluate the

relationship between variables and explore the difference in acceptance between automated hotels and traditional hotels.

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APPENDIX A

SURVEY LETTER

Dear respondents,

I am a master student at the University of South Carolina trying to complete my thesis. I am writing to ask for your help with an important scientific study that will provide the data I need to complete my thesis. Without your support and completion of this survey questionnaire, I cannot finish my studies.

Why you? Your name has been randomly selected from a very small sample who represent guests who may in the future or might have stayed in the past in automated hotels through the USA and elsewhere. The purpose of this survey is to obtain your opinions and perceptions of automated hotels (also named "unmanned hotels" or "robotic hotels" or "full-automation hotels"). You may or may not have had any experience of this type of hotel. We are asking your perception of these new hotel types. Regardless of whether you had an experience with such hotels, we would like you to think about your images, thoughts or perceptions of how such hotels might be or should be when responding to my questionnaire. Your cooperation is very much needed and this survey is an excellent opportunity to voice your opinion about automated hotels, especially during this worldwide COVID-19 crisis. The hospitality industry is trying to reinvent or repurpose existing hotels to contain and manage the spread of current and future diseases to help the traveling public.

Your personal opinion is important! The survey will only take about 10 minutes to complete.

In order to answer these questions, you don't have to be an 'expert'. We are confident that everyone will be able to take part, not just those with strong views or particular viewpoints. Please remember that there are no right or wrong responses to the questions. Your participation is entirely voluntary; you are free to withdraw from the study at any time without causing any bad feeling and will not affect your future relationships with the University. The information you provide will be held in strict confidentially and will be used only for the purposes of this study. The results will be reported in aggregate form only, and cannot be identified individually. The data will be stored in a secure server and accessed only by the principal investigator of this study; and will be destroyed once it is no longer needed for the study. Please do not write any identifying information such as your name and address on the survey. This study has been approved by the University of South Carolina’s IRB (Institutional Review Board- the ethics committee on human

research subject). If you have any complaints or concerns regarding this study, please contact my advisor Ercan Sirakaya Turk, Ph.D. by ERCAN@hrsm.sc.edu.

Please do not hesitate to contact us if you have any questions regarding this study at (917) 969-8166. If for some reason you do not wish to do this, you may contact the Chair of Department at (803) 777-2600. Our mail, e-mail, phone and fax details are on the final page of questionnaire. When you have finished completing the questionnaire, please submit by clinking the submit button.

Thank you in advance for your help and your time.

Sincerely,

Jianhong Feng
Graduate student in College of Hospitality, Restaurant, and Tourism Management
University of South Carolina
E-mail: jfeng@email.sc.edu

APPENDIX B

QUESTIONNAIRE

Question: Imagine that you are currently in your automated hotel stay, please indicate the extent to which you agree or disagree with each of the following statements (from 1=Strongly Disagree to 5=Strongly Agree). Of course, you can choose any number on the scale that reflects your feelings (please check one only).

	Facets	Variables	Measurement question	Measure
PE	Perceived usefulness (PU) (Venkatesh et al., 2012)	PE1 (PU)	I find automated technology useful in an automated hotel.	Likert Five-point scale, check from 1=Strongly Disagree to 5=Strongly Agree
	Relative Advantage (RA) (Rogers, 1995)	PE2	Using automated technology in an automated hotel would enable me to accomplish tasks more quickly.	
		PE3	Using automated technology in an automated hotel would improve the quality of my hotel stay.	
		PE4	Using automated technology in an automated hotel increases my productivity.	

EE	Perceived Ease of Use (PEOU) (Moon & Kim, 2001) Ease of use (EU) (Moore & Benbasat, 1991)	EE1 (PEOU)	It will be impossible to use automated technology in automated hotels without expert help.	
		EE2 (EU)	Learning to operate automated technology systems will be easy for me.	
		EE3 (PEOU)	It would take too much time to learn how to use automated technology systems in automated hotels.	
		EE4 (PEOU)	My interaction with automated technology systems in an automated hotel is clear and understandable.	
		EE5 (EU)	Interacting with automated technology systems in automated hotels doesn't require a lot of my mental effort.	
		EE 6*	This question is a test question, please choose "Strongly Agree" to indicate that you have read the question carefully.	
		EE7 (PEOU)	If I already use automated technology, it will be easy for me to become skillful at using automated technology systems in an automated hotel.	
		EE8 (EU)	If I use automated technology, it will be easy for me to remember how to use automated technology systems in an automated hotel.	
SN	Subjective Norm (SN)	SN1	People who influence my behavior think that I should use automated technology in an automated hotel.	

	(Ajzen (1991), Davis et al., (1989), Fishbein & Ajzen (1975), Taylor & Todd (1995), Venkatesh & Zhang (2010))	SN2	People who are important to me think that I should use automated technology in an automated hotel.	
		SN3	People whose opinions that I value recommend that I use automated technology in an automated hotel.	
FC	Perceived behavior control (PBC) (Wu I-L, Chen J-L., 2005)	FC1	I think that I would be able to use automated technology systems in an automated hotel.	
		FC2	I think that using automated technology systems in an automated hotel would be entirely within my control.	
		FC3	I think that I have the resources, knowledge, and ability to use automated technology systems in an automated hotel.	
	Compatibility (Giovanis, Binioris, & Polychronopoulos, , 2012)	FC4	Using automated technology systems in an automated hotel is compatible with my lifestyle.	
T	Trust (Doney &Cannon, 1997; Kumar, Scheer & Steenkamp, 1995; Roy, Dewit, and Aubert, 2001; Weerakkody, El-Haddadeh, Al-Sobhi, Shareef, & Dwivedi, 2013)	T1	I think that the information offered by the automated technology system is sincere and honest.	
		T2	The automated technology system is characterized by the frankness and clarity of the services that it offers to the consumer.	
		T3	I think that automated technology systems are capable of carrying out their work.	
		T4*	This question is a test question, please choose	

			"Strongly Disagree" to indicate that you have read the question carefully.	
		T5	Automated technology systems have enough safeguards to make me feel comfortable interacting with them.	
		T6	I feel assured that legal and technological structures adequately protect me from problems with automated technology systems.	
SE	Self-efficacy (Compeau & Higgins, 1995; Venkatesh & Zhang, 2010)	SE1	I could complete most tasks using automated technology systems if there was no one around to tell me what to do as I go.	
		SE2	I could complete most tasks using automated technology systems if I could call someone for help if I got stuck.	
		SE3	I could complete most tasks using automated technology systems if I had a lot of time to complete the job for which the software was provided.	
		SE4	I could complete most tasks using automated technology systems if I had just the built-in help (speak to robot) facility for assistance.	
BI	Behavioral intention (Ayeh et al.,2016; Venkatesh et al., 2003, 2012)	BI1	I intend to use automated technology systems in an automated hotel in the next few months.	
		BI2	I predict I will use automated technology systems in an automated hotel in the next few months.	
		BI3	I plan to use automated technology systems in an	

			automated hotel in the next few months.	
		BI4*	This question is a test question, please choose "Somewhat Agree" to indicate that you have read the question carefully.	
		BI5	I will strongly recommend for others to use automated technology systems in an automated hotel.	
		BI6	I always try new advanced technology.	
		BI7	I will not regret spending money to stay in an automated hotel.	
A	Attitude toward Technology use (Positive or negative of feelings about appliance of the technology)	A1 (AtB)	I think it's a good idea to use the technology systems in an automated hotel.	
		A2 (AtU)	The technology systems in an automated hotel would make my staying more interesting.	
		A3 (AtB)	I think it's a bad idea to use the technology systems in an automated hotel.	
		A4	I like working with the technology systems in an automated hotel.	

*Screening question

Demographics

Question	Item	Measurement
Age	(1) 18-24 years old. (2) 25-34 years old (3) 35-44 years old. (4) 45-54 years old (5) Over 55	Ordinal
Gender	(1) Female (2) Male (3) I don't identify as either of these, instead I identify as (4) I prefer not to answer this question	Category
Ethnic group	(1) White (2) Hispanic or Latino (3) Black or African-American (4) American Indian or Alaska Native (5) Asia/Pacific Islander (6) Native Hawaiian (7) Other (Please specify):	Category
Marital status	(1) Single (2) Married without children (3) Married with children (4) Divorced/Separated/Widowed (5) Living with partner	Category
Education Level	(1) Senior high school diploma or Below (2) Associate Bachelor degree in college (2-year) (3) Bachelor's degree in college (4-year) (e.g., BA, BS) (4) Master's degree (e.g., MA, MS, MEd) (5) Doctorate degree (e.g., PhD, EdD) or Professional degree (JD, MD) (6) Other (please specify)	Category
Income	(1) less than $10,000 (2) $10,001 to $20,000 (3) $20,001 to $30,000 (4) $30,001 to $40,000 (5) $40,001 to $50,000 (6) 50,001 and above	Category