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TOURISTS' RESISTANCE TO INTERNET OF THINGS APPLICATIONS IN HOTEL SERVICES IN HO CHI MINH CITY, VIETNAM

Duong Vu Manh Duy, Ta Xuan Hoai*, Doan Thi Kim Thanh

Faculty of Tourism, Nguyen Tat Thanh University, HCMC, Vietnam

*Email: *taxuanhoai@gmail.com*

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ABSTRACT

The speedy integration of IoT has revolutionized the hospitality industry by making processes more efficient and providing personalized services to guests. However, in spite of the extensive diffusion of IoT worldwide, there is a lack of research on how these innovations are adopted in emerging markets like Vietnam. In this study, the determinants of tourists' resistance towards IoT use in hotel services in Ho Chi Minh City are examined. Using Innovation Resistance Theory and the Technology Acceptance Model as theoretical frameworks, a mixed method approach is used, combining quantitative surveys (n=387) and semi-structured interviews (n=24). It is found out that privacy, complexity, value, and traditional barriers have a significant impact on tourists' resistance behaviors. Moreover, foreign tourists are more resistant to IoT compared to local tourists, and age and technological awareness act as moderators. The paper provides insights into the existing knowledge gap about the phenomenon of technology resistance in the hospitality sector of developing countries.

Keywords: Internet of Things, innovation resistance, hotel technology, smart tourism, technology adoption, Vietnam tourism.

1. INTRODUCTION

Over the past decade, the hospitality industry has undergone a considerable transformation driven by technological progress. The advent of the Internet of Things (IoT) technologies has become one of the major transformative phenomena in this regard since it allows changing the way service delivery in hotels is done and enhancing customers' experience [1]. As defined as the networking connection between common household items that allows for data exchange, IoT can be used by hotels to increase their operational efficiency and provide personalized services [2]. The possibilities of implementing IoT include a range of services from smart room devices and automated check-in systems to service recommendation based on location and individual environmental settings and more.

Ho Chi Minh City (HCMC) is the biggest metropolis in Vietnam and an important tourism center in Southeast Asia. The rapid development of the tourism sector in this city is connected to the increased use of smart technologies in order to provide better services for local and international tourists [3]. The development strategy of the tourism sector in Ho Chi Minh City till 2025–2030 includes the integration of technologies as the main precondition of sustainable development of this sector [4].

Although the application of IoT in hotels promises some advantages for customers and hotel operators, there is still quite a high level of resistance to using this type of technology among certain segments of tourists. Despite the fact that numerous researchers explored the issue of technology acceptance within the hospitality industry [5], [6], the number of works dedicated to the problem of technology resistance is quite low. Moreover, there are no studies on the resistance to IoT in particular. The reason for it is that the problem of technology resistance cannot be ignored because the acceptance of the innovation is possible only in case of overcoming it [7], [8].

Therefore, this research will examine tourists' resistance to IoT applications in hotel services in Ho Chi Minh City. The main question of this work is the following:

1) What are the major factors that influence tourists' resistance to IoT applications in hotel services in HCMC?

2) How do demographic variables and travel patterns moderate tourists' resistance to IoT applications in HCMC?

3) What strategies should be used to cope with tourists' resistance to IoT applications in HCMC?

2. LITERATURE REVIEW

2.1 Internet of Things in Hospitality

The IoT has represented an innovative paradigm of interactions between physical things and digital systems, making possible the creation of networks of connected devices capable of collecting, exchanging, and acting upon information without human interventions [9]. In terms of hospitality sector, IoT applications include various technologies, such as smart room systems, wearable devices, location-based services, as well as property management systems [1].

Several benefits of IoT implementation in hotels have been proven in the previous studies, such as improving efficiency, lowering energy consumption, increasing personalization, and enhancing guest satisfaction [10], [3]. In their work, Neuhofer et al. prove the ability of technologies to create memorable experience because of providing real-time service customization and personalization [11]. Also, Kim and Perdue confirm the impact of technologically advanced room features on hotel selection decision among travelers [12].

As regards Vietnam, numerous studies on the adoption of technology in the hospitality sector were conducted. For example, Tran et al. (2019) explore the impact of various digital factors, namely online rating and e-satisfaction, on customers' behavior and their intention to use hospitality services further. It is an important part of smart tourism system, since it allows conducting researches on tourist dissatisfaction using online platforms with the help of users' generated content.[13]. Nguyen et al. (2021) considered this question indirectly, since they developed a framework for digital transformation in hospitality and tourism. The proposed framework contains technological and organizational changes caused by the process of digital transformation, which is the suitable context for studying customers' resistance to technology [14]. Nevertheless, research on IoT implementation in Vietnamese hospitality is scarce, especially from tourists' perspective.

2.2 Innovation Resistance Theory

While the bulk of technology adoption research emphasizes acceptance factors, insights into innovation resistance can offer equally useful guidance towards effective technology implementation. One possible theory is the Innovation Resistance Theory (IRT), developed by [7], which sheds light on the reasons for consumers' resistance to innovations, which could be beneficial for them. The innovation resistance, according to IRT, has two main barriers: functional (usage, value, and risk) and psychological (tradition and image).

A number of studies of IoT resistance behaviors were performed using the Innovation Resistance Theory framework. For instance, [8] discovered privacy concern, complexity, and vulnerability perception to be important predictors of smart devices resistance. Moreover, Szmigin and Foxall (1998) claimed that innovation resistance should be regarded as the normal behavior of consumers rather than an exception to it [15].

The use of IRT in the hospitality industry is rather limited; however, a number of studies have looked into resistance to particular hotel technologies. Tung and Law (2019) discovered that privacy concerns and perceived complexity significantly influence the guests' resistance to robot service providers in the hotel industry [16]. Security issues were found by Ozturk et al. (2016) to be the major barrier for mobile payment adoption in the hospitality industry [17]. However, there is a lack of comprehensive research regarding the issue of resistance to IoT applications in hotel industry in general, especially in emerging tourism countries such as Vietnam.

2.3 Technology Acceptance Models in Hospitality

Technology acceptance models provide complementary frameworks for understanding resistance by identifying factors that facilitate or hinder adoption. The Technology Acceptance Model (TAM), introduced by Davis (1989) [18], and its extensions such as UTAUT (Unified Theory of Acceptance and Use of Technology), proposed by Venkatesh et al. (2003) [19], have been extensively used in hospitality settings.

Perceived usefulness and perceived ease of use have proved to be significant factors of technology adoption in hotels [6]; [5]. Other factors like social influence, facilitating conditions, and hedonic motivation have also shown to be factors of acceptance of hospitality technology [20].

The role of cultural factors should not be underestimated in technology acceptance. Significant differences were shown to exist in the adoption of technology in various cultural contexts. Thus, according to Wang and Qualls (2007), the organizational culture was found to have a considerable impact on technology adoption [21]. In turn, cultural differences were shown to exist regarding privacy concerns about hotel technologies: people from collectivist cultures have different privacy perceptions compared to people from individualist cultures [22].

Although there is extensive literature devoted to the factors influencing technology acceptance in the hospitality industry, only a few studies have explored the relationships between technology acceptance factors and technology resistance factors. The present research will fill this gap in exploring specific resistance factors in the presence of the traditional technology acceptance factors.

2.4 Privacy and Security Concerns in IoT Adoption

However, privacy and security concerns have become highly relevant barriers in adopting IoT technology in various situations [23]; [24]. Data collection, storage, and analysis, which IoT implies, create numerous risks for users' privacy, especially in the case of monitoring private activities and behavior.

Several works concerning hospitality industry point out that privacy concerns become critical barriers in the process of adopting technologies there. Morosan and DeFranco (2016) found that the level of privacy risk significantly affects guests' intention to use mobile payment systems in hotels [20]. Tung and Law (2019) state that data security is one of the major concerns connected with service robots and IoT technologies in hotels [16]. However, people's perceptions about privacy greatly differ from culture to culture, which makes necessary carrying out the research for particular markets.

There are some specifics about the Vietnamese context in terms of privacy and technology adoption. In particular, T.-B. Luong (2025) found that young Vietnamese tourists show other patterns of privacy concerns comparing to the Western tourists because they pay more attention to social privacy (the control over information being exchanged between guests and their partners) rather than institutional privacy (information collection by organizations) [25]. It may greatly affect the patterns of IoT resistance among the guests in HCMC.

2.5 Research Gap and Contribution

Existing literature gives important insights into the topic of technology adoption and resistance. However, there are some gaps in the literature. First of all, there are no studies that explore the factors of IoT resistance in hospitality. Also, the number of papers about technology adoption in Vietnamese hospitality is very small because of the increasing importance of Vietnam as the place for tourism. Finally, the specifics of the cultural, economic and technological environment of HCMC make it necessary to do the research for this place separately.

2.6 Theoretical Framework and Hypothesis Development

This study integrates IRT [7] with elements from TAM to develop a comprehensive framework for understanding tourists' resistance to IoT applications in hotel services. The proposed model examines how functional barriers (usage, value, and risk) and psychological barriers (tradition and image) influence resistance intentions, with demographic and travel characteristics serving as moderating variables.

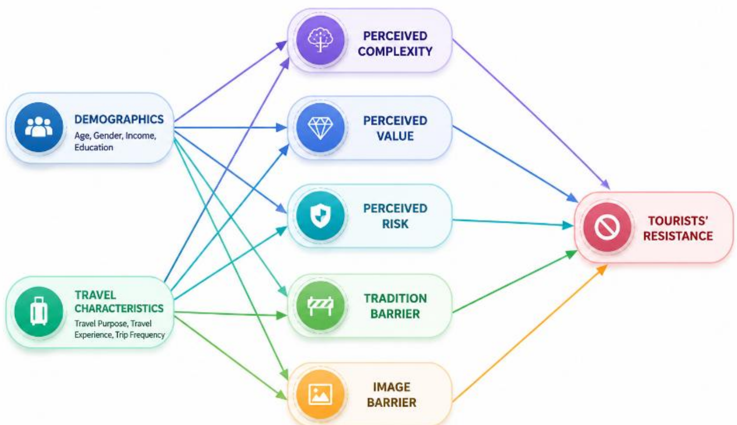

Figure 1. Research Model on Tourists' Resistance to IoT in Hotels.

(Source: Compiled and proposed by the author, 2026)

2.6.1. Perceived Complexity

Perceived complexity refers to how complicated the innovation appears to be [26]. If tourists perceive IoT applications to be complicated or take time to learn then they would be opposed to using them [8]. IoT applications may introduce unfamiliar interfaces or processes during their usage resulting in increased perceived complexity for hotel tourists.

Prior studies have demonstrated the relevance of perceived complexity on resistance to technologies. Laukkanen et al. (2008) demonstrate that in the context of mobile banking complex technologies are strong predictors of resistance [27]. Studies in the hospitality context, Kim and Qu (2014) demonstrate that complexity is a significant predictor for self-service technology resistance in hotels [28]. Given the potentially complex nature of IoT applications complexity perceptions may significantly influence resistance behaviors.

H1: Perceived complexity positively influences tourists' resistance to IoT applications in hotel services in HCMC.

2.6.2. Perceived Value

Perceived value refers to the extent to which the innovation provides performance / value for money relative to other innovations [7]. Tourists may perceive IoT hotel applications to offer less value compared to conventional services particularly if they necessitate additional costs or reduce human interactions.

Value perceptions have been consistently demonstrated as significant predictors for technology adoption in the hospitality context. Kim et al. (2020) demonstrate that value perceptions significantly predicted intentions to use smart hotel technologies [6]. Failure to perceive value in IoT applications would lead to increased resistance among tourists.

H2: Perceived lack of value positively influences tourists' resistance to IoT applications in hotel services in HCMC.

2.6.3. Perceived Risk

Perceived risk refers to a person's perception of the probability that the innovation will have harmful or unpleasant consequences for his or her physical, social, psychological or financial well-being including performance risk, financial risk, physical risk, psychological risk and social risk [7]. In relation to IoT applications hotel tourists may have high perceptions of security and privacy being compromised since such applications typically require collecting large amounts of personal data that may be subject to security breaches [23].

Previous studies have demonstrated the influence of perceived risk on technology resistance in the hospitality context. Ozturk et al. (2016) demonstrate that security concerns significantly predicted resistance to mobile payment systems in hotels [17]. Kim et al. (2019) demonstrate that privacy risk was a significant predictor for biometric technologies resistance in hotel contexts [30]. Given the extensive nature of data being collected for IoT systems risk perceptions may have significant influence on resistance behaviors.

H3: Perceived risk positively influences tourists' resistance to IoT applications in hotel services in HCMC.

2.7. Psychological Barriers

2.7.1. Tradition Barrier

The tradition barrier refers to the extent to which innovation is conflicting with any cultural traditions, social norms or personal behavior [7]. Tourists appreciate human interaction and traditional hotel practices [16] and innovations such as IoT applications that disrupt conventional practices and remove human interactions may be strongly resisted.

Prior studies have demonstrated the significance of tradition barriers on technology resistance. Laukkanen et al. (2008) demonstrate that tradition significantly predicted mobile banking technology resistance among older consumers in particular [27]. Tussyadiah et al. (2019) demonstrate that preference for human interactions significantly predicted resistance to automated services in hotels [31]. Given the potential for IoT applications to significantly disrupt traditional hotel practices tradition barriers may play a significant role in influencing IoT application resistance.

H4: Tradition barriers positively influence tourists' resistance to IoT applications in hotel services in HCMC.

2.7.2. Image Barrier

The image barrier refers to negative associations or prejudices in relation to the origin or category of an innovation [7]. IoT hotel applications may trigger negative associations due to excessive automation or the involvement of corporate surveillance [9].

Image perceptions have been found to significantly influence technology resistance in a variety of contexts. Laukkanen et al. (2008) demonstrated that image barriers predicted mobile banking technology resistance [27]. Tung and Law (2019) demonstrate that in the context of hotels negative perceptions of automation significantly predicted resistance to robot services [16]. With the proliferation of IoT technologies in society image perceptions may significantly influence IoT application resistance.

H5: Image barriers positively influence tourists' resistance to IoT applications in hotel services in HCMC.

2.8. Moderating Variables

2.8.1. Demographic Characteristics

Demographic characteristics such as age, gender, education, and nationality have been identified as significant moderators of technology adoption and resistance [19]. In the hospitality context, several studies have demonstrated demographic influences on technology perceptions and usage patterns.

It is well-known that age is one of the predictors of technology adoption, with younger consumers being more accepting towards new technologies [19]. According to Kim et al. (2020), age is a significant moderating factor of smart hotel technology adoption intentions [6]. Similarly, the education level influences technology perceptions, with higher education being positively correlated with technology acceptance [29].

In the case of HCMC, the city that attracts diverse international and domestic tourists, nationality and cultural background of visitors might have a particular importance. Previous research has shown that there are significant cultural differences in technology perceptions and privacy concerns [22]. Therefore, given the unique Vietnamese cultural context and diverse visitor base, nationality might be a significant moderating factor of resistance behaviors.

H6: Demographic characteristics (age, gender, education, nationality) moderate the relationship between resistance factors and overall resistance to IoT applications.

2.8.2. Travel Characteristics

Travel characteristics such as travel purpose, frequency, and previous experience may significantly influence technology perceptions and resistance behaviors. Business travelers, who typically prioritize efficiency and productivity, may demonstrate different resistance patterns compared to leisure travelers, who may prioritize authentic experiences and human interaction [6].

Previous experience with similar technologies has been consistently identified as a significant predictor of technology adoption [19]. In the hospitality context, Morosan and DeFranco (2016) found that previous experience with mobile technologies significantly influenced mobile payment adoption in hotels [20]. Tourists with greater previous exposure to IoT applications may demonstrate lower resistance levels due to increased familiarity and reduced complexity perceptions.

H7: Travel characteristics (purpose, frequency, previous experience) moderate the relationship between resistance factors and overall resistance to IoT applications.

3. METHODOLOGY

3.1. Research Design

A sequential mixed-methods approach integrating quantitative surveys and qualitative interviews was used in this study to achieve a holistic view of tourists' IoT resistance in hotel services. The combination of both statistical testing of hypotheses and exploration of motivations and perceptions contributing to resistance behaviors was possible because of the application of mixed methods in research [32].

The research was carried out in three phases: (1) qualitative preliminary phase including semi-structured interviews with hotel managers and technology specialists to identify IoT applications and contextual factors relevant to them; (2) quantitative survey phase where the proposed hypotheses about resistance behaviors and their determinants were tested; and (3) qualitative follow-up phase where the interviews with tourists were conducted to explore the resistance factors and ways to mitigate them.

3.2 Study Context and Population

The study was performed in HCMC, Vietnam, from September 2024 until January 2025. HCMC is an appropriate location for examining the tourists' IoT resistance in hotel setting because of the city being the biggest center of tourism in Vietnam, presence of a great variety of visitors (international and domestic tourists), and ongoing development of HCMC as a smart city with focus on technological advancements in tourism [4].

The population of the study included both international and domestic tourists using 3-5 star hotels in HCMC within the period of the research. Such hotels were chosen because the probability of using IoT in such hotels was higher than in budget hotels [13]. In order to ensure diversity of views, the sampling strategy included tourists of different ages, nationalities, purposes, and level of technological familiarity.

3.3. Instrument Development

3.3.1. Preliminary Qualitative Phase

In order to define the IoT applications implemented or planned to be implemented in HCMC hotels, semi-structured interviews were conducted with 12 respondents – hotel managers (n=7) and technology specialists (n=5). Interviews covered topics related to types of IoT applications, challenges in implementation, forms of resistance, and contextual factors.

3.3.2. Quantitative Survey Development

The instrument was designed based on validated measures in the innovation resistance and technology acceptance literature specifically tailored to the context of IoT applications in hotel industry. The questionnaire comprised four parts: (1) demographic information and travel behavior; (2) level of awareness and prior experience with IoT; (3) resistance factors (perceived complexity, perceived value, perceived risk, tradition barrier, image barrier); and (4) resistance intentions.

Resistance factors were measured by multi-item scales adopted from prior literature. Perceived complexity was measured by a four-item scale adopted from [8]. Perceived value was measured by a five-item scale adopted from (4). Perceived risk was measured by a six-item scale with privacy, security, and performance aspects adopted from (23). Tradition barrier was measured by a four-item scale adopted from (16) and (30). Image barrier was measured by a four-item scale adopted from [8].

Resistance intention was measured by a five-item scale adopted from Mani and Chouk (2018) and Szmigin [8] and Foxall (1998) [15] measuring behavioral intentions of avoidance, rejection, postponement, and opposition. All scale items were measured on 7-point Likert scale from "strongly disagree" (1) to "strongly agree" (7).

The instrument was originally drafted in English and translated into Vietnamese by using a back-translation approach to make sure the equivalent meaning is achieved [35]. Both versions of the questionnaire were piloted among 30 travelers (15 international and 15 domestic) to evaluate the clarity and validity of the instrument. Some minor adjustments were made after the piloting to enhance the clarity and cultural suitability of the scale.

3.3.3. Qualitative Interview Protocol

The next step of the study was the semi-structured interview protocol developed to understand more deeply the sources of resistance and the possible solutions to this problem. It comprised open-ended questions to explore motivations for resistance, concerns regarding the use of IoT in hotels, contextual factors affecting resistance and potential solutions to overcome it.

To stimulate conversation, participants were provided with visual presentations and descriptions of the six categories of IoT applications identified at the first stage of the study. As the survey instrument, the interview protocol was prepared in two language versions – English and Vietnamese.

3.4. Data Collection

3.4.1. Quantitative Survey

Quantitative data was gathered using intercept surveys and surveys at selected hotels among major tourist attraction sites. Purposive quota sampling was used where fifteen purposively selected 3 to 5-star hotels were selected in order to provide representation based on geographic distribution in the city, star rating, and level of technological adoption among the hotels.

In order to reduce the chances of seasonality bias, data was collected in the period between September 2024 and January 2025. Quota was set for nationality (domestic vs. international), age, and travel purpose (business vs. leisure). Research assistants then approached potential respondents at popular tourist attraction points such as Ben Thanh Market and Nguyen Hue Walking Street, and distributed surveys in the selected hotels.

In order to control for the potential selection bias, resistance intention scores for both intercept surveys and hotel-based surveys were compared. Comparative analysis did not reveal any statistically significant differences, which proves the representativeness of the combined data. Surveys were administered using tablet computers with English and Vietnamese versions. The Vietnamese version of the survey went through a rigorous process of back-translation where the first translation was carried out by a bilingual translator with graduate-level expertise in tourism studies. Next, back-translation was done independently by another bilingual person to the English version.

A total number of 452 surveys was collected, but only 387 of them was deemed usable, thus, producing 85.6% of usable response rate. In the final sample, there were 203 (52.5%) international tourists and 184 (47.5%) domestic tourists with age distribution between 18 and 72 years old (M=37.4, SD=12.8).

3.4.2. Qualitative Interviews

Qualitative interviews were held with 24 respondents who agreed to take part in further discussion following the survey. Purposive sampling strategy was used in order to achieve representation of diverse resistance intentions and demographics and diverse travel patterns.

The final qualitative sample consisted of 13 international tourists and 11 domestic tourists with various levels of technological adoption and resistance to IoT.

Interviews were conducted in private places such as hotel lobbies, cafe areas, and interview rooms in selected hotels. Interviews lasted between 45-60 minutes and were recorded with respondents' permission. Interviews were conducted in English and/or Vietnamese depending on the preferences of the respondent, while the bilingual researcher was always present during interviews.

3.5. Data Analysis

3.5.1. Quantitative Analysis

Structural Equation Modeling (SEM) was utilized to analyze the relationships postulated between resistance factors, moderation, and resistance intentions. The analysis adopted a two-step process recommended by Anderson and Gerbing (1988) that begins with the measurement model assessment using Confirmatory Factor Analysis (CFA) followed by the structural model test [33].

Initial tests included descriptive statistics, reliability test using Cronbach's alpha, and common method bias using Harman's single factor test. The measurement model was tested using CFA to determine the construct validity. In determining the model fitness, several fit indexes were considered, including Comparative Fit Index (CFI), Tucker-Lewis Index (TLI), Root Mean Square Error of Approximation (RMSEA), and Standardized Root Mean Square Residual (SRMR).

Testing the structural model involved the use of Maximum Likelihood Estimation to test the direct effects postulated between resistance factors and resistance intentions. Multi-groups analysis was done to determine the effect of demographics and travel characteristics on moderating effects. All Quantitative analysis was done using SPSS 27.0 and AMOS 27.0 software.

3.5.2. Qualitative Analysis

Qualitative data was analyzed using thematic analysis according to the six steps approach described by Braun and Clarke (2006). The interview transcripts were transcribed verbatim, while Vietnamese interviews were translated to English language by bilingual researchers. The data analysis involved: (1) Familiarization with data through reading several times; (2) Coding; (3) Theme search; (4) Theme review; (5) Defining and naming themes; and (6) Report production [34].

NVivo 14 software was used to assist in coding and theme generation process. To increase the reliability of findings, member checking was used to check the interpretations of a selected number of participants and researcher triangulation was used in which different researchers coded a part of the data independently and compared their results.

4. RESULTS

4.1. Sample Characteristics

Age distribution ranged from 18 to 72 years (M = 37.4, SD = 12.8), with 32.8% in the 18-29 age group, 28.4% in the 30-39 age group, 21.7% in the 40-49 age group, and 17.1% aged 50 or above. Education levels were relatively high, with 68.2% of participants holding bachelor's degrees or higher. Travel purposes included leisure (63.8%), business (24.3%), and combined business and leisure (11.9%).

In terms of technological familiarity, 42.6% of participants reported high familiarity with IoT technologies, 38.2% reported moderate familiarity, and 19.2% reported low familiarity.

Previous experience with IoT hotel applications varied, with 53.7% reporting previous exposure to smart room controls, 38.5% to mobile check-in systems, 31.8% to voice-activated assistants, 27.9% to location-based service recommendations, 25.3% to personalized environment settings, and 18.6% to biometric access systems.

The qualitative interview sample (n=24) included 13 international tourists and 11 domestic tourists, with ages ranging from 23 to 65 years. The sample included 14 leisure travelers, 7 business travelers, and 3 combined business and leisure travelers, with varying levels of technological familiarity and previous IoT experience.

4.2. Measurement Model Assessment

Before testing the hypotheses, the measurement model was tested using the Confirmatory Factor Analysis. The initial model had all the scales used in the study measuring the five resistance factors and resistance intentions.

Model fit indices indicated acceptable fit after removing two items with low factor loadings (< 0.5): $\chi^2/df = 2.37$, CFI = 0.94, TLI = 0.93, RMSEA = 0.059 (90% CI: 0.051-0.067), SRMR = 0.048. All remaining items demonstrated significant factor loadings ($p < 0.001$) on their respective constructs, with standardized loadings ranging from 0.67 to 0.89.

Reliability was assessed using Cronbach's alpha and composite reliability (CR). All constructs demonstrated acceptable reliability with Cronbach's alpha values ranging from 0.78 to 0.91 and CR values ranging from 0.81 to 0.92. Convergent validity was confirmed through average variance extracted (AVE) values exceeding the recommended threshold of 0.5 for all constructs (ranging from 0.58 to 0.73). Discriminant validity was established as the square root of AVE for each construct exceeded the correlations with other constructs, and all heterotrait-monotrait (HTMT) ratios were below the conservative threshold of 0.85.

Common method bias was assessed using Harman's single-factor test, which revealed that no single factor accounted for the majority of variance (the largest factor accounted for 28.7% of variance), suggesting that common method bias was not a significant concern. Additionally, a common latent factor approach was employed, which showed minimal differences in standardized loadings (all changes < 0.2), further indicating that common method bias did not substantially influence the results.

Table 1. Reliability and Validity Statistics.

Construct	Items	Cronbach's Alpha	CR	AVE
Perceived Complexity (PC)	4	0.86	0.89	0.67
Perceived Value (PV)	4	0.84	0.87	0.62
Perceived Risk (PR)	5	0.91	0.92	0.73
Tradition Barrier (TB)	4	0.82	0.85	0.58
Image Barrier (IB)	3	0.78	0.81	0.59
Resistance Intentions (RI)	5	0.89	0.91	0.68

Table 1 presents the reliability and validity statistics for all constructs, while Table 2 provides the correlation matrix with square roots of AVE values on the diagonal.

Table 2. Correlation Matrix and Discriminant Validity

Construct	PC	PV	PR	TB	IB	RI
Perceived Complexity (PC)	**0.82**					
Perceived Value (PV)	0.41	**0.79**				

Perceived Risk (PR)	0.53	0.38	**0.85**			
Tradition Barrier (TB)	0.48	0.45	0.42	**0.76**		
Image Barrier (IB)	0.39	0.37	0.46	0.51	**0.77**	
Resistance Intentions (RI)	0.58	0.52	0.64	0.56	0.47	**0.82**

Note: Bold diagonal values represent the square root of AVE.

4.3. Hypothesis Testing

The structural model was tested to examine the hypothesized relationships between resistance factors and resistance intentions. Model fit indices indicated acceptable fit: χ^2/df = 2.53, CFI = 0.93, TLI = 0.92, RMSEA = 0.063 (90% CI: 0.055-0.071), SRMR = 0.052. The model explained 67.3% of the variance in resistance intentions (R^2 = 0.673), indicating substantial explanatory power.

Structural Equation Model – IoT Resistance in Hotel Services

Standardized path coefficients (β) and significance levels

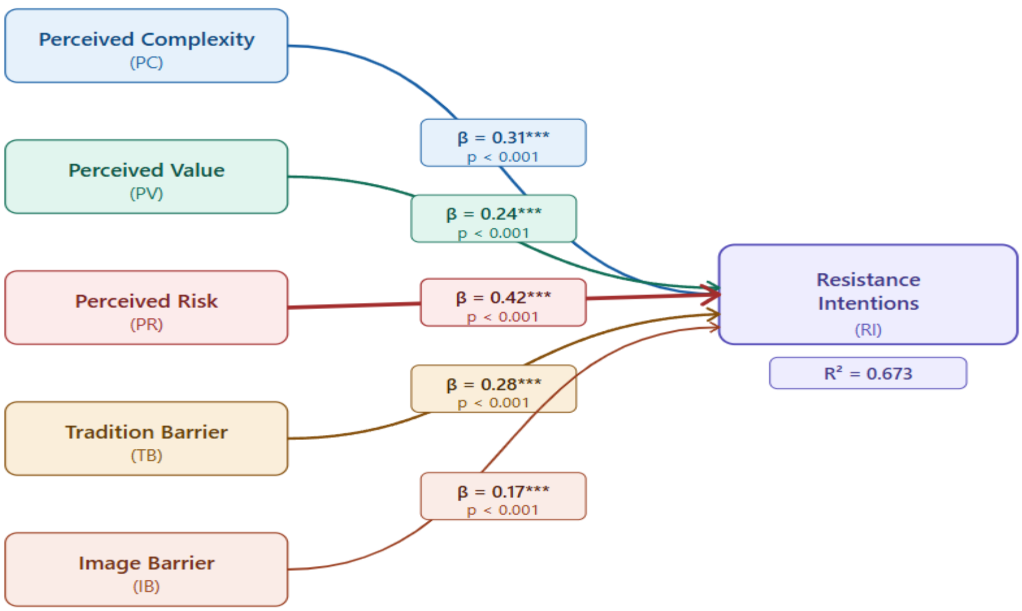

Figure 2. Path Coefficients and Significance in the SEM of IoT Resistance in Hotel Services

(Source: Data extracted from AMOS 27.0 software)

4.3.1. Direct Effects of Resistance Factors

Table 3 presents the standardized path coefficients and hypothesis testing results for the direct effects of resistance factors on resistance intentions.

Table 3. Direct Effects of Resistance Factors on Resistance Intentions

Hypothesis	Path	Standardized Coefficient	t-value	p-value	Result
H1	PC → RI	0.31	5.87	<0.001	Supported
H2	PV → RI	0.24	4.52	<0.001	Supported
H3	PR → RI	0.42	7.93	<0.001	Supported
H4	TB → RI	0.28	5.23	<0.001	Supported
H5	IB → RI	0.17	3.21	<0.001	Supported

All hypothesized relationships were statistically significant ($p < 0.01$), supporting H1 through H5. Perceived risk demonstrated the strongest influence on resistance intentions ($\beta = 0.42$, $p < 0.001$), followed by perceived complexity ($\beta = 0.31$, $p < 0.001$), tradition barrier ($\beta = 0.28$, $p < 0.001$), perceived value ($\beta = 0.24$, $p < 0.001$), and image barrier ($\beta = 0.17$, $p = 0.001$). These results indicate that all five resistance factors significantly contribute to tourists' resistance to IoT applications in hotel services, with privacy and security concerns (perceived risk) exerting the strongest influence.

4.3.2. Moderating Effects

To test the moderating effects of demographic and travel characteristics (H6 and H7), multi-group analyses were conducted for each potential moderator. Significant differences in path coefficients across groups were identified for nationality, age, and technological familiarity.

Nationality as Moderator

The multi-group analysis of national groups identified significant differences in the effects of perceived risk ($\Delta\chi^2 = 8.74$, $p < 0.01$) and tradition barrier ($\Delta\chi^2 = 6.92$, $p < 0.01$) on resistance intentions.

Thus, the effect of perceived risk on resistance intentions is significantly higher for international tourists ($\beta = 0.51$, $p < 0.001$) than domestic ($\beta = 0.32$, $p < 0.001$). In turn, the effect of tradition barrier is significantly higher for domestic tourists ($\beta = 0.36$, $p < 0.001$) than international ($\beta = 0.21$, $p < 0.001$). The findings indicate that while privacy and security issues have the greatest impact on international tourists' resistance intentions, cultural and traditional service experience is more important for domestic tourists.

Age as Moderator

The age variable was used to examine the possible moderating effect of resistance factors. Thus, the comparison of younger (18-39 years, n=237) and older (40+ years, n=150) tourists found significant differences in the effects of perceived complexity ($\Delta\chi^2 = 9.31$, $p < 0.01$) and image barrier ($\Delta\chi^2 = 7.46$, $p < 0.01$) on resistance intentions.

The effect of perceived complexity on resistance intentions is significantly higher for older tourists ($\beta = 0.43$, $p < 0.001$) than for younger tourists ($\beta = 0.23$, $p < 0.001$). Similarly, the effect of image barrier on resistance intentions is significantly higher for older tourists ($\beta = 0.26$, $p < 0.001$) than for younger tourists ($\beta = 0.11$, $p = 0.047$). The findings indicate that perceived complexity and image barrier play a significant role in influencing the resistance of older tourists to IoT use, which is consistent with the findings of the previous research.

Technological Familiarity as Moderator

The technological familiarity of tourists with IoT technologies was compared using three groups of respondents with high (n=165), moderate (n=148), and low (n=74) technological familiarity. Significant differences were found in the effects of all the resistance factors, with the most significant difference in the effect of perceived complexity ($\Delta\chi^2 = 12.47$, $p < 0.001$) and perceived risk ($\Delta\chi^2 = 8.93$, $p < 0.01$).

The effect of perceived complexity on resistance intentions is highest for tourists with low technological familiarity ($\beta = 0.58$, $p < 0.001$), moderate ($\beta = 0.32$, $p < 0.001$), and high technological familiarity ($\beta = 0.15$, $p = 0.031$). At the same time, the effect of perceived risk on resistance intentions is significantly higher for tourists with high technological familiarity ($\beta = 0.53$, $p < 0.001$) than with moderate ($\beta = 0.41$, $p < 0.001$) and low technological familiarity ($\beta = 0.29$, $p < 0.001$). The findings indicate that while complexity plays the main role in influencing the resistance of less technologically experienced tourists, privacy and security concerns are more relevant for more familiar tourists.

No significant moderating effects were found for gender, education level, and travel purpose.

Based on the above, H6 is partially supported (nationality and age as moderators) and H7 is partially supported (technological familiarity as moderator).

4.4. Qualitative Findings

Thematic analysis conducted on data from interviews has allowed revealing five main themes associated with IoT resistance: (1) privacy and control concerns, (2) authenticity and human interaction, (3) technological self-efficacy, (4) perceived value and necessity, and (5) implementation preferences. The themes provide additional insight into quantitative results and suggest potential strategies to overcome resistance.

4.4.1. Privacy and Control Concerns

Privacy and control issues were the first major themes discussed by participants. The participants were concerned about data collection, storage, and possible misuse. International tourists were especially concerned about privacy since they referred to stricter rules in their countries.

A 42-year-old American tourist said: "I am not comfortable with being watched during my stay. At home, I understand at least something about data usage. Here, I cannot say anything for sure."

Domestic tourists were also concerned about privacy issues but for different reasons. For example, a 35-year-old Vietnamese business traveler stated: "I am worried about potential breaches in security. If they do not protect data properly, anyone can find out information about my presence in the room and other details of my private life."

Issues with control were often raised together with privacy concerns. Participants were uncomfortable with giving up their control of systems to technology.

A 51-year-old Australian tourist explained: "I do not want to be controlled by these technologies. They make decisions without asking me what I need."

4.4.2. Authenticity and Human Interaction

Many participants, especially leisure travelers, valued authenticity and human interaction and viewed IoT applications as a factor which diminishes it. The reason why leisure travelers considered technology an obstacle was a decrease in human interaction which takes place during the stay.

A 29-year-old South Korean tourist said: "If I go to Vietnam, I want to experience authentic Vietnamese culture. With these technologies around me, I have no chance of experiencing it since I interact with the same technology which I use at home."

Domestic tourists also valued human interaction although for different reasons. For example, a 47-year-old Vietnamese leisure traveler said: "Good service is important in Vietnamese hospitality and culture. When hotels use technologies instead of people, they try to save money, not improve services."

However, many participants agreed that there was proper proportionality in using IoT technology depending on the trip purpose. For example, a 38-year-old business traveler from Singapore stated: "During business trips, I like the fact that all processes are efficient. However, in case of leisure travels, I want to communicate with people and experience culture."

4.4.3. Technological Self-Efficacy

Self-Efficacy Concerns. Issues related to technological self-efficacy, namely, the confidence of participants in their capacity to efficiently utilize the IoT applications, became another prominent theme, especially relevant to older travelers and those unfamiliar with IoT technologies.

One participant, a 65-year-old domestic tourist said: "It is hard enough for me to use the smartphone applications. Introducing yet another technology into my hotel stay makes it inconvenient rather than convenient. The whole first day I had to struggle to understand how to switch on the lights or turn on the air conditioning."

Language barriers affected the issue of self-efficacy in a negative way as well. "The voice assistants fail to recognize my accent when I speak English," admitted 58-year-old Japanese tourist. "If the system is only working in English or Vietnamese, it causes frustration rather than convenience to most of international travelers."

Intuitive design and availability of support were highlighted by a number of participants. "I am not afraid of new technologies; however, they have to be instantly comprehensible or there has to be support available," explained 43-year-old Australian tourist. "If I have to read the manual to operate a shower, it does not help me much."

4.4.4. Perceived Value and Necessity

A lot of participants did not believe that the IoT applications have any value or necessity, seeing them as useless complications of the hotel stay. This theme was especially prominent in travelers who valued simplicity and reliability.

"I do not see any necessity in using technologies that solve problems that do not exist," commented 33-year-old domestic business traveler. "I do not need a mirror that will show me the weather when I can always check it on my phone. There is no need in a voice assistant when traditional controls work well enough."

Perceptions of value depended heavily on the particular application in question. "There is obvious value in mobile check-in, as it saves time, but smart room controls might be convenient too. However, I cannot see any use in having my toiletries cabinet tracking my usage habits or my mirror displaying advertisements," said 27-year-old international tourist.

Several participants stressed that their assessment of the value of a certain technology included both the benefits and the costs involved. "If these technologies are sold at a premium or used as an excuse to charge extra money for the rooms, the value proposition becomes even more questionable," admitted 45-year-old US business traveler. "I am not willing to pay extra for something that I do not particularly want."

4.4.5. Implementation Preferences

Finally, the last theme focused on the preferences for the ways in which IoT applications could be introduced to increase their adoption. There were three sub-themes: gradual introduction, optionality, and transparency.

Gradual Introduction. A number of participants expressed a preference for gradual introduction of the IoT applications rather than the full implementation. "Hotels have to introduce one or two really useful applications that offer tangible benefits, make sure they work perfectly and then continue step by step according to guest feedback," advised 39-year-old domestic tourist.

Optionality. The necessity of offering traditional alternatives alongside the IoT alternatives was emphasized by many participants. "The important thing here is the choice," claimed 52-year-old international tourist. "It has to be possible for me to either use the automated system or get the traditional one. When technology becomes mandatory rather than optional, the resistance to it grows."

Transparency. The importance of clear explanation of data collection, storage, and utilization was emphasized by all participants. "Hotels have to explain exactly what kind of data they collect, what it is being used for, for how long it is stored and who gets to use it," said 36-year-old international tourist.

Several participants claimed that clear opt-in procedures and detailed privacy policies could greatly reduce the resistance to the technology. "I want to be offered explicit requests to give consent to certain kinds of data utilization, rather than agreeing to generic terms and conditions," said 41-year-old business traveler."

4.5. Discussion

In this regard, this study explored tourists' resistance to IoT applications in hotel services in HCMC. Moreover, the current study identified factors that determine resistance behaviors and possible strategies to combat tourists' resistance to IoT applications.

4.5.1. Theoretical Implications

The current findings add value to IRT in terms of its applicability to IoT applications in tourism in emerging markets. Specifically, all five resistance factors – perceived complexity, perceived value, perceived risk, tradition barrier, and image barrier were found to significantly affect tourists' resistance intentions. The results support the comprehensive nature of IRT framework suggested by Ram and Sheth (1989) [7].

Among these resistance factors, the most influential one turned out to be perceived risk. The importance of this factor is explained by tourists' concerns related to privacy and security issues that arise in connection with IoT technology. This finding is consistent with previous studies that pointed out the significance of privacy issues as a barrier to IoT technology adoption [23]; [24]. However, the findings from interviews suggest that tourists' perceptions regarding their privacy may be different depending on tourist segments. In particular, international tourists are concerned about protection of data in unfamiliar environment whereas domestic tourists consider possible security vulnerabilities of IoT applications.

The significant impact of traditional barriers confirms the need to consider cultural and experiential factors in the process of technology implementation. Specifically, the current findings suggest that IoT applications may be perceived as something that interferes with tourists' ability to experience an authentic culture and communicate with real people in the context of leisure travel. This finding extends previous studies dedicated to tourism experiences that considered the issue of authenticity [36].

The current findings of moderating effects offer valuable information regarding tourists' resistance patterns. The greater impact of perceived risk on tourists' intentions in case of international tourists than domestic tourists implies that lack of knowledge about regulatory practices in the new country increases concerns about tourists' privacy. At the same time, the greater impact of perceived complexity on tourists' resistance intentions among older tourists and those who have lower technological skills shows that technology self-efficacy needs to be taken into account when designing implementation strategy. This finding extends previous research on technology acceptance through identification of moderating factors.

The findings obtained through interviewing regarding tourists' preferences in relation to implementation, gradual introduction of technology, optionality, and transparency of application provide additional insights on potential ways of overcoming resistance to IoT technology in hotels. These preferences can be linked to trialability factor within innovation diffusion theory [26]. Trialability implies providing opportunities for experimenting with innovations in limited scope that will decrease resistance to the innovation in question due to greater familiarity with it.

Although IRT and TAM have been tested in developed countries and have been well-validated, this study reveals how institutional and cultural contexts shape resistance patterns and mechanisms. The unique pattern found in Vietnam provides theoretical extensions to these frameworks.

Risk Perception in Low-Trust Institutional Environments

Perceived risk was found to be the most significant driver of resistance ($\beta = 0.42$) in the current study, which contrasts with previous studies conducted in a Western setting. This sensitivity stems from two contextual issues. On one hand, the emerging data protection system in Vietnam leads to real uncertainties in terms of information security. Additionally, the culture of institutional distrust contributes to the problem of digital privacy concerns. Importantly, the nature of these concerns is different compared to those found in more developed markets since Vietnamese tourists worry not about companies surveilling them or using their data, but rather about unauthorized breach and the lack of regulatory mechanisms. Therefore, IRT's notion of risk needs cultural adjustment within institutional settings.

Differential Moderating Effects: Tourist Origin and Cultural Familiarity

The difference in moderating impacts on international and domestic tourists' behavior supports the need for culturally adjusted theory. In particular, international tourists have higher levels of perceived risks due to the lack of awareness of local regulatory frameworks and uncertainty concerning data protection regulations. This magnification effect is consistent with the prediction of institutional theory that regulatory ambiguity increases perceived vulnerability.

Domestic tourists, on the other hand, are prone to disproportionally resist AI through the tradition barrier ($\beta = 0.36$). This result demonstrates that there is a culturally-specific issue involved: AI-based automation directly clashes with the personalized service paradigm, which characterizes the traditional Vietnamese hospitality industry. The introduction of machines into customer service violates the established norms of personal relationships.

4.5.2. Practical Implications

The results of the research indicate number of practical implications to hotel operators and technology vendors planning to offer an IoT applications in hospitality sector in HCMC. Firstly, the high impact of perceived risk indicates the privacy and security should be handled carefully. Hoteliers should have an inclusive data protection policies and have to implement appropriate mechanism and clearly disseminate it with the guests in addition to protect guest's data more effectively. It would be useful to adopt clear opt-in system for specific use instead of generic approach when taking user's consent which will address particularly the perceived risk on privacy of international guests.

Secondly, high impact of perceived complexity reveals the importance of intuitiveness in design and the sufficient level of user support systems should be put in place. Hotels should ensure that IoT interfaces is clear, simple and easily comprehendible so that guest should have a zero or minimal learning curve. Multiple language support system should be provided, special attention on elderly guests' potential accessibility concerns in using the interfaces should be given due to perceive high level of complexity barrier among this particular segment. Also, availability of assistance from human, either through technology interface or by staff should be provided which address the issue related to self-efficacy.

Thirdly, finding from the moderating effect indicates that segmentation can be considered for the design and offering of the services. For example, in case of international guests a strong assurance of the implementation of a global standard privacy-protection should be presented to overcome the fear that stems from a relatively high perception of the risk. Simplifying the interfaces and system support could be more appropriate to elder as well as to non tech-savvy people to reduce the barriers due to perceived high complexity of IT based devices/ services. By considering the characteristic, one can apply segmentation in their system design which ensures to address the specific need more efficiently.

Fourthly, qualitative study of authentic and human interaction indicates that the use of IT system should supplement rather than replace existing hotel service design features. Hotels should explore ways to use technology not to decrease cultural authenticity but reinforce cultural values, either by having the culture incorporated in IT interfaces or making it complement human connection rather than displace it.

Finally, identified preference of implementation method (gradual, optional and clear procedures) suggests hotel consider offering non-compulsory and low risk IT application at first like an IoT for room condition and Energy management, alternatively on line check in function can be offered and guest could use their preferred way, hotel can have a gradually improvement and implementation system. By so the gap is filled and resistance can be lowered and it would fulfill the needs of heterogeneous customers segments.

5. CONCLUSION

5.1. Summary of Findings

This paper investigated how tourists resist IoT-enabled hospitality applications in the tourism context of HCMC, Vietnam. The research indicates that perceived risk, traditions, the number of services being integrated with IoT, and the perceptions of value and complexness significantly influence tourists' resistance to the IoT-enabled hospitality applications in HCMC, Vietnam. Among those five factors and demographic variables of interest, Perceived risk had the highest predicting ability towards tourists' resistance toward the IoT-enabled hospitality applications. Nationality and ages have positive effect to moderate between independent and dependent variables. Instead, Familiar with technologies has negative effect.

On another hand, the insights we gain through qualitative approach indicated that tourists expressed concerns about privacy and control issues in IoT-enabled application, desired authentic travel, human interaction, challenge with technological self-efficacy when using it and perception of technology, application feature preference and adoption factors that the value of application and way to adopt application become important factors that would effect tourists' resistance while some issues are worth to mention such as desire on being cared when face problem and the necessity of using different interfaces to interaction with the Internet. In general, tourists' resistance toward the IoT applications would be the outcome combined with practical issue and psycho-cultural issue.

In terms of study results, we can understand that the issue of tourist' resistance must be carefully examined during deployment phase. Technological advancements in hospitality may enable hotel managers to gain considerable benefits. Nevertheless, they should consider these different tourists' perspectives and contextual factor during the application of Internet of Thing in tourism as to improve its adoption rate with customized strategies.

5.2. Limitations and Future Research Directions

The study is not without its limitations. First, the research has investigated the extent and nature of tourists' resistance to IoT in the specific tourist context of HCMC and, as such, the results cannot be generalized to other tourism settings which might have their own uniqueness in socio-cultural context, economic circumstances and different degrees of technical maturity. Therefore, future research might take place in another developing tourism settings.

Second, this research captured tourist' resistance toward IoT-embedded hospitality application at a single point of time. Given the rapid technological development, it is possible that patterns of resistance toward it might change with technological maturity. A longitudinal study to address such issues would be desirable.

Third, our study focuses on tourists' perspectives, and it neglects the interplay between guests' resistance and the strategic decisions made by hotel managers with regards to the management of the IoT-embedded hospitality services in their establishments. A multi-stakeholder study, incorporating perspectives on both guests' resistance and hotel managers' implementations, would provide a more comprehensive picture of this topic.

Fourth, it identifies the potential usage and design preferences of tourists but has not empirically tested strategies to tackle these factors. Experimental research with tested strategies regarding communication methods, the nature of technological features, or particular management strategies would be valuable in order to shed light on effective methods of minimizing negative tourists' attitudes toward the technology.

Fifth, the study investigated tourists' resistance toward IoT-embedded applications in the hospitality sector at a rather broad level. Future research could be done more narrowly to study resistance toward particular types of applications. This could make more insightful insights into which categories of technology that the research should consider and invest most.

5.3. Managerial Implications

Based on the findings, several specific recommendations can be offered for hoteliers in HCMC seeking to implement IoT applications:

Develop transparent data policies: Create comprehensive, easily accessible privacy policies that clearly communicate what data is collected, how it is used, how long it is stored, and who has access to it. Consider implementing differential privacy approaches that provide personalized services without storing identifiable individual data.

Adopt segment-specific implementation strategies: Recognize that different tourist segments have different concerns and preferences regarding IoT applications. Develop targeted approaches for international versus domestic tourists, business versus leisure travelers, and guests with varying levels of technological familiarity.

Implement gradual adoption approaches: Begin with applications that provide clear value and minimal privacy implications before expanding to more comprehensive implementations. Ensure initial applications function flawlessly to build trust and positive perceptions before introducing more complex systems.

Maintain service optionality: Preserve traditional service alternatives alongside technological options, allowing guests to choose their preferred service mode. Avoid making technological interaction mandatory for essential services.

Invest in intuitive design and support: Ensure IoT interfaces are immediately understandable with minimal learning requirements. Provide multilingual support options, including both technological assistance (tutorials, help features) and human assistance when needed.

Balance technology and human interaction: Use technology to enhance rather than replace meaningful human interactions. Identify opportunities for technology to facilitate personalized human services rather than substituting automated interactions for human ones.

Integrate cultural elements: Incorporate local cultural elements into technological interfaces to enhance rather than diminish authenticity. Consider how technology can be used to share cultural information and facilitate authentic local experiences.

Communicate clear value propositions: Clearly articulate how specific IoT applications enhance the guest experience rather than implementing technology for its own sake. Focus on applications that solve genuine guest problems or significantly improve service quality.

Implement robust security measures: Invest in comprehensive security systems to protect guest data and regularly audit these systems to identify and address vulnerabilities. Communicate these security measures to guests to build trust and reduce risk perceptions.

Solicit and respond to feedback: Establish mechanisms to gather guest feedback regarding IoT applications and demonstrate responsiveness to concerns and suggestions. This iterative approach can help refine implementations and reduce resistance over time.

To effectively operationalize transparent data policies, hotel managers must transition from generic privacy statements to explicit, granular opt-in mechanisms. For instance, guests should be presented with a modular digital consent form during mobile check-in, allowing them to selectively approve data usage for smart room personalization while opting out of location tracking. Furthermore, hotels must adopt internationally recognized security certifications (e.g., ISO/IEC 27001) and employ end-to-end encryption for biometric data. For implementation, a phased 'sandbox' approach is recommended; hotels should pilot non-intrusive IoT applications, such as energy-efficient climate control, in specific room categories before expanding to complex biometric access systems.

By addressing these recommendations, hoteliers in HCMC can develop more effective IoT implementation strategies that minimize resistance while maximizing potential benefits for both operational efficiency and guest experience.

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SEE APPENDIX

Appendix A: Quota Sampling Strategy and Sample Distribution

To address the methodological requirements for representative sampling, a multidimensional quota sampling approach was employed. The quotas were established based on secondary data regarding the demographic profile of tourists staying in 3-to-5-star accommodations in HCMC. Table A2 details the targeted quota percentages against the actual achieved sample (N = 387) across the primary moderating variables: Nationality, Travel Purpose, and Age Group.

Table A1. Quota Target and Actual Sample Distribution

Demographic Category	Sub-group	Targeted Quota (%)	Actual Sample (n)	Actual Percentage (%)
Nationality	International	50.00%	203	52.50%
	Domestic	50.00%	184	47.50%
Travel Purpose	Leisure	60.00%	247	63.80%
	Business	25.00%	94	24.30%
	Combined (Business & Leisure)	15.00%	46	11.90%
Age Group	18 – 29 years	30.00%	127	32.80%
	30 – 39 years	30.00%	110	28.40%
	40 – 49 years	20.00%	84	21.70%
	50 years and above	20.00%	66	17.10%

The detailed wording of all measurement items utilized in the survey instrument, alongside their respective sources and standardized factor loadings from the confirmatory factor analysis, is provided in Table A1 below to ensure methodological transparency and facilitate future replicability. As noted in the methodology section, two items were excluded during the purification process due to low factor loadings (< 0.50).

Table A2. Construct Measurement and Confirmatory Factor Analysis Results

Construct & Source	Measurement Items (Scale: 1 = Strongly Disagree to 7 = Strongly Agree)	Standardized Loading
Perceived Complexity(PC) (Adapted from [8])	PC1: Using IoT applications in hotel services requires a significant amount of mental effort.	0.82
	PC2: The setup and operational procedures of these IoT devices are overly complicated.	0.78
	PC3: It takes too much time to learn how to properly use smart hotel services.	0.85
	PC4: The user interfaces of these IoT applications are not intuitive or user-friendly.	0.74
Perceived Value (PV)	PV1: The potential benefits of using IoT in hotels do not justify the associated costs or efforts.	0.81

	PV2: I do not see any significant functional advantage in using IoT compared to traditional hotel services.	0.79
	PV3: The overall value proposition provided by automated hotel applications is low.	0.84
	PV4: Utilizing these technologies does not meaningfully enhance the quality of my stay.	0.76
	PV5: Item removed due to cross-loading and factor loading < 0.50.	-
Perceived Risk (PR) (Adapted from [23])	PR1: I worry that my personal data collected by hotel IoT devices might be misused or shared without consent.	0.88
	PR2: Relying on these technologies exposes me to significant digital privacy risks.	0.85
	PR3: I feel that interconnected hotel IoT networks are highly vulnerable to security breaches.	0.82
	PR4: I am concerned that my physical movements and habits are being tracked during my stay.	0.86
	PR5: There is a high risk of these automated systems malfunctioning and disrupting my experience.	0.79
	PR6: Item removed due to low factor loading < 0.50.	-
Tradition Barrier (TB) (Adapted from [27])	TB1: Using IoT devices disrupts how I traditionally prefer to interact with hotel staff.	0.81
	TB2: I prefer the established routines of a traditional hotel stay over automated, self-service processes.	0.77
	TB3: These technologies conflict with my desire for an authentic, human-centered hospitality experience.	0.83
	TB4: I feel uncomfortable changing my usual travel habits to accommodate new hotel technology.	0.75
Image Barrier (IB) (Adapted from [8])	IB1: I strongly associate hotel IoT applications with excessive corporate surveillance and monitoring.	0.82
	IB2: The heavy integration of automation gives the hotel a cold, impersonal image.	0.79

	IB3: I have a negative overall impression of hotels that rely too heavily on technological substitution.	0.76
	IB4: Item removed to improve the internal consistency of the construct.	-
Resistance Intentions (RI) (Adapted from [8])	RI1: I am likely to actively oppose the use of IoT applications during my hotel stays.	0.87
	RI2: I prefer to avoid booking hotels that mandate the use of these smart technologies.	0.84
	RI3: I would postpone using these automated services even if they were readily available.	0.81
	RI4: I intend to reject the use of smart room controls as long as a traditional option exists.	0.85
	RI5: Overall, I am highly resistant to adopting IoT applications in hospitality environments.	0.83