The Influence of Technology Innovation Adoption on Customer Perceived Health Risk and Customer Hotel Selection Behaviour During a Pandemic Period in Malaysia

Siti Nurul Iman Hajan[1], Nur Hidayah Che Ahmat[2*]

[1,2] *Faculty of Hotel and Tourism Management, Universiti Teknologi MARA, Cawangan Pulau Pinang, Kampus Permatang Pauh, 13500 Permatang Pauh, Pulau Pinang, Malaysia*

*Authors' Email Address: [1]imansiti96@gmail.com, *[2]hidayah.ca@uitm.edu.my*

*Corresponding Author

ABSTRACT

During the critical COVID-19 pandemic period, many governments, including the Malaysian government, imposed domestic and international travel bans. People were discouraged from travelling due to safety and regulations. The hotel industry was severely affected by the COVID-19 pandemic, and the government decision impacted the nature of hospitality services. Customers interacted face-to-face with hotel employees, thus increasing the possibility of being infected as the virus is primarily transmitted between human respiratory droplets and physical contact routes. Many hotels focused on improving their safety techniques and implementing risk-reduction strategies to encourage customers to visit their hotels. Some strategies include adopting technology innovation to minimise guest contact with hotel employees (e.g., contactless check-in and check-out) and improving cleanliness to minimise health risks (e.g., regularly sanitising hotel rooms and public areas). This study investigated the influence of technology innovation adoption on customers' perceived health risks and customers' hotel selection behaviour during the pandemic period in Malaysia. An online self-reported questionnaire was developed and conveniently distributed via social media platforms between December 2021 to February 2022. The data obtained showed that 420 individuals were interested in staying at four- or five-star hotels in Kuala Lumpur, Malaysia. Most of the respondents have had their second and third doses of vaccination. Based on the analysis, this study found that the adoption of technology innovation significantly influenced customer-perceived health risk and hotel selection behaviour. Findings from this study will benefit many stakeholders, such as hotel operators, and help them understand the influence of technology-based services on customer behaviour and in considering whether to invest in technology to maximise their businesses.

Keywords: *COVID-19, customer behaviour, health risk, hospitality, technology innovation*

INTRODUCTION

The hotel industry was highly affected by the COVID-19 pandemic due to the high risk of environmental contamination of hotel properties. Park et al. (2022) compared COVID-19 with other health-related crises (e.g., severe acute respiratory syndrome, H1N1 influenza, infectious disease, Ebola) and found that COVID-19 hit hospitality and tourism the hardest. The year 2020 recorded a

tremendous decrease in occupancy rate, where most hotels remained at or below 50 per cent occupancy, which was below the break-even threshold (AHLA, 2020). In Malaysia, the Malaysian Association of Hotels reported an average occupancy of 21.5 per cent in July 2020, and the hotel occupancy rate in main cities and states such as Kuala Lumpur, Selangor, Johor, and Sabah was low, with an average occupancy rate between 12 per cent to 20 per cent (MAH, 2020). The spread of COVID-19 and the large-scale travel restrictions have devastated the global hospitality and tourism industries (Guevara, 2020). People avoid travelling because the health risk of COVID-19 exposure is high. Kozak et al. (2007) stated that travel and tourism often include risks when visiting destinations or hospitality properties. Since COVID-19 hit the world, many researchers have conducted empirical studies from various perspectives (e.g., Longwoods International, 2020; Shin & Kang, 2020). Shin and Kang (2020) found a gap in the perception of health risks in influencing customer hotel selection behaviour during a health crisis like COVID-19. Researchers reported that the perception of health risk is crucial, which could influence the tourist decision-making process, and a tourist is less likely to visit a destination if they perceive a high level of health risk at the destination (Law, 2006; Williams & Baláž, 2013). A report by Longwoods International (2020) stated that about 48 per cent of United States travellers had cancelled their trips, and 43 per cent of them cancelled their travel plans because of the COVID-19 pandemic. This situation indicated the importance of reducing health risk to attract travellers because high health risk from COVID-19 exposure has resulted in travel avoidance, mainly when COVID-19 is still around.

The Malaysian Association of Hotels introduced a 'clean and safe Malaysia' hygiene and safety certification program for hotels operated in Malaysia, which the Ministry of Tourism, Arts and Culture Malaysia endorses. The certification program is a benchmark for hygiene and safety standards for the hotel industry in promoting and attracting tourists to travel and stay at hotels in Malaysia (MAH, 2020). The Ministry of Health Malaysia recommends the sanitising and social distancing procedures included in the program. Nevertheless, the certification program may not make customers feel safe when choosing and staying at hotels (MOH, 2020). Hotel customers were still interacting face-to-face with the hotel employees; hence, the possibility of being exposed and infected with COVID-19 was still high. The virus is primarily transmitted between humans via respiratory droplets and physical contact routes (WHO, 2020). The virus can also transmit in confined and poorly ventilated indoor environments, and people often spend most of their time in hotel establishments. This incident is because aerosols remain suspended in the air or reach more than a one-meter range (WHO, 2020). Hotels should focus on improving health safety perceptions and reducing customers' fear by implementing risk-reduction strategies to encourage customers to stay in hotels. Investing in advanced technology such as mobile or self-check-in kiosks, QR codes, cleaning robots, and advanced Ozone and UV xenon disinfection systems is necessary to help minimise customer contact with hotel employees and to improve hotel cleanliness (Klussmann, 2020). This strategy is also critical in reducing customers' perceived threat of COVID-19 while staying relevant in the hotel business. Most branded hotels such as Marriott, Hilton, and Hyatt have utilised advanced technologies (e.g., mobile check-in systems, kiosk check-in devices, robot cleaning systems) to optimize their operation and improve their cleanliness protocols by incorporating advanced cleaning technologies such as electrostatic sprayers and ultraviolet light technology for better disinfection (Garcia, 2020). Such approaches would be crucial for hotels to reduce present and potential health risks for hotel customers.

The safety measures are implemented by several hotel brands such as Accor, Hilton Worldwide, Hyatt Hotels Corporation, Intercontinental Hotels Group, and Marriot International (Kim & Han, 2022). They addressed the importance of hotel selection attributes and images that could influence hotel customer intention to revisit. Recently, Ju and Jang (2023) found that the perceived severity of COVID-19 negatively influenced customer hotel booking intentions. In addition, they reported that the rational appeal type of message (emphasising the functional aspects of products) significantly influenced hotel booking intentions during the COVID-19 pandemic more than the emotional appeal type of message (focused on generating feelings to motivate purchase). The COVID-19 pandemic outbreak is still ongoing, although not much attention has been given by many countries lately. Given the increasing attention paid to the impact of COVID-19 on the hospitality and tourism industries, it is essential to

examine whether COVID-19 has influenced customer hotel selection. This study investigated the influence of technology innovation adoption on customers perceived health risks and customer hotel selection behaviour. Figure 1 displays the proposed research framework, adapted from Shin and Kang (2022).
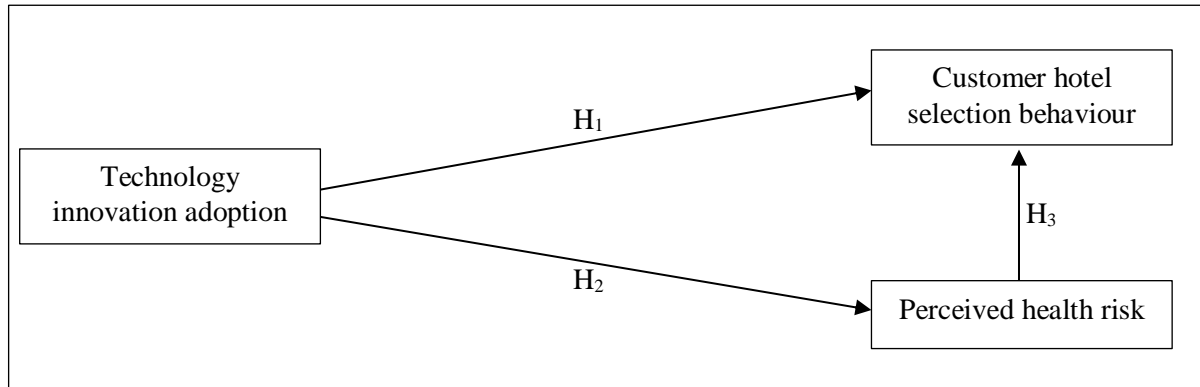

Figure 1: Research Framework

LITERATURE REVIEW

Customer Hotel Selection Behaviour

Researchers found that safety and security is the critical factor that could influence travellers' happiness and satisfaction, thus become the necessary factor for a successful hospitality industry (Chan & Lam, 2013; Cro et al., 2020; Herjanto et al., 2017; Rittichainuwat & Chakraborty, 2012). Despite the rising interest in health and safety hazards, mainly since COVID-19 started, there is still a void in the literature on hotel safety and security elements from customers' perception (Shin & Kang, 2020). The World Health Organization has introduced regulations, precautions, and information on COVID-19, which has altered people's behaviour and changed how people do their business, such as working from home, social distancing, and avoiding public spaces (Liu et al., 2021). People are aware that COVID-19 can be spread by having contact, and they now understand that washing their hands regularly and taking care of hygiene can help eliminate the virus. The Ministry of Health Malaysia has also educated the people through several media platforms such as television, social media, and advertisement about COVID-19 information to create awareness and knowledge about the COVID-19 virus. The result of the continuous broadcasting of COVID-19 information is that people have become aware of the importance of social distancing, avoiding crowded spaces, and becoming self-conscious about cleaning and sanitation. The Malaysian government promotes a stay-at-home policy and encourages employers to allow their employees to work from home to minimise the risk of getting infected by COVID-19. As a result, people have relied on technology to avoid interaction and maintain cleanliness to reduce the risk of getting COVID-19 disease (Shin & Kang, 2020). Researchers postulated that the COVID-19-related safety and health policy had changed individual behaviour, such as wearing a face mask in public spaces and regularly washing and sanitising hands.

Previous researchers affirmed that such changes in behaviour are due to an increase in awareness of the COVID-19 health risk, which then promote the use of technology in their daily life (Huang et al., 2021; Jiang & Wen, 2020; Sheth, 2020; Shin & Kang, 2020). Increased technology usage during COVID-19 is influenced by customers' perceived utility and simplicity (Shin & Jeong, 2020); this aligns with Venkatesh and Davis (2000)'s study about more people being willing to accept and embrace new technologies in the 20th century. Shin et al. (2019) reported that using front desk technology innovation in hotels helps employees become more effective, thus, promoting high-touch and high-tech customer experiences. The impact of the recent technological development on digitalisation is when customers expect unique experiences, rapid adoption of new technology, and the

ability to boast about their experience to others (Ivanov, 2020). Many hospitality establishments, including hotels, incorporate innovative technology and services such as robot butlers to provide customer service while reducing the danger of infection for human staff and visitors. Huang et al. (2021) found that customers in China had a good experience with service robots in the hospitality industry. However, the service robots require further development regarding their social interaction skill.

Earlier studies suggested that safety and security influenced customer hotel selection behaviour (Chan & Lam, 2013; Herjanto et al., 2017; Rittichainuwat & Chakraborty, 2012). Customers were willing to pay extra for hotel security measures exist at the hotel (Feickert et al., 2006). The social exchange theory focuses on social exchange behaviours between parties in human interaction context (Homans, 1958). The customer's actions result from risk-benefit analysis, and human connections are established through exchanging resources such as emotions, wealth, services, and information (Ji & Jan, 2020; Akarsu et al., 2020). Therefore, customers' perceptions and behaviour are influenced by their assessment of the advantages and costs or risks related to these interactions (Cropanzano & Mitchell, 2005). Businesses globally are utilising technological advancement for their survival and the benefit of their customers; hence, customers acknowledged and accepted the use of technology innovation to reduce COVID-19-related threats. Nunkoo and Ramkissoon (2012) posited that trust and authority are essential elements. Concerning the COVID-19 pandemic disease, trust may be thought of as customers' faith in a hotel facility to deliver a safe hotel stay experience, and the hotel has the authority to ensure the safety and security of its customers. If hotels cannot be established such trust, and when potential customers observe more significant safety hazards than advantages of staying at a hotel, the customers will not visit that hotel facility.

The current study suggested that considering the COVID-19 pandemic and increasing knowledge of such infectious diseases, hotel customers should observe the safety and security advantages when selecting their next hotel. Some essential characteristics of hotel safety and security advantages have been identified in previous studies. AlBattat and Mat Som (2013) stated explicitly that emergency planning and readiness are the most important aspects of dealing with a disaster in the hospitality industry. Jiang and Wen (2020) found that hygiene and cleanliness influenced customers' decisions in a service setting; hence, hotel providers should prioritize hygiene and cleanliness following customers' high safety expectations when travelling. Later, Kim and Han (2022) listed precautions measures (e.g., social distancing, hygiene, cleanliness), functional quality (e.g., accessibility, convenient check-in/out), and employee attribute (e.g., appearance, professionalism) among the hotel selection attributes that are important due to COVID-19. Moreover, Bangwal et al. (2022) highlighted the importance of hotel building design and employee health, such as having a proper sanitisation system and contactless technologies to enhance health and safety protection while promoting a healthy hotel establishment.

Technology Innovation Adoption as a Key Strategy in Reducing Risk

Technology innovation can alter human lives, and customers enjoy using technology because it makes their lives easier, especially when booking flights, hotel accommodations, and travel suggestions. The Malaysian government is gradually integrating technology innovation throughout the country as part of the National Transformational 2050 or TN50 and IR 4.0 agenda (MITI, 2018). However, not all hotel providers in Malaysia can invest and adopt technology innovation in their hotel properties because the technology requires a considerable investment. Considering the financial stability, more luxury hotel properties and international hotel brands might be able to invest in technological advancement to mitigate risk during COVID-19. Technological advancement refers to a mixture of inventions linked to technological advances to develop existing goods or services artificially or effectively create new ones. Meanwhile, a risk-reduction strategy is a mechanism in which customers try to reduce perceived risks and uncertainties associated with purchasing a product or service (Mitchell et al., 1999). Typically, customers will gather information and analyse it to reduce risk. When the perceived risk level reaches the level customers deem appropriate, they follow risk-reduction strategies

to make better buying decisions (Pappas, 2016). With COVID-19, customers are more aware of the health risk when they are ready and willing to travel; hence, perceived health risks would affect their hotel choices.

Some travel risks based on epistemological uncertainty could be minimised by acquiring additional knowledge during decision-making (Reisinger & Mavondo, 2005). Thus, it is equally vital for hospitality operators to focus on enhancing safety perceptions and reducing consumer anxiety by incorporating risk-reduction techniques for health risk management. How hospitality and tourism companies efficiently mitigate risks is a priority for sound risk management (Williams & Baláž, 2014). Adam (2015) suggested hospitality providers utilize technological advancement to help reduce the perceived health risk. Given the importance of social distancing in reducing COVID-19-related health risks, high interactions with employees will likely increase customers' health risks. In contrast, low interactions with employees while high interactions with technological tools will reduce health risks (Zeng et al., 2020). Physical environments, including technology systems, can affect the perception and actions of customers or employees. Introducing modern technology systems will minimise perceived health risks by changing the hotel service experience to decrease social interactions and enhance cleanliness. Shin and Perdue (2019) found that fully automated hotel check-in systems (e.g., mobile key) or self-service kiosk check-in machines allow customers minimal contact with employees. Based on the review of related literature, the researchers proposed the following hypothesis:

H1: Technology innovation adoption significantly influences customer hotel selection behaviour.

Customer Health Risk Perception

Customers' risk perceptions have significantly influenced their decision-making and behaviour (Han et al., 2019; Quintal et al., 2010). Perceived risk refers to customers' interpretation of risk in their decision-making actions due to ambiguity that could lead to negative consequences. Therefore, perceived risk is proportional to the likelihood of outcomes arising, multiplied by the negative result of poor actions and brand choice (Mitchell, 1992). Perceived risk is generated from unexpected and unpredictable effects of an unpleasant nature arising from purchases of goods (Rehman et al., 2019). Conceptually, perceived risk is strongly related to perceived uncertainty. Several studies consider both definitions the same construct; perceived risk is a subjective sense of uncertainty for the customer (Shimp & Bearden, 1982; Shin & Kang, 2020). Nevertheless, other research focuses on distinguishing between them; risk perception comprises two elements: confusion and adverse effects of purchasing a product or service (Mitchell, 1998; Rehman et al., 2019). The previous studies consider uncertainty to be the cause of perceived danger; higher levels of product or service uncertainty make consumers aware of higher levels of risk. Uncertainty is the cause of perceived risk. Thus, the secret to managing health risks is effectively minimising uncertainty. In this regard, two forms of uncertainty provide essential information to consider potential health risks: epistemological uncertainty and random uncertainty. Epistemological uncertainty is internal, practical, subjective, or reducible uncertainty and arises from a lack of information. More knowledge of products or services may help reduce epistemological uncertainty and perceived risk.

Previous research on tourism and hospitality has established many threats of random uncertainty in the tourism sector, such as functional risk (e.g., the possibility of technical, equipment, or organizational problems), health risk (e.g., the possibility of being ill or suffering from certain diseases), physical risk, and crisis risk (Adam, 2015). Among them, the perceived health risk is highly dependent on random uncertainty, which is not reducible by acquiring additional knowledge. An increasing number of hospitality studies in the 1990s are found focusing on tourist perception of risk, factors influencing tourist perceptions of risk, how tourism perceptions of risk influence travel and decision-making, and types of travel-related threats (Adam, 2015; Lepp et al., 2011; Yang & Nair, 2014). Tourists' risk perception is affected by internal (e.g., socio-demographic factors such as income,

gender, and age) and external variables (Yang & Nair, 2014). This study aims to investigate the adoption of hotel technology innovation as an external source for lowering perceived health risks.

The COVID-19 pandemic has made tourists perceive high health risk levels when visiting destinations or hospitality establishments. It is afraid that tourists would be reluctant to travel due to health issues and fear of COVID-19 even in the post-pandemic period. Therefore, hospitality providers must incorporate technology as a risk-reduction strategy (Shin & Kang, 2020). In addition, customers perceive health risks will increase when there is an outbreak of novel infectious illnesses with no specific cures, such as COVID-19. As a result of this increased risk perception, a strong demonstration of willingness to avoid such dangers may emerge (Addo et al., 2020). However, with the help of technological innovation adoption in reducing the perceived risk, as suggested by Shin and Kang (2020), this could make customers feel more secure when travelling and staying in hotels. Kim et al. (2021) found that customers perceived health risk influenced their hotel selection when they preferred a robot-staff hotel to a human-staffed hotel. Based on the previous studies, the researchers suggested the following hypothesis:

H2: Technology innovation adoption significantly influences customer perceived health risk.
H3: Customer perceived health risk significantly influences customer hotel selection behaviour.

METHODOLOGY

A descriptive cross-sectional study was developed to investigate the influence of technology innovation adoption on customers' perceived health risk and customer hotel selection behaviour during a pandemic period in Malaysia. The quantitative method is used to help researchers achieve the research objectives. Using a non-probability convenience sampling method, the researchers sampled individuals who are 18 years old and above and interested in staying at four- or five-star hotels in Kuala Lumpur, Malaysia. Kuala Lumpur, Malaysia, is known as the most urbanised part of Malaysia, with the highest number of four- and five-star hotels that are more likely interested in adopting technology to attract customers. According to the Malaysia Tourism Arts and Culture statistic, there were 56 four- and five-star hotels in Kuala Lumpur as of August 2021.

An online survey was developed using a Google Form with five sections measuring all the variables of interest. During the data collection period, Malaysia's COVID-19 pandemic was still active. The government prohibited public gatherings, and most people were conscious of social distancing; hence justified the use of online questionnaires. Technology innovation adoption was measured using 11 items and a sample of questions, including "Using technology will be safer in this pandemic to reduce the interaction" and "The use of technology will be safer in this pandemic to increase hotel cleanliness". The perceived health risk was measured using nine items. A sample of questions included "My current health status is the same compared to my health status before the outbreak" and "I feel nervous about visiting a hotel because of health concerns". Customer hotel selection behaviour was measured using eight items. Sample questions include, "I would likely book a room at a hotel in Kuala Lumpur" and "I am willing to book a room at a hotel in Kuala Lumpur". The instrument was adapted from Wolf et al. (2020) and Shin and Kang (2020), and all items were measured using the original Likert-type scale from strongly disagree (1) to strongly agree (7) from the previous studies.

The researchers included four scenario-type questions from Shin and Kang (2020) associated with technological innovation adoptions for reducing perceived health risks, such as a mobile or self-check-in kiosk, scan QR code, advanced ozone, and UV disinfection system. Demographic questions include gender, age, employment status, and monthly income level. The university research ethics committee has approved the instrument used in this study [REC/07/2021 (MR/584)]. For the pilot study, the researchers invited 30 hospitality postgraduate students to participate and later improved the final version of the questionnaire based on the pilot test feedback. The data collection period was between

December 2021 and February 2022, and the researchers shared the questionnaire link to various social media platforms such as Facebook, Twitter, and WhatsApp.

RESULTS AND DISCUSSIONS

Descriptive Analysis

From 438 respondents who participated in the survey, the researchers included 420 useable samples in the analysis after the data cleaning procedures. Preliminary analysis showed no outliers, and all the items were normally distributed. The greatest absolute values of skewness and kurtosis were 0.410 and 0.970, below the threshold or cut-off of 3 for skewness and 8 for kurtosis suggested by Kline (2014). Table 1 displays the details of respondents who participated in this study. More females participated in the study than males. The highest age group is between 21 to 30 years old (35%, $n = 147$) and most respondents were single (63.6%, $n = 267$). Working adults represented more than 60 per cent of the entire sample, most earning between RM2,500 to RM4,849 per month. During the data collection period, all respondents were vaccinated, and most already had their 3rd dose of vaccination (71%, $n = 298$). The mean scores for all items in technology innovation adoption ranged between 5.80 to 6.50, while the item standard deviations ranged between 0.498 to 0.980 (Table 2). Results for the four scenario-based questions are presented in Table 3. From the scenarios, the respondents agreed and preferred hotels that use technology such as mobile or self-check-in kiosks, QR codes, cleaning robots as risk reduction strategies to protect customers from the COVID-19 virus.

Table 1: Demographic profiles of respondents (N = 420)

Particulars		Frequency (*n*)	Percentage (%)
Gender	Male	201	47.9
	Female	219	52.1
Age Group	18-20	59	14.0
	21-30	147	35.0
	31-40	132	31.4
	41-50	61	14.5
	51 and above	21	5.0
Marital Status	Single	267	63.6
	Married with no kids	37	8.8
	Married with kids	102	24.3
	Divorce	14	3.3
Employment	Employed	272	64.8
	Self-employed	33	7.9
	Others	115	27.4
Monthly Salary	Below RM2,500 / US$564	79	18.8
	RM2,500- RM4,849 / US$564 to US$1,093	188	44.8
	RM4,850-RM10,959 / US$1,093 to US$2,470	119	28.3
	RM10,960 / US$2,470 and above	34	8.1
Purpose of Travel	Business	190	45.2
	Leisure	22	5.2
	Others	208	49.5
Vaccination Status	2nd dose	122	29.0
	3rd dose	298	71.0

Table 2: Summary of Total Mean Scores and Standard Deviations for All Variables

Variable	Cronbach's Alpha	Mean score	Standard deviation
Technology innovation adoption	0.976	6.222	2.460
Perceived health risk	0.946	5.203	1.578
Customer hotel selection behaviour	1.000	6.400	0.491

Notes: all items were measured using scales from 1 = strongly disagree to 7 = strongly agree.

Table 3: Results for Scenario-Type of Questions

Question	Mean Score	Standard deviation
Imagine a hotel in Kuala Lumpur that provides mobile or self-check-in kiosks that perform check-in tasks. These systems will allow you to have a contactless service experience. There will be no employee near you, and sanitation chemical is provided.	6.4000	0.49048
Imagine a hotel in Kuala Lumpur providing a QR scan code that performs as a check-in for MySejahtera. This QR code will allow you to have a contactless service experience, and sanitation chemical is provided.	6.4000	0.49048
Imagine a hotel in Kuala Lumpur providing cleaning robots that perform housekeeping tasks. These robots will allow you to have a contactless service experience. The robot has advanced Ozone and UV xenon disinfection systems.	6.4000	0.49048
Imagine a hotel in Kuala Lumpur providing regular housekeeping services (i.e., using staff) during the COVID-19 pandemic. The housekeeping staff will use advanced Ozone and UV xenon disinfection system.	6.4000	0.49048

Notes: All items were measured using scales from 1 = strongly disagree to 7 = strongly agree.

Results for Correlation and Regression Analysis

Pearson correlation analysis was conducted, and the results reported significant and positive associations between the variables of interest. Technology innovation adoption significantly and positively correlated with perceived health risk ($r = 0.889$, $p < 0.001$) and customer hotel selection behaviour ($r = 0.972$, $p < 0.001$). Meanwhile, perceived health risk positively and significantly correlates with customer hotel selection behaviour ($r = 0.764$, $p < 0.001$).

Simple linear regression analyses were conducted to test the two proposed hypotheses. According to the results presented in Tables 5a to 7b, technology innovation adoption significantly influenced customer hotel selection behaviour ($\beta = 0.972$, $p < 0.001$), thus, supporting hypothesis one. Technology innovation adoption explained 94.5 per cent of the total variance in customer hotel selection behaviour ($F = 7136.482$, $R^2 = 0.945$). Moreover, technology innovation adoption significantly influenced customer perceived health risk ($\beta = 0.889$, $p < 0.001$), thus supporting hypothesis two. Technology innovation adoption explained 79.1 per cent of the total variance in customer-perceived health risk ($F = 1581.306$, $R^2 = 0.791$). Meanwhile, perceived health risk significantly influenced customer hotel selection behaviour ($\beta = 0.764$, $p < 0.001$), thus supporting hypothesis three. Perceived health risk explained 58.4 per cent of the variance in customer hotel selection behaviour ($F = 586.600$, $R^2 = 0.584$).

Results gathered from this study are supported by previous studies by Shin and Kang (2020) and Jiang and Wen (2020). Customer awareness of the COVID-19 health risk has influenced their hotel selection behaviour, thus increasing technology usage, particularly during the COVID-19 period. Even though many countries have lifted their restriction orders and businesses started to operate as usual, more hospitality establishments are incorporating innovative technology and services (Zeng et al., 2020), such as contactless check-in and check-out and robot housekeeping and butlers, as risk reduction strategies. Additionally, the "Clean and Safe Malaysia" certification program introduced by the Malaysian Association of Hotels (2020) could increase customer confidence when staying at certified hotels. Hotels with a "clean and safe Malaysia" label and certificate can be an added advantage to encourage customers to stay with them with peace of mind. Customers who perceive risk as appropriate follow risk-reduction strategies to make better buying decisions (Pappas, 2016). The technological innovation adoption by hospitality establishments is also aligned with the Malaysian government's agenda in promoting technology innovation throughout the country (MITI, 2018). Therefore, it could be said that the adoption of technology innovation influences customer perceived health risks and behaviour. Nevertheless, not all hotel properties can invest in technological innovation due to their

financial condition; hence, the government could assist those who cannot afford it. Moreover, customers nowadays have more options for selecting hospitality establishments that use such technology. Customers concerned about their health risks and preferred less or no interaction with employees might choose hotels that use contactless services. This is because low interactions with employees and high interactions with technology tools will reduce health risks (Shin & Perdue, 2019; Zeng et al., 2020).

Table 5a: Linear Regression Model for Predicting Customer Hotel Selection Behaviour

Model	Sum of Squares	df	Mean Square	F	p-value
Regression	95.223	1	95.223	7136.482	<0.001[b]
Residual	5.577	418	0.13		
Total	100.800	419			
Standardised Coefficients					
Model		β	t		p-value
Constant			34.554		< 0.001
Technology innovation adoption		0.972	84.478		< 0.001

Note: Dependent variable is customer hotel selection behaviour.

Table 5b: Model Summary of Technology Innovation

Model	R	R²	Adjusted R²	Std. Error of the Estimate
1	0.972	0.945	0.945	0.11551

Table 6a: Linear Regression Model for Predicting Perceived Health Risk

Model	Sum of Squares	df	Mean Square	F	p-value
Regression	584.606	1	584.606	1581.306	<0.001[b]
Residual	154.534	418	0.370		
Total	739.140	419			
Standardised Coefficients					
Model		β	t		p-value
Constant			-21.236		< 0.001
Technology Innovation		0.889	39.766		< 0.001

Note: Dependent variable is perceived health risk.

Table 6b: Model Summary of Perceived Health Risk

Model	R	R²	Adjusted R²	Std. Error of the Estimate
1	0.889	0.791	0.790	0.60803

Table 7a: Linear Regression Model for Predicting Customer Hotel Selection Behaviour

Model	Sum of Squares	df	Mean Square	F	p-value
Regression	58.859	1	58.859	586.600	<0.001[b]
Residual	41.941	418	0.100		
Total	100.800	419			
Standardised Coefficients					
Model		β	t		p-value
Constant			78.834		< 0.001
Perceived Health Risk		0.764	24.220		< 0.001

Note: Dependent variable is customer hotel selection behaviour.

Table 7b: Model Summary of Perceived Health Risk.

Model	R	R^2	Adjusted R^2	Std. Error of the Estimate
1	0.764	0.584	0.583	0.31676

CONCLUSION

This study investigated the relationship between technology innovation adoption, customer perceived health risk, and customer hotel selection behaviour. Based on the correlation and regression analyses, technology innovation as a risk reduction strategy reported a strong and positive influence on customer hotel selection behaviour. The pandemic has influenced customer decisions to use technology; hence, hotel operators should prioritise hygiene and cleanliness, especially during the COVID-19 pandemic (Jiang & Wen, 2020). Technology innovation is vital in helping customers choose hotels and is critical in reducing customer-perceived health concerns. Earlier, Shin and Kang (2020) suggested hotels invest in modern technology to offer contactless services to customers and lower their perceived health risks. Additionally, this study found that technology innovation adoption significantly and positively influenced customers perceived health risk, which aligned with prior research done by Shin and Perdue (2019). They also found that using technology, such as mobile or self-check-in kiosks and a scanning QR code, has reduced customer-perceived health concerns. The current technology systems will alter the hotel service experience through reduced social contacts and improved cleanliness. Completely automated hotel check-in systems (e.g., mobile key) or self-service kiosks for check-in and check-out allow customers to have less contact with hotel employees. Furthermore, this study found that customer-perceived health risks significantly influenced customer hotel selection behaviour. This finding corroborated a study by Kim et al. (2021) where customers perceived health risk influenced their hotel selection. Customers preferred a robot-staff hotel over a human-staffed hotel as the chances of getting infected by COVID-19 are low with robot staff.

Technology innovation can influence the success of the hospitality industry. This study is the first empirical research in Malaysia focusing on using technology innovation as a risk reduction strategy on customer perceived health risk and customer behaviour. Therefore, the present study is theoretically meant to explain the potential of technological tools application in the hospitality industry from customers' perspective. This study is unique as the findings unveiled the change in Malaysian customer behaviour influenced by the COVID-19 pandemic. Regarding managerial implications, findings from this study could help hotel operators better understand the influence of technology-based services like mobile and kiosk check-in systems on customer behaviour when choosing hotels during an outbreak like COVID-19. Hotel operators could use customer data to invest in the right technology to maximize efficiency and profitability. Even post-COVID-19, hotel operators will continue using technology since using technology in business can be considered the new norm that can positively impact business operations (Sharma et al., 2021; Zeng et al., 2020). This study is not without limitations. First, the researchers relied on self-reported measures to gather data; hence future studies could collect data using other methods to gather in-depth information regarding the phenomena. Second, the researchers distributed the survey using an online approach via social media online platforms; hence, the findings cannot be generalized. Third, the researchers investigated the associations between the variables and tested whether technology innovation adoption influenced customers perceived health risk and hotel selection behaviour. Therefore, future studies should examine the mediating effect of customer-perceived health risk on the association between technology innovation adoption and customer hotel selection behaviour.

ACKNOWLEDGEMENTS

FUNDING

AUTHORS' CONTRIBUTION

Hajan, S. N. I. planned and carried out most of the research project and Che Ahmat, N. H. took the lead in writing the manuscript per the journal guidelines. All authors contributed significantly to this research project and the manuscript development.

CONFLICT OF INTEREST DECLARATION

We certify that the article is an original work of the authors. The manuscript has not been previously published and is not under consideration for publication elsewhere. No conflict of interest exists in this manuscript's subject matter or materials.

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