




DOES COVID-19 DRIVE ROBOT ACCEPTANCE? AN EXPLORATORY STUDY OF SERVICE ROBOT IN HOSPITALITY

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Abstract

Purpose – The purpose of this study is to explore the acceptance of robots as social distancing agents and to understand how guests may respond to the application of service robots in a hospitality setting as a way to achieve a zero-COVID-19 travel experience. This study contributes to the current knowledge in the area of service robot application by providing a better insight of, and guests response to, service robot operation in hotels.

Design/Methodology/Approach – To obtain information from participants, the semi-structured interview method was used. Participants were hotel guests who had stayed in hotels where robots performed human tasks. Data were analysed using thematic analysis.

Findings – The findings suggest that robots are perceived as effective social distancing agents even though the participants experienced instances of robot incompetency during their stay at a hotel with robotics-based services. Participants also believe that with improved smart robot services, hotels can resume operations and guests can stay in hotels during the pandemic period without unnecessary worries.

Originality – In light of the findings, some future research directions are suggested for researchers to further understand and explore the wider application of robotics in social distancing.

Keywords service robot, social distancing agent, robot acceptance, hospitality, COVID-19.

INTRODUCTION

The COVID-19 virus that emerged in late 2019 in Wuhan, China has had a massive impact on the entire world. As of April 2022, globally, more than 490 million people have been infected by COVID-19 and more than 6.1 million people have died (WHO 2022). Within a few months, the disease has transformed the social and economic aspects of our daily lives. The service industry, which involves human contact and encompasses restaurants, hotels and air travel, has been temporarily shut down during this period to reduce and minimize the spread of the virus. In particular, the tourism and hospitality industry, which is highly reliant on human interaction, has been deeply shaken and negatively impacted by the COVID-19 pandemic which remains widespread. The highly adverse impact on this sector is due to lockdowns, travel bans and quarantines of citizens that have been imposed by most of the affected countries around the world in an attempt to stop the spread of the virus (Hoque et al. 2020).

Evidence from around the globe indicates that the application of robotics has made significant steps forward during the pandemic. Robots have been used as social distancing agents to reduce the spread of the virus in many sectors. Such examples draw attention to how the tourism and hospitality sector can deploy robots in order to provide a zero-COVID-19 travel. Hence there is a call for academics to utilize the conditions of the pandemic to develop robotic applications that enhance the tourist experience and at the same time protect customers, workers and the industry (Zheng, Chen and Lew 2020). Collaboration and cooperation among service providers, practitioners and academics is needed so that guests are not turned away due to the fear of this virus (Jamal and Budke 2020). Although some researchers have previously stated that guests' experiences of robots in hotels are unsatisfactory and suggested that engineers redevelop robots to better fulfil the human-robot interaction needs (Bhimasta and Kuo 2019; Osawa et al. 2017), the COVID-19 crisis has led to new applications and scenarios for robots. For instance, because robots are immune to virus, they have been efficiently used to handle tasks which were considered risky during COVID-19 pandemic, for example, delivering food and medicine, cleaning and disseminating information by performing the tasks of chefs and waiters which reduced human contacts and enhanced food safety (Marr 2020; Yang et al. 2020; Lu et al. 2021). These developments have led to new questions, including "How will people's acceptance of robots be affected after seeing the roles that robots can play during the pandemic?" There are a few studies that examine robot acceptance in hospitality during COVID-19 (for example Chuah, Aw and Cheng 2021; Chiang and Trimi 2020). As there are very limited studies that focused on the impact of robot adoption during COVID-19 and little is known as yet about people's perception and reactions towards the adoption of service robots during the pandemic, this exploratory study that adopts a qualitative approach aims to explore whether or not tourists are more likely to accept service robots as social distancing agents in order to help the tourism and hospitality industry continue to cultivate given the COVID-19 pandemic situation is getting worse.

1. LITERATURE REVIEW

During the COVID-19 pandemic, the aid of robots in maintaining social distance has also been publicized to the community (Seyitoğlu and Ivanov 2021). Moreover, it has proved that the adoption of robots for tasks related to transportation, cleaning and information dissemination reduces the risk of infection (Marr 2020; Yang et al. 2020). In respect of the hospitality sector in particular, service robots may offer a technology-based form of protection for both tourists and employees through enabling a high level of physical distance to be maintained between both parties, which helps in the provision of safer services during the pandemic (Seyitoğlu and Ivanov 2021). For instance, a restaurant in Beijing uses robots to deliver customers' takeaway orders and prepared meals from the kitchen to delivery workers (Toh and Wang 2020). Robots are also being used to transfer goods from stores, warehouses and trucks to customers, thus avoiding the need for close contact between humans (Demaitre 2020).

Robots have already been proven to provide benefits for companies in a range of sectors. They have been used for many years in various settings, including operating machinery and in packaging activities with the aim of enhancing labour productivity and work

efficiency (Choi et al. 2020). Similarly, the use of robots in tourism and hospitality can enhance work efficiency, increase service quality and lower financial costs (Ivanov and Webster 2019). Hotels are adopting robot technology to improve the guest experience. Robots are used to guide guests or tourists and undertake tasks such as giving directions, checking guests in and out of hotel rooms, delivering meals or amenities, cleaning, and providing safety and security services (Ivanov, Webster and Berezina 2017). Intelligent service robots are adopted mainly as robot concierges that are designed to provide hotel information to guests and tell them about nearby attractions and places to eat. Robots are also employed by hotels as butlers to make room deliveries. Furthermore, they are available in hotel rooms to assist hotel guests on how to operate TV, switch on lights and air conditioners via voice detection. They are also placed at the front desk as receptionists to give instructions and monitor self-check-in.

In hotel settings, most of the research focussed on the investigation that aims to improve and guide robot's design, performance and acceptance. For instance, Ivanov, Webster and Garenko (2018) conducted a survey on customers' attitude towards the use of robots in hotel. Their findings draw a few tasks that customers prefer to be executed by robots and tasks that should be remained done by human-staff. Customers accept robots to perform butler services, to provide information about the hotel and to assist them in making payment, while task such as guards or security should be remained delivered by human-staffs. Service robots are also changing the role of employees in service environment. Tuomi, Tussyadiah and Stienmetz (2020) suggest that to stay significant in robotised service environment, employees in hospitality sector can consider one of five roles that are enabler, coordinator, differentiator, educator, and innovator. Factors such as human intervention, usefulness, and embodiment have all been highlighted as contributing to the failure of robot adoption in the Henn na Hotel chain in Japan (Bhimasta and Kuo 2019). Other than failure, the disadvantages of service robot also being highlighted that includes customers dissatisfaction due to service robot's malfunction (Go, Kang and Suh 2020) and employee's turnover intention (Li, Bon and Ye 2019). Therefore, it has been suggested that hotels should pay attention to services that are particularly related to guests' comfort (Motta and Sharma 2020). In light of the mixed results thus far, some argue that service robots are against the principle of hospitality while some claim that robots are a part of a range of technological developments that will have positive impacts on the tourism and hospitality sector (Choi et al. 2020).

2. METHOD

This study focuses on the hotels in the Henn na Hotel chain because this hotel chain was the first in the world to attempt to execute all its operations with autonomous robots and utilize a broad range of service robots as compared to other hotels in other localities. For instance, robot velociraptors, so-named after a very smart category of dinosaurs, staff the front desk at the Henn na Hotel Maihama Tokyo Bay. In addition to using dinosaur-type robots as receptionists, the chain also introduced humanoid robots. For instance, at Henn na Hotel Hamamatsuchō, two humanoid uniformed receptionist robots, one male and one female are positioned at the front desk. Besides greeting guests, they also guide guests in completing the check-in procedure by providing clear instructions, where the check-in is done through the use of touch panels at the front desk. This particular hotel

also has a robot concierge, called Unibo, located next to the front desk. This robot's task is to provide guests with information regarding nearby restaurants and convenience stores. At another hotel in the chain, Henn na Huis Ten Bosch, there are, in addition to robot receptionists, porter robots that are available to carry luggage up to the guest rooms. Moreover, a robot butler, called Chur-ri Chan, functions as a room assistant that can provide weather reports, entertain guests and act as an alarm.

Due to the exploratory nature of this study, the in-depth semi-structured interview was chosen as the data collection method because this method allows a detailed description and imaginative exploration of the guest experience. The semi-structured interview also facilitates digression about subjects that the participants think are important in relation to the issues under discussion. Thus, this method can aid in attaining reasonable conclusions on the investigated issues.

A purposive sampling approach was employed for the selection of participants in order to include only Henn na Hotel guests who had stayed in the hotel for the past six months. A six-month period was chosen because it was considered suitable enough to ensure that the guests' memories and recollections about their hotel stay would be as fresh and as accurate as possible (Lee 2003). Potential participants were searched for through social media channels, mainly Instagram, Facebook and YouTube. For the Instagram search, the hashtag was used with the keyword #henna-nahotel. The Henn na Hotel Facebook account was also used to search for potential participants. YouTube was also employed with the search term "Henn na Hotel". People who met the criteria were approached and an invitation to participate in the study was sent to them.

A series of 14 online semi-structured interviews were conducted between March 2020 and May 2020. The online medium seemed suitable for both researchers and participants due to geographical and safety factors because the research was conducted during the COVID-19 pandemic. Each interview took 30 to 45 minutes and was audio-recorded with the permission of the interviewees. The semi-structured interview focused on three core questions: (1) How did you perceive your hotel-stay intention during the COVID-19 pandemic crisis? (2) How will your acceptance towards robots be affected during the COVID-19 pandemic? And (3) How did you perceive service robots as social distancing agents? The data was collected until no new topics were discussed and determined by the researcher to have reached saturation.

An independent coder was employed to scrutinize through the transcript to confirm data reliability. This continuous comparative analysis method allows the researchers to return to the data repetitively thus enhancing consistency to the coding process (Strauss and Cobin 2008). Thematic analysis was used to identify the emergent themes (Patton 1990) because it "offers an accessible and theoretically flexible approach to analysing qualitative data" (Braun and Clarke 2006, pp. 77). To guide data analysis, the researchers followed the six phases of analysis (familiarizing oneself with the data, generating initial codes, searching for themes, reviewing themes, defining and naming themes, producing the report) outlined by Braun and Clarke (2006) summarised in Table 1.

Table 1. Steps in thematic analysis

Step	Explanation
Familiarizing oneself with the data	Researchers get themselves familiar with the data by reviewing the interview transcription.
Generating initial codes	Generate a group according to the relevant attributes of the data in a coordinated way and arranging the data for each code.
Searching for themes	Groups the different codes into prospective themes and gathering all the codes within the related themes
Reviewing themes	Ensure whether the constructed themes were relevant to the code and the whole data set
Defining and naming	Refine each theme and provide clear definitions. Researchers describe the meaning of the themes and determined the viewpoint of the data that each theme categorization.
Producing the report	Selection of extract and relate the analysis to the research aims and literature and producing the report.

Source: (Braun and Clarke 2006)

3. FINDINGS AND DISCUSSION

In line with the research design, presented below are the analysis results for the four identified themes, namely, impacts of the COVID-19 pandemic on hotel-stay intention, acceptance of robot-staffed hotels during the COVID-19 pandemic, service robots as an effective social distancing agents and perception of service robots replacing human staff during the COVID-19 pandemic.

3.1. Participant profile

The study sample consisted of an equal number of male and female participants. The participant's age is quite diversified. Four of them were 20-30 years old, eight were 30 to 40 years old and the rest were 41 to 50 years old. All of the participants were from Southeast Asia. Five of them were Indonesian, five were Singaporean, three were Malaysian, and one was from the Philippines. The period of stay at Henn na Hotel ranged from a maximum of four nights to a minimum of one night.

3.2. Impacts of the COVID-19 pandemic on hotel-stay intention

While the COVID-19 pandemic crisis has, without question, caused negative consequences for the tourism industry, the question is to what extent and for how long the hotel-stay intention will be affected. Hence participants were asked to elaborate on what they thought about the pandemic and if they believed it would affect their hotel-stay intention. Most of the participants, regardless of age, indicated that they would not stay at a hotel again until the pandemic is over. The responses can be divided into two categories, one of which encompasses concerns about safety and the other of which relates to their daily lived experience during the pandemic.

Tourists were extremely worried about the risk of infection when staying in hotels which are staffed by humans due to high level of interpersonal contacts (Kim et al. 2021). This study found that participants' safety concerns stemmed primarily from their expectancy of an increasing level of anxiety about the COVID-19 pandemic. Some interviewees thought that people are no longer able to travel freely like before due to the lockdowns imposed by governments. The mass media is also actively creating awareness about the importance of avoiding crowded places, maintaining good hygiene and travelling only for necessary reasons in order to minimize the spread of infection. Participants considered hotels as shared public space and therefore as being high risk in terms of spreading the infection. Thus, participants have seen that, during the pandemic, travel and tourism activities are curtailed. They were also generally of the opinion that staying at hotels is non-essential business and should be avoided during the peak of the pandemic. Some interviewees believed that the situation will recover soon and wished to resume their travels after the pandemic ends. For example, Participant 3 remarked:

I am extremely paranoid about COVID-19. If hotels resume their operations before this pandemic end, I do not think I have the confidence to stay at hotels at the moment. I am trying to avoid shared and public places as much as I can (Participant 3).

In addition to safety reasons, participants attributed their hotel-stay intention to their current, negative daily lived experience during the pandemic in their home countries to movement restrictions and limited-service availability in the country where they lived. As mentioned by some interviewees, in regards to movement restriction orders, people need to obey the strict regulations put in place by their government. These restrictions made them feel worried. This feeling had impacted their lives, and thus they have developed fears and anxiety about how serious the pandemic is which also influenced their future travel intention. Some participants had even cancelled their overseas and domestic trips in 2020 due to the growing concern about the possibility of the pandemic becoming worse in certain parts of the world, such as China and Europe. Given the current situation, they chose not to travel until the situation is safe and back to normal. For example, Participants 15 and 1 said:

I would not put my family at risk by travelling during this time because I do not want my holiday to turn into a tragedy. In fact, I cancelled my booking for a winter trip to Europe this year when I knew that Europe was badly affected by the coronavirus. When all is stable and virus-free, I will think about travel again (Participant 15).

Regardless of the social distancing measures and a few more SOPs [standard operating practices] being followed, staying at hotels is not for me during this time. I really feel

that the movement restriction order is like a prison for me. There is no freedom at all. Honestly speaking, I hate this feeling. I will not stay at a hotel in the near future, until the conditions are totally safe (Participant 1).

The pandemic had catalysed the future travels for some participants. They were keen to see for themselves the real situation of the travel and tourism industry after the pandemic instead of reading about anticipated post-pandemic impacts in the mass media. To a wider extent, the curiosity about hotel-stays in a post-COVID world may cause a decline in risk and ambiguity. This suggests that a surge in curiosity leads to a reduction in perceived travel limitations. It is also interesting to note that some interviewees had adopted a 'wait and see' approach regarding their booking of hotels for 2020 travel. This implies that they are ready to travel again when the situation gets better. For example, Participant 12 commented that:

The mass media has begun to focus on reporting issues related to social distancing, opening of non-essential shops, and public transport operations. Soon, hopefully, they can open the borders again and airlines will resume their operations. I am excited to see how the tourism environment will change due to this pandemic. Currently, we have seen that the ways people dine in, shop and celebrate festivals have changed. So, soon, my guess is that how people travel will change too. I have one trip pending this year and I cannot wait to travel again (Participant 12).

3.3. Acceptance of robot-staffed hotels during the COVID-19 pandemic

To examine the acceptance of robot-staffed hotels during the pandemic, the participants were asked whether they would stay at a hotel during the pandemic when hotels restart their operations, and if so, why or why not. It should be noted that the participants in this study had experienced staying at a robot-staffed hotel in the past six months. From their responses, over two thirds of the interviewees exhibited a high acceptance of robot-staffed hotels during the pandemic. This study also discovers that the acceptance of robots before the pandemic and during the pandemic had changed slightly. Initially, the participants had an unfavourable experience with robots during their previous stay; however, their level of acceptance became more positive during the pandemic. Positive acceptance to robot-staffed hotel was discovered as some participants literally said that even though their past experiences with the hotel were not favourable. A sense of isolation and disappointments with robot-provided services were recalled as their main unfavourable experiences but adaption to the new norms is more important when they want to do normal things, including taking a vacation. The interviewees also highlighted that safety is vital and that the use of robots might reduce the risk of getting infected and at least the robots could help to provide a safe travel experience. For example, Participant 5 remarked:

It would feel a little bit weird if I were to stay at a hotel that is 100% staffed by robots. Based on my experience at Henn na Hotel, I still needed humans when the self-check-in was not functioning well. I personally think that seeing a human staff member at the hotel made me feel alive. It is a bit 'dry' when you do not see any human staff, I guess. But with this pandemic, I believe that we need to cope with the new norms, such as social

distancing and many more. If the government allows the hotel industry to restart their operations, I believe that robot-staffed hotels will be the first option for most tourists. For myself, I need a holiday in a safer environment. Nobody wants to risk their lives for a holiday. So, the robot hotels can give peace of mind (Participant 5).

The interviewees also had some expectations in relation to the utilization of robots in hotels. Before their actual encounters with the robots, they had had a high expectation of the robots' capabilities, which were not always borne out by their actual experiences. Thus, they hoped that some improvements could be made to improve robot services if robots were to be used widely during the pandemic. This suggests that the positive acceptance of robots during the pandemic is also subject to seeing improvements in the functionality of robots. It is interesting to discover that participants are happy to stay at hotels staffed by robots during the pandemic, despite their previous negative experiences with the robots. Also remarkably, some interviewees expressed a wish to stay at a robot hotel if the robot services were upgraded or equally as good as human staff. This is consistent with El-Said and Al-Hajri (2022) who found that the perceived ease of use of robots strongly influences satisfaction which suggests that individual's acceptance towards service robots is shaped by the ability of the robots to complete human tasks as expected. From their past experiences, it is clear that human intervention is still needed to help robots to complete certain tasks, such as self-check-in. Worry and curiosity about the competency of the hotel robots were also revealed in the interview discussion on whether the participants would stay in a hotel that was fully operated by robots. Other than usefulness, human intervention is among the factors identified in the failed adoption of robots in hotels (Bhimasta and Kuo 2019). The interviewees in this study wanted robots to be as competent as humans, so that they would feel more confident in interacting with robots at hotels. In line with Kaushik et al. (2015), who found that consumers have a greater tendency to accept technology if it is trustworthy and risk-free, the findings of this study indicate that robot acceptance is dependent on the quality of the robots, as shown by the comments made by Participants 7 and 11:

Provided the hotel is staffed with good-quality robots, I am more than happy to stay at this kind of hotel. I did not have any impressive experiences with robots during my recent stay at Henn na. For me, the robots were not so intelligent, human staff came when I was stuck with a robot. And I can't imagine how we can rely totally on them. So now a total makeover of the robot function needs to be done, if one is to decide to have a 100% robot hotel (Participant 7).

For me, when on holiday, the hotel is a crucial thing. To be honest, I am OK with the staff robots if they can deliver something that is at par with human staff. If robots can take over the task in a proper way, why not? (Participant 11).

Surprisingly then, robot acceptance during the pandemic seems to be less related to the need for interaction that was identified in previous research as the main factor that contributed to the failure of Henn na Hotel (Bhimasta and Kuo 2019). Rather, it was discovered from the interviews that trust and reliability are important issues for robot acceptance. This finding is in line with that of a previous study in which trust was identified as the main influencing factor for robot acceptance (Tussyadiah and Park 2018) and trust in service robots is negatively influenced by negative attitude towards

technology (Tussyadiah, Zach and Wang 2020). Based on the findings of the current study, it is assumed that the participants' reactions to the issues discussed are mainly affected by their desire to stay at a hotel that offers a safe and low-risk environment with competent robots. Other issues such as human touch and interaction do not seem to be important to the participants. However, a desire for a level of task delivery and robot functionality similar to that provided by human staff was also emphasized by the interviewees. This indicates that participants still need some degree of human interaction to express their needs, however in a lesser way.

3.4. Robots as effective social distancing agents

To examine the perception of service robots as social distancing agents in the tourism and hospitality context, the participants were asked to elaborate on the extent of their belief that service robots can act as effective social distancing agents. Most of the participants agreed that service robots can act as social distancing agents. All their comments were related to the effectiveness of social distancing measures in minimizing the spread of the COVID-19 virus as evidenced in certain countries. Consequently, on that basis, they agreed that robots can serve as effective social distancing agents to deliver services at hotels. Their perception was based on the experiences that they had had with robots during their previous stay. For example, Participant 4 commented:

That's a brilliant idea. It is a great way for the hotel industry to sustain itself during the pandemic. I believe that people will be more confident to stay at such hotels. I hardly interacted with any staff at Henn na, and yeah ... no problem at all. After all, it depends on the service that the robot delivers (Participant 4).

Positive responses were also expressed about the use of robots as social distancing agents based on past experiences with robots in which the participants had no contact with human staff during their stay. However, the participants noted that, in this situation, guests would lose the benefit of the 'human touch' at hotels. The nature of robot services at hotels where little or no contact with human staff was necessary was seen as a privilege because, based on their experiences, the participants believed that they could safely stay at hotels and enjoy services through the full use of automation and robots. The above perceptions are exemplified by the comment of Participant 2, who stated:

Based on my experience at Henn na Hotel, I did not have any direct contact with human staff. All was automated and worked perfectly for me. Many things the robot can do for you, from the front desk to room delivery. Therefore, during this pandemic situation, I can say, we can rely on robots to continue our lives. On the negative side, there is less human touch or no human touch at all. I reckon with this pandemic, many things will change including the way we go for vacation (Participant 2).

3.5. Perception of service robots replacing human staff during COVID-19 pandemic

One recurrent theme that emerged during the interviews concerned the ability of service robots to replace human staff during the pandemic. It was also discovered that over two thirds of the interviewees stated that robots can replace humans in the provision of certain services at hotels. However, they remarked that their experience during their stay might not be as 'exciting' as before if only robots were present. Overall, most of the participants said that they prefer to have human interactions during their stay, but are also open to the use of any robot technologies, depending on the service being provided. For instance, Participant 12 noted that robots should be well designed and programmed to serve guests' broad enquiry:

After all, a robot is still a robot, and has its own shortcomings. I faced difficulties during my stay at Henn na, whereby it was hard to see any human staff to ask about a local SIM card problem that I had. Perhaps a human member of staff should still be available to address certain issues that are not able to be dealt with by robots (Participant 12).

Insecurity and trust also seem to be important issues for the participants in the current study. Tussyadiah, Zach and Wang (2020) discovered there is an impact of tendency to trust technology which leads to negative feelings towards robots in which trust in service robot also negatively influenced by the undesirable attitude towards robots. For instance, they mentioned that they were concerned about dealing with a fully-automated hotel service without any availability of humans in case of problems. Their level of knowledge about technology is given as the reason for their concern. Hence, despite the fact that the participants accept robots as effective social distancing agents at hotels, human interaction still seems to be an important factor for an enjoyable their hotel stay. For example, Participant 14 explained that:

It is quite nerve-wracking to stay at a hotel without any human staff available. I am not so technologically savvy. I still need human staff to guide me on the robot services or if I need any help. It is a different experience when you do not see any human greet you at the front desk. I think it would be more exciting and there would be a warmer welcome with human greeters (Participant 14).

The idea of the full use of robots in a hotel setting further escalated the tension among the interviewees. Consequently, some interviewees started to ponder seriously the risks and ambiguities related to the current situation and the current performance of robots, and how their stay could be affected if they were to stay at a fully-automated or robot-staffed hotel. The comments they made in this regard were also related to their past experiences of the Henn na Hotel chain. It is interesting to discover that although their acceptance of robots is positive, they still felt that human interaction and human touch are still needed when asked about their perception of robots doing human tasks at hotels. They stated that robots cannot replace humans and added that human interaction enriched their experience at the hotel. Most of the participants emphasized that humans are needed to meet their personalized needs and that humans should be available to refer to in order to resolve any confusion or to get prompt answers. Humans are also needed to deal with

guests' feelings such as insecurity and nervousness as well as trust issues. Human contact and social support is absent when tourists deal mainly with robots, which can cause anxiety and loneliness (Tussyadiah 2020).

On the other hand, several participants went so far as to anticipate that guests might no longer need humans if robots were designed and programmed well enough to suit guests' needs. Even though some think that it might be impossible to have a fully successful robot hotel operation, they still felt that it is acceptable to have a fully-automated hotel. They believe that the robot industry will grow, that robots will have improved capabilities, and that robot designers and hotels will probably create better robots to meet guests' needs. Thus, the challenge is for robot designers to apply smart design so that robots that can meet hotel guests' expectations. On this theme, Participant 2, one of the younger participants, commented that:

I am sure that with technological developments and with the current situation, it is possible to have a fully robot-operated hotel. For people's safety and everyone's benefit, I believe it is worth it to develop a well-functioning robot that can cater to guests' needs. The time will come and the technology will be here. Who knows if human staff will soon be irrelevant? (Participant 2)

CONCLUSION

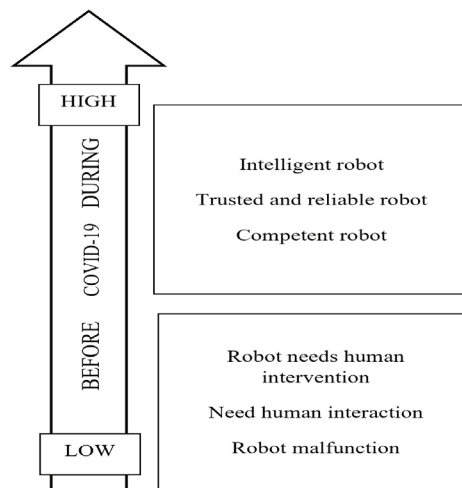
This study aimed to explore the perception of using robots as social distancing agents at hotels during the pandemic. Figures 1 and 2 summarize the findings of this study and its theoretical contributions. While past studies examined the robot adoption in hospitality, previous studies were focused on large surveys and online reviews (for example Ivanov, Webster and Garenko; Tung and Au 2018). In contrast to past studies, this study employed a qualitative approach to examine this area. This study observed that there was a different acceptance of robot before and during the pandemic, and thus this acceptance also influences their perception of robot adoption as social distancing agent during the pandemic.

The undesirable effects of the occurrence of crises on tourist arrivals is well recognized in the literature (Huan, Beaman and Shelby 2004; Sönmez, Apostolopoulos and Tarlow 1999) and the findings of this study are largely consistent with the observations that have been made in past studies. In the current study, it was found that the majority of the participants believed that the crisis caused by the COVID-19 pandemic, lockdowns and travel bans would result in a substantial decline in the number of travels. The anxiety caused by the pandemic and related safety concerns have negatively influenced the participants' desire to travel and stay at hotels. Yet, interestingly, despite their concerns about the level of risk involved in staying at hotels during the COVID-19 pandemic, the pandemic and the measures taken to reduce the spread of the virus have had positive impacts on their acceptance and perception of robots in tourism and hospitality settings. However, their past negative experiences of their stay in robot-staffed hotels did influence their responses to some extent. For instance, they anticipated that robot competency would improve, thus reflecting their optimism about the application of robotics in hotel

settings. Therefore, robot designers should apply smart technology in designing robots to prevent consumers experiencing frustration when dealing with robots.

Figure 1 shows that tourists have a high acceptance towards robots during the pandemic compared to before the pandemic, provided some improvement and modifications such as a competency, intelligent, trustworthy and reliable robots. Furthermore, the reasons for the acceptance of robots in tourism and hospitality were found to be similar to those reported for the acceptance of robots in different contexts of studies and included usefulness, adaptability, enjoyment, sociability, companionship and perceived behavioural control, all of which have been identified as important factors in evaluating user acceptance of robots (De Graaf and Allouch 2013). The current study also supports the findings of Bartneck et al. (2009) that imply that the acceptance of robots is highly dependent on the level of perceived safety, which is related to the level of danger and comfort perceived to be involved in interacting with robots.

Figure 1: **Robot acceptance before and during COVID-19.**

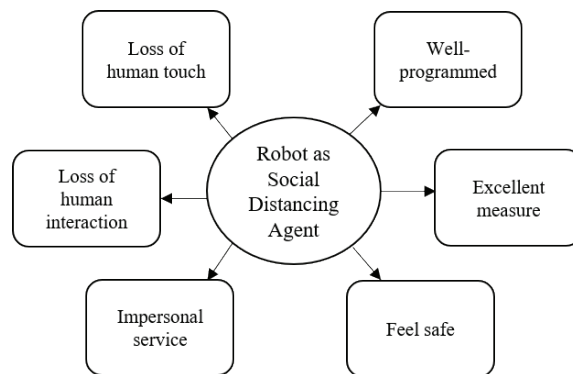


To answer the research aim, the Figure 2 summarizes the perception of robot as social distancing agents. Interestingly, this study found that robots were seen as effective social distancing agents at hotels. The participants perceived robots as having the potential to assist in combating COVID-19 and, at the same time, in helping hotels to resume their operations after temporary closure. They also believed that the risk of getting infected seems to be reduced with the use of robots. In addition, it was found that, although the participants exhibited positive acceptance of robots and were ready to accept robots as efficient social distancing agents, they still expressed a preference for human staff to be present at a robotics-based hotel. It was discovered that security, risk and trust would be of greater concern to the participants if a hotel were fully operated by robots. These issues are not only related to robot competency; the lack of human interaction

also contributed to anxiety about stays in robot-staffed hotels. However, on a positive note, the participants were open to the use of robotics technology and ready to adapt to technological changes as long as the technology was easy to use and competent.

Furthermore, the results revealed that it would be easier for hotels to adopt robots as social distancing agents as the introduction of robots faced less resistance from consumers especially when the physical distancing is emphasized in our new norms lives. For instance, initially, the introduction of robots at Henn na Hotel for concierge, delivery, receptionist and personal assistance tasks also gained positive acceptance and was welcomed by hotel guests. However, the desire to have robots that can deliver services to the same standard as human staff and the need to have robots with a human touch were also emphasized by the participants. Thus, hotels that would like to offer automated high-touch personal services should consider these views when designing robots. Moreover, hotels need to be proactive in shifting consumer attitudes toward being more positive about the use of service robots.

Figure 2: Perception of robot as social distancing agents



Theoretically, this study has explored the tourist acceptance of robots and their perception of robot as social distancing agents during the pandemic. It contributes to the theory by enhancing the existing literature on robot adoption and its challenges in adopting the service robot in hospitality environment. This study provides evidence that robot acceptance can be influenced by situational reason. The findings also support the sight that crisis can transform tourists' attitude towards new technology (Galoni et al. 2020). As for the practitioners, what is also significant is that the contribution of this research is to pioneer the field of human acceptance towards the primer of robots in travel and hospitality specifically as social distancing agents from customers' perspectives. Robot designers specifically can take note and consider designing robots that have better competencies in meeting diverse consumer needs specifically in hospitality sector. Wakelin-Theron (2021) suggests that robot designers should design robots which not only meet tourists' needs and requirements suits but also where it will be employed. This study show that robots are more readily accepted by individuals who are concerned about the perceived risk of the pandemic. Thus, marketers need to identify customers'

demographics related with their risk perceptions. Focussing on customers' needs will help the robot designers to identify the features needed to make the robots- more effective when discharging their duties at hotels. Also, promotional videos that portray the robot's capability to deliver more reliable and consistent tasks than human employees should be used to emphasize on the functional aspects of robot staff. Targeting this aspect would be very effective in promoting the efficiency of service robots.

This study is not without its limitations, but they do suggest some directions for future research. Firstly, the findings of this study were based on a small sampling frame of 14 Henn na Hotel guests, which limits the generalizability of the findings. Furthermore, as the sample was drawn from Henn na Hotel guests, the findings may apply to only this particular group of experienced guests and may not completely represent the views of guests at other robot hotels in general. Hence researchers may wish to expand the scope of research in this area to a general population of guests who have stayed in various robotics-based hotels and they may also wish to consider alternative data collection methods, such as quantitative approaches, to further investigate the factors that may affect tourists' attitudes towards robots as social distancing agents. Secondly, this study shows the positive acceptance and perception of robots at hotels during the pandemic. However, it remains unclear as to how long and to what extent this positive acceptance would last and how it would influence hotel-stay intention and behaviour in the long run. Future research should therefore take these contextual influences into consideration. Lastly, while motivation may influence tourists' decision-making regarding visiting a certain place, this factor was not explicitly discussed in the interviews conducted for this study. Thus, future research may wish to focus on the issue of motivation when examining consumers' intention to stay at hotels.

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