CUSTOMERS' SATISFACTION AND ADAPTATIONS TO SERVICE ROBOTS IN A HOTEL ENVIRONMENT

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Abstract

Purpose - The research aimed to investigate customers' satisfaction and adaptations to service robots in various operational areas in a hotel. Although few hotels have introduced service robots in Africa, their creation is still in the initial stage and present challenges. The research objectives were to investigate customers' satisfaction with service robots in a hotel and to determine customers' adaptations to service robots in various hotel operational areas.
Methodology - The study adopted an explanatory sequential mixed-method research approach. An online survey was used to collect quantitative data from hotel customers, while interviews were used to determine the customers' adaptations and validate the quantitative results amongst hotel management.
Findings - Customers are adapting well to service robots; however, they have mixed feelings about the presence of these robots in hotels. While they enjoy interacting with service robots in the hotel's reception and additional services, amongst others, they still question the services that these robots provide.
Originality - This study also contributes to the literature, managerial contributions, limitations, and recommendations for future research. Results from this research may help hotel managers to understand how the hospitality and tourism industries will have to adapt to customers' satisfaction and adaptability towards robots in hotels.
Keywords Customers' satisfaction, customers' adaptations, service robots, hotel industry, operational areas

Original scientific paper
Received 16 March 2024
Revised 9 September 2024
9 October 2024
Accepted 10 October 2024
https://doi.org/10.20867/thm.31.2.10

INTRODUCTION

Since robots are becoming more prevalent in industries globally, the subject matter of artificial intelligence (AI), service automation and robotics are dominant and prevail around near future implementation of technology in various sectors. (Ivanov et al., 2018) as well as (Wakelin-Theron, 2021) argue that recent technological advancements have allowed modern organizations to integrate numerous technologies into the hotel industry, displacing or supplementing a significant number of human staff.

Additionally, (Ivanov et al., 2018) show that the tourism and hospitality industry experienced inconsistent automation recently, such as vending machines, check-in kiosks, and so on, resulting in some commodification and standardization of tourism and hospitality services. Additionally, (Ivanov et al., 2018) posit that while the significant leap in advanced technologies, facilitated by AI may take some decades, technological advancement in the tourism and hospitality industry is sometimes easily noticeable to tourists (Wakelin-Theron & Sanda, 2024). Many people recall a period when buying a plane ticket needed calling or meeting a travel agent to check for flight details and to handle payments. Tourists may now buy their plane tickets, check-in online, and even check in their bags independently. With reception services still a norm in hotels, automation is creeping in, though few hotels have adopted advanced use of robotics (Ayyildiz et al., 2022).

A number of researchers have investigated the utilisation of service robots in the tourism and hospitality industries. (Ivanov et al., 2017) provide an overview of the current robots that are used by tourism-related businesses and draw attention to the paucity of in-depth research on the subject. (Ivanov & Webster, 2017, Kwinda & Wakelin-Theron, 2024) discussed the design of friendly robots in various hospitality services. Simultaneously, (Ivanov & Webster, 2018) investigated the costs and benefits of robots' utilisation in the tourism and hospitality industries. Researchers (Wirtz et al., 2018), as well as (Tung & Au, 2018) have evaluated the relationship between service robots and customers' experience. Numerous studies (Choi et al., 2020; Honig & Oron-Gilad, 2018; Lu et al., 2020) have examined the impact of Human-Robot Interactions (HRI) on customers' experiences. Scholars (Qiu et al., 2020) have analysed the improvements in consumer experiences.

(Garmann-Johnsen et al.,2014) assert that the implementation of robotic services developed into a way to improve service competitiveness in economic circumstances. However, robots are still new in the South African hotel industry and only two hotels, Hotel Sky in Sandton and Hotel Sky in Cape Town have adopted service robots thus far. Most research on hotel service robots has been conducted from a European perspective. Therefore, this study investigated South African hotel customers' satisfaction with these service robots and their adaptability to service robots in various operational areas of a hotel environment. To the best of the researcher's knowledge, there are limited academic papers that have examined customers' satisfaction and adaptations towards service robots in the South African hotel industry.

Two major research streams relates to AI. The technology and service literature tend to focus on the positives of AI usages, while the economic literature tends to focus on jobs. Theory determines that AI job replacement occurs at task level, instead of job level, thus replacing some service job tasks, and then progressing to replace human labor when it has the ability to take over all the tasks, thus replacing from lower level to high intelligence, and is seen as a predictable shirt over time (Huang & Rust, 2018).

This study is a continuation of work done by (Ivanov et al., 2018), aiming to learn more about South African customers' satisfaction and adaptations to service robots in the hotel industry and the demographics associated with customers' satisfaction with robots in the hotel industry. The research assumes a demand-side approach, focusing on the satisfaction and adaptations of South Africans (aged 18–65) towards service robots in hotels.

Statement of Research Problem

Robots in the South African hotel industry are still in the early stages. While South African hotels are adapting to the environment's shift by incorporating robots into their operations, customers have different perceptions and feelings about these robots. There are several service attributes that a robot cannot provide, which affects customers' satisfaction and adaptations to service robots in hotels. As a result of the present level of technology and a lack of understanding of the connection among different aspects of service robots, customers' satisfaction with hotel operations can be challenging to accomplish.

Research Objectives

- To determine customers' adaptation to service robots in various hotel operational areas; and
- To investigate customers' satisfaction with service robots in a hotel.

Research Questions

- How are customers adapting to service robots in various hotel operational areas?
- What is customers' satisfaction with service robots in a hotel?

1. LITERATURE REVIEW

1.1. Service Robots in Hotels

Robot services are being used progressively in the hotel sector. (Lopez et al., 2013) state that robotics and automated services have made their way further into the hotel industry, altering its unique sectors. (Choi & Wan, 2021) affirm that contemporary technologies have been upgrading their intelligence levels to enhance consumer interaction with robotics on the frontline. Additionally, (Wirtz et al., 2018) declare that service robots engage in social activities such as conversing with guests when encountering services in the same way that people can. (Sharma et al., 2020) provide an example of the Henn-na Hotel in Japan, which started operating in 2015 and was the first hotel of its type staffed by robots. According to the said authors, the robots handle every aspect of the hotel's activities. (Papathanassis, 2017) states that the hotel deploys robots as in-room attendants, porters, and floor cleaners in addition to replacing human receptionists. Similarly, (Ivanov & Webster, 2019) determined the hotel operational areas that are best suited for robot services. The most appropriate services were determined to be services associated with information, housekeeping, food services, additional services and front desk.

Nevertheless, few hotels have adopted service robots in South Africa, and as far as we know, only two hotels have service robots. (Poitevien, 2021) states that Hotel Sky, located in Sandton, Johannesburg, opened in November 2020 and Hotel Sky in Cape Town, which opened in early 2021, are the two hotels that have adopted service robots in South Africa. According to (Poitevien, 2021), Hotel Sky in Johannesburg was the first to use AI technology in the form of robots in Africa. The said author declares that the two hotels currently use three robots named Lexi, Micah and Ariel as hotel staff. (Poitevien, 2021) mentions that these robots are deployed to provide room service deliveries and travel advice, and to transport up to 75 kilograms of baggage weight from the reception area to the rooms.

Significantly, (Moodley, 2020) mentions that the industry has been waiting a long time to introduce a new innovative product to hotel consumers, targeting tech-savvy individuals. According to (Moody, 2020), Hotel Sky aim to provide good connectivity, a unique and advanced style, representing local flare and a cheap, high-quality product, thus reviving genuine hospitality and excitement. However, it is also essential to look at how customers are adapting to these robots and their satisfaction, as they are still new in the area.

As robots are increasingly introduced in hotels, customers seem to have different perceptions about them. (Luo et al., 2021) conducted research in Nepal and found that consumers are more agreeable to adopting service robots in the hotel industry compared to the banking and health sectors. Likewise, (Sharma et al., 2020) used a structured questionnaire to survey hotels in Delhi, India, discovering that respondents are open to adopting robotics in the hotel sector, while the adoption appears to be positive. In addition, (Ivanov et al., 2018) found in their studies that respondents are willing to adopt robots and that most respondents believe that using hotel service robots is a great idea. Nonetheless, (Sharma et al., 2020) maintain that there will be a group of hotel customers that are more attracted than others to having robots serve them. The next section presents a synopsis of customers' experiences and adaptations in hotels with service robots.

The latest study conducted by (Huang & Rust, 2018) delineate a strategic framework for using artificial intelligence (AI) to engage customers in the service industry. The framework is divided into four AI sections namely: mechanical, analytical, intuitive, and empathetic. Yet (Huang & Rust, 2021) divides the framework into three sections which drives the economy from mechanical intelligence, thinking intelligence and feeling intelligence. Regarding which AI to use to engage customers, service providers need to understand the strengths of each AI. According to (Huang & Rust, 2021) the mechanical AI is good for standardization. The thinking AI being good for personalization. The feeling AI being good for relationalization; different AIs can be applied based on the considerations of the nature of the service it delivers.

1.2. Customers' experiences and adaptations in hotels with service robots

(Sharma et al., 2020) argue that robotics innovation has hugely impacted customer experience in recent years. (Eksiri & Kimura, 2015) detailed the invention of serving robots and their assessment of decent hotel restaurants. The said authors accessed two groups of service robots; one that takes orders from guests and another that delivers the meals that the customer ordered. (Eksiri & Kimura, 2015) found that with roughly 14,280 services, robots gained over 235,680 customers. Hence, this implies that consumers are enjoying the experience and adapting well to robot services. Likewise, (Ivanov et al., 2018) showed that respondents believed that being served by robots would be a pleasurable, memorable and exciting experience.

Furthermore, (Maharjan & Chatterjee, 2019) conducted research in Nepal and found that young adults are more familiar with robotics and are more likely to shoot photos and videos. (Maharjan & Chatterjee, 2019) found that young customers are fascinated by robotics and want to have their meals served by robots, while much younger visitors are more likely to place more meal orders. Generally, many customers were happy with robots' services, while robots have also been shown to aid in developing better customer relationships. As a result, the said authors suggest that employees on hand should monitor and regulate a wide range of behaviours. In a similar study, (Kwinda & Wakelin-Theron, 2024) found that hotel customers show positive attitudes towards robots, and they are confident that the robots in hotels would deliver more functionalities. The present study will examine the customers' adaptations to service robots in different operational areas of a hotel with the hotel manager. The study will look at how customers engage with service robots, including their experiences and behaviours around these robots.

1.3.Customers' satisfaction with service robots in hotels

Customer satisfaction is a significant facet of the hospitality service industry (Jiane & Wakelin-Theron, 2023). (Maharjan & Chatterjee, 2019) maintain that every sector is racing to implement services that automate work and improve consumer satisfaction. The hospitality sector is likewise establishing services that best meet customer needs (Ngoepe & Wakelin-Theron, 2023b). (Sharma et al., 2020) found that robot services in hotels will likely provide customer satisfaction and that customer and robot contact will be positive. In their study, (Sharma et al., 2020) found that 35% of the participants were excited about hotel robot services, 21% were relatively excited, 18% were slightly excited, and 26% were not interested in the concept at all. Overall, (Sharma et al., 2020) study concluded that the respondents were enthusiastic about using robots in hotels. However, managers must find a middle ground between robots and staff to meet customers' expectations. As a result, this study will also examine customers' satisfaction with service robots in hotels.

Yet, (Nomura et al., 2011) discovered that individuals who interacted directly with robots had less unfavourable opinions than those who had not. (Ho et al., 2020) mention that customers expect human staff and robots to perform duties similarly, and they anticipate that service robots will participate in service recovery activities as human employees do. (Choi & Wan, 2021) suggest that human employees and robots may work together to circumvent robotics' emotional and social limitations, with service robots performing analytical and practical activities, while human employees are assigned emotional duties. For instance, a robot may carry luggage to the rooms while a human employee welcomes the visitor. (Luo et al., 2021) suggest that since service robots are becoming more prevalent in the hospitality industry and most hotels are intrigued to deploy them, then hotel management and investors should be aware of assessing the effects and performances of service robots. Simply put, hotel managers must utilise distinctive robots in different situations because individuals have diverse tastes. The study continues to unpack the influence of robot appearance on customer satisfaction.

1.4. Influence of robot appearance on customers' satisfaction

The appearance of robots may be another factor that influences customers' satisfaction with service robots. (Broadbent, 2017) showed that the corpus of research on hospitality shows how the human likeness of service robotics positively influences customer intention to use service robots. (Broadbent, 2017) maintains that this literature is built on robotic literature that proffers the benefits of anthropomorphism on consumer engagement. Researchers (Choi et al., 2020; Choi et al., 2019) also posit that humanoid robots are the most effective in terms of human interaction. Similarly, recent scholars (Chi et al., 2020; Lin et al., 2020; Shi et al., 2020) argue that the more customers anthropomorphize robots, the greater their positive perceptions and trust feelings towards them, improving consumers' satisfaction and intentions to adopt these robots. Also, (Tinwell et al., 2011) suggest that robots' human-like attributes, like emotional expressions and appearance, could also assist in aiding trust.

Furthermore, (Yoganathan et al., 2021) claim that customers are more inclined to expect excellent services from service robots that resemble humans. More intriguingly, (Choi & Wan, 2021) found that when service robots are more humanoid, customers want them to act like humans. For instance, recent research (Choi et al., 2019; Lu et al., 2021) argues that consumers perceived service interactions with humanoid robots as being more satisfying when the robots' motions and communications mimic humans. In essence, (Luo et al., 2021) assert that people's first impressions of service robots improve as they become more human-like; however, hate and fear emerge when anthropomorphism reaches a certain level. Hence, robot designers must consider their robots' appearance and people's feelings, as emotions influence their behaviour.

In contrast, (Mori, 1970) originally introduced the theory of the Uncanny Valley, which states that humans have different reactions towards robots, depending on their appearances, as humans perceive machines as being strange and frightening when they have a human appearance. (Ivanov et al., 2018) also found that respondents were unconcerned about the appearance of robots and preferred to be served by human staff in a hotel. (Shin & Jeong, 2020) indicate that consumers are uneasy while engaging with humanoid service robots. However, researchers (Choi et al., 2020; Hu et al., 2021) state that customers frequently believe that service robots that are like humans lack interpersonal skills when compared to human employees, which is one of the key factors influence satisfaction in the hotel sector. These soft skills are critical important in the industry (Jiane & Wakelin-Theron, 2023; Ngoepe & Wakelin-Theron, 2023a). The current study will also examine the hotel customers' preferences towards the appearance of service robots and determine their satisfaction and adaptations to these robots. Therefore, the critical takeaway for hotel management to note from the research is that providing service robots with humanoid characteristics may improve customer satisfaction. However, hotel sector management should exercise more caution when deploying (very) humanoid robots, particularly when performing tasks that need frequent interactions with customers.

2. RESEARCH DESIGN AND METHODOLOGY

The current study adopted a sequential explanatory mixed method. According to (Dawadi et al., 2021), a researcher starts by collecting and analysing quantitative data in an explanatory sequential mixed method. (Dawadi et al., 2021) assert that qualitative data collection and analysis is done in phase two of the research and is then compared to the findings from the first phase. The researcher collected quantitative data from hotel customers in phase one of data collection. The researcher then analysed the quantitative data to discover the satisfaction of hotel customers with robots. The purpose of this investigation was to obtain customers' perceptions and satisfaction with robots as they are still in the initial stage in South Africa. In phase two of data collection, qualitative data was collected by conducting semi-structured telephone interview with hotel manager. Qualitative data was informed by the hotel customers' satisfaction with service robots and was used to verify the hotel customers' responses with the hotel managers. In addition, the study was used to determine the managers' perceptions of how their customers adapt to these service robots. The data was then integrated, and the results were discussed.

The quantitative study utilised a simple random sampling approach. The study targeted 340 respondents between the ages of 18 and 65 who had visited 3–5-star hotels. The instrument used in the study was a predetermined questionnaire developed by Stanislav Ivanov, and permission was granted. The closed-ended questionnaire consisted of two sections. The first section of the questionnaire consisted of demographic questions. Section two of the questionnaire comprised statements regarding robots. The statements in section two were rated on a four-point Likert-type scales. The questionnaire was then used as an online survey to reach respondents in different South African geographical areas. The survey link was sent to a group of individuals simultaneously on social media, and the researcher waited for responses from those who had been to 3–5-star hotels. The data was collected over four months, from October 2022 to January 2023.

The participant of qualitative study was purposively approached owing to fewer hotels with service robots and no other option that could have provided the crucial information that was needed. **(**Creswell, 2014) suggests having between five and twelve interviews. However, one hotel general manager was selected to participate in the qualitative study due to limited hotels with robots in South Africa. The participant was selected because the hotel's management believed that the general manager would provide all the required answers for the study, as he is perceived to be an expert. The aim of the qualitative study was to validate the quantitative study and examine the customers' adaptations to service robots in a hotel.

Ethical considerations were maintained throughout the study. Participants were given informed consent that provided sufficient information and assurance about participation to understand the consequences of participating. The confidentiality and anonymity of study participants were respected. The research participants were not hurt in any manner. Participation in the research was entirely voluntary, and participants had the choice of withdrawing from the study at any time. The study's objectives and objections were not fabricated or exaggerated in any way.

The quantitative study data was processed by the statistical software Statistical Package for Social Science (SPSS24), which also provided the overall results of the analysis. The current study used descriptive statistics to present the analysed data. The study used mean scores, standard deviation and frequencies to describe the analysed data. Regarding qualitative data, the audio-recorded interview was transcribed to put together a comprehensive written report. The current study followed the steps of content data analysis. The majority of the interview questions were based on quantitative outcomes, as the main purpose of the qualitative research was to verify and validate customers' perceptions of robots and their adaptations. Themes and pseudo-codes were used in the study to analyse the data, aided by verbatim interview extracts. The study used detailed narrative descriptions from the interview to strengthen the research study's credibility and validity.

3. RESULTS

The results of the present study are structured in terms of the two major phases. The researcher starts by discussing the quantitative results as descriptive statistics, followed by the semi-structured interview responses discussed in themes. The quantitative results pertain to the responses of an online survey distributed to South African hotel customers who stayed at a hotel with robots. The qualitative results include responses from the interview with the general manager of the hotel that adopted service robots. The collected data was analysed against the backdrop of the study's research questions.

3.1. Phase one: Quantitative results

Phase one of the study consists of two sections. The first section provides a summary of the demographic data of everyone who participated in the survey according to age, gender, level of education and duration of stay in a 3–5-star hotel. The second section outlines the respondents' frequencies per question to present customers' perceptions of each question. The respondents' answers were rated on a four-point Likert scale. Furthermore, the tables provide each statement's mean scores (M) and standard deviation (SD). All the statements are ranked from highest to lowest in the column on the right side of the table. The statements are rated according to their mean scores. The frequencies per question will enable the researcher to determine customers' satisfaction with service robots in a hotel based on respondents' survey answers. Table 1 below shows the demographic characteristics of respondents.

Table 1: **Demographic characteristics of hotel customers in South Africa**

Demographics	**Numbers (N)**	**Percentage (%)**
Age (N = 340)		
18-25	87	25.6
26-35	130	38.2
36-45	68	20.0
46-55	31	9.1
56-65	24	7.1
Gender (N = 340)		
Female	195	57.4
Male	145	42.6
Duration of stay in 3–5-star hotels (N = 340)		
Once-twice	79	23.2
3-4 times	110	32.4
5-6 times	76	22.4
7-8 times	23	6.8
More than 8 times	43	12.6
Have stayed in 3–5-star hotels but not in the past three years	9	2.6
Education levels (N = 340)	340	

Demographics	Numbers (N)	Percentage (%)
No matric	9	2.6
Matric	80	32.5
Diploma/Degree	180	52.9
Postgraduate	71	20.9

Source: (Author)

The table above shows that most hotel customers were aged 26-35 (38.2%), followed by 18-25 (25.6%), while 20.0% were aged 36-45. Only 9.1% were aged 46 to 55 years, and 7.1% of the respondents were aged 56 to 65. The respondents' ages ranged from 18 to 65 years. According to the survey, females were more prevalent (57.4%) than males (42.6%). Regarding the duration of stay in 3–5-star hotels, most of the sample have stayed 3-4 times (32.4%). The once-twice group (23.2%) has the second-highest number of respondents, followed by the 5-6 group (22.4%). Only 12.6% stayed more than 8 times, and 6.8% visited 7-8 times. A total of 2.6% of the respondents have stayed in 3–5-star hotels but not in the past three years. The results show that the largest group of the respondents had obtained an undergraduate diploma/degree (52.9%). The second highest number are those who obtained matric (23.5%). Respondents who attained postgraduate education qualifications represented 20.9% of the sampled population. Table 2 below shows the respondents' satisfaction with service robots in hotels.

Table 2**: Customers' satisfaction with service robots in hotels**

To what extent do you agree or disagree with the following statements?	**Strongly disagree**	**Disagree**	**Agree**	**Strongly agree**	**M**	**SD**	**Ranking**
Being served by robots will be an exciting experience	17.1%	40.6%	30.6%	11.8%	2.37	0.901	8
Being served by robots will improve my travel experience	9.7%	53.2%	30.6%	6.5%	2.34	0.741	10
It will be easy for me to become skilful in using service robots	7.1%	42.4%	44.4%	6.2%	2.50	0.718	6
Learning to operate a service robot will be easy for me	4.1%	10.9%	75.6%	9.4%	2.90	0.599	1
I will be able to use robots without expert help	5.3%	12.1%	72.1%	10.6%	2.88	0.652	3
Using robots will be convenient	11.5%	50.9%	29.1%	8.5%	2.35	0.793	9
Using robots will not cost much time	16.5%	51.8%	24.4%	7.4%	2.23	0.808	11
Using a robot will not cost much money	16.8%	63.8%	14.4%	5.0%	2.08	0.712	12
Using robots will not hurt my social interactions with other people	5.6%	10.9%	72.1%	11.5%	2.89	0.661	2
The use of robots in hotels is a good idea	14.7%	33.8%	42.9%	8.5%	2.45	0.845	7
I will feel safe and secure when I use robots	8.2%	39.1%	45.3%	7.1%	2.51	0.747	5
I consider hotels that use robots to be innovative	4.1%	17.9%	69.7%	8.2%	2.82	0.629	4

Source: (Author)

A majority of the respondents disagreed with the five statements about customer satisfaction (*being served by robots will be an exciting experience, being served by robots will improve my travel experience, using robots will be convenient, using robots will not cost much time and using robots will not cost much money*). However, many respondents agreed with the other seven statements (*it will be easy for me to become skilful in using service robots, learning to operate a service robot will be easy for me, I will be able to use robots without expert help, using robots will not hurt my social interactions with other people, the use of robots in hotels is a good idea, I will feel safe and secure when I use robots and I consider hotels that use robots to be*

innovative). Moreover, statement, "*Learning to operate a service robot will be easy for me*", had the highest mean score (M = 2.90; SD = 0.599) and was ranked number one. The highest mean score suggests that many respondents perceive that it will be easy for them to use a service robot in a hotel. statement, "*Using robots will not cost much money*", had the lowest mean score (M = 2.08; SD = 0.712). Table 3 below shows the respondents' preferences towards the appearance of service robots in hotels.

Table 3: **Customers' preferences towards the appearance of service robots in hotels**

What are your preferences towards the appearance of service robots?	**Strongly prefer a machine-like appearance**	**Prefer machine-like appearance**	**Prefer human-like appearance**	**Strongly prefer a human-like appearance**	**M**	**SD**	**Ranking**
Robots' appearance	31.2%	30.0%	27.1%	11.8%	2.19	1.008	1

Source: (Author)

A sum of 61.2% (30.0% + 31.2%) indicated that they preferred a machine-like appearance, while 38.9% (27.1% + 11.8%) preferred a human-like appearance. The statement had a low mean score (M = 2.19; SD = 1.008), suggesting that the majority of customers preferred service robots with a machine-like appearance. Table 4 below shows the percentage amount that respondents would be willing to pay for fully robotised services in a hotel.

Table 4: **Percentage amount that customers would be willing to pay for fully robotised services in a hotel**

If you were to be served entirely by robots in the following hotel departments, how much would you be willing to pay?	**At least 20% less**	**Up to 10% less**	**Up to 10% more**	**At least 20% more**	**Mean**	**SD**	**Ranking**
Reception	12.4%	40.9%	43.5%	3.2%	2.38	0.740	3
Housekeeping	12.9%	38.8%	42.1%	5.9%	2.41	0.788	2
Restaurant/ bar	13.2%	44.1%	40.0%	2.6%	2.32	0.733	4
Additional services	13.2%	36.5%	39.4%	10.9%	2.48	0.857	1

Source: (Author)

The above results reveal that a majority of the respondents would be willing to pay less in all the hotel's operational areas except for additional services. Moreover, statement, "*Additional services*", had the highest mean score (M = 2.48; SD = 0.857) and was ranked number one. The highest mean score suggests that many respondents would be willing to pay more for this operational area. Statement, "*Restaurant/ bar*", had the lowest mean score (M = 2.32; SD = 0.733).

3.2. Phase two: Qualitative results

The second phase outlines the results of the qualitative study in accordance with the research questions. The general manager of a South African hotel that has adopted service robots was the only participant chosen for the study. The general manager was chosen because he has more than ten years of experience in the hotel industry and works closely with the hotel's robots, and has expert knowledge from both hotels. A telephonic semi-structured interview was conducted with the hotel's general manager, and it was audio-recorded. The qualitative research was important to verify and validate the hotel customers' perceptions of robots and their adaptations to these robots. Content analysis was used to analyse the qualitative data. Themes and pseudo-codes were used in the study to analyse the data, aided by verbatim interview extracts. The study used detailed narrative descriptions from the interview to strengthen the research study's credibility and validity. The male general manager was given the code "GM." The themes that emerged from the results are discussed below.

Theme 1: Activities performed by service robots

The participant was asked to discuss how they deploy robots in the hotel. The rationale behind the question was to obtain information about the activities that robots perform in different operational areas within the hotel. The following sub-themes arose:

- Welcome of guests;
- Handle reservations;
- Provide information about the hotel;
- Robots for room service delivery; and
- Entertain and amuse guests.

The excerpts below highlight the participant's responses, supporting the above-mentioned themes.

Regarding the activities that are performed by service robots, the **GM** stated:
"We have three robots in this hotel. They all do the same function, and because of the design of our system, they may be deployed anywhere in the hotel to perform various functions."

The **GM** avowed:
"Our robots are able to provide room service delivery, although they do not do this more often; they would enter elevators and proceed to the rooms. They can also announce their arrival once they reach the room's door."

With regards to activities that service robots perform, the **GM** mentioned:
"There are robots downstairs to welcome the guests at the reception. The guests can also use robots in the hotel app system to make reservations with no need for human interaction."

The **GM** noted further:
"We have robots on the ground floor that help with information dissemination. You ask questions, and they answer your questions. They can provide guests with directions and instructions about what is not permitted while staying at the hotel, among other things."

In terms of entertainment, the **GM** mentioned:
"Our robots can also amuse our guests. Guests can take pictures with the robots and learn more about them by inquiring about their capabilities."

In addition to the above, the **GM** stated:
"Our robots are in a duty roster. If one is doing room service delivery, the other would be on the ground floor assisting guests with information, and the third one would probably be at the charging station. After finishing their respective shifts, the two would return to the station to rest and get recharged before the third robot began its shift."

The participant indicated that they currently have only three robots at the hotels that operate in the same areas. The three hotel robots only do room service delivery, welcome customers at the entrance, provide information at the reception area, and provide entertainment. The participant also said that their customers may use the hotel's app system to make reservations. The results reveal that hotel robots provide services in the three operational areas of a hotel: reception, restaurant and additional services.

Theme 2: Customers' experiences and satisfaction with service robots in this hotel

The participant was asked to describe customers' experiences and satisfaction with service robots in this hotel. The logical basis behind this question was to obtain information about customers' overall satisfaction with service robots in the hotel. The question also helped to validate the quantitative results. Below are the sub-themes that emerged:

- Excitement;
- Amazed;
- Comfortability; and
- Feel safe and secure to use robots.

The excerpts below highlight responses that support the above-mentioned themes.

Concerning customers' experiences and satisfaction with service robots in a hotel, the **GM** observed:
"Our guests love the robots so much; they are always cheerful around them. They always show excitement whenever they interact with them."

The **GM** noted:
"Usually, the functions that our robots offer leave the guests in astonishment. They are amazed as they watch the robots entertain them and provide them with the information they want. They genuinely appreciate the special experience we give them."

The **GM** said:
"The robots are well-liked by our guests, and they are very at ease around them. They are comfortable interacting with them independently without human staff assistance."

The **GM** observed:
"I have noticed they seem to feel safe and secure using robots, as they like to ask them more questions and engage with them. I just have no idea how they would feel about robots in restaurants and housekeeping, as we do not have robots in those areas."
The participant declared that many customers in the hotel like to engage with their robots, and they are typically satisfied with the robots. The customers seem to be amazed and love the features that the robots offer. The results also revealed that customers are comfortable engaging with these robots on their own and feel safe around them. Nevertheless, the participant indicated that he is unsure of the customers' satisfaction with the robots in all other activities not offered by robots in their hotel.

Theme 3: Robots' appearance perceived by customers

The participant was questioned about their robots' appearance. The question aimed to compare the responses with the quantitative outcomes. The results also examined the customers' satisfaction with service robots in a hotel by considering their attitudes towards the appearance of service robots. The following sub-theme appeared from the responses:

- Human-like appearance.

The excerpts below highlight responses that support the above-mentioned themes.

In terms of the robots' appearance, the **GM** stated:
"Our robots have human being imitations in terms of structure. We work in the service sector, so our customers still need to feel like they are receiving warm, friendly treatment from human beings. Our guests seem to love our robots' appearance because they enjoy engaging with them."

The results revealed that the hotel only offers robots that have a human-like appearance, and their customers seem to be fine with this and enjoy interacting with them. The participant went on to demonstrate that the human-like appearance was appropriate because customers in the hotel industry still need to perceive the presence of human beings with all the features that they exhibit.

Theme 4: Customers' adaptations to robots in the hotel

The participant was asked to discuss their customers' adaptations to service robots. The rationale behind the question was to tackle customers' adaptations to service robots in various hotel operational areas. The following sub-themes arose:

- Sceptical about robots;
- Enjoying the experience; and
- Expectations of more robots.

The excerpts below highlight responses that support the above-mentioned themes.

Relating to customers' adaptations to robots in the hotel, the **GM** posited:
"I've seen that some of our guests are a little dubious about the robots because they would seek information from the robots but still inquire at the desk. They would use our app systems to make reservations but still want to double-check with the front desk staff. So, I think they continue to have issues accepting that the information they receive from the robots is accurate."

The **GM** observed:
"Although some of our guests are sceptical about these robots, they generally enjoy the experience, most especially because they cannot get it anywhere else in South Africa. They always go to robots to seek information, and the guests appreciate the unique encounter."

In addition, the **GM** noted:
"The building could use more robots than the three we have right now. Most guests want to interact with robots, leaving them with little time to do so. They look forward to being served by robots in various operational areas."

It appears that the hotel customers are showing mixed feelings and experiences. The participant indicated that although the customers generally enjoy the hotel's unique experience, they remain dubious about the robots. According to the participant, the customers do not seem to trust the robots when they receive information from them, as they would sometimes verify these with the front desk person. Nonetheless, the results revealed that the customers are fond of the robots and look forward to engaging with them in various hotel operational areas.

4. DISCUSSIONS

4.1. Customers' satisfaction with service robots

The hotel customers disagreed with the five statements about customer satisfaction (*being served by robots will be an exciting experience, being served by robots will improve my travel experience, using robots will be convenient, using robots will not cost much time and using robots will not cost much money*). The study revealed an unexpected result that disconfirmed the results of (Maharjan & Chatterjee, 2019), as well as those of (Sharma et al., 2020). These said authors, respectively, found that people value time more than anything else; thus, introducing robots into the financial constraint would assure higher quality services in less time with less time and resources wasted.

However, the hotel manager gave a different response, indicating that their customers love robots and always show excitement whenever they interact with them. This could be because not all respondents have interacted with service robots in hotels, as they responded based on their experiences in 3–5-star hotels. In addition, many hotel customers disagreed that using robots would not cost much money and had the lowest mean score. The low mean score suggests that the majority of hotel customers think that using robots will result in hotels charging more for their services.

Nonetheless, more than 50% of hotel customers agreed with the other seven statements (*it will be easy for me to become skilful in using service robots, learning to operate a service robot will be easy for me, I will be able to use robots without expert help, using robots will not hurt my social interactions with other people, the use of robots in hotels is a good idea, I will feel safe and secure when I use robots and I consider hotels that use robots innovative*). Interestingly, most hotel customers agreed that learning to operate a service robot would be easy and had the highest mean score. The highest mean score suggests that many respondents perceived that they would not have difficulties when using service robots in a hotel. It is noteworthy that customers believe that it will be easy for them to operate robots and that they will be able to use them without an expert. This indicates that it would be easy for them to adopt service robots in hotels as they will not struggle to utilise them. The qualitative results also showed that hotel customers feel safe and secure using robots, as they like to ask them questions and engage with them, generally. However, the hotel manager was unsure how they would feel about robots in all other activities not provided by robots in their hotel. Notably, the results in this study show customers' satisfaction with service robots in a hotel, as they agreed with most statements regarding customers' satisfaction.

4.2. Customers' preferences towards the appearance of service robots

(Mori, 1970) originally introduced the theory of the Uncanny Valley, which states that humans have different reactions towards robots, depending on their appearances, as humans perceive machines as being strange and frightening when they have a human appearance. In support of (Mori's, 1970) theory, the current study's quantitative results found that customers prefer service robots that have a machine-like appearance. This could be because they are frightened by human-like robots; however, the reason behind their preferences is unknown, as this was not examined.

Conversely, (Yoganathan et al., 2021) argue that customers tend to like human-like service robots. Researchers (Choi et al., 2019; Choi et al., 2020) posit that humanoid robots are the most effective in terms of human interaction. Additionally, recent scholars (Chi et al., 2020; Shi et al., 2020) claim that the more customers anthropomorphise service robots, the greater their positive emotions and trust feelings towards robots, which improve consumers' adoption intentions.

In support of the above results, the qualitative results revealed that the hotel only offers robots with a human-like appearance, and their customers seem to be fine with this and enjoy interacting with them. The hotel manager mentioned that the human-like appearance is appropriate because customers in the hotel industry still need to perceive the presence of human beings with all the features that they exhibit. Also, (Tinwell et al., 2011) suggest that human-like attributes such as the service robots' looks and emotional expressions could also help to foster trust in the robots. The quantitative and qualitative results are contradictory because some respondents have not engaged with service robots and cannot, therefore, precisely state which robots' appearance would excite them more. Also, (Nomura et al., 2011) state that individuals who had interacted directly with robots had fewer unfavourable opinions than those who had not.

4.3. Percentage amount that customers would be willing to pay for fully robotised services in a hotel

The study's results revealed that hotel customers would be willing to pay less in all hotel operational areas, except for additional services. The results further confirm that the hotel customers are satisfied with robots in additional services and are ready to adopt service robots in this operational area. Nevertheless, many hotel customers would be willing to pay less in a restaurant/ bar than in other operational areas. This further confirms the customers' dissatisfaction with robotic activities in a hotel's restaurant/ bar operational area. The results cannot justify why the customers dislike of robots in a hotel's restaurant/ bar. The hotel manager could not justify the customers' dislike of service robots in the restaurant/bar since the hotel does not have robots operating in this operational area.

4.4. Customers' adaptations and experiences

According to (Eksiri & Kimura, 2015), roughly 14,280 service robots have served over 235,680 customers, which implies that consumers are enjoying robotic services. Likewise, (Ivanov et al., 2018) report that respondents believed that being served by robots would also be a pleasurable, memorable and exciting experience. Nonetheless, hotel customers exhibited mixed feelings and experiences in this respect. The hotel customers enjoy interacting with service robots, and are excited to take pictures with them. The results revealed that although the customers generally enjoyed the hotel's unique experience, they remained dubious about the robots. It was shown that the customers seemed to not trust the robots with all the information that they provided, as they would sometimes verify with the front desk person. In essence, the results revealed that South African customers are happy to engage with robots in the hotel's reception area and in its additional services, and are looking forward to engaging with them in various other hotel operational areas. Furthermore, (Maharjan & Chatterjee, 2019) conducted research in Nepal and found that young adults are more familiar with robotics and are more likely to take photos and videos. Likewise, the current research found that young adults are adapting to service robots in hotels more as they enjoy engaging with robots and taking pictures with them.

It is noteworthy that the customer respondents disagreed that they would feel uneasy when being served by robots, and the statement had the lowest mean score. This implies that many hotel customers would feel comfortable interacting with service robots. The qualitative results also revealed that the robots are well-liked by hotel customers and are at ease around them. The hotel manager indicated that the customers are comfortable interacting with them independently without human staff assistance. The participant declared that many customers in the hotel like to engage with their robots, and they typically look happy around them. The customers seem to be amazed and love the features that the robots offer. The results also revealed that customers are comfortable engaging with these robots on their own and feel safe around them. Nevertheless, the participant indicated that he is unsure of the customers' satisfaction with the robots in all other activities not offered by robots in their hotel.

5. CONTRIBUTION OF THE STUDY

The hotel industry has been increasingly advanced and has adopted robots to enhance the quality of services and customer satisfaction in various divisions of a hotel. Although there are studies that have examined the adoption of service robots and customers' satisfaction of robots in hotels, there is limited research from an African perspective. The study contributes to the literature by providing knowledge of innovations and robotics in the hospitality industry. The study adds to the body of knowledge by investigating customers' satisfaction and adaptations to service robots in a hotel environment. As a result, this enhances the journal and fills the critical gap as there are very limited published articles that examine innovations and robotics from the demand side of the hospitality industry. In addition, the results of the study can be a helpful guide for future investigations into the variations in hotel customers' level of satisfaction and their adaptations to service robots across national boundaries. The current study utilised a sequential mixed method that provided a thorough investigation covering every prospective construct influencing customer satisfaction and adaptations in a hotel, as well as management verifications to enrich the results, which are not thoroughly examined by prior related studies.

The current study also contributes to the management of hotels with robots. Results from this research may help hotel managers and owners to understand how the hospitality and tourism industries will have to adapt to customers' perceptions and adaptability towards robots in hotels. The results can be used as a guideline for managers to provide robotic services in accordance with customers' perceptions, satisfaction and adaptations to service robots and the use of specific operational areas.

6. LIMITATIONS

The sample includes people who have visited 3–5-star hotels, including those who have not interacted with robots in hotels. As a result, this may limit the study's results as some of the respondents have not engaged and experienced service robots in hotels. The study did not explore reasons behind the customers' satisfaction and dissatisfaction with service robots. The interview was conducted with one hotel manager because the hotel's management believed that the general manager would provide all the required answers for the study, as he is perceived to be an expert. The sample included three hundred and forty respondents, making it difficult to generalise the study's results to the South African population.

7. RECOMMENDATIONS FOR FUTURE RESEARCH

The current study presented customers' satisfaction and adaptations to service robots in a hotel environment. Future research may investigate hotel customers' satisfaction and adaptation towards robots in other countries to assess if cultures shape the adaptations. Interestingly, another research direction would be to repeat the same research in coming years, when more hotels have adopted robots, to evaluate any change in adaptations among South Africans during and after the initial stage of robots, and to review adaptation in a hotel's more operational areas. By utilising the qualitative method, future research may also interview hotel customers about their interactions with robots in hotels and explore the reasons behind their perceptions of service robots. Yet, AI continues to be integrated into service robots and a potential concern regarding gender representation and stereotyping exist. As

per previous studies, AI could unintentionally reinforce gender biases, which is especially significant in the tourism and hospitality industry where gender sensitivity plays a key role in guest satisfaction (Ahn et al., 2022; Leong & Sung, 2024). Future research should examine how these gendered aspects of AI influence customer perceptions and preferences, ensuring that technological advancements in service robots promote inclusivity and do not perpetuate existing societal stereotypes. Finally, future studies may examine other tourism and hospitality areas such as museums, tour guides, travel agencies, and so on.

CONCLUSION

The use of robots in the South African hotel industry is in its infancy. Although South African hotels are adjusting to the changing environment and have begun to use robots in hotel operations, customers have different perceptions of these robots. Therefore, the current research aimed to investigate customers' satisfaction and adaptations to service robots in a hotel, since majority of the studies have been conducted from a European perspective. As a result, South African customers are satisfied with the activities that service robots perform in hotels. Hotel customers in South Africa expressed mixed feelings about robot services in hotels. Customers may adapt well to robots in hotels whilst enjoying interacting with them, but they remain doubtful in terms of the services that these robots provide. While they enjoy interacting with service robots in the hotel's reception and additional services, amongst others, they still question the services that these robots provide. The results also reveal that South African hotel customers would be willing to pay less in all the hotel's operational areas except for additional services. As a result, South African hotel customers are satisfied and adapting well to service robots in additional services of a hotel.

Artificial intelligence continues to be integrated into service robots, there is a potential concern regarding gender representation and stereotyping. As per previous studies (Ahn et al., 2022; Leong & Sung, 2024), AI could unintentionally reinforce gender biases, which is especially significant in the hospitality industry where gender sensitivity plays a key role in guest satisfaction. Future research should examine how these gendered aspects of AI influence customer perceptions and preferences, ensuring that technological advancements in service robots promote inclusivity and do not perpetuate existing societal stereotypes."

This study suggests that South African hotel managers who want to implement robot-delivered services should begin with the services that will receive the lowest resistance from guests such as reception and additional services as customers enjoy interaction with them in these operational areas. In addition, customers are willing to pay more for robotised activities in additional service. Most importantly, for the hotel industry to satisfy both consumer groups, a balance between service robots and human employees should be maintained. In addition, human staff should be readily available instead of depending on robots completely to minimize operational uncertainty for the business, as the human staff could take over the delivery of services in the event that the robot fails to function, misinterprets the guest's question, or is unable to handle the complexity of the service procedure.

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Please cite this article as:
Kwinda, V.Q. & Wakelin-Theron, N. (2025). Customers' Satisfaction and Adaptations to Service Robots in a Hotel Environment. Tourism and Hospitality Management, 31(2), 293-306, https://doi.org/10.20867/thm.31.2.10