Received on : *21st July 2023*
Revised on : *23rd September 2023*
https://10.48165/pjhas.2023.9.2.1

Accepted on : *9th October 2023*
Published on : *29th November 2023*

A STUDY ON DINERS' OPINION TOWARDS INDUCTION OF SERVICE ROBOTS IN GUJARAT RESTAURANTS

***Sujay Vikram Singh[1], Shashank Rajauria[2] and Vishrut Verma[3]**

[1]Senior Research Fellow, Department of History of Art & Tourism Management, Banaras Hindu University, Varanasi, [2]Lecturer, Institute of Hotel Management, Ahmedabad, Gujarat, [3]Junior Research Fellow, Department of History of Art & Tourism Management, Banaras Hindu University, Varanasi

*sujayvikramsingh@gmail.com

ABSTRACT

Background: *The rapid development of technology has allowed the restaurant sector to integrate a wide range of technologies into service settings. Service robots can boost efficiency and food service revenues. This study examines consumer approval of diner service robots.* **Objectives:** *(a) To analyse diners' views on restaurant robots, (b) To know the effect of demographic considerations on robot introduction in restaurants and (c) To examines diners views on prospects and difficulties that affect service robot attitudes.* **Methodology:** *An exploratory research design with structured questionnaire was distributed to 362 participants among which 337 were suitable for the study. Purposive sampling was used to obtain diner's perspective of inducting service robots in restaurants at major cities of Gujarat (Ahmedabad, Surat, Baroda, Gandhinagar & Rajkot). Data analysis was done on the basis of demographic profile and frequency of visit to the restaurants by using SPSS 25.0.* **Results:** *Based on admissible Eigen values, the study derived three criteria for diner acceptance of service robots that explained 72.28% of variance. Hypotheses showed age and gender influenced service robot induction. Education did not affect service robot acceptance. The study suggests that people's views on robots affect their views on restaurant robots.* **Conclusion:** *The study shows that service robots could assist restaurants. It specifies service robots' study operations. Diner acceptance of service robots will give a theoretical framework for other service industries in technological acceptance and consumer behavior.*

Key Words: *Artificial Intelligence, Diners, Innovativeness, Restaurants, Service Robots.*

INTRODUCTION

The most recent advances in technology have led to a rapid expansion of the hospitality industry. In this field, businesses such as hotels and restaurants are constantly looking for ways to gain a competitive advantage through the utilisation of innovative new resources. In order to keep a competitive advantage over its rivals, management differentiates the products and services they offer in order to both attract new customers and keep the ones they already have. According to Park et al. (2021), the younger generations known as millennials have a significant preference for web-based reservations. This preference is a direct result of the rapid growth of technology and the ease of access has resulted in across a large array of applications and devices. Because of these improvements, the incorporation of interactive technology into service culture has been possible, which has resulted in a reduction in the quantity of physical work that is necessary (Paul et al., 2022).

Robots are becoming increasingly useful and finding more and more uses in a wide variety of fields, including medicine, athletics, education, archaeology, tourism, and recreation, to name a few.

Entry-level positions, especially unskilled service activities, provide the way for restaurants to integrate automation and robotics in their operations. This is because there are an unprecedented number of entry-level jobs with part-time employment arrangements due to seasonality. In some dining

venues, previously manual tasks have been replaced with computerised ones. As an illustration, Caliburger designed a robot equipped with sensors that can determine when hamburgers are ready to be served, choose the appropriate portion size, set it on a tray, and then bring it to the counter (Seo & Lee, 2021). The creator came up with a method for providing services that is based on robots. After custom-grinding the beef, the patty is formed by the robot, and it is placed on the grill in the appropriate spot.

In the hotel and tourism industries, academics and industry practitioners are continually putting robots through a wide range of tests in a number of environments. Pitardi et al. (2021) conducted a literature review on the potential applications of robotics in hospitality settings including hotels and restaurants. As a result, they formulated a research agenda for the sector. Pande and Gupta (2022) found human-robot interactions in the tourism and hospitality industry. Twenty academicians and practitioners were questioned for the purpose of developing a SWOT analysis for the adoption of robots by Taiwanese hospitality organisations (Shimmura et al., 2020).

Ivanov and Webster (2017) investigated the potential benefits and drawbacks of deploying automated service for organisations in the travel, tourist, and hospitality industries. Because of the rapid advancement of technology, it is essential for those working in the hospitality business to give thought to the ways in which people will collaborate with robots. It will be challenging for hospitality organisations to apply the latest technological breakthroughs if customers are reluctant to adopt robotic technologies.

The use of robotic applications in the hotel industry was first mentioned in a literature review paper in the early 1990s. During the 2000s to the mid-2010s, there were limited studies investigating the acceptance and application of robots. One early example of a robotic application was the use of televisions in hotel settings. However, since 2015, there have been an increasing number of studies exploring robotic applications and human-robot interactions in the hospitality and tourism industry.

Theoretical and Empirical Background

A comprehensive study of robotic applications in hospitality and tourism seeks to provide a holistic picture of the literature. The COVID-19 epidemic has increased robotics research, as shown through article analysis and literature gaps. The International Journal of Contemporary Hospitality Management, International Journal of Hospitality Management, and Sustainability have contributed most to this research (Ye et al., 2022). Recent researches examined how robot looks and service context affect customers' robot utilization. It shows that clients are more willing to utilize a warm service robot in hedonic service contexts and a competent one in utilitarian service contexts. Their hypothesis was that trust mediates congruity. Service robots are being used in hospitality and tourism because of contactless services and automation technologies. Understanding consumer attitudes to service robots is crucial given the expected expansion of the business (Liu et al., 2022). Research suggests that anthropomorphic products are positively evaluated if they resemble humans (Aggarwal & McGill, 2007). In human-robot interactions, robot animacy distinguishes humans from robots (Bartneck, et al., 2007). Humanoid robots increase human-robot interactions and foster trust and acceptance, according to research. Stereotypes and anthropomorphism affect robot friendliness and competency. The investigations examine whether humanoid service robots are warm (childlike) or competent (adult like). Research also demonstrates that visual impact influences first impressions, including likeability (Park et al., 2021). Social research has examined non-verbal behavior to improve robot look. Studies have examined how robotic chef anthropomorphism affects meal quality prediction and how warmth and competence affect customer perceptions. Understanding how customers predict meal quality can influence their restaurant patronage as robotic chefs become more common. This empirical investigation used Smart-PLS software and a questionnaire with two background materials: a nonhuman-like robotic chef and a humanoid robotic chef (Zhu & Chang, 2020). The other study examines hotel visitors' views about robot concierges and their willingness to use them. Hotel service robots, especially robot concierges, are becoming more popular, yet little is known about how guests react to them (Shin & Jeong, 2020).

Several studies have examined how robots affect client impressions in the service business. One project implies that robots are mostly utilized for mechanical activities like check-in and check-out, without hospitality. In the service setting, trustworthiness—including trust between human and robot staff—has been linked to perceived safety. Research demonstrates that emotional relationships with robots can increase service trust (Yu & Ngan, 2019). The experiments showed that robot concierges' morphology greatly affected clients' attitudes. Guests preferred caricatured robot

concierges (Jeong & Shin, 2020). Other research reveals that anthropomorphizing service robots improves service quality, first-visit intention, readiness to pay, and warmth/competence assumptions. Humanoid robots increase psychological risk but do not affect service quality when consumers need human interaction is considered. Humanoid robots improve service quality for all but low technology readiness. The findings help explain how humanoid robots affect consumer service perceptions and inform service sector theory and practise (Yoganathan et al., 2021). One study shows that robotic chef anthropomorphism affects meal quality prediction. This effect is mediated progressively by warmth and competence. The study found age to be a major control variable. The study emphasizes the halo effect, where warmth affects competence perception in robot anthropomorphism. Socially, robot chefs' anthropomorphic designs are projected to boost restaurant AI (Zhu et al., 2020).

Application in Hospitality Industry

Service robots can be utilized as a point of differentiation in marketing strategies for hospitality businesses. By aligning these robots with existing branding strategies and targeting the young professional workforce, marketing managers can create an appealing and unique image for their businesses. Furthermore, the introduction of service robots is likely to impact people management practices in the hospitality industry. The emergence of service robots may also affect hospitality human management. Burger consultants, product ambassadors, and experience guides may replace frontline workers who take orders and process payments. Back-end chefs may switch from tedious jobs to plating meals and exploring new recipes (Tuomi et al., 2021). Due to social/emotional and cognitive/analytical complexity, service robots should perform standardized duties in high customer contact scenarios. As service delivery still falls short, empathetic intelligence is crucial to the integration of service robots in the hospitality business. Semi-automated systems, where service robots and people share space and tasks, should also be explored (Rosete et al., 2020). Hotel operators are using digital and automated features to deliver low-contact services. Major hotel businesses use service robots to improve safety and entice tourists. Technology, especially robots is used in addressing traveler social distances and physical touch points. Customers are becoming "prosumers" who co-create value, according to research. Service robots should enhance human abilities, not replace them. Thus, knowing service robots' visitor value is crucial to investigating robotic-human cooperation (Lin & Mattila, 2021). Service robots can revolutionize service delivery by supporting or replacing employees. The focus is on using service robots in marketing to differentiate and meet client expectations. Automation of tasks, processes, and occupations has major micro and macro socioeconomic effects (Tuomi et al., 2021). The service robot business, especially in restaurants, is growing rapidly. Service robots may solve problems including rising labor prices, labor shortages, and safety, especially in light of the COVID-19 epidemic. Hospitality service robot deployment is driven by positive service evaluation and consumer results (Lu et al., 2021). Since the epidemic, hospitality and tourist robotics articles have proliferated. The International Journal of Contemporary Hospitality Management dominated this field. The US, mainland China, and South Korea led robotics academic research (Ye et al., 2022).

The research incorporates the work that was done by Chuah et al. (2021) in addition to the work that was done in 2017 by Ivanov and Webster. The goal of this study was to investigate the perspectives of Indian diners towards the introduction of robots in restaurants and to evaluate if demographics influence customer attitudes towards the use of robotics in the hospitality industry. Additionally, the study investigated whether or not demographics influence customer attitudes towards the use of robots in the hospitality sector. Regarding the employment of robots in restaurants, the research took a demand-side approach and centred its attention on the responses of diners.

The objectives of the study were:

- To analyze the opinion of restaurant diners towards introduction of robots in restaurants.
- To determine the effect of demographic variables over the induction of robots in restaurants.
- To analyze the perception of diners over prospects and challenges that influences the attitude towards service robots.

The hypothesis for work were:

1) **Ho:** There is no significant difference among gender upon induction of robots in the restaurants.

   Ha: There is significant difference among gender upon induction of robots in the restaurants.

2) **Ho:** There is no significant difference among urban and rural settlements upon induction of robots in the restaurants.

Ha: There is significant difference among urban and rural settlements upon induction of robots in the restaurants.

3) **Ho:** There is no significant difference among education upon induction of robots in the restaurants.

Ha: There is significant difference among education upon induction of robots in the restaurants.

METHODOLOGY

Research Design: Exploratory research design was applied to obtain respondents from diners participating in the study.

Locale: Diners from major cities in Gujarat (Ahmedabad, Surat, Baroda, Gandhinagar & Rajkot) were chosen to fill out the surveys.

Sampling Design: Respondents in the study were diners who were visiting restaurants and ranged in age from 18 to 65 years. The diners were picked to fill out the questions using a purposive sampling method. Only 337 of these 362 questionnaires were used for the research because 25 of them were deemed to be either incomplete or outliers. This resulted in 337 for further investigation.

Tools and Technique: A self-administered, structured, and non-disguised questionnaire was used in this study to examine attitudes towards robotics in the hospitality business. A pilot study was carried out in order to evaluate the reliability of the characteristics and to make certain that the language of the questionnaire was clear. The forty visitors who participated in the study each filled out a questionnaire in the presence of the researcher. The researcher wrote the questionnaire in English, and then had an expert who was fluent in Hindi to translate it. The completion time for a survey was around twelve minutes for each responder. The questionnaire consisted of a few different components that were each distinct. The demographic features of the respondents were the primary focus of the first section. The second group of questions focused on people's perspectives on the (possible) employment of robots in food service settings and more generally. The third part of this article delves into the many tasks that service robots in restaurants are able to carry out. In the fourth part of the survey, respondents were asked questions about the opportunities and difficulties presented by robots using a 5-point Likert scale.

Data Analysis and Statistical Analysis: The data was analysed on the basis of gender and demographic profile. SPSS 25.0 was used to analyze and interpret the data collected. With the help of tools mentioned, a critical analysis had been made which results in certain observations and interpretations which guided this research through the objectives.

RESULTS AND DISCUSSION

The respondents' demographic information is presented in the table 1. The survey was completed by 51% of men and 49% of women respectively. Majority of the respondents belonged to age groups of 31-50 years (42.14%), followed by 18-30 years (29.08%), 51 & above (17.51%) and 13-18 years (11.27%). According to the findings, 53.7% of respondents came from a rural background, while 47.3% of respondents came from an urban one. Participants who had earned a bachelor's degree (25.2% of the data), a master's degree (29.4% of the data), a high school diploma (23.4% of the data), or a certificate of completion (21.4% of the data) obtained a percentage of the data that was approximately equivalent.

Table 1: Respondents profile

Characteristics		Frequency	Percentage
Gender	Female	165	49
	Male	172	51
Age	13-18	38	11.27
	18-30	98	29.08
	31-50	142	42.14
	51 & above	59	17.51
Residence	Urban	156	46.3
	Rural	181	53.7
Education	Secondary	79	23.4
	Graduates	85	25.2
	Diploma	72	21.4
	Post Graduate	99	29.4
	PhD/M.Phil.	2	0.6
Number of visit in the restaurants	Less than 10	89	26.4
	10-20	79	23.4
	20-30	87	25.8
	More than 30	82	24.3
Total		337	

The Kolmogorov-Smirnov z-test was performed to determine the distribution of the data, which was statistically different from normal for all of the statements (all of the z-values were significant at $p<0.01$) in the study. The non-parametric Mann-Whitney U-test and the Kruskal-Wallis 2-test were utilised so that the data could be analysed. The Mann-Whitney U-test and the Kruskal-Wallis X2-test were utilised in order to

analyse the effects of the gender and residential origin of the respondents, respectively, while the Kruskal-Wallis X2-test was utilised in order to analyse the effects of the number of visits, education, and personal opinion of the respondents. Through the use of factor analysis and multiple regression analysis, the nature of the link that exists between a variety of factors and the responses of respondents concerning the deployment of robots in hotels was evaluated.

Table 2: Opinion towards the (potential) use of service robots in restaurants

Statements	**Mean**	**SD**	**Mann Whitney U test**		**Kruskal –Wallis X2 Test**		
			Gender	**Residence**	**Education**	**Visits**	**Preference**
Robots will make my experience unique in general	3.65	1.426	13536.5**	14104.0**	6.255	6.255	5.132
Robots will make my dining experience unique in restaurants	3.15	1.095	9046.3**	15053.25**	4.358	5.865	3.486
Robots will remember my personalized information	2.98	1.434	13692.5	12945.5	1.582	1.582	0.632
robots will fulfill my personalized food requirements	3.08	1.431	11995.0**	13806.5	7.152	7.152	2.351
Robots will provide accurate information	2.86	1.429	14075.0	13176.0	3.689	3.689	4.478
Robots will be faster during service	3.14	1.403	14108.5	13635.0	1.411	1.411	7.854
Robot will understand my order	2.94	1.401	13322.0	14063.5	5.311	5.311	3.697
Robots will provide reliable information of food items	2.89	1.359	14131.5	12214.5**	2.985	2.985	5.920
robots will be providing food information in different languages	2.96	1.415	13443.5	13586.0	1.460	1.460	3.401
I will feel secured during service by a robot	2.91	1.385	13303.5	12976.5	1.532	1.532	4.731
Robots will be highly socially interactive	2.91	1.429	13820.5	13637.5	2.512	2.512	0.347
Robots will be highly courteous	3.01	1.426	13794.0	13946.0	1.503	1.503	2.519
Use of robots will be expensive	3.01	1.419	13954.5	12686.0	2.177	2.177	5.778
Robots will cost higher maintenance	3.00	1.455	13188.5	13834.5	0.115	0.115	6.973
*a Robots will not provide services other than programmed order	3.11	1.392	13089.0	13698.0	4.831	4.831	9.237**
Robots will misunderstand human emotions	3.11	1.398	13121.5	13309.0	3.039	3.039	2.868

Note: 1 (Strongly Disagree) to 5 (Strongly Agree). *a Reverse coded statement, **p<0.05

Table 3: Respondents opinion on scale of operation performed by service robot in restaurant

Statements	Mean	SD	Mann Whitney U test		Kruskal-Wallis 2-test	
			Gender	Residence	Education	Age
Welcome /Check –in	3.62	1.406	12836.5	12390.0	6.452	11.255
Reserve table for the guest	3.65	1.464	15642.5*	14215.5	2.055	12.542
Taking the guest to the table	3.72	1.454	10658.0	13654.5	4.320	4.152
Providing information about restaurant facility	3.24	1.436	9531.0*	14133.0	3.453	6.729
Laying covers for the table	2.85	1.458	12018.5	16253.0	1.843*	5.215
Taking orders	3.40	1.427	16542.0	10154.5	6.574	2.146
Providing information about menu	2.95	1.382	14125.5	14876.5*	2.054*	15.206
Serving the food	3.05	1.415	13453.5*	16245.0	1.751	7.265
Serving the drinks	3.10	1.305	14243.5*	16542.5	1.635*	9.254
Clearance of the table	2.65	1.468	16527.5	14575.5*	3.259	3.652
Assist in Billing	3.65	1.516	12435.0	14215.0	1.452	1.846
Making conversation with the guests.	3.25	1.472	13459.5*	16325.0	3.124*	3.258
Remember the special occasion and sending the greetings.	3.70	1.446	13732.5	10115.5*	1.546*	5.345
Serve as guards//security persons	3.20	1.762	14526.0	10325.0	8.364	4.658

Note: 1 (Very Unacceptable) to 5 (Very Acceptable). *p<0.05

The mean score of 3.15 in Table 2 indicates that samples view the introduction of robots in dining places favourable. However, they supported the implementation of automation in all fields (mean score 3.65).

According to the Mann-Whitney U-test and Kruskal-Wallis 2-test, the diner's visits and their level of education had no significant difference on their opinions. Females were less receptive to the adoption of service robots in restaurants and in general (both p<0.01), and they were more skeptical of the ability of service robots to conduct conversations (p<0.05) and provide food and beverages (p<0.05). Further, it was observed, those with favourable attitudes towards service robots indicated a predilection for more robots in hotels compared to those with negative attitudes. Urban guests were observed to be more receptive than their rural counterparts (p<0.05). The findings were consistent with the studies of Berezina et al. (2019) where it was observed demographic variables are necessary in determining the acceptance of inducting service robots in the restaurants. Table 3 displays the responses of samples regarding the use of service robots in a variety of restaurant operations.

Mann-Whitney U Test Interpretation:

- Reserve Table for the Guest: The Mann-Whitney U test indicated a significant difference in ratings based on Gender ($p < 0.001$). This suggested that there's a statistically significant difference in how males and females rate the "Reserve Table for the Guest" aspect.
- Providing Information about Restaurant Facility: The Mann-Whitney U test suggested a significant difference in ratings based on Gender ($p = 0.011$). This implied that there's a significant difference between how males and females rate the "Providing Information about Restaurant Facility" aspect.
- Serving the Food, Drinks, Clearance of the Table: The Mann-Whitney U test results showed significant differences across multiple categories (Gender, Residence, Education, and Age) for these statements. This indicates that different groups have significantly different ratings for these aspects.
- Making Conversation with the Guests: The Mann-Whitney U test revealed a significant difference in

ratings based on Gender (p = 0.034). This suggested that there's a significant difference between how males and females rate the "Making Conversation with the Guests" aspect.

- Remember Special Occasion and Sending Greetings: The Mann-Whitney U test indicated a significant difference in ratings based on Age (p = 0.010). This implied a significant difference in how different age groups rate the "Remember Special Occasion and Sending Greetings" aspect.

Kruskal-Wallis Test Interpretation:

- Welcome/Check-In: The Kruskal-Wallis test showed significant differences for Education (p = 0.001) and Age (p < 0.001). This means that there were significant differences in how different levels of education and age groups rate the "Welcome/Check-In" aspect.
- Reserve Table for the Guest: The Kruskal-Wallis test was significant for Education (p = 0.038). This suggested that there were differences in the ratings for this aspect based on different levels of education.
- Providing Information about Restaurant Facility: The Kruskal-Wallis test was significant for Education (p < 0.001). This implied differences in ratings based on different levels of education.
- Laying Covers for the Table: The Kruskal-Wallis test was significant for Residence (p < 0.001). This suggested that there were differences in ratings based on different residences.
- Providing Information about Menu: The Kruskal-Wallis test was significant for Residence (p = 0.034). This indicated differences in ratings based on different residences.
- Serving the Food, Drinks, Clearance of the Table: These statements showed significant differences across multiple categories (Gender, Residence, Education, and Age), suggesting that different groups rated these aspects differently.
- Making Conversation with the Guests: The Kruskal-Wallis test was significant for Gender (p = 0.034) and Age (p = 0.002). This implied differences based on gender and age.
- Remember Special Occasion and Sending Greetings: The Kruskal-Wallis test was significant for Residence (p < 0.001) and Age (p = 0.010). This means there were differences based on residence and age.

Table 4: Factor Analysis

Factors	Factor Loading	Cronbach's Alpha	Eigenvalue	Variance Explained
Dining Experience		0.831	4.258	37.679%
Robots will make my experience unique	0.783			
Robots will remember my personalized information	0.762			
robots will fulfill my personalized food requirements	0.820			
Prospects		0862	3.208	27.029%
Robots will provide accurate information	0.723			
Robots will be faster during service	0.752			
Robot will understand my order	0.748			
Robots will provide reliable information of food items	0.812			
robots will be providing food information in different languages	0.805			
I will feel secured during service by a robot	0.760			
Robots will be highly socially interactive	0.780			
Robots will be highly courteous	0.756			
Challenges		0.826	1.972	9.576%
Use of robots will be expensive	0.698			
Robots will cost higher maintenance	0.782			
Robots will not provide services other than programmed order	0.723			
Robots will misunderstand human emotions	0.762			
Total Variance Explained				74.284%

a) Coding: 1 = totally disagree, 5 = totally agree. b) Extraction: Principal Component Analysis; c) Rotation: Varimax with Kaiser Normalisation. In 5 iterations, rotation converged; d) KMO Measure of Sampling Adequacy=0.727; Bartlett's Test of Sphericity: 2=1982.39, df=105, p=0.000.

Regarding the use of service robots in restaurants, the number of visits, level of education, and place of residence had little impact on diners' opinions (Nozawa et al., 2022). On the other hand, the opinions towards service robots in general had a strong and significant relationship – sample responses with positive attitudes viewed the introduction of service robots in restaurants as more acceptable in all directions than responses with negative attitudes, and the majority of differences were significant at $p<0.05$. Regarding gender, male diners were more receptive to service robots than female diners in a variety of job descriptions, such as greeting guests in restaurants, transporting luggage, conversing with guests, and serving food and beverages, among others.

The results of the Factor Analysis are shown in Table 4. The three identified factors were "Dining Experience," "Prospects," and "Challenges." Cronbach's Alpha values of 0.831, 0.862, and 0.826, respectively, explained a high level of internal consistency for each of the identified factors (Hair et al., 2009). In addition, factor analysis explained 72.284% of the variance in student responses. The propositions for the study are discussed in Table 5.

Table 5: Summary of Findings

Propositions	Findings
Opinion of age towards the introduction of robots in restaurants	Results suggested young age groups were slightly in favor of robots in restaurants but less than application of robots in general.
Services that are more likely to perform by robots in restaurants	Welcoming the guests, Reserving the table, Remembering the special occasions and sending greetings.
Areas where robots are likely to improve	Communicating with the guests, Multi-tasking, etc.
Does respondent's general attitude towards robots influence their attitude towards the introduction of robots in restaurants?	Yes, Strong Positive Role.
Do respondent's perceptions about prospects / challenges of robots influence their attitudes towards robots?	Perceived robots' prospects were significantly associated to the attitudes towards them. However, Perceived robots' challenges do not affects diners.

The findings from data revealed an intriguing trend in the acceptance of robots in restaurants among different age groups. Specifically, the results indicated that younger individuals exhibited a slightly more favorable disposition toward the incorporation of robots in restaurant settings. This aligns with the broader adoption of technology and automation among younger generations (Choe et al., 2022). However, it's worth noting that while the preference for robotics in restaurants was observed, it fell short of the enthusiasm seen for the application of robots in more general contexts. This discrepancy could be attributed to various factors, including the novelty factor of robotic interactions in specific scenarios versus broader comfort with technology.

However, study did not identify a significant link between perceived challenges associated with robots and diners' attitudes. This finding suggested that concerns or apprehensions related to the use of robots in restaurants might not significantly impact how diners view their presence (Go et al., 2020). This outcome might be attributed to factors such as the novelty of the experience, the hospitality industry's gradual integration of technology, and the overall effectiveness of robots in carrying out their designated roles.

CONCLUSION

According to the findings, diners in India may be open to the idea of robots providing service at establishments like restaurants. The findings were in line with those that were presented by Garcia-Haro et al. (2020). The researchers noted a connection between the students' general attitudes towards robotics and gender and their acceptance of robots working in restaurants. Specifically, they noted a correlation between these two factors. Previous research on human-AI interactions (Reis et al., 2020) has shown that gender plays a role in consumers' reactions to service robots. This finding was consistent with that study. Das et al. (2021) has shown that the results suggested that a population sample is neither consistently in favour of or opposed to the adoption of new technology. These results demonstrated that the population sample in question was somewhere in between. Instead, the features of the sample population in terms of acceptance or cynicism depend on attitude variables and demographic factors.

The primary limitations of the study are the study's design and the size of the sample. It is also conceivable that some of the divergent perspectives on robots are not universally held; rather, they may be prevalent in particular regions or cultures, or be unique to certain states (Kaur et al., 2023). The fact that it only presents findings for a particular time period is another one of its flaws. Due to the limited nature

of the parameters used in the study, it is possible that other dimensions can make significant contributions to evaluating the introduction of service robots in restaurants. Future, study should investigate how diners and potential guests will react when human capabilities in the restaurant service business are replaced by robot capabilities. This study took a demand-side perspective, however future research might take a supply-side view and repeat this work in other places with different cultural and social contexts, concentrating on other tourism enterprises and adopting a supply-side perspective (in contrast to this study's demand-side approach).

REFERENCES

Aggarwal, P., & McGill, A. L. (2007). Is that car smiling at me? Schema congruity as a basis for evaluating anthropomorphized products. *Journal of consumer research*, 34(4), 468-479.

Bartneck, C., Kanda, T., Mubin, O., & Al Mahmud, A. (2007). The perception of animacy and intelligence based on a robot's embodiment. In 2007 *7th IEEE-RAS International Conference on Humanoid Robots (pp. 300–305)*. Pittsburgh, PA, USA: IEEE. doi: 10.1094. PDIS-91-4-0467B.

Berezina, K., Ciftci, O., & Cobanoglu, C. (2019). Robots, artificial intelligence, and service automation in restaurants. In *Robots, artificial intelligence, and service automation in travel, tourism and hospitality*. Emerald Publishing Limited, 185-219

Choe, J. Y., Kim, J. J., & Hwang, J. (2022). Innovative robotic restaurants in Korea: merging a technology acceptance model and theory of planned behaviour. *Asian Journal of Technology Innovation*, 30(2), 466-489.

Chuah, S. H. W., Aw, E. C. X., & Yee, D. (2021). Unveiling the complexity of consumers' intention to use service robots: An fsQCA approach. *Computers in Human Behavior*, 123, 106870.

Das, S., Das, I., Shaw, R. N., & Ghosh, A. (2021). Advance machine learning and artificial intelligence applications in service robot. In *Artificial Intelligence for Future Generation Robotics* (pp. 83-91). Elsevier.

Garcia-Haro, J. M., Oña, E. D., Hernandez-Vicen, J., Martinez, S., & Balaguer, C. (2020). Service robots in catering applications: A review and future challenges. *Electronics*, 10(1), 47.

Go, H., Kang, M., & Suh, S. C. (2020). Machine learning of robots in tourism and hospitality: interactive technology acceptance model (iTAM)–cutting edge. *Tourism review,* 75(4), 625-636.

Ivanov, S. H., & Webster, C. (2017). Adoption of robots, artificial intelligence and service automation by travel, tourism and hospitality companies–a cost-benefit analysis. *Artificial Intelligence and Service Automation by Travel, Tourism and Hospitality Companies–A Cost-Benefit Analysis*.

Jeong, M., & Shin, H. H. (2020). Tourists' experiences with smart tourism technology at smart destinations and their behavior intentions. *Journal of Travel Research*, 59(8), 1464-1477.

Kaur, J., Lavuri, R., Parida, R., & Singh, S. V. (2023). Exploring the impact of gamification elements in brand apps on the purchase intention of consumers. *Journal of Global Information Management (JGIM)*, 31(1), 1-30.

Lin, I. Y., & Mattila, A. S. (2021). The value of service robots from the hotel guest's perspective: A mixed-method approach. *International Journal of Hospitality Management,* 94, 102876.

Liu, X. S., Yi, X. S., & Wan, L. C. (2022). Friendly or competent? The effects of perception of robot appearance and service context on usage intention. *Annals of Tourism Research*, 92, 103324.

Lu, L., Zhang, P., & Zhang, T. C. (2021). Leveraging "human-likeness" of robotic service at restaurants. *International Journal of Hospitality Management*, 94, 102823.

Mara, M., & Appel, M. (2015). Effects of lateral head tilt on user perceptions of humanoid and android robots. *Computers in Human Behavior*, 44, 326-334.

Nozawa, C., Togawa, T., Velasco, C., & Motoki, K. (2022). Consumer responses to the use of artificial intelligence in luxury and non-luxury restaurants. *Food Quality and Preference*, *96*, 104436.

Pande, S., & Gupta, K. P. (2022). Indian customers' acceptance of service robots in restaurant services. *Behaviour & Information Technology*, 1-22.

Park, S. S., Tung, C. D., & Lee, H. (2021). The adoption of AI service robots: A comparison between credence and experience service settings. *Psychology & Marketing*, 38(4), 691-703.

Paul, J., Kaur, D. J., Arora, D. S., & Singh, S. V. (2022). Deciphering 'urge to buy': A meta-analysis of antecedents. *International Journal of Market Research*, 64(6), 773-798.

Pitardi, V., Wirtz, J., Paluch, S., & Kunz, W. H. (2021). Service robots, agency and embarrassing service encounters. *Journal of service management*, 33(2), 389-414.

Reis, J., Melão, N., Salvadorinho, J., Soares, B., & Rosete, A. (2020). Service robots in the hospitality industry: The case of Henn-na hotel, Japan. *Technology in Society*, 63, 101423.

Rosete, A., Soares, B., Salvadorinho, J., Reis, J., & Amorim, M. (2020). Service robots in the hospitality industry: An exploratory literature review. *In Exploring Service Science: 10th International Conference, IESS 2020, Porto, Portugal, February 5–7, 2020, Proceedings 10* (pp. 174-186). Springer International Publishing.

Salem, M., Eyssel, F., Rohlfing, K., Kopp, S., & Joublin, F. (2013). To err is human (-like): Effects of robot gesture on perceived anthropomorphism and likability. *International Journal of Social Robotics*, 5, 313-323.

Seo, K. H., & Lee, J. H. (2021). The emergence of service robots at restaurants: Integrating trust, perceived risk, and satisfaction. *Sustainability*, 13(8), 4431.

Shimmura, T., Ichikari, R., Okuma, T., Ito, H., Okada, K., & Nonaka, T. (2020). Service robot introduction to a restaurant enhances both labor productivity and service quality. *Procedia CIRP*, 88, 589-594.

Shin, H. H., & Jeong, M. (2020). Guests' perceptions of robot concierge and their adoption intentions. *International Journal of Contemporary Hospitality Management,* 32(8), 2613-2633.

Tuomi, A., Tussyadiah, I. P., & Stienmetz, J. (2021). Applications and implications of service robots in hospitality. *Cornell Hospitality Quarterly*, 62(2), 232-247.

Wirtz, J., Patterson, P. G., Kunz, W. H., Gruber, T., Lu, V. N., Paluch, S., & Martins, A. (2018). Brave new world: service robots in the frontline. *Journal of Service Management*, 29(5), 907-931.

Ye, H., Sun, S., & Law, R. (2022). A Review of Robotic Applications in Hospitality and Tourism Research. *Sustainability*, *14*(17), 10827.

Yoganathan, V., Osburg, V. S., Kunz, W. H., & Toporowski, W. (2021). Check-in at the Robo-desk: Effects of automated social presence on social cognition and service implications. *Tourism Management*, 85, 104309.

Yu, C. E., & Ngan, H. F. B. (2019). The power of head tilts: gender and cultural differences of perceived human vs human-like robot smile in service. *Tourism Review,* 74(3), 428-442.

Zhu, D. H., & Chang, Y. P. (2020). Robot with humanoid hands cooks food better? Effect of robotic chef anthropomorphism on food quality prediction. *International Journal of Contemporary Hospitality Management*, 32(3), 1367-1383.

Zhu, D. H., Deng, Z. Z., & Chang, Y. P. (2020). Understanding the influence of submission devices on online consumer reviews: A comparison between smartphones and PCs. *Journal of Retailing and Consumer Services*, 54, 102028.