Can Consumer Citizenship Behavior be Created Using Service Robots in Luxury Hospitality Services?

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Abstract

Purpose : This study sought to increase an understanding of consumer citizenship behavior through the service quality of AI-mediated service robots (SR) in the luxury hotel context. Since the expectations and demands from luxury customers are different, this paper studied the effect of service quality provided by robots on customer citizenship behavior.

Methodology : In the initial phase, qualitative research was conducted by interviewing people who had experienced SR in luxury hospitality settings. The second phase of the study was conducted based on the respondents' themes. In the second phase, video clips of robots performing tasks like concierge and front-desk employees were shown to understand the customers' perceptions.

Findings : The study's findings showcased the importance of communication quality between the inorganic service agent and humans. Simultaneously, the factors like problem-solving and trendiness did not have a positive impact on service quality. However, an interesting finding was that the perception of robot service quality positively affected consumer citizenship behavior in the luxury hotel context.

Practical Implications : Luxury hotels have deployed SR in their operations in developed economies. Luxury hotels are renowned for their service quality, and by deploying SR, they are entering a new service industry domain. The results of this study showcased that communication ability, competence, and quality are significant factors in perceiving high-service quality by luxury consumers.

Originality/Value : The research explored the impact of service robots in the luxury hospitality industry on consumer citizenship behavior toward the hospitality organization. The study empirically validated the essential factors for creating citizenship behavior among luxury patrons.

Keywords : **service robots, luxury hotel services, service quality perception, consumer citizenship behavior**

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Conventionally, service providers have been humans. However, the advancement in robotics, the Internet of Things (IoT), and big data analytics have led to a surge in AI-mediated service robots (SR) (Chiang & Trimi, 2020). This SR is being deployed in various service scenarios ranging from hotels, e.g., Yotelin New York, Henn-Na Hotel in Japan, and Chase Walker, Taiwan (Tung & Au, 2018), to retail outlets (Mende et al., 2019), information dispensing at airports, public places, to serving food at restaurants, etc. (Lee et al., 2009). The hospitality brands, including luxury operators like Mariott Residences (Los Angeles) and Aloft (Cupertino), due to technological advancement, aging labor population, increasing labor costs, and trendiness factors are deploying SR (Tung & Law, 2017). The SR as service providers leads to differentiation in customers' expectations for both (hedonic and utilitarian) kind of services (Lee & Lee, 2020) and their quality (Edvardsson et al., 2018). In hospitality, positive interaction between the host and their visitors is essential (Filimonau & Brown, 2018). The core of hospitality is hospitableness, defined as "the positive attitudinal, behavioral, and personality characteristics of the hosts that result in positive emotional responses in guests feeling welcomed, wanted, cared for, safe, and important" (Tasci & Semrad, 2016). Therefore, the authors posit that services provided by robots are affected by the technical capability of robots and customer expectations.

The expectations of luxury segment patrons differ from those of mid-scale or budget hotel customers. The emphasis on service quality is much higher in luxury hotels (Monty & Skidmore, 2003) viz-a-viz the other hospitality segments. Hence, the luxury segment's customer expectations from deploying SR will be distinctive. For luxury patrons, human services appear personal and customized; therefore, they may refrain from using robotic services. Instead, the hotels may prefer robots due to the innovativeness, uniformity of service quality, and precise communication, thus, ensuring that the probability of errors is minimized (Ivanov, 2020), leading to a higher customer experience.

The Indian hospitality industry has primarily constrained SRs to backend works and has yet to adopt the SRs in public-facing tasks. Nevertheless, factors like the entry of international luxury chains in India (Shukla, 2009), globally traveled Indian tourists, and expectations of uniform service standards have mandated the adoption of SR in front-end jobs in India too. Accordingly, the authors explored the impact of the perception of SR's service quality impacted customer experience among Indian luxury hospitality patrons and their purported customer citizenship behavior.

Since the robotic services in the Indian hotel industry have not yet taken off, the authors conducted a two-phase study. The analysis of the first phase of qualitative research presented us with the factors considered necessary by the users for creating a positive customer experience, which later translates into consumer citizenship behavior. The study finds the importance of different aspects of communication quality between the robot and the humans as the primary cause of expectation of superior service quality. The extant hospitality literature showcases a positive impact of service quality on consumer citizenship behavior. The present research extends the same assertion to the robots as service agents in the luxury hotel context.

Review of Literature and Hypotheses Development

Service Robots in Luxury Hospitality Services

The present study adopted Murphy et al. (2017) description of service robots as independent, self-governing, sovereign physical-mechanical devices capable of operating and performing pre-programmed services by mimicking human behavior without constant human guidance. In hospitality services, these robots have multiple functionalities ranging from simple tasks like providing pre-programmed information and giving new information by instantly browsing the internet to serving customers and assisting consumers in delivery. In addition, they offer concierge services and do menial tasks like housekeeping and butler services, besides other complex services (Tung & Law, 2017).

Service robot provides a distinctive element to the service quality dimension by ensuring that the customers receive personalized service per their choice of time. This service quality dimension will drive future luxury hospitality service and customer relationship-based experience. Luxury hotels are exemplified by their ambiance, tasteful aesthetics, quality of services, physical infrastructure, and high-quality staff-to-customer interaction (Walls et al., 2011). Mattila (1999) posited that the quality of personalized services the hotel offers was the distinguishing feature between a luxury hotel and other categories of hospitality services. The staff is trained to recognize the customers' needs without their expressing the same, provide personalized services (Singh et al., 2017), and respond to the needs and emotions of the customers amicably.

The hospitality industry is based on providing the expected levels of service in environments away from the environment familiarity of the consumers. The technological developments in big data analytics, facial recognition, artificial intelligence, and cloud-based customer relationship management databases, when integrated with the SR, can enable the service providers to know their customers and reduce the unfamiliarity-related anxiety from the consumers (Buhalis et al., 2019). Furthermore, this information can be utilized to create long-lasting relationships, which drive customer satisfaction, and loyalty and finally lead them to indulge in citizenship behavior.

The authors, initially, through the qualitative study and subsequently through pursuing the literature, identified a few prominent factors that would impact the desire of luxury hotel customers to avail of SR services. The authors proposed that these factors would lead to a positive perception of the service quality of the luxury hotel, thereby leading to indulging in citizenship behavior by the hotel guests.

Problem-Solving

Hospitality firms are deploying SRs to provide several services. These service encounters result in human-robot interaction (HRI). New elements have arisen in the service exchanges because of the application of SR (Kuo et al., 2017). However, the one consistent element in hospitality services, irrespective of the nature of the service—provider-natural or artificial—has been the ability of the service provider to solve the customer's queries.

↳ **H1 :** The problem-solving factor significantly impacts the perception of service quality being provided by the service robots in a luxury hotel.

Communication Accuracy

Barry and Crant (2000) emphasized that the accuracy of the communication was paramount to creating customer trust in the completeness and reliability of the communication. Ivanov and Webster (2017) posited that compared to human service exchange, there was a higher probability of miscommunication, ambiguous translation, and lack of sustained conversation in SR-mediated service encounters. Still, the technological advancements in the form of voice recognition, the ability to understand and respond from the pre-programmed answer(s) and respond to unique queries may lead the customers to perceive a service robot as "just" another server sharing certain features with humans (Van Doorn et al., 2017).

↳ **H2 :** The communication accuracy factor significantly impacts the perception of service quality provided by the service robots in a luxury hotel.

Communication Competence

Like human staff, the SR deployed in hospitality services is crucial to enhancing customer-brand relationships.

The guest's inputs and understanding by the autonomous service provider are necessary to ensure that customers receive what they want with the highest quality service (Čaić et al., 2018) in the luxury hotel environment. This entails that the service robot should be competent in deciphering and interpreting the verbal and non-verbal communication from the customers (Shetty et al., 2018) and carry forward the communication accordingly.

↳ **H3 :** The communication competence factor significantly impacts the perception of service quality provided by the service robots in a luxury hotel.

Communication Credibility

Customers believe communication to be credible when they enjoy a good relationship with the communicator (Yuan et al., 2016). The customers must feel that the AI-mediated service providers are empathetic to their needs, have the necessary knowledge to interpret their concerns, and can provide the requisite information (Clokie & Fourie, 2016; Nair et al., 2017). Customers tend to positively evaluate "the believability of a communicator" (O'Keefe, 2015) if the information sought is communicated promptly and efficiently.

↳ **H4 :** The communication credibility factor significantly impacts the perception of service quality provided by the service robots in a luxury hotel.

Trendiness

Customers desire unique experiences, especially on leisure trips, vacations, and stays at luxury hotels. Many customers associate these experiences with their trendy lifestyles (Zolkepli & Kamarulzaman, 2015). The AI-mediated autonomous SR is an emerging trend among Indian luxury hotel patrons. They may have interacted with the AI-based chatbots during the reservation process, but an anthropomorphic humanoid service provider would be a unique experience for most visitors. This uniqueness of service experience may lead the customers to overlook communication errors, system failures, or limited performance ability of the SR and have a positive perception.

↳ **H5 :** The trendiness factor significantly impacts the perception of service quality provided by the service robots in a luxury hotel.

Perception of Service Quality of Service Robots

Garvin (1984) described service quality as a subjective cognitive value the consumer perceives instead of an objective calculated measure. Service quality has been defined as the customer's perception post their experiencing the actual service performance by the service provider or agents (Grönroos, 1984). Service quality denotes the degree of customers' perception that the proffered service met their expectations (Hemmington et al., 2018). Thus, service quality is measured by the customer's estimation of the service encounter (Garg, 2018; Parasuraman et al., 1991). The consumer's assessment is affected by the service staff's knowledge, attitude, communication skills, behavior, and willingness to serve (Pandey et al., 2020). At the micro level, the behavior of service provider and/or their agents is crucial in meeting customers' needs or solving their problems. Huang and Rust (2018) expanded the service dimension from interaction among humans to interactions between humans and autonomous machines.

Hence, an understanding of services by autonomous machines is crucial in the expanded services management literature. This new dimension, due to the loss of human touch and additional element of human-robot interaction (HRI), leads us to review and, if necessary, re-conceptualize previous concepts of service quality, service delivery,

perceptions of failure, service recovery (Murphy et al., 2019) and communication aspects between an organic and non-organic being. The interference of robots in the service industry is leading the change in service encounters and redefining the existing relationships between customers and service agents. Due to the physical form, structure, intelligence level, communication, and decision-making ability, new service agents have been added to the service exchanges and encounters literature (Kuo et al., 2017). Belanche et al. (2020) asserted that the importance of services in luxury hospitality complicated the consumer's decision-making process when interacting with SR.

Customer participation is a characteristic of service that is not restricted to the duration of service encounters (Krishnamoorthy et al., 2016). The participation may extend to post-encounters in the form(s) of post-purchase feedback, word of mouth, advocacy, assisting fellow customers and the organization's employees, and displaying tolerance toward the service organization and its employees. These are the dimensions of "consumer citizenship behavior." Groth (2005) defined consumer citizenship behavior (CCB) as "voluntary and discretionary behaviors that are not required for the successful production and/or delivery of the service but that, in the aggregate, help the service organization overall." The service literature is enriched by the research of authors (Ahearne et al., 2005) who consider CCB an essential dimension of service research. For example, Yi and Gong (2008) posited that CCB is a single dimension of customer value co-creation. Woo (2019) showcased that service quality did impact consumer citizenship behavior. However, in the HRI (human-robot interaction) scenario, although the SR may co-create positive service experiences with the customers, the service organization should be willing to accept the associated risks that service experiences might also be co-destructed.

↳ **H6 :** The customers' perception of service quality provided by the luxury hotel service robots significantly impacts their consumer citizenship behavior.

There is a noticeable lack of empirical studies on the SERVQUAL provided by robots, the expected level of intelligence, the degree of requisite anthropomorphism, and deploying SR to meet customer expectations and needs in service functionalities and operations. This gap is further accentuated in the luxury hospitality services context, wherein the human staff provides the emotional touch and performs complex decision-making tasks based on their training. There are instances, e.g., Henn-Na hotel (Japan), the SR has been substituted with human staff. Similar actions are also being contemplated by a few Chinese hospitality service providers (Qiu et al., 2020). The customer acceptance of AI-mediated service agents drives their use which will further their success in meeting the marketing goals through consumer citizenship behavior. Therefore, gaining customer acceptance for SR and ensuring successful transactions with AI-mediated service delivery agents is critical in the luxury hotel segment (Tung & Law, 2017).

Hence, this study sought to understand the factors that lead to creating a perception of service quality by AI-mediated SR in the luxury hotel segment, wherein the service quality would directly impact consumer citizenship behavior.

Research Methodology

The study's first phase was qualitative research, as the phenomenon was emerging, and not much empirical evidence was available for quantitative validation. The potential respondents were selected based on the following eligibility criteria: (a) Must have traveled at least two times internationally in the last five years; (b) Stayed in luxury category hotels/resorts, either for business or leisure purposes; (c) Owned a minimum of two automobiles valued at INR 5 million each (US$ 80,000).

During the period between December 2021 and January 2022, a total of 12 respondents were interviewed with open-ended questions to explore their experiences and perceptions. The authors ensured that the respondents were

not part of a single-family and were independent of each other. Since, in India, very few people have experienced SR in luxury, interviewing further respondents was deemed difficult. Hence, we received theoretical saturation levels. The authors used Nvivo 12 software for coding the interviews. The results are reported in Table 1(a). Therein, we got validation and potential constructs for the theoretical model based on the survey results, as shown in Figure 1 in the word cloud.

After analyzing, triangulating, and synthesizing, the prominent themes generated from the interviews and the literature review validated the key themes emerging for the quantitative surveys and the constructs in the theoretical model. These are shown in Figure 2.

Table 1(a). ***Thematic Analysis of the Qualitative Interviews to Arrive at the Survey Instrument***

S. No.	Themes	Codes	Quotes
1.	Problem-Solving	1. Resolving doubts 2. Ready with answers to queries 3. Quick fix	1. Replied in quite an elaborate manner, even giving us timing for breakfast, floors of the gym, swimming pool, etc. *(R4)* 2. Gave a proper guide map to our destination. *(R2)* 3. Refilled the room refrigerator at 3 am and got hot milk for our kid. *(R5)*
2.	Communication Accuracy	1. Precise interaction 2. Reliable information	1. Unbelievable clarity of conversation. *(R1)* 2. Was articulate and precise simultaneously. *(R8)* 3. Conveyed reliable information. *(R7)*
3.	Communication Competence	1. Proficient 2. Clarity	1. They have a vast knowledge bank, and they can access the internet also to get any information we want. *(R3)* 2. My family and I had many conversations with the robot and never felt a gap or misunderstanding. *(R2)* 3. Conveyed the information in a clear tone. *(R9)*
4.	Communication Credibility	1. Trust 2. Dependable 3. Expert	1. We never got any wrong information during our seven-day stay. *(R9)* 2. It is a binary function for them; either they know or do not know, and they will not lie or try to misguide you. *(R4)* 3. …was practically an all-rounder. It knew games, routes, tourist destinations, even local train timings, and ISD codes and could communicate all this effortlessly. *(R6)* 4. They are not human; lying is not there in their programming. *(R7)*
5.	Trendiness	1. In-vogue 2. Fashionable 3. Stylish	1. Simply amazing, never seen before, they are the present and the future. *(R3)* 2. Thank God they are not human-like. That is what makes watching them such an enjoyable experience. *(R8)* 3. I think more hotels should adopt these robots. *(R2)* 4. They are being used to generate curiosity due to their innovativeness. *(R6)* 5. They are in demand today…tomorrow no one knows, but today, they are indispensable. *(R1)*

Figure 1. ***Word Cloud Based on Thematic Analysis of Qualitative Interviews***

Figure 2. ***Conceptual Framework***

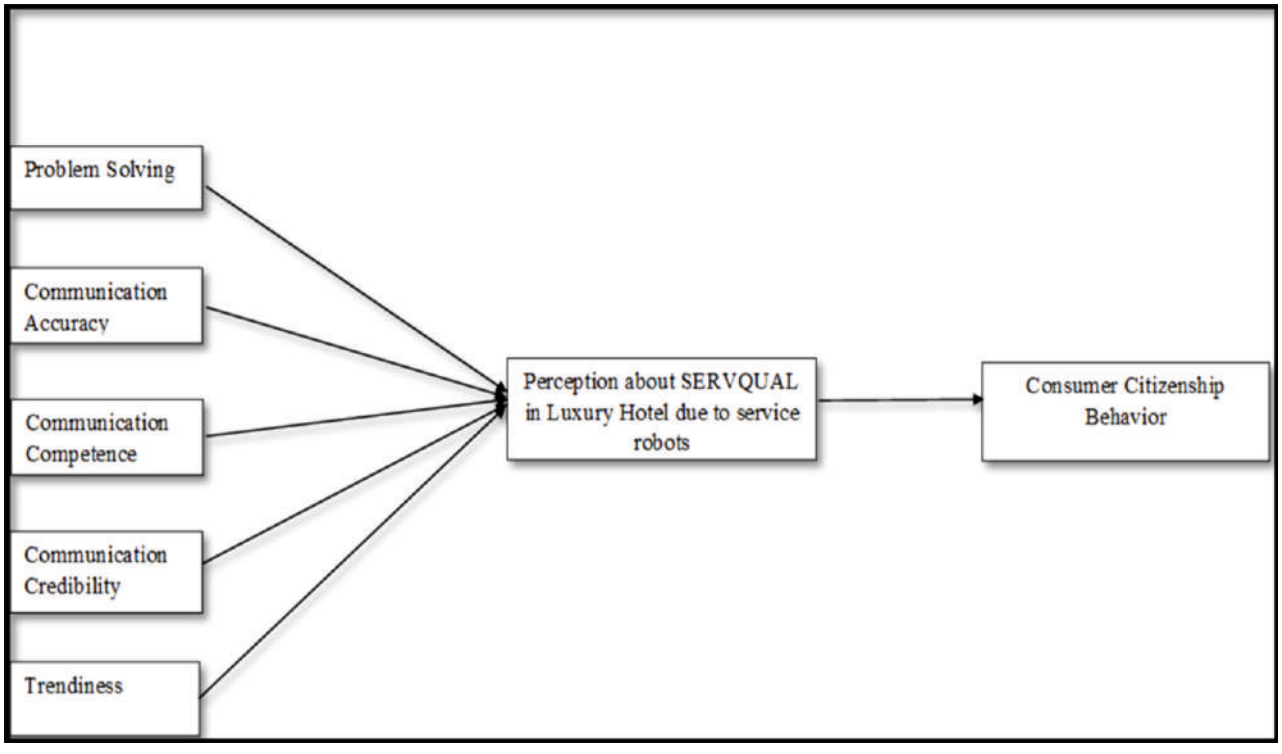


Table 1(b). ***Respondents' Profile***

S. No.	Particulars	Number of Respondents (*n* = 237)
1.	**Gender of the Respondents**	
	Male	129
	Female	105
	Did not disclose	03
2.	**Age of the Respondents**	
	21–30	26
	30–40	79
	40–50	109
	50+	23
3.	**Total no. of foreign trips undertaken (till 31st Dec. 2021)**	
	2–5	41
	6–10	92
	10+	104

The online questionnaire was mailed to 300 HNIs (high net-worth individuals) in Delhi-NCR (India) in February 2022. The data were collected from 237 respondents through the online survey method. Respondents' profiles were analyzed based on gender, age, and the number of foreign trips undertaken (refer to Table 1(b)). The 7-point Likert scale evaluated the received responses for all the factors considered in the study. The responses were categorized, ranging from *"strongly disagree"* (1) to *"strongly agree"* (7). In this study, 37 items were used for detailed statistical analysis.

Analysis and Results

This section explains the analysis and the results obtained from the received responses in two stages. Firstly, we detail the selected scales used in the study in Table 2 and the evaluation of the measurement model using confirmatory factor analysis (CFA), and secondly, using the SPSS software for SEM-PLS analytical technique (Kumar & Malik, 2022), we test the hypothesized relationships of the proposed research framework.

Reliability and Validity of the Measurement Scale

The internal consistency reliability of the constructs is measured with the help of Cronbach's alpha, and construct validity is performed using the CFA method. A total of five factors (problem-solving, communication accuracy, communication competence, communication credibility, and trendiness) are considered in the measurement model representing the different aspects of communication, trendiness, and problem-solving. The Cronbach's alpha values for all the items considered in this study are above the accepted value of 0.70. Also, composite reliability is found to be above 0.8, which further claims the reliability of the data (Table 3). The construct validity is confirmed by examining the convergent and discriminant validity, with values above 0.70 and 0.50, respectively, for all the constructs (Table 4).

Table 2. ***Scales Used in the Study***

S. No.	Construct	Author(s)
1.	Physical Quality	Ekinci (2001)
2.	Staff Behaviour	Ekinci (2001)
3.	Trendiness *(Tr)*	Chung et al. (2020); Kim & Ko (2012); Lee & Choi (2017)
4.	Problem-Solving *(PS)*	Chung et al. (2020); Kim & Ko (2012); Lee & Choi (2017)
5.	Communication Accuracy *(Comm acc)*	Chung et al. (2020); Spitzberg (2006)
6.	Communication Competence *(Comm comp)*	Spitzberg (2006)
7.	Communication Credibility *(Comm cred)*	Mohr & Sohi (1995); Spitzberg (2006)
8.	Consumer Citizenship Behaviour *(CCB)*	Yi & Gong (2013)

Table 3. ***Construct Reliability and Validity***

	No. of Statements	Cronbach's Alpha	Composite Reliability	Average Variance Extracted (AVE)
Problem-Solving	4	0.865	0.865	0.616
Communication Accuracy	5	0.874	0.874	0.583
Communication Competence	3	0.807	0.807	0.583
Communication Credibility	4	0.853	0.853	0.593
Trendiness/Interaction	8	0.889	0.896	0.523
Service Quality	7	0.867	0.867	0.579
Consumer Citizenship Behaviour	6	0.885	0.858	0.519

Table 4. ***Discriminant Validity***

	Comm acc.	*Comm comp.*	*Comm cred.*	*CCB*	*PS*	*Service Quality*	*Tr.*
Communication Accuracy	**0.763**						
Communication Competence	0.662	**0.763**					
Communication Credibility	0.717	0.770	**0.770**				
Consumer Citizenship Behaviour	0.447	0.459	0.410	**0.721**			
Problem-Solving	0.543	0.506	0.549	0.421	**0.785**		
Service Quality	0.811	0.761	0.805	0.504	0.570	**0.761**	
Trendiness	0.465	0.490	0.484	0.633	0.561	0.502	**0.723**

Testing of Hypotheses

After the confirmatory factor analysis, path analysis was conducted. In order to test the hypothesized relationships, SEM-PLS 3.0 is applied. As a result, the structural model developed signifies the relationship between problem-solving, communication accuracy, communication competency, communication credibility, and trendiness factors on service quality and consumer citizenship behavior. In the model, consumer citizenship behavior is assumed as an endogenous construct, while other factors are assumed to be exogenous. Further, all the

exogenous factors are considered a zero-order construct. Then, the exogenous factors are measured with the help of different statements indicating the estimated scores in the communication, trendiness, and problem-solving dimensions. Finally, the average score of all zero-order constructs is estimated.

The structural model is shown in Figure 3. The path coefficient indicates the relationship between problem-solving and service quality, which is 0.507 (Table 5). The probability value (*p*-value) of *t* - statistics is less than the 5% significance level. Thus, H1 is accepted. The *R*-square of the model is found to be 35%. This indicates that variations in the perception of service quality can explain 35% of the variations in the problem-solving factor.

The results indicate that the SRMR indicator of model fitness is found to be 0.057, which is less than the required value of 0.08. The NFI estimate is 0.874, indicating the presence of statistical fitness in the model. Hence, the structural model is assumed to have statistical fitness.

The structural model is shown in Figure 4. The path coefficient indicates the relationship between communication accuracy and service quality, which is 0.723 (Table 6). The probability value (*p*-value) of *t* - statistics is less than the 5% significance level. Thus, H2 is accepted.

This *R*-square indicates that 69% of the variations in communication accuracy can be explained with the help of variations in the perception of service quality. The result of the SRMR indicator of model fitness is found to be

Figure 3. ***Impact of Problem-Solving on Service Quality***

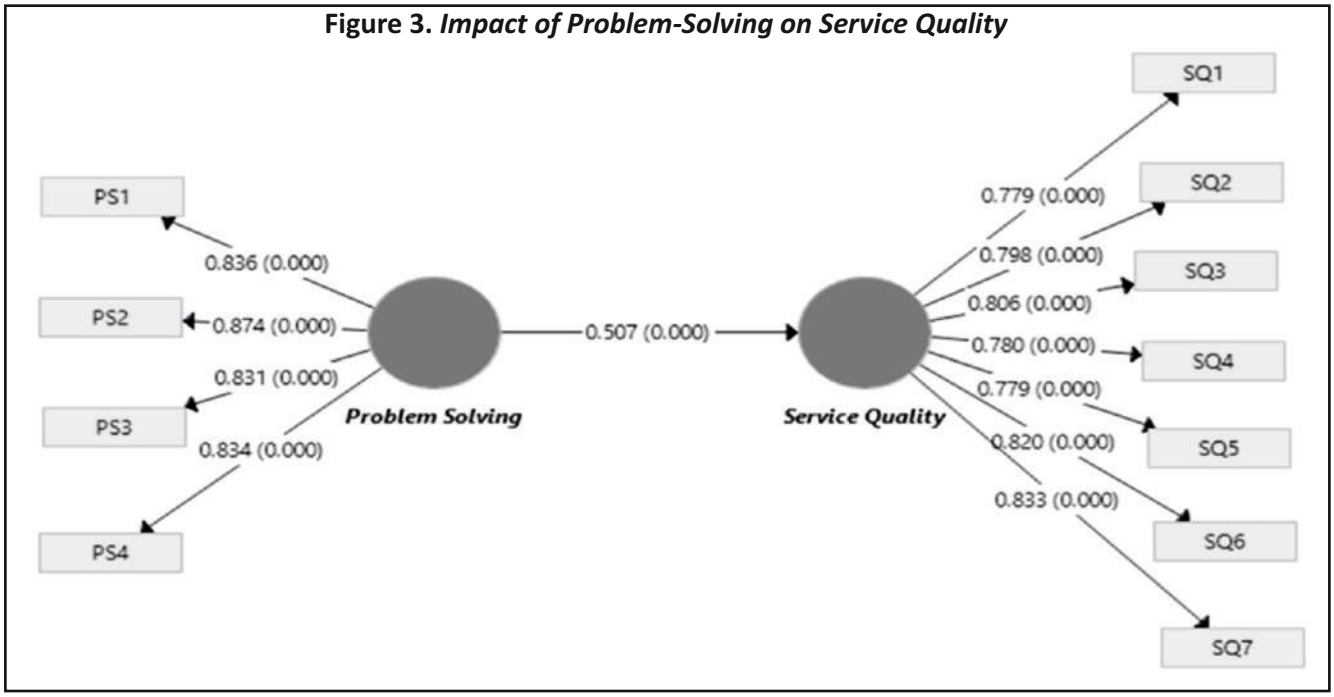


Table 5. ***Results of PLS-SEM for the Relationship between Problem-Solving on Perceived Service Quality***

Exogenous Construct	Endogenous Construct	Path Coefficients (Bootstrapping PLS)	*t* - stats (*p*-value)	*R* - square
Problem-Solving	Service Quality	0.507	9.37 (0.000)	35 %
Statistical Fitness Measures				
Standardized Root Mean Square residual (SRMR)			**Chi-Square**	**Normed Fit Index(NFI)**
0.057			190.497	0.874

0.052, which is less than the required value of 0.08. The NFI estimate is 0.882, indicating the presence of statistical fitness in the model. Hence, the structural model is assumed to have statistical fitness. The structural model is shown in Figure 5. The results (Table 7) indicate that the path coefficient is 0.652. Therefore, H3 can be accepted as the *p*-value is less than the 5% significance level. Therefore, it can be concluded that communication competence positively and significantly impacts the perception of service quality.

Figure 4. ***Impact of Communication Accuracy on Service Quality***

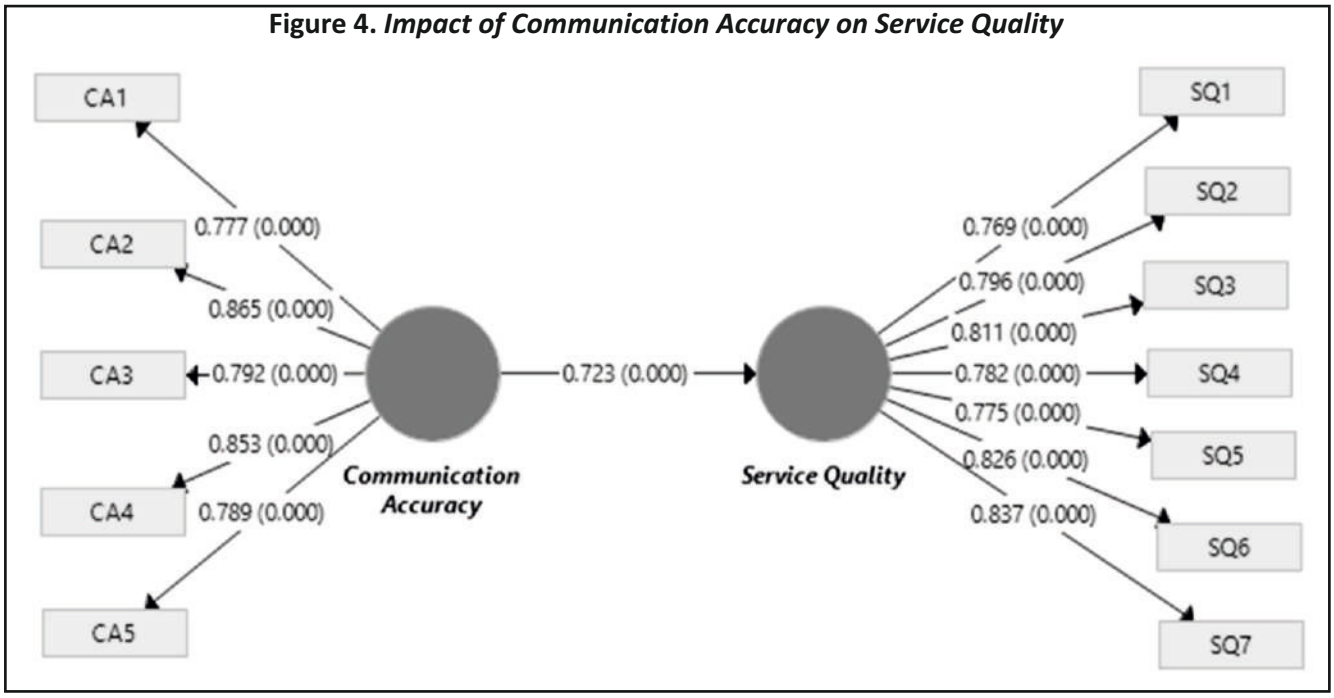


Table 6. ***Results of PLS-SEM for the Relationship between Communication Accuracy on Service Quality***

Exogenous Construct	Endogenous Construct	Path Coefficients (Bootstrapping PLS)	*t* - stats (*p*-value)	*R* - square
Communication Accuracy	Service Quality	0.723	18.701(0.000)	69%
Statistical Fitness Measures				
Standardized Root Mean Square residual (SRMR)			**Chi-Square**	**Normed Fit Index(NFI)**
0.052			211.607	0.882

Table 7. ***Results of PLS-SEM for the Relationship between Communication Competence on Service Quality***

Exogenous Construct	Endogenous Construct	Path Coefficients (Bootstrapping PLS)	*t* - stats (*p*-value)	*R* - square
Communication Competence	Service Quality	0.652	14.32(0.000)	59%
Statistical Fitness Measures				
Standardized Root Mean Square residual (SRMR)			**Chi-Square**	**Normed Fit Index(NFI)**
0.049			134.419	0.901

Figure 5. ***Impact of Communication Competence on Service Quality***

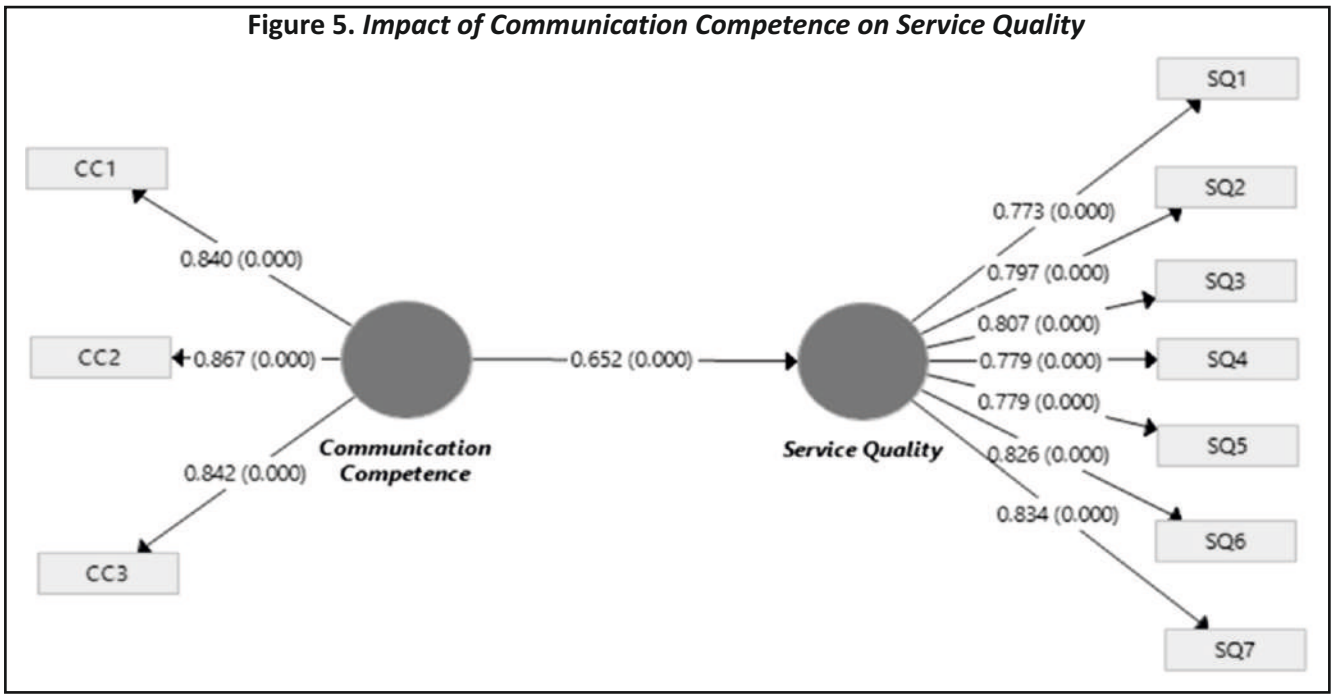
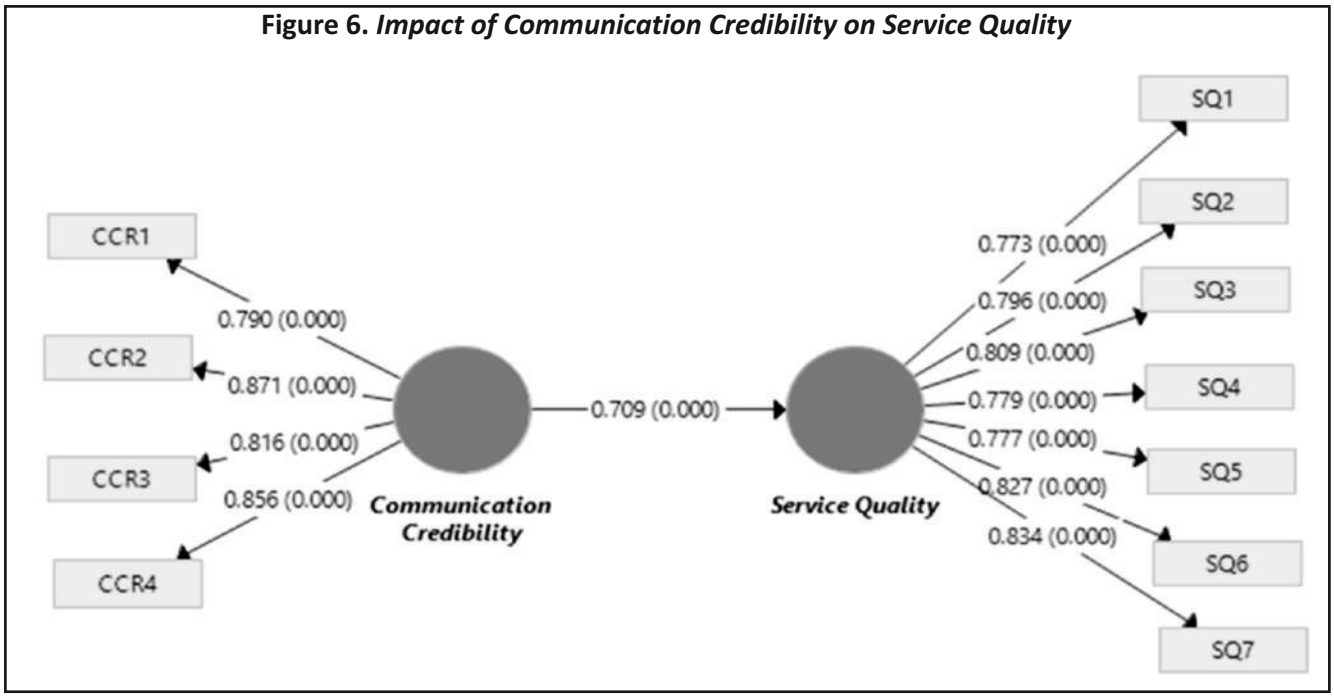


Figure 6. ***Impact of Communication Credibility on Service Quality***

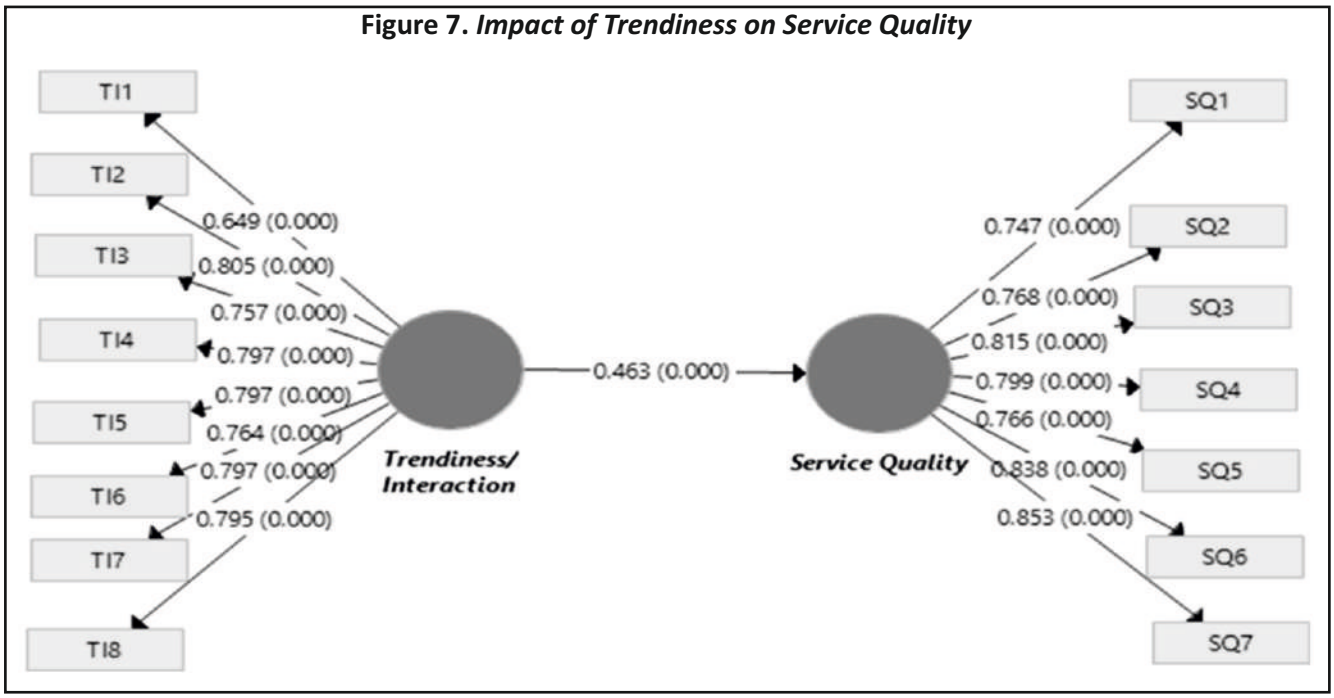


The *R*-square represents that 59% of the variations in communication competence can be explained with the help of variations in the perception of service quality. The statistical fitness of the model is shown in Table 7. The results indicate that the SRMR indicator of model fitness is found to be 0.049, which is less than the required value of 0.08. The NFI estimate is found to be 0.901, indicating the presence of statistical fitness in the model. Hence, the

Table 8. ***Results of PLS-SEM for the Relationship between Communication Credibility on Service Quality***

Exogenous Construct	Endogenous Construct	Path Coefficients (Bootstrapping PLS)	*t* - stats (*p*-value)	*R* - square
Communication Credibility	Service Quality	0.709	19.115 (0.000)	65%
Statistical Fitness Measures				
Standardized Root Mean Square residual (SRMR)			**Chi-Square**	**Normed Fit Index(NFI)**
0.050			181.916	0.886

Figure 7. ***Impact of Trendiness on Service Quality***



structural model is assumed to have statistical fitness. Similarly, the structural model is shown in Figure 6. The path coefficient indicates that the relationship between communication credibility and service quality is 0.709 (Table 8). Hence, hypothesis H4 can be accepted as the *p*-value is less than the 5% significance level. Therefore, it can be concluded that communication credibility positively and significantly impacts the perception of service quality.

The *R*-square indicates that 65% of the variations in communication credibility can be explained with the help of variations in the perception of service quality. The SRMR indicator of model fitness is found to be 0.050, less than the required value of 0.08, which is mentioned in Table 8. The NFI estimate is 0.886, indicating the presence of statistical fitness in the model. Hence, the structural model is assumed to have statistical fitness.

The path coefficient indicates that the relationship between trendiness and service quality is 0.463 (Figure 7 and Table 9). Therefore, the framed hypothesis H5 can be accepted as a *p*-value of less than 5%. It can be concluded that the trendiness factor's positive and significant impact exists on the perception of service quality. The *R*-square indicates that 29% of the variations in the trendiness factor can be explained with the help of variations in the perception of service quality. The SRMR indicator of model fitness is found to be 0.008, less than the required value of 0.08. The NFI estimate is 0.8, indicating the presence of statistical fitness in the model. Hence, the structural model is assumed to have statistical fitness.

Table 9. ***Results of PLS-SEM for the Relationship between Trendiness/Interaction on Service Quality***

Exogenous Construct	Endogenous Construct	Path Coefficients (Bootstrapping PLS)	*t* - stats (*p*-value)	*R* - square
Trendiness/ Interaction	Service Quality	0.463	8.304 (0.000)	29%
Statistical Fitness Measures				
Standardized Root Mean Square residual (SRMR)			**Chi-Square**	**Normed Fit Index(NFI)**
0.008			538.553	0.8

The structural model between service quality and consumer citizenship behavior is shown in Figure 8. The path coefficient indicates the relationship between service quality and consumer citizenship behavior is 0.456 (Table 10). Therefore, the H6 can be accepted as the *p*-value is less than 5%, and it can be concluded that a positive and significant relationship exists between service quality and consumer citizenship behavior.

Figure 8. ***Impact of Service Quality on Consumer Citizenship Behavior***

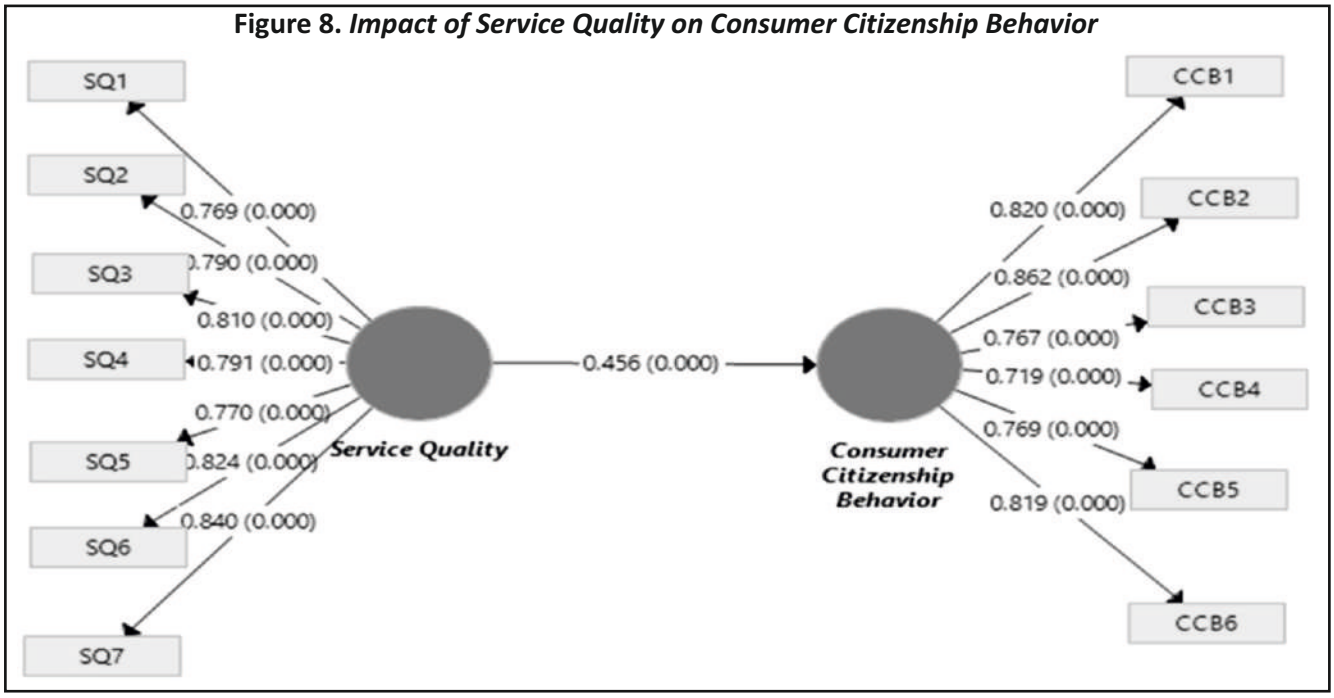


Table 10. ***Results of PLS-SEM for the Relationship between Service Quality on Consumer Citizenship Behavior***

Exogenous Construct	Endogenous Construct	Path Coefficients (Bootstrapping PLS)	*t* - stats (*p*-value)	*R* - square
Service Quality	Consumer Citizenship Behaviour	0.456	9.922 (0.000)	26%
Statistical Fitness Measures				
Standardized Root Mean Square residual (SRMR)			**Chi-Square**	**Normed Fit Index(NFI)**
0.119			774.79	0.81

The *R*-square of the model is found to be 26%. This indicates that 26% of the variations in service quality can be explained with the help of variations in consumer citizenship behavior. The statistical fitness of the model is shown in Table 10. The NFI estimate is 0.81, indicating the presence of statistical fitness in the model. Hence, the structural model is assumed to have statistical fitness.

Discussion

Service robot attributes facilitate the hospitality experience via their communication ability. The study identifies the unique factors of customers' perceptions toward using SR in luxury hotel settings in the Indian context. Understanding these factors can assist the hotels in deploying the SR in the given specified tasks only, providing better service, which will lead to attaining consumer citizenship behavior. Hence, the study is the first of its kind about luxury hotel customers' perceptions of using a service robot in the Indian context. Thus, this study answers the call for the impact of service robotics on hospitality management (Tuomi et al., 2021).

Expectation disconfirmation theory (Oliver & DeSarbo, 1988) proposes a direct relationship between a customer's expectation for the service and the actual service received. The higher expectation than the experience, as expected in luxury hospitality services, will leave the customers dissatisfied; contrarily, a lower service expectation than the actual experience will create a satisfied customer. Since the study is in the context of luxury hospitality services, the physical settings are consistently impeccable. Therefore, the service delivery agent affects the customers' perceptions and citizenship behavior. The research results indicate that communication ability, competence, and quality are significant factors for perceiving a high service quality by the SR. The customers believe the AI-mediated SR will possess the requisite skills and competence to converse effectively with them. The results are synchronous with the studies that showcase the effectiveness of the SR as front-desk employees, concierges, and room attendants. However, since the customers do not trust the SR to solve their problems, what will be the essence of their conversations is a matter of speculation outside the scope of this study.

The autonomous AI-mediated SR might be able to converse with customers and complete specific simple service tasks by mimicking human workers in diverse service settings like retail showrooms, warehouses, and hospitality businesses (Choi et al., 2020). However, as a finding shows, customers do not trust them for their problem-solving capabilities. This is because the SR can neither display emotions as humans nor perform spontaneously in a sincere manner due to the limitations of technological advancement (Arbib & Fellous, 2004). The trendiness of the service robot scores low in its effect on the perceived service quality. It can be deduced that even though, at present, only Henn-Na (Japan) deploys humanoid (physically similar to humans) robots (Alexis, 2017), while other hotels like Aloft, Hilton, etc. deploy machine-like SR for the customers in the luxury service segment, AI-mediated SRs have ceased to be a novelty. The patrons of luxury hotels have different expectations from the service agents (Zhang et al., 2011). Therefore, it is necessary to emphasize the service agents' skills, competence, and problem-solving ability to convert customers into citizens. The "uniqueness" factor may derive from the transactional business, but for relationship building and effective citizenship behavior, the functionalities of the service agent (robot) are of prime importance.

The basic premise in many studies of HRI is that humans tend to respond to non-human service agents similarly to how they respond to humans (Epley, 2018). Even during the first phase of the study, a few respondents used human terms (like he/she, well-dressed, thoughtful) to describe the SRs. Researchers concluded that the users might respond to and expect the same level of service quality from the SRs in luxury settings as human employees expect. In emerging countries like India, which do not face a labor shortage, luxury hotels may be able to meet customer expectations through human employees. However, in countries where SRs are deployed because of a lack of a trained workforce (Bowen & Morosan, 2018), there might be a gap in the expectations and service delivery. Recently, efforts have been made to improve the emotional cognition abilities of robots, yet they do not

match the human level of cognition and emotional intelligence. The hospitality industry is predicated on tasks requiring human empathy, critical thinking, and judgment (Enz & Siguaw, 2000). Therefore, it is proposed that human employees are still needed to augment SR, particularly for meeting the hedonic needs of luxury customers.

Managerial and Theoretical Implications

The present study extends the traditional SERVQUAL model by investigating AI-based service robots as service providers. The ever-increasing use of AI-SR as service providers necessitated research about their impact on SERVQUAL, to which this study has responded. In the hospitality industry, especially in the luxury industry, the role of a service provider is paramount. Therefore, luxury patrons expect a high level of service and consistency across different service encounters. While initially, the SR was deployed in the back-operations by the hotels due to their efficiency and the 24 × 7 availability, luxury hotel organizations have deployed the SR in customer-facing front desk operations due to the advancement of interpersonal communication technologies. However, as is evident in the research, the luxury patrons lack confidence in these SRs' problem-solving abilities. Therefore, it is implied that luxury hotels should deploy SR in conjunction with human employees to serve their luxury patrons.

Conclusion

The research on consumer attitudes toward SR is still in the nascent stages. Prior research (Van Dolen et al., 2004) emphasized the behavioral aspects of the service agents like empathy, understanding the needs and profile of the customers, interpersonal care, and trustworthy behavior to generate goodwill and create and sustain a long-term relationship with customers (Van Dolen et al., 2004). In the study, the importance of the communication skills of the SR has been highlighted. The study attempts to develop the framework for the future deployment of SR in an emerging economy like India, particularly in the luxury service hospitality context.

Limitations of the Study and Future Scope for Research

We understand that the research has limitations, thus, providing future researchers a direction for their research. Firstly, we were constrained by limited resources, and the quantitative study was conducted based on the customers' perceptions. In future studies, the respondents must have "real" experience of front-end SR since low-contact, background operations involve the customers physically and mentally at a low level. Secondly, a larger respondent pool would be more reliable. Though the research is unique in the Indian context, there are still many potential research areas for future researchers. Firstly, they can understand the effect of the anthropomorphic qualities of the robots; secondly, post-deployment of the SR in the industry, they can study the actual consumer behavior. Finally, considering India's geographic, demographic, and linguistic diversity, multiple studies studying the same constructs must come to a definite conclusion.

Authors' Contribution

Dr. Gautam Agrawal and Dr. Savita Sodhi conceptualized the idea and developed the initial outline of this research work. Dr. Amiya Kumar Mohapatra and Dr. Gautam Agrawal validated and translated the idea into a detailed framework. Further, Dr. Krishna Raj Bhandari and Dr. Savita Sodhi conducted a detailed literature review to find the research gaps. Dr. Gautam Agrawal and Dr. Amiya Kumar Mohapatra collected and analyzed the data by adopting appropriate research tools & techniques. Dr. Savita Sodhi methodically analyzed the data using qualitative and quantitative techniques along with necessary interpretation. Dr. Gautam Agrawal, Dr. Savita

Sodhi, and Dr. Amiya Kumar Mohapatra prepared the manuscript. And finally, Dr. Amiya Kumar Mohapatra & Dr. Gautam Agrawal concluded the research outcomes along with the required copy-editing and formatting.

Conflict of Interest

The authors certify that they have no affiliations with or involvement in any organization or entity with any financial interest or non-financial interest in the subject matter or materials discussed in this manuscript.

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