

Customers' Loyalty to AI-Powered Service Robots in Hospitality Services: An Empirical Study in Vietnam

Abstract

This study explores customer satisfaction and loyalty toward AI-powered service robots in Vietnam's hospitality sector using the ACSI model. Data from 304 respondents show customer expectations, perceived quality, and value significantly boost satisfaction and loyalty, while satisfaction's impact on complaints and complaints' influence on loyalty are negligible. The findings highlight the importance of user-friendly design, trust-building, and strategic communication. This research adapts the ACSI model to AI contexts, providing practical insights for enhancing customer experiences and loyalty in hospitality services.

Keywords: ACSI, AI robots, Restaurants, Service, Loyalty

1. Introduction

The integration of AI into the hospitality industry has revolutionized customer experiences, with service robots performing tasks such as greeting customers, taking orders, and delivering meals. Designed to enhance efficiency and service quality, these robots cater to the demands of tech-savvy consumers (Fu et al., 2024). Globally, their adoption is accelerating, with a market value projected at \$11.52 billion by 2027 (Karagiannis, 2024). In Vietnam's competitive market, upscale restaurants and hotels increasingly utilize AI robots to differentiate themselves.

While beneficial, these robots lack the human connection and empathy traditionally central to hospitality (Ma et al., 2023). Understanding customer perceptions and the dynamics of satisfaction, complaints, and loyalty in AI-driven contexts is critical, as technical solutions often replace human discretion in resolving issues (Hlee et al., 2023).

Using the American Customer Satisfaction Index (ACSI) model, this study examines how customer expectations, perceived quality (PQ), and perceived value (PV) influence satisfaction and how satisfaction impacts complaints and loyalty. Focused on Vietnam, it addresses key questions: (1) How do expectations, PQ, and PV shape satisfaction with AI robots? (2) What is the relationship between satisfaction, complaints, and loyalty? (3) How can operators enhance satisfaction and loyalty through AI robots?

The findings bridge technical and behavioral insights, offering practical recommendations for optimizing AI use in hospitality.

2. Theoretical Background

2.1 AI robots in Hospitality Services

AI-powered service robots are autonomous systems that perform tasks like order processing, food delivery, and customer engagement with minimal human intervention. These robots integrate software intelligence and hardware, representing a shift from human-centered to technology-driven models (Huang and Rust, 2021). Their adoption in hospitality is driven by efficiency, precision, and consistent quality, with features like ease of use, performance, and entertainment enhancing customer experiences (Hlee et al., 2023, Liu et al., 2022). However, challenges like unclear instructions, technical glitches, and individual differences in comfort with technology can impact perceptions, highlighting the need to balance technical and psychological factors (Iqbal, 2024)

2.2 American Customer Satisfaction Index (ACSI)

The ACSI model (Fornell et al., 1996) evaluates customer satisfaction by linking expectations, PQ, and PV as antecedents to satisfaction, which influences complaints and loyalty. Widely validated across industries like retail and online services (Wattoo & Iqbal, 2022), it offers robust insights into customer behavior. However, its application to automated settings, such as AI-powered robots, remains limited. This study adapts the ACSI model to AI-driven hospitality services, where reduced human interaction and altered expectations redefine customer experiences. It evaluates six dimensions—expectations, PQ, PV, satisfaction, complaints, and loyalty—highlighting their causal links and importance for profitability.

- H1: Customer expectations have a positive impact on PQ.
- H2: Customer expectations have a positive impact on PV.
- H3: Customer expectations have a positive impact on satisfaction.
- H4: PQ has a positive impact on PV.
- H5: PQ has a positive impact on satisfaction.
- H6: PV has a positive impact on satisfaction.
- H7: Satisfaction negatively impacts complaints.
- H8: Satisfaction positively impacts loyalty.
- H9: Complaints positively impact loyalty.

3. Method

3.1 Questionnaire Design

The questionnaire had two sections: the first measured six constructs using a 10-point Likert scale, and the second collected demographic data (age, gender, income, education). Measurement items, adapted from ACSI literature, were tailored for the AI context, assessing factors like robot reliability (PQ) and cost-benefit perception (PV). Pretesting and a pilot test with 50 respondents refined the instrument, ensuring high reliability and construct validity by removing items with factor loadings below 0.5.

3.2 Participants and Sample Collection

The study targeted customers who had interacted with AI-powered robots in Vietnamese restaurants and hotels. Data were collected through online and on-site surveys over three months. A total of 550 questionnaires were distributed, yielding 337 responses (61.2% response rate). After excluding incomplete responses, 304 valid questionnaires were analyzed.

4. Results

4.1 Descriptive Statistics

The sample included 51% female and 49% male respondents, with the majority aged 20–30 (31.3%). Income levels varied, with 28.9% earning 10–20 million VND. Approximately 90% of respondents reported prior interactions with AI-powered service robots, reflecting the growing prevalence of these technologies in Vietnam.

4.2 Reliability

All constructs demonstrated high internal consistency, with Cronbach's α values ranging from 0.76 to 0.91. Composite reliability (CR) values exceeded 0.86 for all constructs, while average variance extracted (AVE) values surpassed 0.5, confirming convergent validity. Discriminant validity was established, as the square root of AVE for each construct exceeded its inter-construct correlations.

4.3 Measurement Model

CFA confirmed convergent and discriminant validity, with all significant regression relationships ($p < 0.05$) except for customer satisfaction with complaints and complaints with loyalty. VE values above 0.5 indicated strong explanatory power (Hair et al., 1992). Using maximum likelihood estimation (Bagozzi and Yi, 1988), reliability metrics showed factor loadings above 0.7, CR exceeding 0.7, and AVE values over 0.5, demonstrating high internal consistency and reliability (Fornell and Larcker, 1981) (Table 1).

Table 1: Measurement Model Index Values

Measurement Variable	Factor Loading	Measurement Error (SMC)	Individual Reliability (SMC)	CR	VE
PQ1	0.85	0.27	0.72	0.89	0.74
PQ2	0.83	0.31	0.68		
PQ3	0.81	0.34	0.65		
PV1	0.84	0.29	0.70	0.88	0.77
PV2	0.82	0.32	0.67		
CS1	0.88	0.22	0.77	0.92	0.81
CS2	0.86	0.25	0.74		
CS3	0.87	0.24	0.75		
CC1	0.75	0.43	0.56	0.86	0.67
CC2	0.76	0.42	0.57		
CC3	0.74	0.45	0.54		
CL1	0.90	0.19	0.81	0.94	0.85
CL2	0.91	0.17	0.82		
CL3	0.92	0.15	0.84		
CE1	0.83	0.31	0.68	0.89	0.74
CE2	0.82	0.32	0.67		
CE3	0.81	0.34	0.65		

(4) *Discriminant Validity*: Discriminant validity was established by ensuring that the square root of AVE for each latent variable exceeded inter-construct correlations. In this study, all constructs met the required threshold.

(5) *Model Fit*: The research model achieved a good fit, with $\chi^2/df = 2.15$, RMSEA = 0.06, and CFI = 0.92. These results confirm the adequacy of the model for hypothesis testing (Bagozzi and Yi, 1988).

4.4 Structural Model

The structural model revealed significant path relationships for most hypotheses. Customer expectations positively influenced PQ ($\beta = 0.65$), PV ($\beta = 0.40$), and satisfaction ($\beta = 0.46$). PQ positively impacted PV ($\beta = 0.25$) and satisfaction ($\beta = 0.25$), while PV positively influenced satisfaction ($\beta = 0.19$). Satisfaction strongly predicted loyalty ($\beta = 0.62$). However, satisfaction did not significantly impact complaints ($\beta = -0.04$), nor did complaints significantly affect loyalty ($\beta = -0.05$).

4.5 Research Model Effects

This study, based on the ACSI model, explores customer satisfaction with AI robots. Most hypotheses were supported ($p < 0.01$), except for the non-significant relationships between satisfaction and complaints (H7: $\beta = -0.04$) and complaints and loyalty (H9: $\beta = -0.05$). Key findings include positive effects of customer expectations on PQ (H1: $\beta = 0.65$), PV (H2: $\beta = 0.40$), and satisfaction (H3: $\beta = 0.46$), as well as relationships between PQ and PV (H4: $\beta = 0.25$), PQ and satisfaction (H5: $\beta = 0.25$), PV and satisfaction (H6: $\beta = 0.19$), and satisfaction and loyalty (H8: $\beta = 0.62$).

Customer expectations strongly influence PQ, PV, and satisfaction, which positively affect loyalty. PQ and PV also contribute significantly to satisfaction. Indirect effects, such as PQ on satisfaction (0.04) and customer expectations on satisfaction (0.26), were significant ($p < 0.01$). Total effects highlight the importance of customer expectations in shaping perceptions and driving loyalty.

The lack of an inverse relationship between satisfaction and complaints suggests that satisfaction alone does not reduce complaints in AI contexts. Additionally, resolving complaints does not directly enhance loyalty, underscoring the role of a company's positive image in maintaining trust and loyalty.

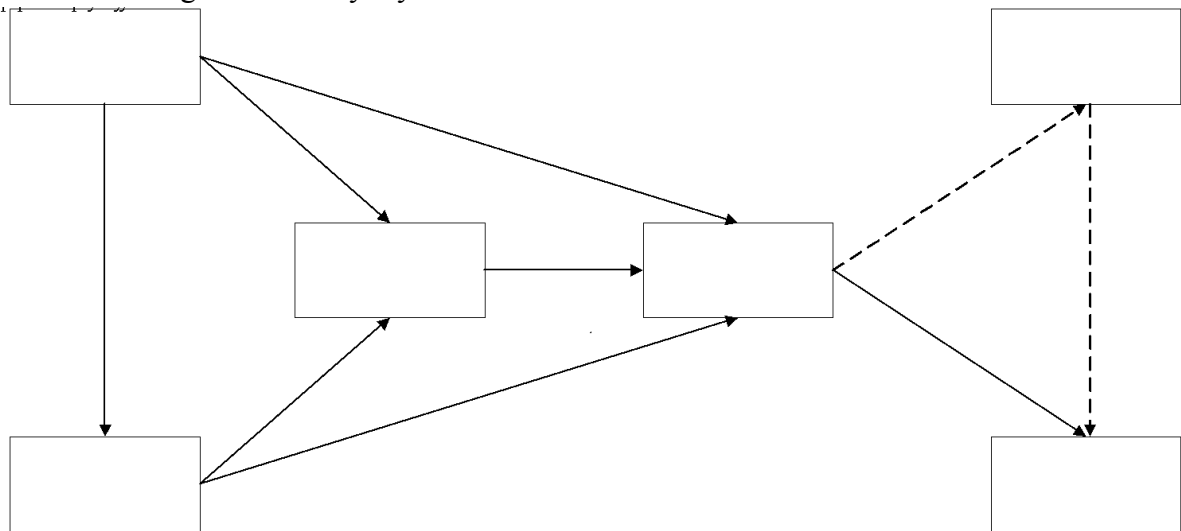


Figure 1: Structural Model

5. Discussions and Implications

5.1 Theoretical Implications

This study applies the ACSI model to AI-powered service environments, reaffirming its robustness and offering insights into customer behavior in automated settings. Unlike its traditional use in retail and e-commerce (Wattoo and Iqbal, 2022), the model proves relevant for AI-driven hospitality but requires refinement in assumptions about satisfaction's impact on complaints and loyalty. Key findings emphasize the importance of perceived quality (PQ) and customer expectations in shaping satisfaction and loyalty (Rasheed et al., 2023). However, it challenges the notion that satisfaction reduces complaints (Matsuoka, 2022), highlighting the critical role of system reliability and trust in AI contexts. Future studies should further explore trust, perceived value (PV), and expectations to adapt models to AI-driven environments.

5.2 Practical Implications

Designing intuitive and reliable AI robots is essential, with user-friendly interfaces like touchscreens and voice commands simplifying interactions and encouraging adoption. Proactively addressing complaints through standardized protocols and staff training fosters trust and minimizes dissatisfaction. Ensuring robust data security with encryption and guarantees enhances trust and differentiates businesses in competitive markets. Highlighting benefits such as efficiency and personalized service through targeted marketing and experiential campaigns can improve perceptions and reduce apprehension. Leveraging customer interaction data to refine services and address feedback ensures continued relevance and satisfaction. Clear communication, testimonials, and success stories further build confidence in adopting AI technology.

6. Limitations and Future Research

This study's cross-sectional design limits insights into changes in customer perceptions over time; longitudinal research is needed to track satisfaction and loyalty trends with ongoing AI use. The Vietnam-specific focus may affect generalizability, warranting cross-cultural studies and exploration in sectors like healthcare and retail. Future research should also examine factors like trust in AI and ease of use to deepen understanding of customer behavior in automated services.

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