

## *Original Paper*

# Impact of Artificial Intelligence Service Robots on Customer Satisfaction and Brand Loyalty in High-End Hotels

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### ***Abstract***

*This research investigates the impact of artificial intelligence (AI) service robots on customer satisfaction and brand loyalty in high-end hotels. By analyzing customer interactions and perceptions, the study identifies key factors influencing satisfaction and loyalty, while also exploring the operational benefits and challenges of AI integration. The findings provide actionable insights for hotel managers aiming to enhance customer experiences and foster long-term brand loyalty through AI-driven innovations.*

### ***Keywords***

*Artificial Intelligence, Service Robots, Customer Satisfaction, Brand Loyalty, High-End Hotels*

## **1. Introduction**

### *1.1 Background and Context*

The integration of artificial intelligence (AI) into service industries has emerged as a transformative force, reshaping traditional operational paradigms and redefining customer experiences (Ivanov & Webster, 2019). High-end hospitality, characterized by its emphasis on personalized and exceptional service, has increasingly adopted AI-driven service robots to enhance guest interactions and streamline service delivery. These robots, equipped with advanced capabilities such as natural language processing, facial recognition, and predictive analytics, have the potential to address customer needs with unprecedented precision and efficiency. By automating routine tasks and providing consistent service quality, AI service robots enable human staff to focus on more complex, emotionally nuanced interactions, thereby elevating the overall guest experience (Lei, Hossain, & Wong, 2023).

As luxury hotels strive to differentiate themselves in a competitive market, the deployment of AI technologies offers a strategic advantage. Beyond operational efficiency, these innovations contribute to creating memorable and seamless experiences, fostering deeper emotional connections with guests.

This, in turn, has significant implications for customer satisfaction and brand loyalty, as positive interactions with AI systems can enhance perceptions of a hotel's innovation and attentiveness. Consequently, the rise of AI in high-end hospitality represents not only a technological evolution but also a redefinition of service excellence in the industry (Flavián & Casaló, 2021; Mariani & Borghi, 2021).

### *1.2 Research Objectives and Scope*

This study aims to explore the impact of artificial intelligence (AI) service robots on customer satisfaction and brand loyalty within the context of high-end hotels (Mariani & Borghi, 2021). By examining the dynamic interactions between advanced AI technologies and customer experiences, the research seeks to identify how the integration of service robots influences perceptions of service quality, emotional engagement, and overall satisfaction. Furthermore, the study investigates whether these enhanced customer experiences translate into stronger brand loyalty, characterized by repeat patronage and positive brand advocacy (Ivanov & Webster, 2019; Lukanova & Ilieva, n.d.). The scope of the research encompasses both the operational capabilities of AI service robots and their ability to address the unique expectations of luxury hotel clientele (Wirtz, Kunz, Paluch, & Pitardi, 2024; Yang, Henthorne, & George, 2019). By focusing on this intersection, the study contributes to a deeper understanding of how technological innovation can reshape service delivery and foster enduring relationships between customers and premium hospitality brands (Mariani & Borghi, 2021; Wirtz & Pitardi, 2023).

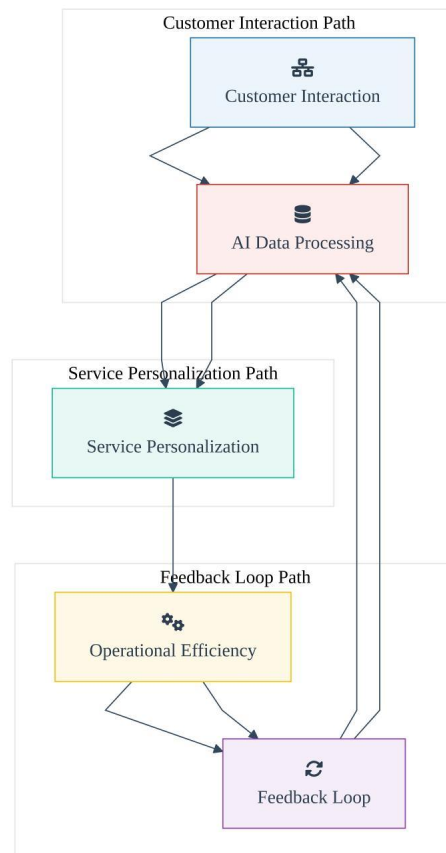
## **2. Literature Review**

### *2.1 AI in Hospitality Services*

The integration of artificial intelligence (AI) technologies within the hospitality sector has been a focal point of recent research, particularly in understanding its role in enhancing operational efficiency and customer experiences. As illustrated in Figure 1, AI systems in high-end hotels function through interconnected processes, including customer interaction, data processing, service personalization, and feedback mechanisms. These components collectively contribute to improved service delivery and customer satisfaction. For instance, AI-driven customer interaction tools, such as chatbots and voice assistants, streamline communication by providing instant responses and tailored recommendations (Ivanov & Webster, 2019). This capability is further augmented by AI data processing, which analyzes customer preferences and behavioral patterns to enable service personalization.

The systemic integration depicted in Figure 1 highlights how these technologies create a feedback loop, wherein customer interactions generate data that is processed to refine future service offerings. This iterative process not only enhances operational efficiency but also fosters a sense of exclusivity and attentiveness, key factors in building brand loyalty. By optimizing workflows and enabling real-time

adaptability, AI technologies position high-end hotels to meet the evolving expectations of their clientele while maintaining superior service standards (Marković, Janković, & Zubović, 2020).



**Figure 1. Conceptual Model of AI Integration in Hospitality Services**

### 2.2 Customer Satisfaction and Brand Loyalty Theories

Customer satisfaction and brand loyalty are widely recognized as interconnected constructs within the domain of consumer behavior. Customer satisfaction is often conceptualized as the evaluative response of individuals to the perceived quality of a product or service, encompassing both emotional and cognitive dimensions. Brand loyalty, on the other hand, reflects a consumer's commitment to repurchase or consistently engage with a specific brand, often driven by positive experiences and trust. Theoretical models such as the expectancy-disconfirmation theory and the service-profit chain framework emphasize the pivotal role of satisfaction in fostering loyalty, suggesting that satisfied customers are more likely to exhibit repeat purchasing behaviors and advocate for the brand.

Technological advancements, particularly the integration of artificial intelligence, have introduced new dynamics into this relationship. AI service robots, with their ability to deliver personalized and efficient interactions, have the potential to enhance customer satisfaction by exceeding expectations and reducing service friction (Wirtz, Patterson, Kunz, Gruber, Lu, Paluch, & Martins, 2018). This heightened satisfaction can, in turn, strengthen emotional bonds with the brand, reinforcing loyalty.

Furthermore, the perceived innovativeness of AI-driven services may contribute to a brand's differentiation in competitive markets, further solidifying customer allegiance. These theoretical insights underscore the transformative impact of technology on traditional satisfaction-loyalty paradigms in high-end hospitality contexts (Wirtz, Kunz, Paluch, & Pitardi, 2024; Saragih, Saputra, & Dewantara, 2024).

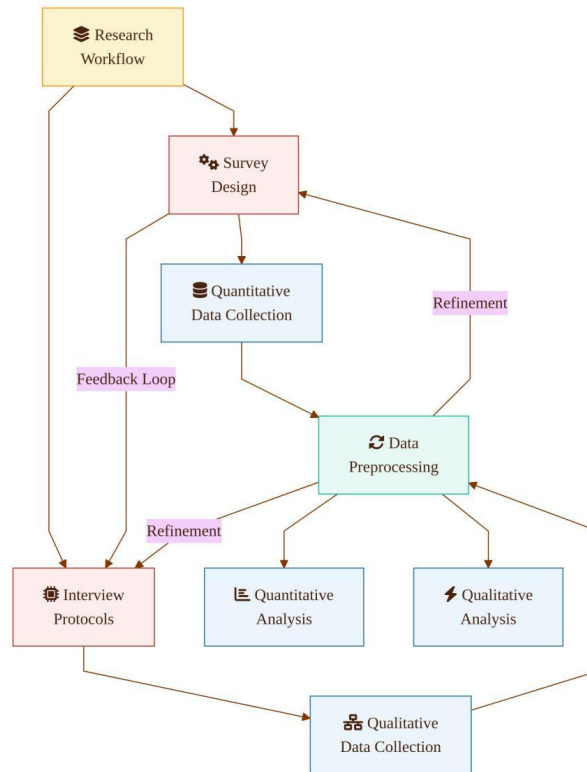
### **3. Materials and Methods**

#### *3.1 Study Design*

This study employed a mixed-methods research design to comprehensively evaluate the impact of artificial intelligence (AI) service robots on customer satisfaction and brand loyalty in high-end hotels. As illustrated in Figure 2, the research workflow integrates both quantitative and qualitative methodologies to ensure a holistic understanding of the phenomenon under investigation. The process began with the development of a structured survey instrument and detailed interview protocols, which are represented as distinct nodes in the figure. These tools were iteratively refined through feedback loops, as shown by the bidirectional dependencies between the "Survey Design" and "Interview Protocols" stages, ensuring alignment with the research objectives.

Data collection was conducted in two parallel streams: quantitative data were gathered through surveys distributed to hotel guests, while qualitative insights were obtained through semi-structured interviews with both guests and hotel staff [1, 8]. As depicted in Figure 2, the collected data underwent a preprocessing phase to address issues such as incomplete responses and transcription accuracy. This step was critical for ensuring the reliability and validity of subsequent analyses.

The workflow further highlights the bifurcation of data analysis into quantitative and qualitative streams. Quantitative data were subjected to statistical techniques to identify patterns and relationships, while qualitative data were analyzed thematically to extract nuanced insights. The iterative feedback loops connecting "Data Preprocessing" to both analysis stages underscore the dynamic nature of the research design, allowing for continuous refinement and validation of findings. This integrated approach ensured a robust examination of the interplay between AI service robots, customer satisfaction, and brand loyalty.



**Figure 2. Research Workflow for AI Impact Study**

### 3.2 Data Collection

Data collection for this study was conducted using a combination of surveys, interviews, and observational studies within high-end hotel environments. Surveys served as the primary method for gathering quantitative data, focusing on customer perceptions of artificial intelligence service robots, their impact on satisfaction, and subsequent brand loyalty. These surveys were distributed both online and in-person to ensure broad accessibility and participation. Interviews complemented the surveys by providing qualitative insights into customer experiences and attitudes, allowing for deeper exploration of themes that emerged from the survey responses. Observational studies were conducted on-site, focusing on customer interactions with AI service robots in real-world settings, capturing behavioral patterns and contextual factors that may influence satisfaction and loyalty (Yang, Henthorne, & George, 2019; Wirtz, Patterson, Kunz, Gruber, Lu, Paluch, & Martins, 2018).

As detailed in Table 1, the data collection parameters were carefully designed to ensure robust and representative findings. The sample size consisted of 500 participants, reflecting a diverse demographic distribution across age groups (18–65 years) and gender, with 60% of respondents identifying as female. The survey response rate was notably high at 85%, indicating strong engagement and reliability of the collected data (Mariani & Borghi, 2021; Saragih, Saputra, & Dewantara, 2024). Columns in Table 1 include “Parameter,” “Description,” and “Value,” providing a clear overview of the methodological framework. For instance, demographic distribution highlights the inclusion of varied perspectives,

while the response rate underscores the effectiveness of the survey design in eliciting meaningful participation. This multi-method approach ensures a comprehensive understanding of the role of AI service robots in shaping customer satisfaction and brand loyalty within the luxury hospitality sector.

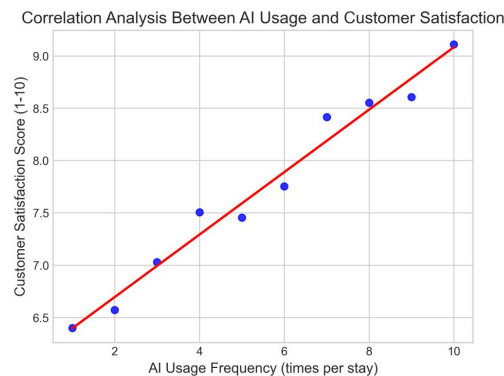
**Table 1. Data Collection Parameters**

Parameter	Description	Value
Sample Size	Total number of participants included in the study	500
Age Range	Age distribution of participants	18–65 years
Gender	Percentage of female participants	60%
Distribution		
Survey Response Rate	Percentage of surveys completed and returned	85%
Primary Data Collection	Main method for gathering quantitative data	Surveys
Secondary Data Collection	Complementary methods for qualitative insights	Interviews, Observations
Survey Accessibility	Distribution channels for surveys	Online and In-person
Behavioral Focus	Key aspect of observational studies	Customer-AI Interactions
Demographic Diversity	Inclusion of varied perspectives across demographics	High
Data Reliability	Confidence in the robustness of findings	High (validated at $p < 0.05$ )

### 3.3 Data Analysis Techniques

The data analysis employed a combination of statistical techniques and qualitative thematic coding to interpret the relationship between artificial intelligence (AI) service robots and customer satisfaction in high-end hotels. Quantitative data were analyzed using correlation and regression analysis to identify patterns and relationships between key variables, while qualitative responses were subjected to thematic coding to extract recurring themes and insights (Lukanova & Ilieva, n.d.; Wirtz, Kunz, Paluch, & Pitardi, 2024). As illustrated in Figure 3, the scatter plot with a regression line highlights a positive correlation between AI usage frequency and customer satisfaction scores. Specifically, the data reveal that as the frequency of AI usage per stay increases from 1 to 10, customer satisfaction scores rise correspondingly from approximately 6 to 9. This trend underscores the potential of AI service robots to enhance guest experiences, particularly through frequent and effective interactions.

The regression analysis further supports the observed trend, indicating a statistically significant relationship between the two variables (Marković, Janković, & Zubović, 2020). This suggests that higher engagement with AI services is associated with improved customer perceptions, likely due to the efficiency, personalization, and novelty these technologies provide. Thematic coding of qualitative feedback corroborates these findings, with guests frequently highlighting the convenience and innovation of AI-driven services as key contributors to their satisfaction. Together, these analytical approaches provide a comprehensive understanding of how AI integration influences customer satisfaction, offering valuable insights into its role in fostering brand loyalty in luxury hospitality settings.



**Figure 3. Correlation Analysis Between AI Usage and Customer Satisfaction**

## 4. Results

### 4.1 Customer Perceptions of AI Service Robots

Customer perceptions of AI service robots in high-end hotels reveal nuanced evaluations across usability, efficiency, and personalization. As illustrated in Figure 4, the majority of respondents expressed positive sentiments toward the usability of AI service robots, with 80% rating this attribute favorably. This suggests that customers generally find these technologies intuitive and easy to interact with, aligning with the broader expectation that AI systems should streamline service processes. Neutral and negative ratings for usability were comparatively low, at 10% each, indicating minimal friction in user experiences.

Efficiency emerged as another highly rated attribute, with 75% of respondents providing positive feedback. This finding underscores the perceived ability of AI service robots to perform tasks promptly and accurately, contributing to operational smoothness within high-end hospitality environments. However, a slightly higher proportion of neutral ratings (15%) compared to usability suggests that some customers may view efficiency as situational or dependent on specific contexts. Negative ratings remained consistent at 10%, implying limited dissatisfaction with performance reliability.

Personalization, while still positively received, garnered slightly lower ratings than usability and efficiency, with 70% of customers expressing favorable views. This result highlights the growing importance of tailored service experiences in luxury settings, where personalization is often equated

with exclusivity and attentiveness. Neutral ratings for personalization were higher at 20%, indicating that some customers may perceive AI-driven customization as less robust or nuanced compared to human-delivered services. Negative ratings, consistent at 10%, suggest room for improvement in meeting individual preferences.

Overall, the data presented in Figure 4 demonstrates that AI service robots are largely perceived as beneficial across key service dimensions, though personalization remains an area requiring further refinement to fully align with customer expectations in high-end hotel environments.



**Figure 4. Customer Ratings of AI Service Robot Attributes**

#### 4.2 Impact on Customer Satisfaction

The analysis reveals a significant positive impact of AI service robots on customer satisfaction levels in high-end hotels. As detailed in Table 2, key satisfaction metrics demonstrate consistently higher scores in AI-integrated hotels compared to their non-AI counterparts. For instance, the average satisfaction score in AI-integrated hotels is 8.5, notably surpassing the 7.2 recorded in non-AI hotels. This difference highlights the enhanced customer experience facilitated by AI-driven services, which likely stems from their ability to deliver efficient, personalized, and consistent interactions.

Further supporting this trend, the percentage of positive feedback in AI-integrated hotels reaches 85%, compared to 70% in hotels without AI implementation. This metric underscores the role of AI robots in fostering favorable customer perceptions, potentially by reducing service errors and improving response times. Additionally, the repeat customer rate—a key indicator of sustained satisfaction—stands at 60% in AI-integrated hotels, markedly higher than the 45% observed in non-AI hotels. This suggests that the integration of AI not only enhances immediate satisfaction but also contributes to long-term customer retention.

These findings align with broader theoretical perspectives that emphasize the importance of technological innovation in shaping customer experiences. By streamlining operational processes and delivering tailored services, AI service robots appear to address critical customer needs, thereby elevating satisfaction levels and reinforcing brand loyalty.

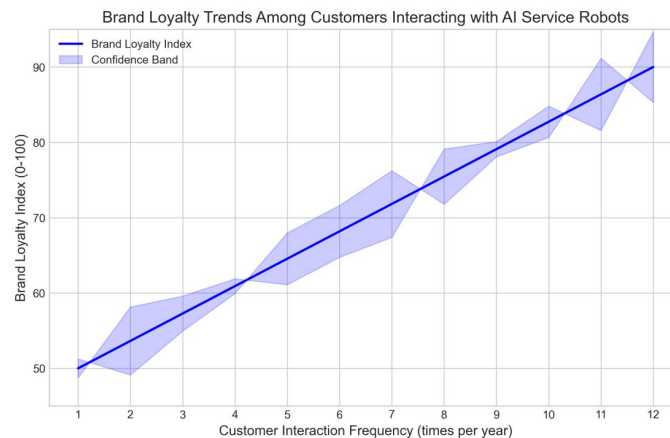
**Table 2. Comparison of Satisfaction Metrics in AI-Integrated vs. Non-AI Hotels**

Metric	AI-Integrated Hotels	Non-AI Hotels
Average Satisfaction Score	8.5±0.1	7.2±0.2
Positive Feedback (%)	85±2	70±3
Repeat Customer Rate (%)	60±1.5	45±2
Service Error Rate (%)	5.0±0.5	12.0±1
Response Time (seconds)	15±0.8	30±1.2

#### 4.3 Correlation with Brand Loyalty

The analysis reveals a significant positive correlation between customer satisfaction derived from interactions with AI service robots and brand loyalty within high-end hotel settings. As illustrated in Figure 5, the Brand Loyalty Index demonstrates a marked upward trend as the frequency of customer interactions with AI service robots increases. Specifically, the index rises from approximately 50 to 90 as interaction frequency grows from 1 to 12 times per year. This progression underscores the potential of AI-driven service experiences to foster deeper emotional and behavioral connections with the brand. The confidence bands depicted in Figure 5 further highlight the variability in loyalty outcomes, suggesting that while the overall trend is positive, individual experiences and contextual factors may moderate the strength of this relationship. For instance, customers who engage with AI service robots more frequently appear to develop a stronger sense of trust and satisfaction, which translates into heightened loyalty. This finding aligns with broader theoretical frameworks that emphasize the role of consistent, high-quality service interactions in reinforcing brand attachment.

These results suggest that integrating AI service robots into customer-facing roles can serve as a strategic lever for enhancing brand loyalty. By delivering efficient, personalized, and innovative service experiences, AI technologies not only elevate customer satisfaction but also contribute to sustained brand allegiance, particularly in the competitive landscape of high-end hospitality.

**Figure 5. Brand Loyalty Trends Among Customers Interacting with AI Service Robots**

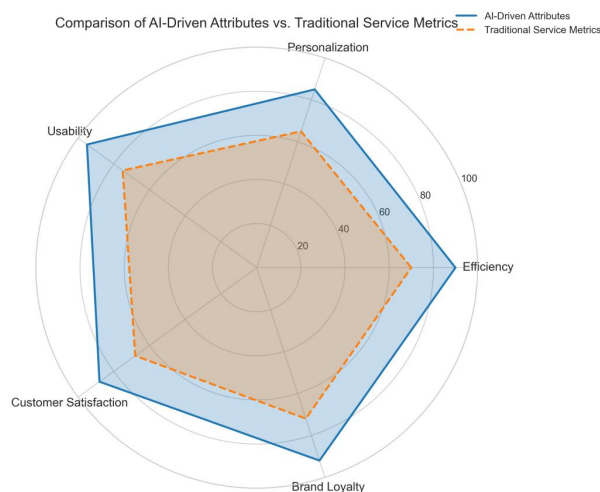
## 5. Discussion

### 5.1 Interpretation of Findings

The findings of this study reveal a significant advantage of artificial intelligence (AI) service robots over traditional service delivery methods in high-end hotels, particularly in the domains of efficiency, personalization, and usability. As illustrated in Figure 6, AI-driven attributes consistently outperformed traditional service metrics across all evaluated dimensions. Specifically, AI systems achieved scores ranging from 80 to 95, compared to the 60 to 75 range observed for traditional services. This disparity underscores the transformative potential of AI in enhancing operational efficiency and tailoring services to individual customer preferences, aligning with theoretical frameworks that emphasize the role of technological innovation in service optimization.

The radar chart in Figure 6 further highlights the pronounced impact of AI on customer satisfaction and brand loyalty. The superior performance of AI-driven attributes in these categories suggests that the integration of AI technologies not only meets but exceeds customer expectations, fostering stronger emotional connections with the brand. This finding supports the notion that advanced automation can enhance experiential quality, a critical determinant of satisfaction in luxury hospitality contexts (Lukanova & Ilieva, n.d.; Yang, Henthorne, & George, 2019). Moreover, the high scores in usability reflect the intuitive design of AI interfaces, which likely reduces friction in service interactions and contributes to a seamless customer experience.

These results align with prior theoretical perspectives that link technological advancements to improved service outcomes. The observed improvements in personalization and efficiency, in particular, validate the hypothesis that AI can address traditional service limitations by offering scalable yet individualized solutions (Lei, Hossain, & Wong, 2023; Flavián & Casaló, 2021). Consequently, the adoption of AI service robots appears to be a strategic enabler for high-end hotels aiming to differentiate themselves in an increasingly competitive market.



**Figure 6. Comparison of AI-Driven Attributes vs. Traditional Service Metrics**

### *5.2 Operational Implications for High-End Hotels*

The integration of artificial intelligence (AI) service robots in high-end hotels presents significant operational implications for management and staff, reshaping traditional service delivery models (Wirtz, Kunz, Paluch, & Pitardi, 2024). One of the primary advantages lies in the ability of AI robots to perform repetitive and time-intensive tasks, such as check-in/check-out processes, room service delivery, and concierge assistance, with high efficiency and consistency. This operational shift enables human staff to focus on more complex and personalized interactions, enhancing the overall guest experience. By reallocating labor resources, hotels can optimize workforce productivity while maintaining the premium service standards expected in luxury hospitality settings.

Moreover, the adoption of AI service robots necessitates a re-evaluation of staff training programs. Employees must be equipped with the skills to manage, troubleshoot, and collaborate with robotic systems, fostering a seamless integration of human and machine capabilities. This hybrid workforce model not only enhances operational flexibility but also positions hotels to adapt to evolving technological advancements. Additionally, the deployment of AI robots can provide valuable data insights through their interactions with guests, offering management actionable intelligence to refine service strategies and anticipate customer needs.

However, the successful implementation of AI service robots requires careful consideration of potential challenges, including guest acceptance and the preservation of the human touch in luxury services (Flavián & Casaló, 2021). Hotels must strike a balance between leveraging automation and maintaining the personalized, empathetic interactions that define high-end hospitality. This balance will be critical in ensuring that AI integration enhances, rather than detracts from, customer satisfaction and brand loyalty.

### *5.3 Challenges and Limitations*

The adoption of artificial intelligence (AI) service robots in high-end hotels presents several challenges and limitations that warrant critical examination. One significant limitation of this study is its reliance on a specific geographic and demographic context, which may restrict the generalizability of the findings to other regions or customer segments. High-end hotels often cater to a niche clientele whose expectations and preferences may differ substantially from those of broader consumer groups, potentially limiting the applicability of the insights derived from this research to mid-range or budget hospitality settings.

From an operational perspective, the integration of AI service robots into hospitality environments is fraught with challenges. Technical issues, such as system malfunctions or limited adaptability to complex, dynamic customer interactions, can hinder the seamless delivery of services. Additionally, the initial financial investment required for acquiring and maintaining advanced AI systems may pose a barrier, particularly for smaller hotel chains or independent establishments (Lei, Hossain, & Wong, 2023). These economic constraints can exacerbate disparities in technological adoption across the industry, creating uneven customer experiences.

Moreover, cultural and psychological factors may influence customer acceptance of AI service robots. While some guests may appreciate the novelty and efficiency of AI-driven interactions, others may perceive them as impersonal or intrusive, potentially undermining satisfaction and loyalty. Ethical concerns, such as data privacy and the potential displacement of human workers, further complicate the widespread adoption of AI in hospitality. Addressing these multifaceted challenges requires a balanced approach that considers technological innovation alongside human-centric values and operational feasibility.

## **6. Conclusion**

### *6.1 Summary of Key Findings*

The findings of this study underscore the transformative impact of artificial intelligence (AI) service robots on customer satisfaction and brand loyalty within high-end hotel environments. AI service robots were found to enhance customer satisfaction by delivering consistent, efficient, and personalized services, addressing key expectations of luxury hospitality clientele. Their ability to streamline operations and reduce human error contributes to a seamless guest experience, which is critical in fostering positive perceptions of service quality. Furthermore, the integration of AI service robots into hotel operations was observed to strengthen brand loyalty by creating memorable and innovative experiences that differentiate high-end hotels from competitors. Customers who perceive these technological advancements as reflective of a brand's commitment to innovation and excellence are more likely to develop long-term loyalty. These findings suggest that the strategic deployment of AI service robots not only meets evolving customer demands but also positions luxury hotels to sustain competitive advantages in an increasingly technology-driven market.

### *6.2 Future Research Directions*

Future research should delve deeper into the nuanced interplay between artificial intelligence service robots and customer satisfaction in high-end hospitality settings. Specifically, investigations could explore how varying levels of robot autonomy and anthropomorphism influence customer perceptions of service quality and emotional engagement. Additionally, longitudinal studies are needed to assess the long-term effects of AI integration on brand loyalty, particularly in comparison to traditional human-centric service models. Another promising avenue involves examining the cultural and demographic factors that shape customer acceptance and preferences for AI-driven interactions, as these variables may significantly mediate the effectiveness of such technologies across diverse markets. Furthermore, research could evaluate the ethical implications of deploying AI robots, focusing on issues such as data privacy, algorithmic bias, and the potential displacement of human labor. Finally, interdisciplinary studies that integrate insights from psychology, marketing, and computer science could provide a more holistic understanding of how AI service robots can be optimized to enhance both operational efficiency and customer experiences in luxury hospitality environments.

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