Research on Applying AI to Improve Hotel Service Quality

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Abstract—This paper focuses on the current problems and challenges of the application of Artificial Intelligence (AI) in enhancing hotel service quality, and the solutions to each problem. This paper first introduces some application scenarios of artificial intelligence in hotel services. Secondly, it analyzes the current problems and challenges faced by AI services in hospitality industry from five aspects: Outdated Interface Design, Unreliable System Performance, Lack of Responsive Support, Security Concerns, Limited Personalization. Finally, solutions and feasible suggestions are put forward for the problems and challenges in five aspects. By comprehensively examining both the challenges and solutions, this paper contributes to the ongoing discourse on leveraging AI to elevate hotel service quality.

Keywords—hotel, hospitality industry, Artificial Intelligence (AI), hotel service quality, smart hotel, artificial intelligence, operation

I. INTRODUCTION

With the proliferation of Artificial Intelligence (AI) technology, its integration into various industries, including the hospitality sector, has gained significant momentum. From basic applications like smart door locks and automated curtain control to advanced systems such as Hospitality Digital Operation System (HDOS), Hotel GPT, and Hotel Multifunctional Robots-Up, AI is transforming the industry landscape. As AI technology continues to evolve rapidly and expand its reach, the question of how to seamlessly integrate it with hotel service quality has emerged as a pivotal research focus. attracting attention both domestically and internationally.

This paper delves into the core issue of "enhancing hotel service quality through artificial intelligence" from multidimensional and multilevel perspectives, aiming to provide a solid theoretical foundation for hotel enterprises. The adoption of AI-powered services in hotels not only promises substantial improvements in operational efficiency but also offers guests unparalleled convenience and unique experiences.

However, the integration process is not without challenges, as issues pertaining to AI stability, privacy protection, and computational costs remain areas of active research and discussion. Therefore, exploring effective strategies to harmoniously blend AI advancements with the pursuit of exceptional hotel service quality stands as a pressing research agenda, both nationally and globally.

II. LITERATURE REVIEW

A. Research Process

In recent years, there has been an increasing amount of research on artificial intelligence services in the hotel industry. Despite significant progress, most research still focuses on the impact of AI service characteristics on user purchase intention, and exploration of AI service characteristics themselves is still insufficient. Quinn emphasized the fundamental position of services in manufacturing enterprises, and intelligent manufacturing and intelligent services have become new production methods pursued by enterprises, highlighting the value of services (Quinn, 1992).

Zhou Qingdong's team conducted in-depth exploration of intelligent room systems and found that AI technology can effectively control room equipment, improve guest experience, and reduce energy consumption (Zhou, 2018). Tussyadiah *et al.* conducted experimental research on the influence of human-computer interaction space on customers' choice of hotel service robots (Tussyadiah, 2020). In addition, Yu and Xu (2019) respectively studied the impact of service robots on customers' repurchase intention and their social roles in human-computer interaction.

The latest research explores multiple aspects of AI services in the hotel industry, including their impact on service experience, customer preferences, and psychological mechanisms. For example, Murphy *et al.*'s "Fear Valley" theory studied the role of anthropomorphic features in robot service experience (Ho *et al.*, 2010); Professor Song Xiaoxiao's team is committed to developing a hotel service robot with speech recognition and path planning functions (Song *et al.*, 2023). Tests have shown that it not only improves service efficiency, but also reduces labor costs, bringing guests a novel and interesting interactive experience.

B. Artificial Intelligence

In 1955, John McCarthy, a mathematics professor at Dartmouth University, first introduced the concept of "Artificial Intelligence" to Dartmouth and organized a conference called the "Dartmouth Forum" in 1956 to lay the foundation for the development of artificial intelligence (Lehtinen, 1991). The definition of artificial intelligence can be seen from multiple perspectives: the Oxford Dictionary regards it as the theory and practice of computer systems completing tasks that typically require human intelligence; Minsky, hailed as the pioneer of artificial intelligence, emphasized that the essence of artificial intelligence is that machines must perform tasks that combine with human intelligence (Luo et al., 2015). Technically speaking, artificial intelligence can be seen as a result of advances in cognitive computing, deep learning, and other computer technology fields. Jack Ma regards artificial intelligence as a unique thinking tool used to understand the external world, predict the future, and understand the internal situation of humanity. Although the definition of artificial intelligence varies, it is indeed related to "intelligence" and its main goal is to liberate people. As an application scenario, smart hotels are undergoing the third development step of artificial intelligence to enhance service levels, leveraging their AI capabilities in perception technology. In order to achieve intelligent services, smart hotels rely on external technological support, allowing them to choose between upgrading their own intelligent technology or relying on external technology to achieve the goal of intelligent production and services.

1)The Application of Artificial Intelligence in Hotel Services

Smart Hotel represents a novel concept in the hotel industry, aiming to adopt modern and advanced information technology in hotel management and services to create a more intelligent and convenient service experience. Initially, the main concept of a smart hotel focused on the intelligent upgrade of hardware facilities, including Room Control Units (RCUs) for managing equipment in guest rooms, as well as the implementation of Radio Frequency Identification (RFID) and infrared sensing technology (Li *et al.*, 2024). However, with the advancement of technologies such as artificial intelligence, the definition of smart hotels has been expanded to cover a wider range of information technology aspects, with the core goal of providing consumers with more personalized and intelligent service experiences.

For example, Hilton Hotels has introduced an AI gatekeeper robot device called "Connie" that specializes in providing unique services to customers. The Chinese Alibaba Group in Hangzhou has launched the FlyZoo Hotel project, which provides customers with an intelligent service platform with full scene facial recognition capabilities. Throughout the entire service process of the hotel, from the initial booking, registration, accommodation experience to check-out, there is basically no one serving as a waiter. The entire service process is completed by robots, covering multiple different links such as reception, navigation, ordering, and delivery. This refreshed intelligent experience has attracted a large number of customers, making Alibaba's future hotels a popular check-in spot for internet celebrities.

Although smart hotels have achieved significant success in certain professional fields, their progress is still at an early stage and they face challenges in standardization and improvement. Given this context, it is increasingly crucial to study how to improve customer satisfaction in the construction of smart hotels. With the help of existing practical methods in smart hotels, I may have a deeper understanding of customers' actual needs and further accelerate the growth and improvement of the smart hotel field.

III. MATERIALS AND METHODS

Search for literature through domestic and foreign literature websites, such as CNKI, Google Scholar, and other literature databases. A review was conducted on the research theories and achievements of domestic and foreign experts in the field of hotel intelligence. Subsequently, the collected data was thoroughly organized, analyzed, and summarized. Explore the factors that affect the level of intelligent development in hotels from the aspects of internal environment, hardware facilities and equipment, service process management, and comprehensive quality of employees, and propose corresponding countermeasures and suggestions. The overall research direction of the article is

determined through literature analysis.

IV. RESULT AND DISCUSSION

A. The Issues of Artificial Intelligence Services in Hospitality Industry

1) Outdated interface design

When exploring the interface design of artificial intelligence service systems in the hospitality industry, customer feedback shows that the current system interface design fails to fully fit contemporary aesthetic trends and appears outdated. This is mainly reflected in the old visual elements and uncoordinated color matching, which significantly deviates from the mainstream preferences of customers for fashionable and simple interface design. To enhance the user experience, it is urgent to modernize the interface design, integrate the latest design concepts and elements, and ensure that the system interface is both beautiful and practical, thereby enhancing user satisfaction and loyalty.

2) Unreliable system performance

Customers have higher requirements for the real-time response capability and continuous stability of hotel intelligent service systems. However, the current system often encounters problems such as stalling and crashing in practical applications, especially during peak occupancy periods, which seriously affects the customer experience. In addition, the differences in the quality of internal services, employee attitudes, environmental facilities, and management strategies in hotels also exacerbate this problem. To improve the current situation, it is necessary to strengthen system performance optimization to ensure stable operation under high load conditions. At the same time, establish a sound customer feedback mechanism to respond to and handle customer suggestions in a timely manner, so as to continuously improve service quality.

3) Lack of responsive support

As an important bridge between hotels and customers, the response speed of intelligent customer service system directly affects customer satisfaction. The current system's response delay problem can easily lead to customer dissatisfaction and exhaustion of patience (Jin, 2023). In addition, the system is not good at identifying and meeting the personalized needs of customers, making it difficult to meet the increasing demand for personalized services. Therefore, it is necessary to strengthen the technological upgrading of intelligent customer service systems, improve response speed, and introduce advanced algorithms and technologies to more accurately identify customer preferences and provide customized services, thereby enhancing customer satisfaction and loyalty.

4) Security concerns

While enjoying the convenience of smart services, customers are increasingly concerned about data security and privacy protection issues. If the hotel's artificial intelligence system fails to properly manage customer information, there is a risk of leakage, which will seriously damage the rights and interests of customers (Wei, 2001). Therefore, the hotel needs to strengthen data security protection measures to ensure the security of customer information during the

collection, storage, processing, and transmission process. At the same time, clearly inform customers of information usage policies and enhance transparency to win their trust and support.

5) Limited personalization

Deepen personalized service and emotional connection. Personalized service is the key to enhancing customer experience. At present, the hotel's artificial intelligence system has deficiencies in deeply mining customers' preferences, habits, and needs, making it difficult to provide accurate personalized services. In addition, the system lacks the ability to recognize and respond to emotions, making the service appear mechanical and cold. To improve this problem, it is necessary to strengthen data analysis and mining capabilities, build a more complete customer portrait, and provide more intimate and personalized services. At the same time, the introduction of emotional computing technology enables the system to recognize and respond to changes in customer emotions, enhancing emotional connection and humanistic care in service.

B. The Solutions of Issues

1) The solutions of issues of outdated interface design

In the process of enhancing the quality of hotel AI services, hotels have adopted various measures. Firstly, hotels are committed to upgrading smart devices by introducing powerful and beautifully designed intelligent robots, self-service terminals, and so on. These devices not only improve the convenience and efficiency of services but also enhance customers' favorable impression of the hotel's AI services. Secondly, hotels prioritize optimizing the interface and interaction design to ensure that the AI service interface is intuitive and user-friendly, blending practicality with aesthetics. By leveraging technologies such as intelligent voice assistants, hotels achieve seamless interactions with customers, further enhancing the comfort and satisfaction of the user experience. Additionally, hotels utilize AI technology to make service processes transparent, clearly presenting them through images and animations, enabling customers to easily understand and grasp service details and steps. This, in turn, strengthens trust in the service and customer satisfaction. Lastly, hotels emphasize data-driven continuous optimization. By leveraging customer behavior data and feedback, hotels accurately grasp customer needs and expectations, customizing and optimizing service items and operational processes. They also actively follow industry trends and emerging technological advancements, adopting innovative solutions to continuously elevate the quality and efficiency of AI services.

2) The solutions of problems of unreliable system performance

Ensuring the reliability of services can greatly improve guests' satisfaction with the hotel. The primary task is to ensure the stable and trouble-free operation of the system. Hotels should prioritize investing in the development of stable and efficient AI service systems to reduce failure rates and downtime. It should cover high-end hardware equipment, the optimization of efficient software algorithms, and the establishment of a sound system maintenance system. Hotels maintain the stable operation of the system, aiming to provide continuous and uninterrupted services to fully meet the needs of customers. Hotels must regularly perform daily maintenance on smart devices, and once equipment malfunction or damage is discovered, the manufacturer should be immediately notified for repair. During use, a dedicated person should monitor the performance of AI equipment. In the event of customer needs that cannot be met or equipment comprehension barriers, it is important to intervene quickly to ensure customer satisfaction and prevent negative impacts on the hotel's reputation and customer dissatisfaction. Secondly, it is crucial to ensure the provision of accurate information and services. AI systems need to accurately analyze customers' needs and wishes to ensure the provision of accurate and relevant information and services. The hotel can enhance the accuracy and intelligence of the system by improving natural language understanding technology and strengthening data analysis and in-depth analysis functions. The intelligent customer service system needs to accurately respond to customer inquiries, such as reservation details, room rates, etc., to ensure accuracy. At the same time, ensuring the security of customer data and respecting privacy are key to improving reliability. By ensuring the security of customer data and respecting privacy, hotels can enhance customers' trust in AI services, thereby strengthening the credibility and satisfaction of the services. It is significant to have an effective feedback mechanism and encourage continuous optimization. Hotels need to establish an effective customer feedback mechanism to quickly collect and respond to customer feedback and suggestions on AI services. Based on in-depth analysis of customer feedback, the hotel can identify problems and shortcomings in service and quickly implement improvements and upgrades. Hotels must keep up with industry standards and advanced practices, continuously introduce innovative technologies and optimization strategies, and enhance the stability and market competitiveness of AI services.

3) The solutions of issues of lack of responsive support

Ensuring a rapid response service is crucial to enhancing user satisfaction. The first thing to improve is the system response speed. The hotel's artificial intelligence system needs to be able to quickly identify and effectively respond to guests' needs. By improving algorithm efficiency and enhancing system resources, response time can be significantly reduced so that customers can quickly obtain the information they need and enjoy the service. The intelligent customer service system must respond to customer inquiries in real time, avoid customer waiting, and provide services immediately. Secondly, personalized experience is important. The intelligent service system can accurately analyze users' housing preferences and automatically recommend room types and rooms that meet their preferences. The implementation of personalized services can significantly improve customer satisfaction. At the same time, improving interactive performance can effectively improve response speed. The hotel's artificial intelligence system needs to have highly natural dialogue capabilities to seamlessly communicate and interact with customers. The system strengthens the voice recognition and natural language processing capabilities, ensuring accurate interpretation of customer intentions and needs, and providing precise

feedback. After improving the interaction efficiency, the AI system can provide more active customer service, thus optimizing service quality and improving efficiency. The feedback system must be sound and effective. Hotels need to establish a dedicated mechanism to solicit customer evaluations and suggestions on AI services. The hotel can discern the bottlenecks and shortcomings in service based on these feedbacks and take prompt measures to optimize them. Hotels also need to periodically evaluate the effectiveness and service quality of AI systems to maintain their optimal operating state.

4) The solutions of troubles of security concerns

The privacy security and data protection of customers are key factors in improving the intelligent service of hotels. Hotels need to take relevant measures to protect customer privacy in order to increase customer trust in AI services, ensure data security and personal privacy during the consumption process, and so on. By applying cutting-edge technology and rigorous testing procedures, the hotel ensures the confidentiality of privacy and brings customers a satisfactory experience. In addition, hotels must clearly explain the specific content and expected performance of AI services, and provide customers with clear service guarantees. Hotels need to ensure the stable operation of their systems and meet their service commitments to fully meet customer expectations and needs. If the system fails to perform tasks or does not meet expected standards, the hotel needs to immediately notify the customer and actively seek alternative solutions. At the same time, strengthening employee training and supervision are indispensable measures. Although AI can operate independently, the intervention and supervision of employees are indispensable. The hotel needs to regularly provide training on AI services for its employees, so that they are familiar with the system functions, operation procedures, and common problem-solving strategies. The hotel also needs to implement a strict monitoring system to ensure that employees can effectively implement operating procedures and respond quickly to and address customer needs. Emphasize the importance of customer feedback and continuous optimization. Hotels need to establish an efficient customer feedback mechanism to collect user evaluations and improvement suggestions for AI services. By evaluating customer feedback, hotels can identify problems and shortcomings in service and quickly implement optimization. Hotels should actively listen to customers' needs and feedback, and continuously optimize the functions and performance of AI systems to improve service quality and enhance customer satisfaction.

5) The solutions of problems of limited personalization

Ensuring standardized services and providing unique personalized services to customers is a key strategy. The primary task is to achieve personalized service, and the hotel's artificial intelligence system needs to have powerful data parsing and processing capabilities, which can deeply insight into each customer's preferences, behavior patterns, and needs, in order to achieve personalized customized services. For example, the system can intelligently recommend customers' preferred room types and floors based on their past check-in records, or provide personalized recommendations for dining choices based on their dietary preferences. Secondly, enhancing emotional intelligence interaction capability is a key element. AI systems should strive to mimic human emotional communication patterns in order to create a more intimate and humanized user experience. For example, the system utilizes speech recognition and natural language understanding technology to perceive customer emotions and understand their needs, thereby providing corresponding emotional feedback and comfort. The system has built-in speech synthesis technology, which can generate speech with humanized affinity and enhance customer experience. Meanwhile, by building customer profiles and continuously learning, empathy can be enhanced. The hotel needs to establish a comprehensive customer database that includes detailed information about each customer, including personal data, accommodation history, and preferences, so that artificial intelligence can accurately understand customer needs. Moreover, the system should have the ability to continuously learn and improve the efficiency of its service algorithms and models to more accurately meet the needs and expectations of customers. Finally, through diversified service channels and intuitive and easy-to-use interaction design, the quality of artificial intelligence services can be effectively improved. Provide WeChat mini programs and smart room terminals, allowing customers to easily enjoy efficient services anytime and anywhere. The system needs to ensure high stability and fast response, so that customers can obtain the necessary information and support in real time.

V. CONCLUSION

The integration of Artificial Intelligence (AI) into the hospitality industry holds immense potential for enhancing hotel service quality, fostering customer satisfaction, and driving operational efficiency. Through the proposed solutions, hotels can address these challenges by embracing user-centric interface designs, ensuring system stability and resilience, providing prompt and efficient customer support, prioritizing data security and privacy, and leveraging AI-driven personalization strategies.

These efforts not only mitigate the existing issues but also pave the way for innovative service models that cater to the evolving needs and expectations of modern travelers. Investing in AI-powered solutions, hotels can streamline operations, optimize resource allocation, and deliver personalized experiences that transcend traditional service offerings.

In summary, the research underscores the importance of strategic planning, ongoing innovation, and customer-centricity in leveraging AI to improve hotel service quality. With a commitment to these principles, the hospitality industry stands poised to embark on a journey of unparalleled growth and excellence, driven by the power of AI.

CONFLICT OF INTEREST

The author declares no conflict of interest.

REFERENCES

Ho, C. C., & MacDorman, K. F. 2010. Revisiting the uncanny valley theory: Developing and validating an alternative to the Godspeed indices. *Computers in Human Behavior*, 26(06): 1508–1518.

- Jin, L. 2023. A study on the impact of artificial intelligence service quality in hotels on customer satisfaction. Unpublished doctoral dissertation, Anhui University of Finance and Economics, Anhui, China.
- Lehtinen, U., & Lehtinen, R. J. 1991. Two approaches to service quality dimensions. Service Industries Journal, 11(3): 287–303.
- Li, W. L., Guo, X., & Yin, Z. H. 2024. Research on smart hotel service quality based on network text analysis: A case study of hotel F in Hangzhou, Zhejiang. *Commercial Display Economy*, 05: 121–124.
- Luo, Y., Luo, Z. S., & Suo, L. Z. 2015. Domestic and international research review on hotel service quality. *Tourism Overview (Lower Half of the Month)*, 20: 86–87.
- Quinn, J. B. 1992. Intelligent enterprise: A knowledge and service based paradigm for industry. Hongkong: The Free Press.
- Song, X. X., Li, Y. P., & Tang, Y. 2023. The influence of anthropomorphic service robots on hotel customers' emotions and transactional intentions. *Journal of Capital University of Economics and Business*, 25(05): 79–94.

- Tussyadiah, I. P., Zach, F. J., & Wang, J. (2020). Do travelers trust intelligent service robots? *Annals of Tourism Research*, 81.
- Wei, Y. N. 2001. A study on service quality management and customer satisfaction in service marketing. Unpublished doctoral dissertation, Kunming University of Science and Technology, Yunnan, China.
- Yu, X. X. 2019. Customer usage attitudes and reuse intentions towards hotel service robots. Unpublished doctoral dissertation, Dongbei University of Finance and Economics, Liaoning, China.
- Zhou, Q. D. 2018. Application research of intelligent control system in hotel guest rooms. *Electronics World*, 24: 168–169.

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