Original Research Article

Research on enhancing customer experience at Zhongtai hotel for intelligent services

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Abstract: In order to establish an overall customer experience improvement path for Zhongtai Hotels under intelligent conditions, the methods of collecting process parameters, quantifying behavioral characteristics, modeling experience perception and conducting multi-scenario verification were adopted. The processing procedures were analyzed to form a system structure consisting of touchpoint data, indicator system and intelligent strategies for nodes. The results show that the multi-node optimization and experience perception model are more stable, providing a replicable basis for the promotion of intelligent services.
Keywords: intelligent service; customer experience; behavioral modeling; journey perception

1. Introduction

In the context of the accelerated penetration of digitalization and intelligence in the hotel service system, customer experience has shown characteristics of multiple touchpoints, multiple links, and frequent dynamic changes. The traditional service model is facing issues such as unbalanced process response and incomplete experience. Based on this demand, the research conducts a systematic analysis of the service structure of Zhongtai Hotel, starting from intelligent front desk, guest control interaction, and behavior data modeling.

2. Analysis of Zhongtai hotel's current customer experience

During peak periods at the front desk, there are issues such as unstable queue times, reliance on manual verification during identity checks, and a lack of real-time information prompts for guests during their waiting periods, which directly affect customers' perception of the smoothness of the process. The adoption of intelligent guest control systems in guest rooms is limited, and there are inconsistencies in control methods for different room types (such as lighting, air conditioning, and curtains), resulting in increased operational costs for some guests during their first use. To visually present the weak links in current customers' interactions at key touchpoints, **Figure 1** has been constructed.

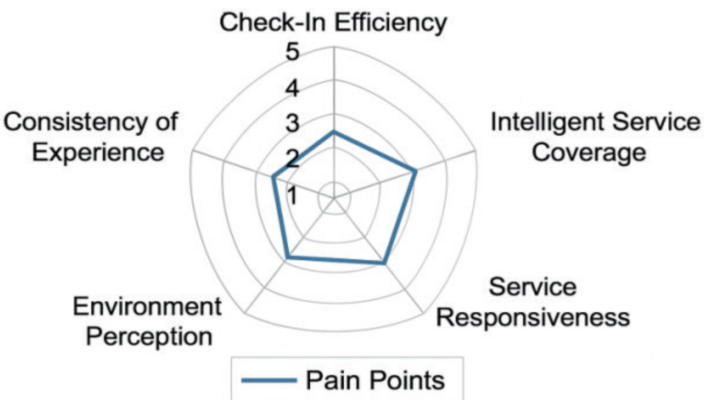

Figure 1. Radar chart of customer experience pain points at zhongtai hotel.

3. Foundational applications of intelligent services in hotel settings

3.1. Technical architecture of smart front desk and contactless check-in

The intelligent front desk system deployment is built upon three core capabilities: identity recognition, data verification, and process scheduling. Through the collaboration of front-end sensing devices, edge processing units, and the hotel management platform, it achieves automated check-in processes with minimal contact.

3.2. Human-machine interaction model of the smart guest control system

The human-computer interaction mode of the intelligent guest control system focuses on room environment adjustment, behavior intention recognition, and multi-terminal collaborative control. It enhances operation accuracy and system response consistency through multiple modal channels such as voice, touch, and sensor feedback.

3.3. Data-driven guest behavior analysis mechanism

The guest behavior analysis mechanism comprises data collection, feature computation, and behavior recognition layers. The collection layer aggregates multi-source behavioral sequences from door lock logs, guest control interactions, mobile commands, and service call data. Timestamp alignment and outlier removal occur at edge nodes. The feature computation layer applies sliding window aggregation (T_w) to sequences based on preset parameters, constructing feature vectors such as behavioral intensity, habit stability, and operation frequency. The behavior recognition model employs a weighted feature scoring function:

$$S = \sum_{i=1}^{n} w_i \cdot f_i \tag{1}$$

where S represents the behavioral pattern score, f_i denotes the i-th behavioral feature (e.g., operation frequency, preference intensity, device invocation cycle), w_i indicates the corresponding feature weight (jointly generated from historical behavior distribution and information entropy results), and n is the number of feature dimensions. During model operation, the system establishes a behavioral index structure based on room ID and guest ID. After each window update, the latest feature vector is written to the cache area. Pattern matching is triggered by the rule engine or lightweight model, enabling rapid determination of preference scenarios, control habits, and latent needs.

4. Building the intelligent customer experience enhancement path for Zhongtai hotels

4.1. Building the experience perception model

The experience perception model is built upon a multi-layered metric structure, comprising the touchpoint data layer, metric measurement layer, and comprehensive calculation layer. The touchpoint data layer synchronously collects raw quantitative data—Including latency, trigger frequency, operation depth, and sensor status—From four interconnected pathways: check-in procedures, guest control interactions, service responses, and environmental conditions. The metric measurement layer normalizes all data using preset parameter intervals ($[L_i, U_i]$) and applies linear interval mapping to derive dimensionless metric values. The comprehensive calculation layer performs weighted perception scoring, employing a core function to represent the experience:

$$E = \sum_{i=1}^{m} w_i \cdot d_i \tag{2}$$

Where E represents the comprehensive experience perception value; d_i denotes the i-th normalized metric (e.g., check-in processing duration, response interval, device stability); w_i indicates the corresponding weight generated by a hierarchical parameter matrix; m is the number of metrics. During model operation, the system establishes perception indexes based on room types, guest source structures, and occupancy cycles. It refreshes metric caches at fixed intervals to deliver real-time quantitative outputs of multidimensional experience states, generating perception results directly applicable for strategy optimization. **Figure 2** illustrates the internal structure and data flow relationships of the experience perception model.

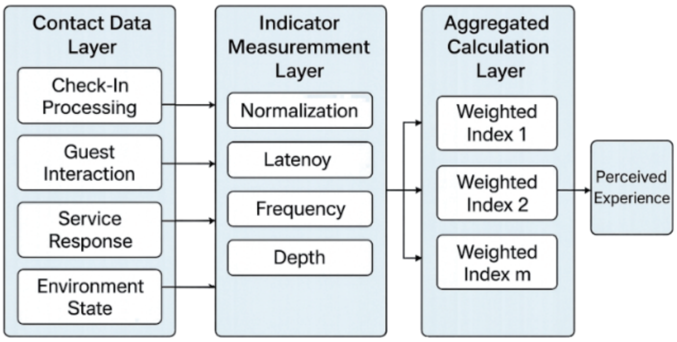

Figure 2. Schematic diagram of the overall structure of the experience perception model.

4.2. Intelligent optimization strategy for service nodes

The intelligent optimization of service nodes is centered on process decomposition, parameter reconfiguration, and trigger mechanism reinforcement. In the accommodation node, the system re-arranges the three steps of document verification, deposit, and room status in a parallel structure. The guest control node uses an intent recognition model, taking voice segments, touch sequence, and sensor status as combined inputs.

4.3. Full-journey experience enhancement mechanism

The end-to-end experience enhancement mechanism is built upon three core structures: journey segmentation, state tracking, and dynamic adjustment. The system first establishes journey segment indices across five phases: Pre-Arrival, Check-In, In-Room, Service, and Check-Out. It continuously monitors guest behavior trajectories in each segment through door lock logs, mobile access sequences, and in-room control status. Next, it configures node-level thresholds: delay threshold (T_i), operation depth threshold (D_i), and interaction density threshold (F_i). During operation, the system calculates journey deviation in real-time based on monitored values. The reinforcement module employs a journey experience offset function:

$$\Delta E = \sum_{i=1}^{k} \alpha_i \left(x_i - \theta_i\right) \tag{3}$$

Where: ΔE represents the journey experience deviation; x_i denotes the real-time monitoring metric at node i (e.g., processing delay, device operation count, service response interval); θ_i indicates the corresponding threshold; α_i signifies the node weight; k represents the number of journey nodes. After each offset calculation, the system triggers compensation strategies such as automatically pushing processing guidance, adjusting passenger control scenarios, or accelerating work order forwarding. Compensation execution status is written into the journey buffer to enable continuous adjustment across journey segments. **Figure 3** illustrates the structured interconnection between journey node monitoring, deviation calculation, and compensation strategies.

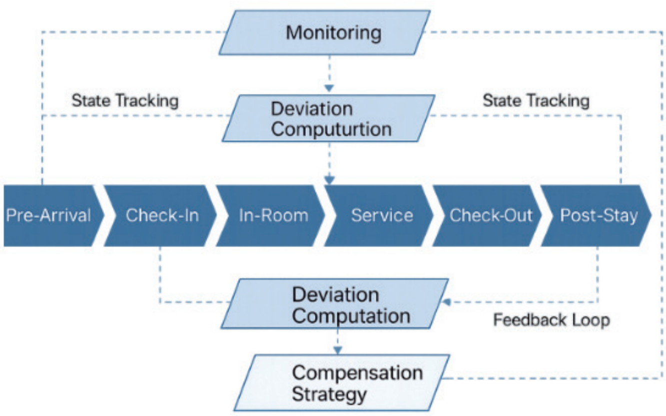

Figure 3. Customer journey full-process experience enhancement mechanism flowchart.

5. Application validation and implementation strategy for path enhancement

5.1. Metric system construction and evaluation methodology

The metric system is built around structured layering and quantifiable computability, forming an executable evaluation framework through three steps: dimension decomposition, metric selection, and data mapping. The system establishes a primary structure across four dimensions: processing efficiency, interaction stability, device operational quality, and response timeliness.

5.2. Validation in typical hotel scenarios

Validation focuses on three key pathways—Check-in, guest control, and service response—To quantitatively compare system performance characteristics across different operational nodes. The check-in pathway emphasizes document recognition latency, room status write success rate, and terminal call intensity. The guest control pathway monitors command execution delay, feedback consistency, and device status deviation.

Table 1. Comparison table of verification metrics for typical scenarios.

Metric Category	Specific Metric	Data Source	Scenario A (Control)	Scenario B (Experimental)
Check-in Processing	Document Recognition Latency (ms)	Front Desk Recognition Log	820	410
	Room Status Write Success Rate (%)	PMS Interface Log	92.4	98.7
	Self-service terminal invocation count (times/hour)	Terminal Monitoring	136	189
Guest room control	Command Execution Delay (ms)	Guest Control Controller	240	115
	Status Feedback Consistency Rate (%)	Device Data Transmission	88.1	95.6
	Equipment Status Deviations (times/day)	Abnormal Event Log	14	6
Service Response	Work Order Dispatch Duration (s)	Dispatch System	63	28
	Work Order Closure Duration (min)	Service Log	18.2	10.4
	Technician Travel Distance (m/ticket)	Positioning System	146	92

Data results indicate that the experimental group demonstrated shorter operational latency and higher execution consistency across all three links—Processing, customer control, and response—Suggesting that the intelligent processing capabilities of key nodes exhibit stable quantitative advantages across multiple scenarios.

5.3. Implementation strategy

During architecture deployment, existing hotel PMS, guest control hosts, and service ticket platforms serve as baselines. Access capabilities, interface bandwidth, and device protocols undergo item-by-item verification, with edge node concurrency thresholds and caching strategies configured based on operational scale. During parameter migration, experience perception models, node threshold tables, and dispatch strategy matrices are regenerated into customized parameter packages aligned with each store's guest demographic structure.

6. Conclusion

Based on the experience perception model, node-level intelligent strategies, and multi-scenario validation framework, key factors influencing customer experience are systematically revealed, while the stability and scalability of the technical architecture are clearly defined. Future research may focus on deep technologies such as multimodal behavior recognition, cross-store parameter adaptation, and device status prediction.

References

[1] The influence of the perception of human–robot interaction on customer value co-creation intention: a case study of hotel service robots[J]. Journal of Hospitality and Tourism Technology, 2025, 16(5): 1004-1023. DOI:10.1108/JHTT-05-2024-0293.

[2] Kolesárová S, Šenková A, Kormaníková E, et al. The Quality of Hilton Hotel Services in the V4 Countries: The Impact of the Platform on Ratings and Customer Satisfaction[J]. Tourism and Hospitality, 2025, 6(4): 169-169. DOI:10.3390/TOURHOSP6040169.

[3] Jiang X, Luo T. From negative feedback to actionable insights: a computational analysis of service robot adoption challenges in Chinese hotels[J]. Engineering Management in Production and Services, 2025, 17(3):1-26.

DOI:10.2478/EMJ-2025-0017.

[4] Luo Z, Weinland J, Okumus F. Antecedents of Self-Efficacy and Task Performance in Hotel Services: The Case of Internship Students in China[J]. Journal of Hospitality & Tourism Education, 2025, 37(3): 265-275. DOI:10.1080/10963758.2023.2295548. 2023.2295548.

[5] Nie X R, Hu H J, Zhang Y H, et al. Classifying Quality Attributes of Hotel Services Considering Review Characteristics and Semantic Consistency: A Review-Driven IPA[J].Journal of Quality Assurance in Hospitality & Tourism,2025,26(3):627-656.DOI:10.1080/1528008X.2023.2259610.