



Artificial Intelligence and Service Innovation in Hospitality: An Umbrella Review

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Article Info :

Received:

18-09-2026

Revised:

12-10-2026

Accepted:

22-10-2026

Abstract

Artificial intelligence is increasingly reshaping hospitality through customer-facing applications, operational redesign, workforce adaptation, and new governance demands. This umbrella review synthesized seven major review-level studies published between 2022 and 2026 and interpreted them alongside representative empirical and conceptual research in hospitality and tourism. The findings show that customer acceptance is consistently associated with performance value, attitude, trust, service fit, and recoverable interaction, while operational benefits depend on appropriate task allocation, data quality, system integration, and human–technology complementarity. Employee outcomes remain mixed because AI can reduce repetitive work and support decision-making but may also increase insecurity, learning demands, troubleshooting burdens, and technology-related stress. Governance emerged as a decisive condition for sustainable implementation, particularly regarding privacy, transparency, fairness, accountability, vendor control, bias testing, and human escalation. The review concludes that hospitality organizations create durable service value when AI is deployed as an integrated service capability rather than as isolated automation, linking customer experience, operational resilience, workforce sustainability, and responsible governance within a coherent service-innovation architecture. This perspective provides a foundation for evaluating AI investments and guiding future multi-stakeholder hospitality research across settings.

Keywords: artificial intelligence, hospitality, human–technology complementarity, responsible governance, service innovation.



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INTRODUCTION

Artificial intelligence (AI) has developed from a specialized technological application into a strategic capability that increasingly shapes service delivery, managerial decision-making, and customer experience in the hospitality industry. Hotels and tourism organizations now employ recommendation systems, revenue-management algorithms, conversational agents, predictive analytics, computer vision, generative AI, and service robots to improve the efficiency and responsiveness of their operations. This expansion reflects the capacity of AI to support prediction, classification, personalization, and operational decision-making across multiple hospitality functions (Doborjeh et al., 2022; Dwivedi et al., 2024). Consequently, the central managerial concern has shifted from whether AI should be adopted toward understanding how intelligent technologies can be integrated into service systems without diminishing the relational and experiential qualities that characterize hospitality.

The growing use of AI is particularly significant because hospitality services combine information-intensive processes with high expectations of responsiveness, personalization, trust, and human interaction. Customer-facing technologies can reduce waiting time, provide personalized recommendations, facilitate reservations, and support service transactions, yet their acceptance depends on more than technical functionality alone. Previous studies indicate that perceived usefulness, attitudes toward technology, trust, service compatibility, and the broader context of service encounters influence customer responses to AI-enabled systems (Gursoy et al., 2019; Goel et al., 2022; Begum et al., 2025). These findings suggest that technological sophistication does not automatically create customer value because intelligent systems must correspond with the functional and emotional requirements of specific hospitality encounters.

AI adoption also produces substantial changes in the operational architecture through which hospitality services are designed and delivered. The distinction between mechanical, thinking, and feeling intelligence demonstrates that different service activities require different combinations of automation and human judgment, making task–technology alignment an important element of service innovation (Huang & Rust, 2018, 2021). Digital technologies and service robots can contribute to cost-effective service excellence when automated capabilities are integrated with appropriate human roles, data resources, and recovery mechanisms rather than being implemented as isolated technological solutions (Wirtz et al., 2023). Hospitality organizations must therefore approach AI as an instrument of service-system redesign involving the reallocation of tasks, decisions, information flows, and responsibilities among employees, customers, and intelligent technologies.

The implications of this transformation extend directly to employees because AI alters job structures, workplace expectations, and patterns of human–technology collaboration. Research concerning hospitality employees indicates that intelligent technologies can reduce repetitive activities and strengthen operational support, but they can also generate job insecurity, learning demands, troubleshooting responsibilities, and technology-related stress (Li et al., 2019; Xu et al., 2023). The Hospitality 5.0 perspective similarly emphasizes that technological innovation requires the coordinated restructuring of human and technological resources rather than simple labor substitution (Pillai et al., 2021). Effective service innovation therefore depends on complementary arrangements in which employees retain responsibility for empathy, contextual judgment, complex communication, and service recovery while intelligent systems perform tasks for which automation offers clear operational advantages.

The rapid expansion of AI further introduces governance challenges related to trust, privacy, accountability, fairness, reliability, and control over automated decisions. Hospitality organizations frequently process customer identity, payment, location, behavioral, and preference data, which means that AI-enabled personalization can simultaneously increase service value and create new forms of informational risk. Studies of intelligent automation have demonstrated that trust depends on perceived competence, integrity, transparency, and controllability, while broader hospitality research highlights ethical concerns associated with labor displacement, technological dependency, and organizational responsibility (Tussyadiah et al., 2020; Zeng et al., 2020; Huang et al., 2022). These governance issues have become more consequential with generative AI because conversational systems may produce persuasive outputs even when their factual basis, data provenance, or decision logic remains uncertain (Dwivedi et al., 2024).

Despite the rapid development of this research field, the scholarly evidence remains distributed across several partially separated domains and analytical perspectives. Existing reviews have examined consumer adoption of AI and robotics, employee interaction with service robots, technological applications, customer experience, and the broader development of service-robot scholarship using different populations, constructs, and review methodologies (Goel et al., 2022; Chen et al., 2023; Mukherjee et al., 2023; Xu et al., 2023). More recent synthesis has extended this literature through meta-analysis of hotel service-robot acceptance and systematic assessment of robotics applications and consequences in hospitality and tourism (Begum et al., 2025; Cheong et al., 2026). However, differences in research scope and units of analysis make it difficult to determine how customer outcomes, operational transformation, workforce adaptation, and governance mechanisms collectively contribute to sustainable AI-enabled service innovation.

This fragmentation reveals an important research gap because individual review traditions generally explain only one component of the broader intelligent hospitality system. Customer-adoption reviews provide limited explanation of employee adaptation, workforce-focused reviews cannot fully account for customer experience and governance, and technologically oriented syntheses may insufficiently address the organizational conditions under which AI capabilities generate service value. An umbrella-review approach is appropriate when multiple mature reviews address overlapping phenomena through different theoretical and methodological frameworks because it enables higher-order comparison of recurring findings, inconsistencies, and knowledge gaps (Snyder, 2019; Page et al., 2021; García-Madurga & Grilló-Méndez, 2023). A systematic synthesis across these research streams can therefore clarify the mechanisms through which AI becomes an integrated organizational capability rather than merely a collection of independent technological applications.

Accordingly, this study conducts an umbrella review to synthesize review-level evidence concerning artificial intelligence, intelligent service technologies, and service robots within hospitality and tourism. The analysis focuses on three interconnected questions concerning recurring customer-value mechanisms, changes in operational and employee arrangements, and governance conditions required for trustworthy and strategically coherent AI-enabled services. Building on smart-service and human–technology perspectives, the study develops an integrated architecture connecting customer value, operational redesign, workforce adaptation, and responsible governance (Kabadayi et al., 2019; Wirtz et al., 2018, 2023). By integrating evidence that has previously been examined within separate research streams, the study seeks to strengthen the theoretical understanding of AI-driven service innovation and provide a structured foundation for hospitality organizations seeking to manage intelligent technologies as coordinated service capabilities.

RESEARCH METHODS

This study employed an umbrella-review design to synthesize review-level evidence concerning artificial intelligence, service robots, and intelligent service systems in the hospitality and tourism sectors. The core evidence consisted of seven peer-reviewed systematic reviews, bibliometric reviews, and meta-analyses published between 2022 and 2026, namely Doborjeh et al. (2022), Goel et al. (2022), Chen et al. (2023), Mukherjee et al. (2023), Xu et al. (2023), Begum et al. (2025), and Cheong et al. (2026). These studies were selected because they applied identifiable review procedures, reported traceable primary-study corpora, and represented complementary perspectives involving customer behavior, technological applications, service operations, employee experiences, and organizational consequences. Because substantial heterogeneity existed across constructs, samples, search periods, research designs, and overlapping primary studies, the review did not statistically combine effect sizes across the selected reviews but instead applied a structured qualitative synthesis consistent with evidence-synthesis principles proposed by Snyder (2019) and Page et al. (2021).

The analytical procedure involved coding each review according to five domains: customer acceptance and experience, service operations and design, employee outcomes and human–technology collaboration, trust and ethical risk, and governance or sustainability. A domain was classified as present only when it constituted a substantive component of the findings, conceptual framework, or future research agenda of the reviewed study, while representative empirical and conceptual literature was subsequently used to explain mechanisms identified across the review-level evidence. Review characteristics, corpus sizes, methodological approaches, and recurring themes were extracted and compared descriptively, and cross-review convergence was identified when similar management mechanisms emerged across studies with different scopes and methodological orientations. The final synthesis was configurational rather than causal, meaning that thematic recurrence was used to identify relationships among customer value, operational redesign, workforce adaptation, and responsible governance without interpreting citation frequency or thematic frequency as evidence of causal magnitude.

RESULTS AND DISCUSSION

Customer Value, Acceptance, and Intelligent Service Design

The synthesis indicates that customer value and technology acceptance constitute the most extensively developed dimensions of artificial intelligence research in hospitality and tourism. Across the core review-level studies, intelligent technologies are generally evaluated according to their capacity to improve service usefulness, convenience, personalization, responsiveness, and overall experience rather than according to technological novelty alone. Goel et al. (2022) demonstrate that consumer adoption of AI and robotics is shaped by individual, service-related, technical, social-cultural, and infrastructural factors, while Begum et al. (2025) identify multiple significant antecedents of hotel service-robot acceptance. These findings suggest that hospitality customers evaluate AI through the practical value generated within a particular service encounter rather than treating intelligent systems as a homogeneous technology category.

Performance expectancy emerges as an especially important mechanism because customers are more likely to accept intelligent technologies when they perceive clear improvements in service outcomes. The meta-analysis conducted by Begum et al. (2025), which synthesized 56 studies, confirms that customer acceptance of hotel service robots is associated with several antecedents and identifies

performance expectancy and attitude among the particularly important relationships. This pattern corresponds with Gursoy et al. (2019), who demonstrate that acceptance of artificially intelligent service devices reflects both utilitarian judgments and affective responses. Hospitality managers should therefore evaluate AI applications in terms of whether customers perceive tangible service improvements, because technical sophistication without recognizable functional benefits may produce weak behavioral acceptance.

Customer attitudes also indicate that efficiency alone cannot adequately explain successful AI adoption in hospitality settings. An automated check-in system may shorten processing time, yet customers can still evaluate it negatively when interaction is difficult, assistance is unavailable, or technology appears inconsistent with the experiential character of the service. Gursoy et al. (2019) show that emotional and cognitive evaluations jointly influence acceptance, while Grundner and Neuhofer (2021) highlight both positive and negative possibilities arising from AI-mediated tourism experiences. The implication is that customer value must be understood as a multidimensional construct combining functional efficiency, experiential quality, perceived control, and compatibility between technological intervention and the expected nature of hospitality.

Trust represents another central mechanism linking technical performance with continued customer acceptance. Tussyadiah et al. (2020) conceptualize trust in intelligent service robots as multidimensional, showing that customers must form judgments about whether an automated system is sufficiently reliable and appropriate for service interaction. Park (2020) further demonstrates that trust surrounding tourism service robots is multifaceted, meaning that confidence may involve the technological system, the service organization, and the institutional arrangements supporting its use. For hospitality organizations, trust should consequently be treated as an operational characteristic created through accurate performance, transparent information, visible human assistance, and clear mechanisms for correcting automated errors.

The role of anthropomorphic and socially interactive design is similarly dependent on the context in which an intelligent system operates. Wirtz et al. (2018) explain that frontline service robots introduce forms of automated social presence, although human-like appearance and communication do not necessarily guarantee stronger customer evaluations. Belanche et al. (2021) distinguish between service-enhancement and cost-reduction logics in tourism and hospitality robotics, demonstrating that customers can interpret the same technology differently depending on its perceived function within the encounter. Excessive anthropomorphic cues may therefore increase expectations regarding empathy, conversational competence, and situational understanding beyond the actual capability of the system, making alignment between visible design and functional competence essential.

Table 1. Review-Level Evidence Relevant to Customer Value and AI Acceptance in Hospitality

Review	Evidence Base Reported	Main Scope	Relevance to Customer Value and Acceptance
Doborjeh et al. (2022)	Systematic review	AI methods and hospitality/tourism applications	Shows the breadth of AI applications supporting prediction, personalization, classification, and service decision-making
Goel et al. (2022)	Literature published during 2011–2020	Consumer adoption of AI and robotics	Identifies individual, service, technological, social-cultural, and infrastructural influences on adoption
Chen et al. (2023)	284 studies	Service-robot research mapping	Identifies customer-related research as a major research front within hospitality and tourism robotics
Mukherjee et al. (2023)	118 articles	Service robots and future research	Demonstrates fragmentation of service-robot research across multiple themes and constructs
Xu et al. (2023)	Systematic review	Hospitality employees working with robots	Provides complementary evidence that employee–technology arrangements

			can influence customer-facing service delivery
Begum et al. (2025)	56 studies	Meta-analysis of hotel service-robot acceptance	Identifies significant antecedents of acceptance, including particularly important relationships involving performance expectancy and attitude
Cheong et al. (2026)	121 articles	Applications and consequences of service robots	Demonstrates the diversity of customer, operational, and organizational outcomes associated with robot applications

Source: Authors' synthesis based on Doborjeh et al. (2022), Goel et al. (2022), Chen et al. (2023), Mukherjee et al. (2023), Xu et al. (2023), Begum et al. (2025), and Cheong et al. (2026).

The comparative evidence in Table 1 reveals considerable differences in corpus size and analytical emphasis across the principal review studies. Chen et al. (2023) analyze 284 studies, Mukherjee et al. (2023) synthesize 118 articles, Cheong et al. (2026) cover 121 articles, and Begum et al. (2025) quantitatively synthesize 56 studies specifically concerned with hotel service-robot acceptance. Rather than weakening the evidence base, this variation demonstrates that customer acceptance is investigated through multiple concepts including attitude, behavioral intention, trust, perceived usefulness, experience, and service performance. Interpretation should therefore focus on recurring mechanisms across studies instead of assuming that these different customer-response constructs measure exactly the same phenomenon.

Evidence derived from actual customer experiences further strengthens the argument that intelligent-service value is created through integrated service performance rather than through technology in isolation. Mariani and Borghi (2021) analyzed online reviews from 19 international hotels using service robots and demonstrated that customers incorporate mechanical AI into their broader evaluations of hospitality encounters. Online reviews are particularly useful because they capture customer reactions following actual service experiences instead of relying exclusively on hypothetical adoption intentions. Such evidence indicates that customer perceptions of AI reflect the combined influence of technological functionality, employee support, service recovery, novelty, and the wider quality of the hospitality experience.

Customer value must also be examined across the complete travel and hospitality journey because contemporary AI systems increasingly operate at multiple interconnected touchpoints. Tussyadiah (2020) explains that automation can mediate tourism activities ranging from information search and booking to on-site encounters, while Ghesh et al. (2024) show that AI-enabled customer experience involves multiple dimensions of value creation and risk. Customers may consequently interact with recommendation algorithms, conversational agents, automated check-in systems, service robots, and post-stay communication technologies during a single journey. Effective intelligent-service design therefore requires consistency in customer identity, preferences, information quality, consent, and service recovery across multiple digital and physical interfaces.

Generative artificial intelligence further expands the range of customer-facing applications by enabling flexible conversational interaction and rapid generation of service information. Dwivedi et al. (2024) identify applications of generative AI in hospitality and tourism involving customer communication, recommendation, content development, and knowledge-related activities, while simultaneously emphasizing substantial implementation challenges. Unlike conventional rule-based systems, generative AI can respond to a wider variety of requests, but its ability to generate fluent responses also creates risks when inaccurate information is presented with apparent confidence. Hospitality organizations should therefore evaluate generative AI not merely by response speed or conversational fluency but also through accuracy, source reliability, escalation mechanisms, and its ability to support recoverable customer service.

The accumulated evidence ultimately suggests that customer-facing AI should be managed as a portfolio of differentiated service encounters rather than as a strategy of maximizing automation. Huang and Rust (2018) distinguish mechanical, thinking, and feeling intelligence, providing a useful basis for allocating standardized, analytical, and relational tasks according to the capabilities required by each service activity. Their later strategic framework further demonstrates that AI can support

personalization and customer relationship processes when technology is aligned with organizational and marketing objectives (Huang & Rust, 2021). Customer value is therefore most likely to emerge when hospitality organizations match the type of intelligence, customer need, service context, human involvement, and recovery architecture instead of assuming that greater technological visibility necessarily represents superior service innovation.

Operational Redesign, Workforce Adaptation, and Human–Technology Complementarity

The synthesis indicates that artificial intelligence generates organizational value in hospitality primarily when it changes the structure of service processes rather than merely replacing isolated manual activities. Doborjeh et al. (2022) show that AI applications in hospitality and tourism encompass prediction, classification, personalization, and operational decision support, illustrating the diversity of tasks that can be technologically mediated. This broad technological repertoire requires organizations to reconsider how information, decisions, and service responsibilities are distributed among employees, customers, software systems, and physical service technologies. Operational innovation should therefore be interpreted as a process of service-system reconfiguration in which AI capabilities are integrated with organizational routines rather than treated as independent technological additions (Doborjeh et al., 2022; Wirtz et al., 2023).

The operational benefits of AI are particularly visible when intelligent technologies are directed toward identifiable service bottlenecks. Wirtz et al. (2023) argue that digital service technologies, AI, and service robots can contribute to cost-effective service excellence when organizations combine technological efficiency with appropriate service-quality objectives. In hospitality settings, such opportunities may involve reducing response latency, improving forecasting, automating repetitive information requests, supporting multilingual communication, or coordinating standardized operational activities. Technology-first adoption is consequently less defensible than problem-oriented adoption because measurable baseline conditions allow managers to assess whether the introduction of AI produces meaningful improvements in process performance (Wirtz et al., 2023).

Task allocation represents a central mechanism through which AI changes hospitality operations. Huang and Rust (2018) distinguish mechanical, thinking, and feeling intelligence, implying that standardized physical or informational activities are more suitable for automation than encounters requiring emotional sensitivity, ethical judgment, or complex improvisation. Ivanov and Webster (2019) similarly conceptualize robots, artificial intelligence, and service automation as a portfolio of technologies whose value depends on the characteristics of the task, customer acceptance, and organizational configuration. The resulting managerial challenge is therefore not to maximize the quantity of automated tasks but to allocate activities according to the comparative capabilities of intelligent systems and human employees (Huang & Rust, 2018; Ivanov & Webster, 2019).

Employee consequences constitute an essential dimension of this operational transformation because technological adoption changes both the content and organization of hospitality work. Li et al. (2019) demonstrate that employee awareness of artificial intelligence and robotics can influence job-related attitudes, particularly when technological developments generate uncertainty concerning future employment roles. Xu et al. (2023) similarly synthesize hospitality employee research showing that human–robot interaction involves beneficial and adverse consequences, including collaboration opportunities, job insecurity, well-being concerns, and changes in willingness to work with service robots. These findings demonstrate that workforce responses emerge not only after direct technological exposure but also through employees' expectations concerning how AI will alter organizational priorities and employment arrangements.

The dual character of AI as both a job resource and a job demand helps explain why similar technologies may generate different workforce outcomes across hospitality organizations. Intelligent systems can reduce repetitive workloads, support access to information, and assist employees in standardized decision processes, yet they can simultaneously increase learning requirements, monitoring burdens, troubleshooting duties, and responsibility for technological failures (Xu et al., 2023). Pillai et al. (2021) conceptualize Hospitality 5.0 as a model in which human and technological capabilities are reorganized within post-pandemic hospitality operations, emphasizing integration rather than straightforward labor replacement. Successful workforce adaptation therefore depends on whether organizational redesign allows technology to augment employee capability without transferring excessive operational risk and invisible support work to frontline personnel.

Table 2. Evidence on Operational Redesign and Workforce Adaptation in AI-Enabled Hospitality

Study	Evidence/Analytical Focus	Operational Workforce Contribution	or Management Implication
Doborjeh et al. (2022)	Systematic review of AI methods and applications	AI supports prediction, classification, personalization, and decision support	AI deployment should be integrated across operational processes rather than isolated by device
Huang & Rust (2018)	Conceptual service-intelligence framework	Distinguishes mechanical, thinking, and feeling intelligence	Allocate tasks according to the type of intelligence required
Li et al. (2019)	Hotel employee AI and robotics awareness	Links technological awareness with employee job-related outcomes	Communication and organizational support should accompany technological change
Pillai et al. (2021)	Hospitality 5.0 operational framework	Explains technology-enabled restructuring of hospitality operations	Human and technological resources should be designed as complementary capabilities
Xu et al. (2023)	Systematic review of hospitality employees working with robots	Identifies beneficial and adverse employee outcomes	Workforce adaptation requires training, participation, and attention to job insecurity and well-being
Wirtz et al. (2023)	Strategic analysis of digital service technologies	Links automation with pathways toward cost-effective service excellence	Technology investment should be tied to measurable service and efficiency objectives
Kabadayi et al. (2019)	Smart-service ecosystem framework	Connects customers, technologies, providers, and service context	Operational performance depends on coordination among multiple service-system components

Source: Authors' synthesis based on the cited studies.

Human–technology collaboration becomes particularly important when employees and intelligent systems perform interdependent rather than independent activities. Seyitoğlu and Ivanov (2021) emphasize that service robots should be designed around the complementary strengths of technological and human actors, especially when robots are introduced into customer-facing hospitality environments. Machines provide consistency, endurance, rapid information retrieval, and standardized execution, whereas employees retain stronger capacities for empathy, improvisation, contextual interpretation, and complex service recovery. Effective collaboration therefore requires explicit process boundaries identifying which actor performs routine operations, handles exceptions, authorizes overrides, resolves technical failures, and communicates with dissatisfied customers (Seyitoğlu & Ivanov, 2021).

Historical discussion of service robotics further supports the argument that technological adoption requires role redesign rather than direct employee substitution. Bowen and Morosan (2018) anticipated that the increasing presence of robots in hospitality would transform existing employment structures and require organizations to reconsider the nature of frontline work. This prediction is consistent with later evidence showing that employees increasingly interact with intelligent systems as supervisors, exception handlers, information interpreters, and recovery agents rather than merely as traditional service providers (Xu et al., 2023). Workforce planning should consequently include the new forms of labor created around automated services, because reductions in routine work may be accompanied by increases in coordination, oversight, and technological support responsibilities.

Data quality represents another critical operational condition because AI performance depends on the information infrastructure surrounding intelligent applications. Huang et al. (2022) emphasize that assessments of AI in hospitality and tourism must connect technological characteristics with theoretical and managerial conditions rather than evaluate computational capabilities in isolation. Recommendation engines, forecasting systems, and conversational applications can reproduce or amplify errors when they rely on fragmented customer records, outdated service policies, inconsistent property-management information, or poorly structured operational databases. Organizations therefore need governance of data ownership, access, updating, validation, and interoperability as part of operational service design rather than treating data management as an exclusively technical responsibility (Huang et al., 2022).

The smart-service perspective further demonstrates that realized AI value depends on coordination across the broader service ecosystem. Kabadayi et al. (2019) conceptualize smart hospitality experiences as interactions among customers, service providers, technology, and contextual conditions, meaning that technological performance alone cannot explain service outcomes. Network reliability, system interoperability, employee capability, customer digital readiness, interface design, and exception-handling routines can either facilitate or constrain the translation of AI capability into practical service value. Operational readiness should therefore be assessed at the ecosystem level because technically functional AI may still fail when the surrounding organizational and service infrastructure is poorly integrated (Kabadayi et al., 2019).

The evidence also indicates that workforce considerations remain less developed than customer-oriented research despite their strategic importance to AI-enabled hospitality. Chen et al. (2023), based on an analysis of 284 studies, identify multiple research fronts in service-robot scholarship, while Xu et al. (2023) specifically demonstrate the need for deeper understanding of hospitality employees working alongside robots. This imbalance can encourage organizations to monitor customer acceptance and financial efficiency while overlooking training requirements, technology-related stress, escalation burden, and changes in employee autonomy. Evaluation systems should therefore combine customer and operational indicators with workforce measures so that apparent productivity gains are not achieved through unsustainable increases in hidden employee workload (Chen et al., 2023; Xu et al., 2023).

Taken together, these findings demonstrate that AI-enabled operational innovation depends on complementarity among technology, employees, organizational processes, and service infrastructure. Wirtz et al. (2023) emphasize strategic pathways in which digital technologies contribute to service excellence, while Huang and Rust (2018) provide a task-based logic for determining where intelligent systems and human capabilities can create the greatest comparative value. Hospitality organizations are therefore more likely to achieve durable operational improvements when they begin with clearly defined service problems, redesign workflows, prepare employees for changed responsibilities, maintain reliable data, and establish explicit procedures for technological exceptions. The central managerial principle is not automation intensity but coordinated human–technology configuration, in which intelligent systems increase operational capability while preserving the human judgment and relational competence required by complex hospitality encounters (Huang & Rust, 2018; Wirtz et al., 2023).

Responsible Governance, Risk Management, and Sustainable AI Service Innovation

The synthesis demonstrates that responsible governance is not an external constraint on hospitality innovation but a condition determining whether artificial intelligence can remain economically and socially usable as its deployment expands. Automated systems may influence pricing, recommendations, access to services, employee scheduling, customer communication, and the allocation of organizational resources, thereby extending technological decisions into areas traditionally managed through human discretion. Zeng et al. (2020) emphasize that the movement from high-touch toward high-tech tourism creates important social and ethical consequences, while Tussyadiah et al. (2020) demonstrate that trust in intelligent service robots depends partly on perceptions of competence, integrity, and control. Hospitality organizations therefore require explicit governance structures defining authorized applications, acceptable data use, human oversight, escalation responsibilities, and accountability for adverse automated outcomes.

Privacy represents one of the most prominent governance concerns because personalization depends heavily on the collection and interpretation of customer information. Travel and hospitality

data can reveal location, purchasing behavior, accommodation preferences, dietary requirements, companions, mobility needs, and other attributes whose combined use may exceed customers' original expectations. Ghesh et al. (2024) identify trust and risk as important dimensions of AI-enabled tourism customer experiences, while Grundner and Neuhofer (2021) describe both beneficial and problematic scenarios emerging from increasingly intelligent destination experiences. Responsible personalization should consequently be built around purpose limitation, meaningful consent, data minimization, transparent reuse policies, and practical opportunities for customers to control how their information is processed.

Accountability becomes more complicated when AI infrastructure is supplied by external technology vendors rather than developed internally by hospitality organizations. Outsourcing model hosting, conversational systems, reservation technologies, or analytical services does not eliminate the hospitality firm's responsibility for customer-facing consequences, particularly when automated systems affect service quality or decision-making. Huang et al. (2022) argue that AI assessment should integrate technological attributes with organizational and managerial conditions, while Wirtz et al. (2023) emphasize that digital service technologies require deliberate strategic design rather than independent technical implementation. Vendor governance should therefore include service-performance standards, data-retention conditions, model-update documentation, incident reporting, subcontractor transparency, audit rights, and exit procedures capable of protecting service continuity.

Algorithmic fairness is similarly important because standardized automation does not necessarily guarantee equal treatment across heterogeneous customer groups. Seyitoğlu and Ivanov (2023) argue that service robots may reduce some forms of interpersonal discrimination while simultaneously introducing or reproducing other forms through technological design and implementation. Automated language recognition, recommendation systems, facial analysis, or conversational technologies may perform differently across accents, age groups, cultural backgrounds, disabilities, or unfamiliar interaction patterns, meaning that average accuracy can conceal unequal customer experiences. Responsible hospitality AI should consequently be tested across diverse service scenarios and user groups, while mechanisms for human intervention should remain available when automated outputs are inaccurate or inappropriate (Seyitoğlu & Ivanov, 2023; Park, 2020).

Service recovery constitutes a particularly important operational expression of responsible AI because customers must be able to challenge, correct, or escape a failed automated interaction. Gursoy et al. (2019) show that attitudes and perceived value shape customer acceptance of intelligent devices, while Begum et al. (2025) confirm through a meta-analysis of 56 studies that hotel service-robot acceptance depends on multiple antecedents rather than technological functionality alone. Failures become especially damaging when customers cannot identify who is responsible, repeat information across automated and human channels, or obtain timely correction of an incorrect recommendation or transaction. Effective recovery architecture should therefore preserve interaction context, allow visible transfer to employees, provide authority for human override, and document incidents for subsequent improvement of the intelligent system (Tussyadiah et al., 2020).

Table 3. Selected Review-Level Evidence Relevant to Responsible AI Governance in Hospitality

Review	Reported Evidence Base	Main Scope	Analytical	Governance Relevance
Chen et al. (2023)	284 studies	Service-robot research in tourism and hospitality		Demonstrates the scale and thematic diversity of robot-related research requiring integrated organizational governance
Mukherjee et al. (2023)	118 articles	Service robots and future research directions		Identifies multiple technological and organizational themes that extend beyond simple consumer adoption
Begum et al. (2025)	56 studies	Meta-analysis of hotel service-robot acceptance		Shows that acceptance reflects multiple antecedents, supporting governance attention to trust, attitude, performance, and customer response

Cheong et al. (2026)	121 articles	Applications and consequences of service robots	and Demonstrates that robotic applications generate customer, operational, and organizational consequences across hospitality settings
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Source: Authors' synthesis based on Chen et al. (2023), Mukherjee et al. (2023), Begum et al. (2025), and Cheong et al. (2026).

Sustainability introduces another governance dimension because technological efficiency should not automatically be interpreted as environmental or social sustainability. Intelligent forecasting, automated scheduling, and digitally controlled operations may reduce resource waste, but AI infrastructure also requires computing capacity, hardware, energy, and organizational resources whose impacts should be considered within broader sustainability assessments. Ivanov et al. (2023) connect robotics in tourism with the Sustainable Development Goals and emphasize evaluation beyond narrow measures of productivity, while García-Madurga and Grilló-Méndez (2023) show that the literature on AI in tourism increasingly addresses strategic and societal consequences. Hospitality firms should therefore substantiate sustainability claims with measurable resource effects and clearly defined boundaries rather than presenting digitalization itself as evidence of sustainable performance.

Generative AI intensifies governance concerns because its conversational flexibility increases both potential service value and the possibility of inaccurate or unverifiable output. Dwivedi et al. (2024) identify customer communication, content generation, recommendation, and knowledge support among the important hospitality applications of generative AI, while also emphasizing challenges associated with responsible implementation. In contrast with fixed-response systems, generative applications can formulate plausible answers beyond predetermined scripts, meaning that factual errors concerning reservations, accessibility, cancellation conditions, destination information, or service policies may appear authoritative to customers. Governance must therefore address retrieval quality, source validation, model monitoring, restricted decision domains, human escalation, and documentation of consequential automated outputs (Dwivedi et al., 2024; Doborjeh et al., 2022).

The findings further indicate that responsible AI requires integration among customer value, operational performance, workforce adaptation, and governance rather than independent management of these dimensions. Kabadayi et al. (2019) conceptualize smart service as an ecosystem involving technologies, customers, providers, and contextual conditions, while Wirtz et al. (2018) emphasize the organizational implications of placing service robots in frontline encounters. An intelligent system that improves response speed but creates excessive employee recovery work, weakens privacy protection, or prevents customers from obtaining human support cannot be considered fully successful from a service-innovation perspective. Responsible service architecture should therefore evaluate technological performance together with customer experience, process resilience, employee workload, accountability, and the availability of meaningful human intervention (Kabadayi et al., 2019; Huang & Rust, 2021).

The review evidence also identifies a need for future research to move beyond isolated technology-acceptance models toward longitudinal and multi-stakeholder analysis. Chen et al. (2023) map a large service-robot literature of 284 studies, Mukherjee et al. (2023) review 118 articles, and Cheong et al. (2026) synthesize 121 articles, yet the diversity of constructs and research designs limits direct comparison of customer, employee, operational, and governance outcomes. Xu et al. (2023) additionally demonstrate the importance of employee-centered research, suggesting that technological performance should be examined alongside job design, well-being, training, and human-robot collaboration. Consistent with structured evidence-synthesis principles discussed by Snyder (2019) and Page et al. (2021), future studies should connect customer outcomes, operational records, employee conditions, financial indicators, and governance incidents within comparable organizational and temporal settings.

Overall, the evidence indicates that responsible AI service innovation depends on the ability of hospitality organizations to combine technological capability with transparent governance, recoverable service processes, inclusive design, workforce preparation, and measurable sustainability objectives. Trust is unlikely to remain stable when systems are opaque, difficult to challenge, or disconnected from human accountability, even when they initially improve convenience or operational efficiency (Tussyadiah et al., 2020; Ghesh et al., 2024). Similarly, productivity gains may prove unsustainable

when technological implementation creates unresolved discrimination, excessive employee burdens, data risks, or environmental costs that are excluded from performance evaluation (Zeng et al., 2020; Ivanov et al., 2023). Sustainable competitive value therefore arises not from maximum automation but from a governed service architecture in which AI capabilities remain reliable, accountable, contestable, complementary to employees, and demonstrably aligned with customer and organizational objectives (Wirtz et al., 2023; Cheong et al., 2026).

CONCLUSION

This umbrella review demonstrates that artificial intelligence creates meaningful value in hospitality when technological capabilities are integrated with customer experience, operational redesign, workforce adaptation, and responsible governance. Customer acceptance is primarily shaped by performance value, attitude, trust, service compatibility, and the availability of effective recovery mechanisms, while operational benefits depend on appropriate task allocation, reliable data, system integration, and human–technology complementarity. AI can reduce repetitive work and strengthen decision support, but poorly designed implementation may simultaneously increase employee insecurity, technological stress, learning requirements, and troubleshooting burdens. These findings confirm that hospitality innovation should not be evaluated according to the intensity of automation alone but according to the quality of the service system created around intelligent technologies.

Hospitality organizations should therefore begin AI implementation with clearly defined service problems and establish measurable objectives covering customer, operational, workforce, and governance outcomes. Responsible deployment requires transparent data practices, privacy protection, fairness testing, vendor accountability, human oversight, and accessible escalation procedures when automated services fail. Sustainable competitive value is most likely to emerge when AI complements employee capabilities while preserving human judgment, empathy, and responsibility in complex service encounters. Future research should employ longitudinal and multi-stakeholder designs that connect customer outcomes, operational records, employee conditions, financial performance, and governance incidents to determine which configurations of AI-enabled hospitality services generate durable organizational and societal value.

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