Leveraging AI to Enhance Productivity and Customer Experience in the Hospitality Sector

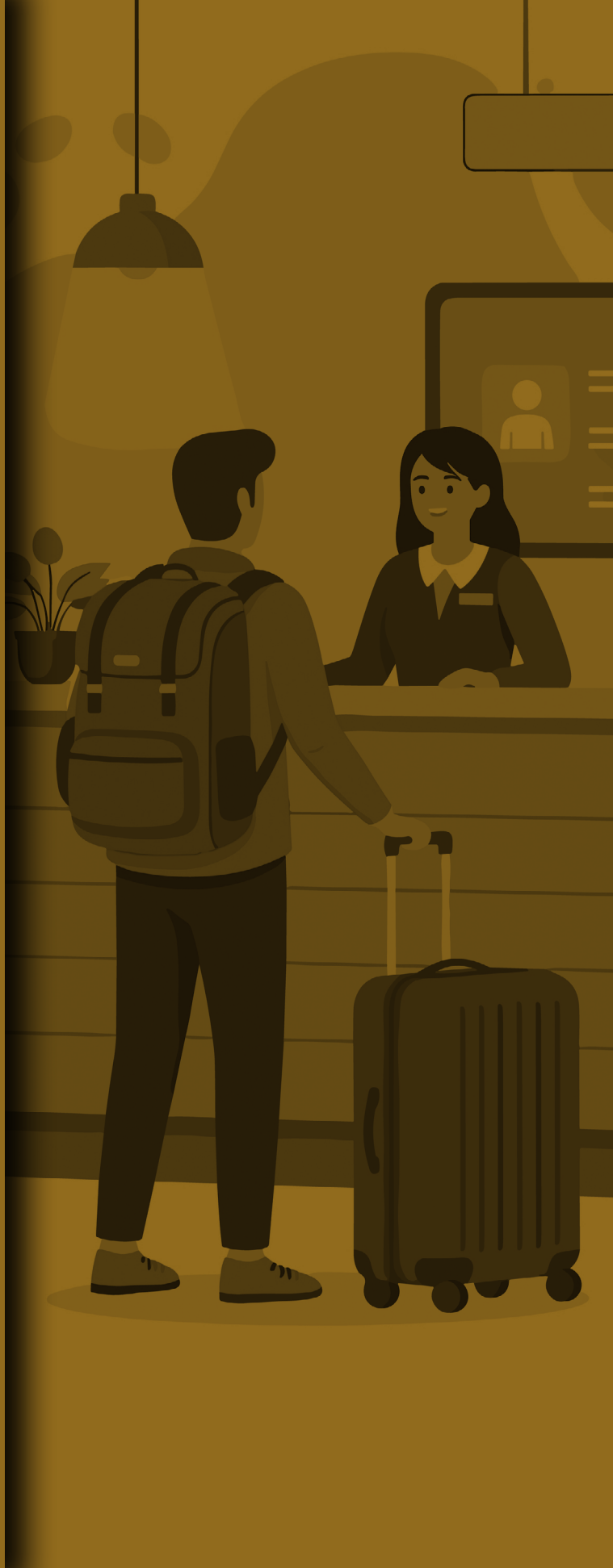
Productivity *Insights*

Vol. 6-5

Asian Productivity Organization

The Asian Productivity Organization (APO) is an intergovernmental organization that promotes productivity as a key enabler for socioeconomic development and organizational and enterprise growth. It promotes productivity improvement tools, techniques, and methodologies; supports the national productivity organizations of its members; conducts research on productivity trends; and disseminates productivity information, analyses, and data. The APO was established in 1961 and comprises 21 members.

APO Members
Bangladesh, Cambodia, Republic of China, Fiji, Hong Kong, India, Indonesia, Islamic Republic of Iran, Japan, Republic of Korea, Lao PDR, Malaysia, Mongolia, Nepal, Pakistan, Philippines, Singapore, Sri Lanka, Thailand, Turkiye, and Vietnam.



LEVERAGING AI TO ENHANCE PRODUCTIVITY AND CUSTOMER EXPERIENCE IN THE HOSPITALITY SECTOR

JANUARY 2026 | ASIAN PRODUCTIVITY ORGANIZATION

PRODUCTIVITY INSIGHTS Vol. 6-5

Leveraging AI to Enhance Productivity and Customer Experience in the Hospitality Sector

Dr. Sara Quach Thaichon wrote this publication.

First edition published in Japan
by the Asian Productivity Organization
1-24-1 Hongo, Bunkyo-ku
Tokyo 113-0033, Japan
www.apo-tokyo.org

Designed by Convert To Curves Media

CONTENTS

PREFACE

The Productivity Insights (P-Insights) series is an extension of the Productivity Talk (P-Talk) series, which is a flagship program under the APO Secretariat's digital information initiative. Originally designed to maximize the full potential of the APO's digital outreach, the interactive, livestreamed P-Talks bring together practitioners, experts, policymakers, and ordinary citizens from all walks of life with a passion for productivity to share their experiences, views, and practical tips on productivity improvement.

With speakers from every corner of the world, the P-Talks effectively convey productivity information to APO members and beyond. However, it was recognized that many of the P-Talk speakers had much more to offer beyond the 60-minute presentations and Q&A sessions that are the hallmarks of the series. To take full advantage of their broad knowledge and expertise, the APO invites some to elaborate on their P-Talks, resulting in this publication. It is hoped that the P-Insights series will give readers a deeper understanding of the practices and applications of productivity.

INTRODUCTION

The hospitality industry plays a vital role in the global economy. In 2024, it contributed USD10.9 trillion to global GDP, represented 10% of the global economy, and supported 357 million jobs worldwide (World Travel & Tourism Council, n.d.). While postpandemic recovery varies across countries and regional disparities remain due to geopolitical shocks, the industry's overall economic importance is evident. However, it faces ongoing challenges in delivering memorable guest experiences while controlling costs and using resources efficiently, particularly in an ever-evolving business environment shaped by shifting customer expectations. Hospitality is a service-oriented and labor-intensive industry, and improvements in productivity and guest satisfaction can result in significant competitive advantages. Recent advances in new technologies such as AI hold the potential to transform the hospitality industry, especially in areas such as customer relationship management (CRM) and operational efficiency.

Businesses are increasingly recognizing the strategic importance of digital transformation. Davison et al. (2023) suggest that firms prioritizing investments in their business, operating, and technology models can achieve performance gains more than 13 times greater than industry peers. With rising operational costs and growing consumer demand, hospitality operators cannot afford to overlook the potential of AI-enabled tools. A recent survey found that 73% of hoteliers agree AI will have a significant impact on the industry, and the vast majority plan to allocate budget for AI tools, with only 5% reporting no investment (Canary Technologies, 2025).[1] Therefore, this paper explores how AI can be leveraged to enhance productivity and customer experience in the hospitality industry.

The structure of this report is as follows. The next section provides an overview of the evolution of AI technologies in hospitality, tracing the development from

[1] Based on a global survey, conducted in Q3 2024, of 327 hospitality professionals responsible for IT purchasing decisions.

early information systems to contemporary applications such as hyperpersonalization and robotics. This is followed by an examination of AI tools used to personalize guest experiences, including customer profiling, chatbots, humanoid robots, and AI-driven marketing. The report then explores how AI enhances operational efficiency through predictive analytics, workflow automation, and resource management. This is followed by a discussion of key data-related and ethical challenges, including data quality, privacy, regulatory developments, and algorithmic bias. Finally, the report presents future trends, workforce implications, and policy recommendations.

THE EVOLUTION OF AI IN HOSPITALITY

From Static Communication to Seamless Experiences

The hotel industry has long since adopted digital technologies to manage reservations, billing, inventories, and communications with customers. In the early 1990s, these systems enabled one-way communication, handled structured data, and supported basic decision-making. By the 2000s, the rise of the internet and mobile devices introduced two-way interactions, such as through online booking platforms and email, which were further enhanced by mobile channels. More recently, human-to-machine and machine-to-machine connectivity has expanded, and AI applications have grown rapidly across services and operations.

However, the adoption of digital and AI tools has not been a linear process. When introducing early initiatives, many hotels experienced slowdowns, setbacks, and repilots due to implementation challenges such as costly system integrations, lack of clear returns on investment, increased complexity for staff, and resistance from hotel guests when they perceived a lack of transparency or control (Jianu et al., 2025). Therefore, successful implementation depends not only on the technology but also on employee skills, data quality, and system compatibility.

On the other hand, recent technological advances have enabled hyperpersonalization. Going beyond the use of static customer profiles in simple personalization, hyperpersonalization tailors services to individual customers across various touchpoints using real-time behavioral and contextual data, thereby facilitating more seamless experiences (K. Quach et al., 2025). Data can be integrated from multiple sources, such as property management systems (PMSs), CRM platforms, and social media, to predict guests' needs and deliver tailored experiences. Voice assistants, service robots, and predictive analytics have also been adopted to improve customer experience. However, their success is determined by the implementation quality and context.

Unlocking the Potential of AI

Hotels are increasingly recognizing AI's potential to drive revenue growth, reduce costs, and improve service quality (Riaz, 2024). AI can be applied across every stage of hotel operations. In the planning stage, AI allows businesses to analyze large volumes of data from PMSs, guest feedback, booking platforms, and social media to generate insights that can predict booking trends, detect seasonal demand patterns, and anticipate guest preferences. AI also plays an important role in targeting strategies by enabling dynamic customer segmentation and continuous competitor benchmarking to inform positioning and marketing mix decisions (Huang & Rust, 2021). In the execution stage, AI contributes to both guest-facing and back-of-house operations. For example, in marketing communications, AI assists with content generation and personalization, ensuring the messages resonate with specific segments. In CRM, AI-powered applications such as chatbots and virtual assistants enable hotels to provide timely responses to common inquiries, thereby improving efficiency and guest satisfaction. AI systems also support operational adjustments such as dynamic pricing and staff scheduling in real time and automate routine processes, freeing up staff to focus on tasks with greater value.

In the monitoring and evaluation stage, AI tools track and assess performance metrics such as guest satisfaction ratings and booking conversion rates across various systems and platforms. These insights can be used to calculate the return on investment of marketing campaigns and service upgrades and identify areas of improvement. Finally, in the optimization stage, AI plays an important role in refining strategies in areas such as service delivery, marketing, and operational processes based on past performance data. As a result, resources can be reallocated to the most effective channels, for example, investments in specific digital marketing platforms or service innovations to maximize operational efficiency while sustaining high-quality guest experiences.

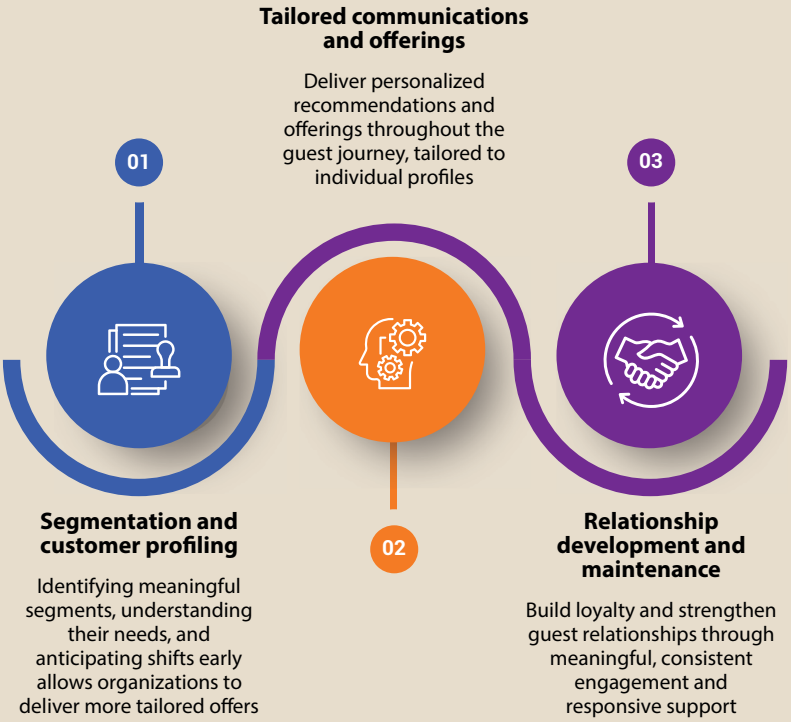
AI for Personalization and Customer Experience

Customer experience is central to hospitality as it is linked to trust, emotional connections, and repeat visits (B. Wang & Jia, 2024). AI can analyze vast amounts of data to create detailed customer profiles and tailor service offerings and communications accordingly, facilitating effective personalization (Figure 1). Over 80% of hoteliers believe that AI will significantly enhance the

customer journey[1] and facilitate more personalized, seamless experiences (Canary Technologies, 2025). This section discusses several key applications: customer profiling and segmentation, hyperpersonalization, chatbots and humanoid robots, and AI-supported marketing.

FIGURE 1

THE ROLE OF AI IN CUSTOMER ENGAGEMENT AND EXPERIENCE.



Source: Author.

Customer Profiling and Segmentation

Traditional segmentation often involves broad demographic categories such as business or leisure travelers, while static profiling only captures customer behavior and attitudes at a single point in time. AI, combined with digital twin

[1] Based on a global survey, conducted in Q3 2024, of 327 hospitality professionals responsible for IT purchasing decisions.

technology, has the potential to transform this area by facilitating more detailed segmentation and dynamic profiling (K. Quach et al., 2025). By amalgamating information from visit history, loyalty programs, and online activities, AI systems can develop dynamic profiles that capture guest preferences and behaviors over time. Machine-learning models can further integrate metrics such as predicted lifetime value and the likelihood of purchasing ancillary services to identify high-potential upselling opportunities within each segment. These richer forms of segmentation and profiling allow for more accurate targeting, which in turn increases customer engagement and drives profitability.

Hyperpersonalization across the Guest Journey

AI advances traditional personalization, which relies on static, predefined customer data, to hyperpersonalization, where every interaction is dynamically tailored to the individual guest in real time, drawing on behavioral signals and contextual data (Lemmens et al., in press). Consumers increasingly expect this level of attention (Medallia, 2024). McKinsey research (Arora et al., 2021) shows that 71% of consumers expect firms to deliver personalized experiences, and 76% become frustrated when they do not.[2] Moreover, research has found that hotel guests are willing to pay more for personalized services (Lei et al., 2024; Piccoli et al., 2017), confirming their dual role as a loyalty driver and a revenue opportunity. Yet Lei et al.'s interviews with hotel managers reveal that routine practices have become "standardized," reducing their emotional impact. Therefore, only creative, genuine, and hard-to-replicate efforts can lead to points of differentiation. Consistent with this, PwC (n.d.) found that 76% of hotel executives view hyperpersonalization as a core loyalty strategy.[3] This is often enabled by AI systems that analyze data from loyalty programs, mobile apps, and other touchpoints to anticipate needs and detect early signs of dissatisfaction (Li et al., 2021).

AI can enhance the customer experience across the entire journey (Gao & Liu, 2023). In the prepurchase phase, AI-powered platforms analyze purchase history, travel records, and browsing patterns to recommend properties that

[2] McKinsey Next in Personalization 2021 consumer survey 7–8 September 2021 (n = 1,013), sampled and weighted to match the US general population 18+ years; McKinsey Consumer Pulse Survey 25–31 August 2021 (n = 2,094) and 18–22 February 2021 (n = 2,076), sampled and weighted to match the US general population 18+ years.

[3] Based on a survey of 410 executives from a range of consumer-facing companies in the US, conducted between 15 October and 22 November 2022.

match individual preferences. During the stay, AI can suggest amenities, dining options, or local experiences based on guest profiles, time of day, and contextual factors. In the poststay phase, machine-learning models can determine the optimal timing, channel, and content for follow-up offers or loyalty rewards, sustaining engagement and strengthening long-term relationships. Some firms are experimenting with emerging AI technologies to engage customers at the earliest stages of their journey. For example, Marriott has piloted a generative AI tool within its Homes & Villas by Marriott Bonvoy platform to match travelers with the ideal home and destination based on natural language descriptions of their desired holiday (Marriott International, 2024). However, AI personalization can fail if poorly integrated or if it raises privacy concerns. For instance, facial recognition for check-in was initially promoted in major hotel chains, such as Hilton and Marriott in Shanghai, as enhancing the guest experience. However, it was discontinued after authorities and guests expressed concerns about sharing biometric data (Yan, 2024). More generally, AI personalization can reduce perceived autonomy or trigger discomfort without a clear "why this" explanation and options for easy opt-outs (Hardcastle et al., 2025).

Humanoid Robots and Service Automation

Over 60% of hospitality executives believe a full contactless experience for all basic hotel transactions such as check-in, checkout, and room services will be the most widely adopted feature or technology in the next three years, and contactless check-in and checkout is the feature 53.6% of travelers would most like to see permanently adopted at hotels (Skift & Oracle Hospitality, n.d.).[4] AI plays a central role in empowering contactless services through automation. By offering greater flexibility, up-to-date information, and always-on services, hotels can significantly enhance the guest experience and strengthen customer-brand relationships, which in turn increases customer advocacy (T.-M. Nguyen et al., 2021).

Robotics is another key application of AI in hospitality, with robots already performing tasks ranging from concierge services to room delivery, although recent adoption initiatives highlight both its potential and limitations. Henn na Hotel, Japan, recognized by Guinness World Records as the first robot-staffed

[4] Based on a survey of 633 hotel executives and 5,266 consumers across nine global markets in the spring of 2022 (Oracle, 2022).

hotel (Guinness World Records, n.d.), illustrated these dynamics: while initially celebrated as a breakthrough, many robots were later removed due to inefficiencies, maintenance challenges, and unmet guest expectations (Bhimasta & Kuo, 2019). This case demonstrates the need to integrate technology carefully while balancing automation with human interaction. When implemented strategically, robots can deliver significant benefits by handling repetitive tasks, freeing human staff to focus on more personalized guest experiences. They also provide consistent services, timely responses, and multilingual support, which are valuable in diverse and high-demand environments (Tuomi et al., 2021). With rising labor shortages and wage pressures, the hospitality industry should adopt robotic solutions in areas where they can complement human staff and enhance service quality. A strategic approach that balances technology with human interaction is critical to ensure that automation enhances guest experience.

AI Chatbots and Virtual Assistants

Chatbots and virtual assistants are among the most widely deployed AI tools in hospitality. They can handle a broad range of tasks, from answering frequently asked questions and assisting with bookings to managing common requests such as amenity replacements or wake-up calls. Hence, their adoption can reduce response times, provide 24/7 availability, and improve service quality when supported by human oversight and well-integrated data (Sam & Jasim, 2025). In addition, voice-enabled assistants are emerging; major chains such as Marriott and Hilton have been implementing in-room AI tools to enhance guest convenience (Fan et al., 2022). The rise of generative AI is expected to accelerate this trend, with 65% of business leaders identifying its potential for customer service tools (Robinson et al., 2024).[5] However, the contexts and design of these tools determine the resulting benefits, as guest adoption can be influenced by privacy concerns, ease of use, and cultural expectations (Fan et al., 2022).

Furthermore, chatbots and virtual assistants can contribute to CRM (Gursoy, 2025). They can recognize returning guests, remember individual preferences, and recommend tailored packages or loyalty offers. The integration of chatbot messaging platforms and PMSs facilitates seamless, cross-channel experiences. On the other hand, negative chatbot experiences can damage consumer-brand

[5] Based on a survey of 313 C-suite executives from global travel companies in March–April 2024.

relationships (Husnain et al., 2025). Poorly configured chatbots that feel impersonal, confusing, or repetitive might frustrate guests. Therefore, natural language processing and context awareness are critical to creating smooth and authentic interactions. M. Nguyen et al. (2023) found that the congruence of humanlike appearance (such as avatars) and anthropomorphic language (such as emojis) enhances perceptions of a chatbot's competence and authenticity, which in turn has a positive effect on customer engagement.

AI-enabled Marketing and Retargeting

Over 80% of hospitality professionals expect AI to substantially transform prebooking interactions and guest communications (Canary Technologies, 2025).[6] This can be achieved via AI-enabled targeted promotions and personalized recommendations. Machine-learning algorithms can analyze browsing histories, demographic profiles, and transaction patterns to deliver highly relevant advertisements and offers to customers. Furthermore, generative AI supports this process by creating content that resonates with specific customer segments, ensuring consistency and impact across multiple touchpoints such as brand websites, mobile apps, text messages, and emails (Medallia, 2024). AI-powered marketing communications can significantly enhance customer engagement and satisfaction, which in turn strengthens intentions to revisit (Shabankareh et al., 2025). In fact, personalized strategies have been shown to generate up to 40% more revenue compared with less targeted approaches (Arora et al., 2021). Retargeting campaigns, which display ads to users who have previously engaged with a brand or visited its website, become even more effective when combined with AI-driven personalization (Hardcastle et al., 2025).

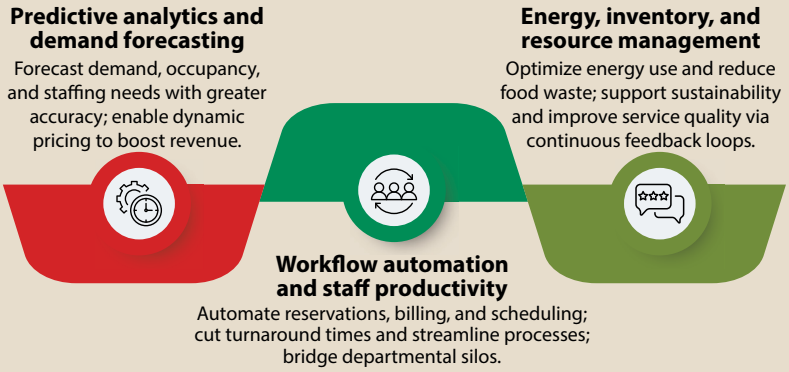
[6] Based on a global survey, conducted in Q3 2024, of 327 hospitality professionals responsible for IT purchasing decisions.

AI FOR ENHANCED PRODUCTIVITY

While personalization enhances guest satisfaction, AI also delivers tangible productivity gains. In this report, productivity refers to the extent to which inputs are converted into outputs (Kim et al., 2021) as reflected in revenue quality (e.g., revenue per available room [RevPAR]), labor productivity (e.g., rooms or tasks per labor hour), and service efficiency (e.g., average handling time and first-contact resolution for guest requests). Complementary to these, reductions in resource intensity (e.g., kWh and water per room per night; food waste per cover) demonstrate how AI can simultaneously enhance productivity and support sustainable resource consumption. By automating routine tasks, predicting demand, and optimizing resource allocation, hotels can reduce costs, save staff time, and improve service quality (Figure 2). This section explores three interrelated applications: predictive analytics for resource planning, workflow automation, and energy and resource management.

FIGURE 2

THE ROLE OF AI IN ENHANCED PRODUCTIVITY.



Source: Author, based on Kim et al. (2021).

Predictive Analytics and Demand Forecasting

Firms in the hospitality sector must manage both long-term and seasonal planning while handling challenges such as weather fluctuations, supply chain issues, and unexpected disruptions (Amar et al., 2024). Drawing on historical and real-time data, predictive analytics enables accurate forecasting of occupancy, inventory, and staffing requirements. These insights allow hotels to optimize room rates, allocate resources more efficiently, and plan procurement effectively.

In addition, AI-driven demand forecasting helps align staff schedules with changing levels of demand and reduce reactive handovers, boosting labor productivity. Firms can increase service efficiency through minimization of last-minute disruptions, which further decreases queues and accelerates response times. By incorporating a large amount of data, such as booking patterns, local events, weather, and economic indicators, and updating predictions based on ongoing analyses, AI models support dynamic pricing that adjusts to demand and contexts, maximizing occupancy and enhancing RevPAR, thereby increasing overall revenue quality (Bastable & Clark, 2024). For new properties with limited historical data, AI models can project simulations from various systems to maintain forecasting accuracy, although their performance depends on the choice of proxy data and rigorous backtesting (Amar et al., 2024). Service quality metrics such as complaint rates and poststay satisfaction can be used in conjunction with this approach to ensure that revenue optimization does not compromise perceived value.

Workflow Automation and Labor Productivity

AI can also be integrated with robotic process automation to streamline business processes, such as invoice matching and loyalty point reconciliation, that improve service efficiency (Ge et al., 2025). By automating various back-of-house processes such as reservation management, billing, and marketing workflows, firms can alleviate the burden of repetitive administrative tasks, allowing staff to dedicate more time to meaningful guest interactions and strategic initiatives. This can raise labor productivity by enabling more task completion in the same amount of time and supports service efficiency through more timely responses and fewer handoffs. The Artificial Multiple Intelligence System (AMIS), for instance, utilizes heuristic-based optimization to manage real-time task allocation and balance workloads among housekeeping staff

(Pitakaso et al., 2025). In a pilot conducted at a hotel in Ubon Ratchathani Province, Thailand, the implementation of AMIS significantly improved operational performance by cutting average room turnaround times by over 50% and achieving a task completion rate of more than 99%. This demonstrates that targeted automation can enhance labor productivity when data and system reliability are established.

Workflow automation can enhance customer satisfaction by not only improving operational efficiency but also bridging departmental silos (Latinovic & Chatterjee, 2022). For instance, when a guest books a room, an AI system can trigger a series of corresponding actions, for example, scheduling housekeeping and informing the concierge team of special requests. As a result, hotels can minimize service failures, increase response times, and ensure service consistency across all guest touchpoints.

Energy, Inventory, and Resource Management

In addition to productivity gains, AI promotes sustainability by optimizing energy consumption and reducing waste, thereby improving resource efficiency without compromising service quality. At the Halifax Marriott Harbourfront Hotel, Nova Scotia, Canada, an AI-driven commercial heating, ventilation, and air-conditioning system resulted in electricity savings of approximately 20% and natural gas savings of almost 18% while aiming to improve indoor occupant comfort (Marriott International, 2022). In restaurants and banquet operations, AI-powered resource management uses real-time data and predictive analytics to monitor, categorize, and minimize food waste. All Four Seasons properties are required to implement AI tools from providers Winnow, Lumitics, and Kitro, which typically combine cameras and connected scales to identify discarded food (Four Seasons, n.d.). This initiative prevented over 184,000 kilograms of food waste, equivalent to more than 520,000 meals, and avoided approximately 460 metric tons of carbon dioxide equivalent emissions. These reductions not only improve profit margins but also align with broader corporate sustainability objectives.

In addition to operational efficiency, AI enhances quality control by analyzing extensive customer data and feedback to generate more insights into guest needs, pain points, and levels of satisfaction. AI-powered sentiment analysis tools can assess the emotions within customer interactions, reviews, and

feedback while guest-comfort indicators and service-recovery metrics ensure that sustainability initiatives do not compromise the experience (KPMG, 2024). As a result, hotels can quickly identify issues and implement effective corrective actions accordingly.

Validating Impact on Service Outcomes

Enhanced efficiency does not automatically translate into better experiences (Anderson et al., 1997). Guest outcomes such as complaint rate per occupied room and postinteraction satisfaction should be maintained or improved to ensure that operational gains do not compromise guest experience (Kim et al., 2021). The benefits come from faster, more reliable service and the redeployment of staff to focus on tasks that add greater value to the guest experience. Without these reallocations, cost savings may go unnoticed or have a negative impact on guests. Therefore, firms should evaluate the impact of productivity gains from technologies such as AI by comparing operational performance before and after implementation while also monitoring guest experience and any staffing changes that help enhance service, such as time saved in housekeeping being redirected to attending to in-stay guest requests. Wherever possible, staggered pilots or concurrent control groups should be used to distinguish the effects of AI from seasonal or demand-related fluctuations.

DATA QUALITY, PRIVACY, AND ETHICAL CONSIDERATIONS

As AI is increasingly adopted to enhance customer experience and operational efficiency in hospitality, there are critical concerns regarding data quality, privacy, and ethics. While it is important to ensure the accuracy and reliability of data to increase the effectiveness of AI systems, firms also need to ensure customer privacy protection and address ethical considerations, including transparency, bias mitigation, and responsible AI, which have been under growing public attention and regulatory scrutiny. This section explores these pivotal challenges and discusses strategies to address them.

The Importance of Data Quality and System Reliability

AI's effectiveness depends on the quality of the data that is used to train AI models. Inaccurate or outdated data can lead to poor predictions and misaligned recommendations, which ultimately damages guest trust. Data must be sourced from reliable sources, cleaned to remove inconsistencies, and updated regularly. System reliability and flexibility are equally important (Husnain et al., 2025). AI tools should be integrated seamlessly with other systems such as PMSs, distribution platforms, and CRM software. They must also be scalable to accommodate future expansion and new data sources. Hotels should monitor model performance continuously and incorporate mechanisms to identify and address any issues in a timely manner.

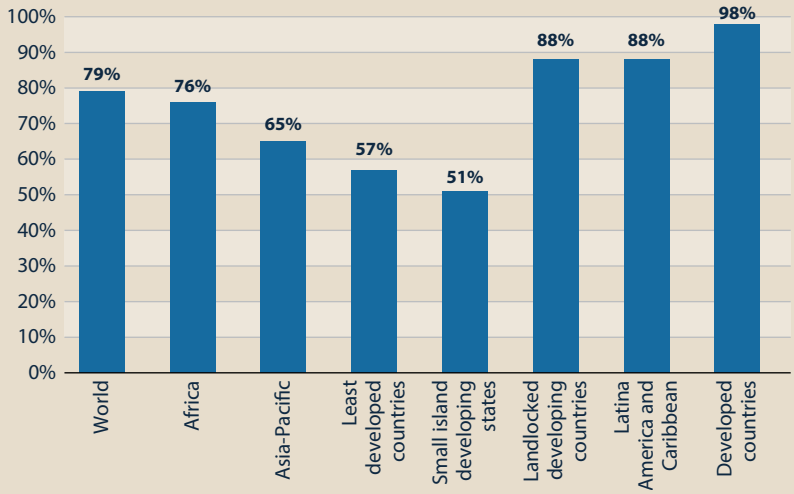
Privacy and Data Protection Frameworks

AI enables organizations to gather, process, and integrate data from diverse sources without human supervision. This may include sensitive customer information such as travel history, spending patterns, and, in some cases, biometric data. Concerns about data privacy and security are becoming prevalent as consumers increasingly expect their information to be managed responsibly (Cheah et al., 2022). A PwC survey from 2023 revealed that one in three

respondents expressed strong concern over the privacy of their personal information when engaging with travel-related websites (PwC, 2023). At the same time, data protection laws are expanding rapidly worldwide (see Figure 3). Hotels operating across multiple jurisdictions must therefore ensure compliance with diverse legal frameworks. Doing so not only helps maintain customer trust but also reduces the risk of costly litigation (S. Quach et al., 2022).

FIGURE 3

COUNTRIES WITH PRIVACY AND DATA PROTECTION LEGISLATION (%).



Source: Created using data from United Nations Trade and Development (2025).

Firms should define a lawful basis for each processing activity, limit data collection to what is strictly necessary, and apply anonymization techniques where possible. In addition, they need to ensure that third-party vendors uphold equivalent privacy and security standards via formal agreements. Role-based permissions can be used to control access and provide guests with rights to access, correct, or delete their data within agreed service levels. Firms should also offer customers personalization options in line with their preferences to strike a balance between relevance and privacy (Moon et al., 2022). Metrics such as the time taken to respond to data requests and the speed of handling opt-outs or consent withdrawals can be used for ongoing monitoring and evaluation.

Ethical Considerations and Algorithmic Bias

Biases can arise in AI systems from three sources: data (underrepresentation of specific segments such as travelers from emerging markets or guests with disabilities), design (choices of models or features), and delivery (how outputs are interpreted and used). AI biases can result in poor decision-making, reduced profitability, and reputational damage and are subject to increasing regulatory scrutiny (PwC, 2022). In the hospitality industry, the problem is often exacerbated by high staff turnover, fragmented PMSs, and inconsistent data quality, which make it difficult to train representative models. To mitigate these risks, hotels should use diverse datasets, document and track data sources and usage, and conduct regular fairness audits. AI systems should be tested across different customer groups before deployment, while drift and bias should be continuously monitored after deployment. Incorporating human-in-the-loop oversight helps ensure fairness in personalization and automation (Mohammed & Denizci Guillet, 2025). In addition, algorithmic decisions should be evaluated using paired metrics, combining commercial KPIs (e.g., RevPAR) with service-quality indicators (e.g., net promoter score) to ensure that efficiency gains do not come at the expense of perceived fairness or quality of care.

Cybersecurity in Hotels

Cyberattacks are becoming common in the hospitality industry due to increasing reliance on digital technologies to engage with guests and process large volumes of sensitive data, such as online bookings, payment transactions, and stay records (Ghaderi et al., 2024). The risks are further heightened by fragmented IT systems and the rapid adoption of AI, IoT, and cloud platforms. Recent incidents underscore the stakes: the Marriott International breach in 2018 compromised up to 500 million guest records via the Starwood reservation system, leading to a GBP18.4 million General Data Protection Regulation (GDPR) fine (Fox, 2018; Tidy, 2020), while the MGM Resorts ransomware attack in 2023 exposed the data of around 37 million guests and caused losses of USD100 million (Siddiqui, 2023; Weisman, 2025). These cases highlight the legal, financial, and reputational damage that follows inadequate safeguards. Smaller operators are also vulnerable as many lack the resources, awareness, or training to adopt sufficient protections.

To mitigate these risks, firms should implement security measures such as multifactor authentication; network segmentation to separate guest, IoT, and

corporate traffic; centralized logging with alerts for unusual activities; vendor security reviews; and regular incident response drills. These measures can typically be implemented using existing IT resources, and costs are mainly attributed to software licenses and staff time, making them feasible for mid-sized firms. Progress can be assessed through metrics such as detection and response times, multifactor authentication coverage (especially on privileged accounts such as administrator and domain admin), and vendor compliance. With the right organizational support and staff training, these measures can lower the risk of breaches and strengthen customer trust.

FUTURE TRENDS AND WORKFORCE IMPLICATIONS

Emergent Technologies and Immersive Experiences

AI will continue to transform the hospitality sector through its integration with emerging technologies such as augmented reality, virtual reality, and advanced robotics (P. Q. Wang, 2025). Although humanoid robots currently handle relatively simple tasks, they may evolve to deliver more interactive and complex services, for example, providing room service in dynamic environments or generating personalized itineraries for guests. Augmented reality and virtual reality could enable prospective guests to explore rooms, destinations, or event spaces before booking, and AI could tailor immersive tours to align with individual preferences. Furthermore, AI integration with smart city infrastructure can facilitate seamless travel planning by coordinating the entire journey, from flight booking to in-destination activities (Organisation for Economic Co-operation and Development, 2024).

However, adoption is likely to be incremental rather than immediate as firms might be cautious about technical, financial, and operational constraints such as high deployment costs, staff training requirements, regulatory compliance, and interoperability challenges. Similarly, the use of voice- and gesture-based interfaces or IoT-enabled ambient sensing will depend on guest acceptance, privacy concerns, and data-security regulations. While edge computing can help reduce latency and privacy risks, it requires a high level of organizational readiness and infrastructure investment.

Impact on the Workforce

The adoption of AI and automation will have a significant impact on the hospitality workforce. When implemented effectively, AI-powered systems are expected to improve working conditions by taking over repetitive, low-value work and giving staff more time for strategic and customer-focused activities (Wong et al., 2023). Predictive scheduling tools can allocate shifts fairly and efficiently, thereby reducing overtime and minimizing burnout. Furthermore,

AI-driven training platforms can personalize learning processes for faster onboarding and continuous capability development. By enriching the scope of work, hotels can create more meaningful roles and increase employee engagement and retention.

However, automation also raises concerns about job security, undermining employee well-being (Chuang et al., 2025). Because routine tasks such as data entry, basic customer inquiries, and inventory management can be performed by machines, there are risks of job displacement, particularly in the high-turnover, low-wage roles that are prevalent in the hospitality sector. Positions that rely on repetitive work are most vulnerable, and employees in these roles may face reduced hours or employment termination. Recent research also highlights challenges including skill gaps and resistance to technology, especially where adoption threatens the "human touch," adds supervision tasks, or requires retraining (Frost & Sullivan, 2023). As a result, organizations may face adoption pushback or collective resistance if algorithmic directions conflict with staff experience or well-being (Jianu et al., 2025).

Technological adoption should be balanced with employee protection and engagement. The hospitality industry is particularly vulnerable due to its reliance on seasonal demand and sensitivity to external shocks such as economic downturns and public health crises (Qi et al., 2026). In addition, its labor market is characterized by a large number of casual or part-time staffing positions with lower pay and high turnover. Therefore, it is important for firms to focus on workforce transitions that emphasize redeployment, upskilling and reskilling, and job redesign instead of relying solely on technology rollouts (Dogru et al., 2023). Staff should be trained to collaborate effectively with AI and adapt to new expectations (Jiwnani, 2024), especially in areas where human capabilities such as empathy, creativity, cultural awareness, and complex problem-solving remain superior.

Balancing Technology and the Human Touch

Although AI can significantly enhance performance efficiency, the hospitality industry is inherently a human-centered industry (Wong et al., 2023). Guests continue to value personal and authentic interactions. It is important to achieve the optimal balance in which AI complements rather than replaces human service. For example, while robots and chatbots manage routine tasks and

enhance convenience, staff should remain available to address complex inquiries and provide emotional support. Human oversight should be implemented to ensure that AI-driven recommendations align with organizational values and guest expectations and comply with regulatory requirements. In other words, a hybrid model that combines the efficiency of AI with the warmth of human care has the greatest potential for delivering outstanding guest experiences.

CONCLUSION AND RECOMMENDATIONS

AI offers significant potential for hospitality by personalizing guest experiences, predicting demand, automating routine tasks, and supporting sustainable operations. However, its success depends on data quality and governance, workforce capability, and the constraints of different property types. It is important to gradually introduce AI and make sure that operational goals are in line with guest-experience outcomes. AI implementation should be considered an ongoing asset rather than a one-time project. By working closely with regulators, industry groups, and universities, firms can develop best practices and share insights.

Setting a Foundation: Data and Pilots

The first priority is to establish the basics, which include usable and secure data, clear accountability, and disciplined pilots. Most hotels, particularly small and medium-sized enterprises (SMEs), operate fragmented systems, making it essential to stabilize PMS, CRM, or booking data through basic cleaning, role-based access, and retention rules.

- **SMEs:** Pool resources via association-led platforms or government digital programs to reduce the cost of cloud or PMS upgrades.
- **Franchisees:** Work with brands to establish baseline data standards and integration agreements.
- **Multiowner properties:** Establish shared data protocols across owners to avoid incompatible systems that block pilots.

Building Impact: Scaling Selectively and Aligning Workforce

AI usage should be extended only when pilots demonstrate measurable gains while maintaining or improving guest outcomes. Efficiency gains should not

be pocketed as cost savings alone but be converted into service value. Implementing foundational governance, including consent management, privacy-by-design, and minimum security standards, safeguards trust and provides a solid platform for scaling AI initiatives.

Workforce development:

- **SMEs:** Join pooled training initiatives (e.g., chambers of commerce, local universities) to contain costs and manage high turnover.
- **Franchisees:** Leverage brand-provided e-learning modules to standardize literacy in tools while allowing for local adaptation.
- **Multiowner properties:** Create shared training pools across ownership groups, reducing duplication and ensuring consistency.

Governance:

- **SMEs:** Apply simple prebuilt compliance templates such as privacy-by-design checklists and consent policies instead of building from scratch.
- **Franchisees:** Provide a centralized governance framework and require regular compliance checks across outlets.
- **Multiowner properties:** Create a cross-functional steering group including all owner and operator representatives to align governance standards before scaling adoption.

Longer-term Opportunities: Transforming Experience

With foundations in place, hotels can connect booking, loyalty, and in-stay signals to deliver personalized, timely experiences. To preserve trust, personalization must remain transparent, with clear opt-outs and seamless human handoffs.

- **SMEs:** Focus on high-impact, low-cost personalization (e.g., repeat-guest recognition, localized offers) via CRM systems.

- **Franchisees:** Use brand-level data networks to personalize across stays and properties, increasing customer loyalty and cross-selling opportunities.

- **Multiowner properties:** Share anonymized guest profiles across properties to deliver consistent and continuous services without violating guest privacy.

Ongoing Promise: Keeping the Human Touch

Automation should reduce friction, not remove the human essence of the hospitality industry. Hotels should actively reinvest efficiencies into higher-value interactions such as service recovery and local expertise to improve the guest experience. This balance not only builds guest relationships but also strengthens employee engagement and retention.

- **SMEs:** Use automation to free staff for personal touches such as welcomes, problem resolution, and local knowledge.

- **Franchisees:** Standardize automation for efficiency while empowering local teams to personalize guest experience.

- **Multiowner properties:** Invest in cross-property service standards to maintain consistency despite fragmented ownership.

By following these recommendations, the hospitality sector can leverage AI to enhance productivity and elevate customer experience. To adopt AI successfully, firms must demonstrate ethical responsibility, an ongoing commitment to innovation, and a deep understanding of the human essence of hospitality.

REFERENCES

Amar, J., Parikh, N., … Faucher, J. (20 September 2024). *AI can transform workforce planning for travel and logistics companies*. McKinsey & Company. https://www.mckinsey.com/industries/travel/our-insights/ai-can-transform-workforce-planning-for-travel-and-logistics-companies

Anderson, E. W., Fornell, C. & Rust, R. T. (1997). Customer satisfaction, productivity, and profitability: Differences between goods and services. *Marketing Science*, *16*(2), 129–145. https://doi.org/10.1287/mksc.16.2.129

Arora, N., Ensslen, D., … Schuler, G. (12 November 2021). *The value of getting personalization right—or wrong—is multiplying*. McKinsey & Company. https://www.mckinsey.com/capabilities/growth-marketing-and-sales/our-insights/the-value-of-getting-personalization-right-or-wrong-is-multiplying#/

Bastable, E. & Clark, L. (19 September 2024). *Boosting efficiency: The role of AI in the hotel industry*. CBRE. https://www.cbre.co.uk/insights/articles/boosting-efficiency-the-role-of-ai-in-the-hotel-industry

Bhimasta, R. A. & Kuo, P.-Y. (2019). What causes the adoption failure of service robots? A case of Henn-na Hotel in Japan. In *Ubicomp/ISWC'19 adjunct proceedings of the 2019 ACM International Joint Conference on Pervasive and Ubiquitous Computing and proceedings of the 2019 ACM International Symposium on Wearable Computers* (pp. 1107–1112). Association for Computing Machinery. https://doi.org/10.1145/3341162.3350843

Canary Technologies. (2025). *Navigating AI: Emerging trends in hospitality*. https://resources.canarytechnologies.com/rs/753-LTW-752/images/Canary_AI_in_Hospitality_Report_Final-v1-q1fy25.pdf

Cheah, J.-H., Lim, X.-J., … Quach, S. (2022). Are privacy concerns still relevant? Revisiting consumer behaviour in omnichannel retailing. *Journal*

of Retailing and Consumer Services, *65*, 102242. https://doi.org/10.1016/j.jretconser.2020.102242

Chuang, Y.-T., Chiang, H.-L. & Lin, A.-P. (2025). Insights from the job demands–resources model: AI's dual impact on employees' work and life well-being. *International Journal of Information Management*, *83*, 102887. https://doi.org/10.1016/j.ijinfomgt.2025.102887

Davison, L., Kande, M. & Borchardt, W. (4 April 2023). *Accelerating performance in a winner-takes-most world*. PwC. https://www.pwc.com/gx/en/issues/transformation/accelerating-performance-in-a-winner-takes-most-world.html

Dogru, T., McGinley, S., … Hanks, L. (2023). Employee turnover dynamics in the hospitality industry vs. the overall economy. *Tourism Management*, *99*, 104783. https://doi.org/10.1016/j.tourman.2023.104783

El Hana, N., Mercanti-Guerin, M. & Sabri, O. (2023). Cookiepocalypse: What are the most effective strategies for advertisers to reshape the future of display advertising? *Technological Forecasting and Social Change*, *188*, 122297. https://doi.org/10.1016/j.techfore.2022.122297

Fan, A., Lu, Z. & Mao, Z. (2022). To talk or to touch: Unraveling consumer responses to two types of hotel in-room technology. *International Journal of Hospitality Management*, *101*, 103112. https://doi.org/10.1016/j.ijhm.2021.103112

Four Seasons. (n.d.). *Four Seasons for good: 2023 progress report*. https://www.fourseasons.com/content/dam/fourseasons/images/web/PDFs/2023-ESG-Report.pdf

Fox, C. (30 November 2018). *Marriott hack hits 500 million Starwood guests*. BBC. https://www.bbc.com/news/technology-46401890

Frost & Sullivan (ed.). (2023). *Hotel productivity benchmarking: An APO study across seven cities in Asia*. Asian Productivity Organization. https://doi.org/10.61145/SDGM8932

Gao, Y. & Liu, H. (2023). Artificial intelligence–enabled personalization in interactive marketing: A customer journey perspective. *Journal of Research in Interactive Marketing*, *17*(5), 663–680. https://doi.org/10.1108/JRIM-01-2022-0023

Ge, Y., Xia, K., … Shahzad, M. F. (2025). Critical success factors for implementing robotic process automation in the hotel industry. *Scientific Reports*, *15*, 26909. https://doi.org/10.1038/s41598-025-11757-6

Ghaderi, Z., Beal, L. & Houanti, L. (2024). Cybersecurity threats in tourism and hospitality: Perspectives from tourists engaging with sharing economy services. *Current Issues in Tourism*. https://doi.org/10.1080/13683500.2024.2353327

Guinness World Records. (n.d.). *First robot-staffed hotel*. https://www.guinnessworldrecords.com/world-records/397696-first-robot-staffed-hotel

Gursoy, D. (2025). Artificial intelligence (AI) technology, its applications and the use of AI powered devices in hospitality service experience creation and delivery. *International Journal of Hospitality Management*, *129*, 104212. https://doi.org/10.1016/j.ijhm.2025.104212

Hardcastle, K., Vorster, L. & Brown, D. M. (2025). Understanding customer responses to AI-driven personalized journeys: Impacts on the customer experience. *Journal of Advertising*, *54*(2), 176–195. https://doi.org/10.1080/00913367.2025.2460985

Huang, M.-H. & Rust, R. T. (2021). A strategic framework for artificial intelligence in marketing. *Journal of the Academy of Marketing Science*, *49*, 30–50. https://doi.org/10.1007/s11747-020-00749-9

Husnain, M., Zhang, Q., … Akhtar, M. W. (2025). How chatbot negative experiences damage consumer-brand relationships in hospitality and tourism? A mixed-method examination. *International Journal of Hospitality Management*, *126*, 104076. https://doi.org/10.1016/j.ijhm.2024.104076

Jianu, B., Tussyadiah, I. P. & Miller, G. (2025). Humanising algorithmic management systems. *Annals of Tourism Research*, *115*, 104021. https://doi.org/10.1016/j.annals.2025.104021

Jiwnani, L. (13 February 2024). *AI's transformative role in the hospitality industry*. Deloitte. https://www.deloitte.com/uk/en/Industries/consumer/blogs/embracing-the-future-ais-transformative-role-in-hospitality.html

Kim, Y. R., Williams, A. M., … Chen, J. L. (2021). Spatial spillovers of agglomeration economies and productivity in the tourism industry: The case of the UK. *Tourism Management*, *82*, 104201. https://doi.org/10.1016/j.tourman.2020.104201

KPMG. (2024). *Artificial intelligence and the orchestrated customer experience: Global customer experience excellence 2023–24*. https://assets.kpmg.com/content/dam/kpmg/uk/images/2024/01/crt151616/customer-experience-excellence-report-2023-24-WA1.pdf

Latinovic, Z. & Chatterjee, S. C. (2022). Achieving the promise of AI and ML in delivering economic and relational customer value in B2B. *Journal of Business Research*, *144*, 966–974. https://doi.org/10.1016/j.jbusres.2022.01.052

Lei, S. S. I., Wang, D., … Ye, S. (2024). Recipe for perceived personalization in hotels. *Tourism Management*, *100*, 104818. https://doi.org/10.1016/j.tourman.2023.104818

Lemmens, A., Roos, J. M. T., … Netzer, O. (in press). Personalization and targeting: How to experiment, learn & optimize. *International Journal of Research in Marketing*. https://doi.org/10.1016/j.ijresmar.2025.07.004

Li, M., Yin, D., … Bai, B. (2021). A systematic review of AI technology-based service encounters: Implications for hospitality and tourism operations. *International Journal of Hospitality Management*, *95*, 102930. https://doi.org/10.1016/j.ijhm.2021.102930

Marriott International. (2022). *2022 Serve 360 Report: Environmental, social, and governance progress*. https://serve360.marriott.com/wp-content/uploads/2022/10/Marriott-2022-Serve-360-ESG-Report-accessible_F.pdf

Marriott International. (21 March 2024). *Homes & Villas by Marriott Bonvoy makes finding a vacation home easy with generative AI*. https://news.marriott.com/news/2024/03/21/homes-villas-by-marriott-bonvoy-makes-finding-a-vacation-home-easy-with-gen-ai-and-intuitive-with-innovative-search-tool-powered-by-generative-ai-launching-today

Medallia. (2024). *Understanding personalization efforts in the hospitality and retail industries*. http://medallia.com/wp-content/uploads/pdf/resources/Medallia-Understanding-Personalization-Efforts-in-the-Hospitality-and-Retail-Industries-Report.pdf

Mohammed, I. & Denizci Guillet, B. (2025). Heuristics and biases in human–algorithm interaction and hotel revenue management override decision-making. *International Journal of Contemporary Hospitality Management*, *37*(2), 358–379. https://doi.org/10.1108/IJCHM-02-2024-0288

Moon, H., Yu, J., … Han, H. (2022). Hotel privacy management and guest trust building: A relational signaling perspective. *International Journal of Hospitality Management*, *102*, 103171. https://doi.org/10.1016/j.ijhm.2022.103171

Nguyen, M., Casper Ferm, L.-E., … Thaichon, P. (2023). Chatbots in frontline services and customer experience: An anthropomorphism perspective. *Psychology & Marketing*, *40*(11), 2201–2225. https://doi.org/10.1002/mar.21882

Nguyen, T.-M., Quach, S. & Thaichon, P. (2021). The effect of AI quality on customer experience and brand relationship. *Journal of Consumer Behaviour*, *21*(3), 481–493. https://doi.org/10.1002/cb.1974

Oracle. (1 June 2022). *Travelers want high-tech, low-touch hotel stays shows new oracle survey* [Press release]. https://www.oracle.com/news/announcement/oracle-hospitality-in-2025-consumer-research-study-2022-06-01/

Organisation for Economic Co-operation and Development. (2024). *Artificial intelligence and tourism: G7/OECD policy paper* (OECD Tourism Papers 2024/02). http://dx.doi.org/10.1787/3f9a4d8d-en

Piccoli, G., Lui, T.-W. & Grun, B. (2017). The impact of IT-enabled customer service systems on service personalization, customer service perceptions, and hotel performance. *Tourism Management*, *59*, 349–362. https://doi.org/10.1016/j.tourman.2016.08.015

Pitakaso, R., Golinska-Dawson, P., … Khonjun, S. (2025). Embracing open innovation in hospitality management: Leveraging AI-driven dynamic scheduling systems for complex resource optimization and enhanced guest satisfaction. *Journal of Open Innovation: Technology, Market, and Complexity*, *11*(1), 100487. https://doi.org/10.1016/j.joitmc.2025.100487

PwC. (n.d.). *Hospitality tech investment pays off*. https://www.pwc.com/us/en/industries/consumer-markets/library/hospitality-tech-investment.html

PwC. (19 January 2022). *Understanding algorithmic bias and how to build trust in AI*. https://www.pwc.com/us/en/tech-effect/ai-analytics/algorithmic-bias-and-trust-in-ai.html

PwC. (16 February 2023). *Consumers seek frictionless experiences in a world of disruptions*. https://www.pwc.com/gx/en/industries/consumer-markets/consumer-insights-survey-feb-2023.html

Qi, R., Mou, X., … So, K. K. F. (2026). Analyzing and mapping the vulnerability and resilience of the hospitality industry: Insights from real consumer visitation behavior. *International Journal of Hospitality Management*, *132*, 104362. https://doi.org/10.1016/j.ijhm.2025.104362

Quach, K., Nguyen, T. T., … Thaichon, P. (2025). Digital twins: Enhancing personalized experience through multiple and dynamic persona across customer phygital journey. *Australasian Marketing Journal*. https://doi.org/10.1177/14413582251358859

Quach, S., Thaichon, P., … Palmatier, R. W. (2022). Digital technologies: Tensions in privacy and data. *Journal of the Academy of Marketing Science*, *50*, 1299–1323. https://doi.org/10.1007/s11747-022-00845-y

Riaz, U. (5 December 2024). *How hospitality AI is steering hotels toward a smart future*. EY. https://www.ey.com/en_us/insights/hospitality/ai-in-hospitality-enhancing-hotel-guest-experiences

Robinson, M., Viswanathan, S., … Subramaniam, S. (2024). *The travel industry's new trip: How generative AI can redefine customer experiences and unlock new value for organizations*. Accenture. https://www.accenture.com/content/dam/accenture/final/accenture-com/document-3/The-Travel-Industrys-New-Trip-Final.pdf

Sam, S. J. I. & Jasim, K. M. (2025). Diving into the technology: A systematic literature review on strategic use of chatbots in hospitality service encounters. *Management Review Quarterly*, *75*(1), 527–555. https://doi.org/10.1007/s11301-023-00388-8

Shabankareh, M., Ranjbaran, A., … Nazarian, A. (2025). Artificial intelligence on social media and revisit behavior: Evidence from the hotel industry. *International Journal of Advertising*, *44*(8), 1523–1562. https://doi.org/10.1080/02650487.2025.2536361

Siddiqui, Z. (6 October 2023). *Casino giant MGM expects $100 million hit from hack that led to data breach*. Reuters. https://www.reuters.com/business/mgm-expects-cybersecurity-issue-negatively-impact-third-quarter-earnings-2023-10-05/

Skift & Oracle Hospitality. (n.d.). *Hospitality in 2025: Automated, intelligent… and more personal*. https://www.oracle.com/in/a/ocom/docs/industries/hospitality/hospitality-industry-trends-for-2025.pdf

Tidy, J. (30 October 2020). *Marriott Hotels fined £18.4m for data breach that hit millions*. BBC. https://www.bbc.com/news/technology-54748843

Tuomi, A., Tussyadiah, I. P. & Stienmetz, J. (2021). Applications and implications of service robots in hospitality. *Cornell Hospitality Quarterly*, *62*(2), 232–247. https://doi.org/10.1177/1938965520923961

United Nations Trade and Development. (2025). *Data protection and privacy legislation worldwide*. Retrieved 18 August 2025, from https://unctad.org/page/data-protection-and-privacy-legislation-worldwide

Wang, B. & Jia, T. (2024). The power of personalization: Hosts how to promote guest bookings by personalized responses. *International Journal of Hospitality Management*, *120*, 103766. https://doi.org/10.1016/j.ijhm.2024.103766

Wang, P. Q. (2025). Personalizing guest experience with generative AI in the hotel industry: There's more to it than meets a Kiwi's eye. *Current Issues in Tourism*, *28*(4), 527–544. https://doi.org/10.1080/13683500.2023.2300030

Weisman, S. (12 March 2025). *MGM ransomware attack settlement is reached*. Forbes. https://www.forbes.com/sites/steveweisman/2025/03/12/mgm-ransomware--attack-update/

Wong, I. A., Zhang, T., … Peng, Q. (2023). Hotel AI service: Are employees still needed? *Journal of Hospitality and Tourism Management*, *55*, 416–424. https://doi.org/10.1016/j.jhtm.2023.05.005

World Travel & Tourism Council. (n.d.). *Travel & Tourism Economic Impact Research (EIR)*. https://wttc.org/research/economic-impact

Yan, L. (22 April 2024). *Shanghai hotels stop scanning faces at check-in; should boost inbound tourism, insiders say*. Yicai Global. https://www.yicaiglobal.com/news/shanghai-hotels-stop-scanning-faces-at-check-in-should-boost-inbound-tourism-insiders-say

LIST OF FIGURES

ABOUT THE AUTHOR

Dr. Sara Quach Thaichon
Senior Lecturer
Department of Marketing
Griffith University
Australia

Watch the Productivity Talk on
Leveraging AI to Enhance Productivity and Customer Experience in the Hospitality Sector