

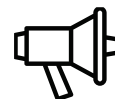
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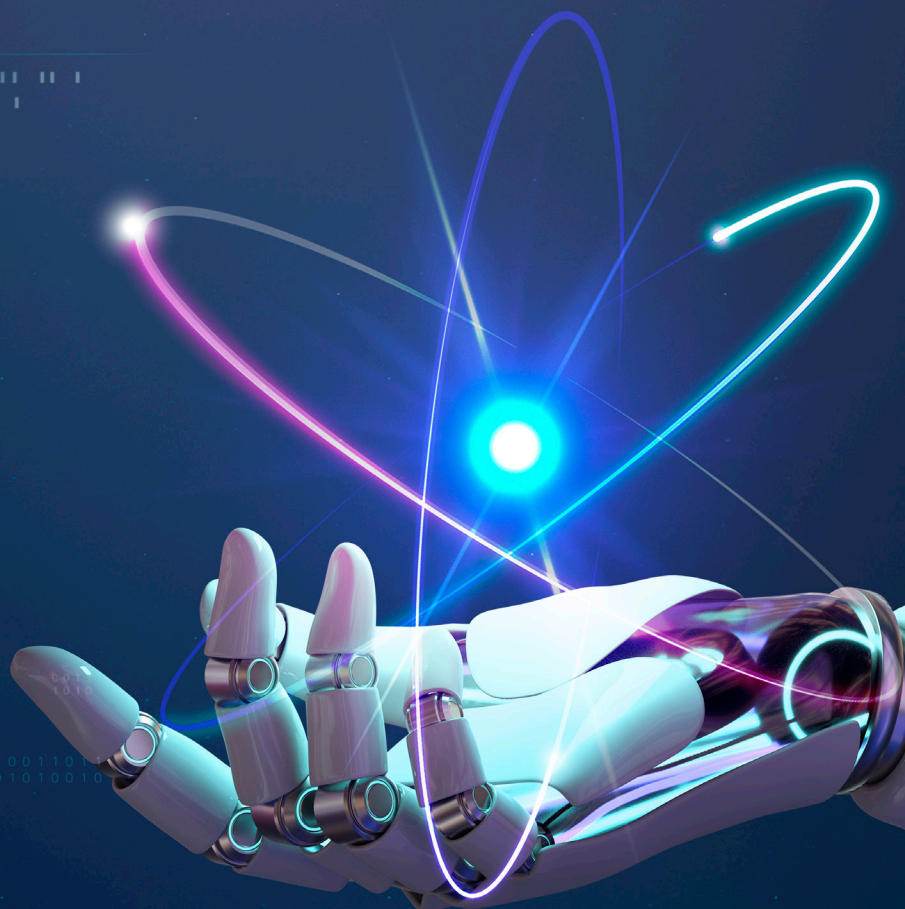
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THE IMPORTANCE OF USING ARTIFICIAL INTELLIGENCE IN HOTEL MANAGEMENT

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Abstract: This scientific article extensively analyzes the role of artificial intelligence (AI) technologies in the modern hospitality industry and their positive impact on hotel operations. The study examines in detail the practical application of AI in such important areas as digitization of customer service processes, flexible setting of room prices in accordance with market demand, scientific forecasting of future demand, and optimization of hotel staff workload. The article scientifically substantiates the advantages of introducing AI, the obstacles encountered, and the development directions for the long term, taking into account the specific characteristics of the tourism industry of the Bukhara region. The results obtained confirm that the successful integration of AI into hotel management allows increasing annual revenues by 15 to 30 percent and significantly reducing costs.

Key words: artificial intelligence, hotel management, revenue management, virtual assistant, machine learning, guest service quality, digital transformation, Bukhara tourism.

INTRODUCTION

As the digital economy takes shape, the hospitality industry is becoming increasingly competitive. Today, every hotel chain or independent hotel operating in every corner of the world is faced with the need to maximize its efficiency, provide memorable guest service, and manage costs wisely. It is this need that has led to the rapid introduction of artificial intelligence technologies into the hospitality industry.

Artificial intelligence is the process of programming and training computer systems to perform complex tasks that would normally require human intelligence, and it encompasses a range of technologies including machine learning, natural language processing, and others. When applied to hospitality, these technologies are characterized by their ability to analyze large amounts of data, identify patterns, and make intelligent decisions.

The relevance of this study is determined by several factors. First, the rapid growth of the tourism industry in Uzbekistan: according to the State Statistics Committee, a total of 11.7 million foreign citizens visited Uzbekistan for tourist purposes in 2025. Second, as one of the tourism centers of the Bukhara region, there is an increasing demand for hotel services that meet international standards. Third, the "Digital Uzbekistan - 2030" program of the Republic of Uzbekistan, adopted in 2020, has identified the widespread use of innovative technologies in all sectors, including tourism, as a priority area of state policy.

The main goal of the article is to systematically analyze the areas of practical application of SI technologies in hotel management, quantitatively and qualitatively assess their added value, and develop scientifically based recommendations for the hotel sector in the Bukhara region of Uzbekistan.

LITERATURE REVIEW

In recent years, the foreign scientific community has conducted significant research on the study of AI technologies in the hospitality industry. Ivanov and Webster (2019) studied the impact of automation and robotization on the recruitment of hotel staff from the perspective of the tourism industry economy and showed that companies have the potential to reduce operating costs by approximately 20-25%. However, the researchers also drew attention to the changing requirements for professional skills.

Mariani and Matevi (2021) conducted a meta-analysis of scientific articles on AI in the hospitality and tourism sector and empirically confirmed the positive impact of AI on guest satisfaction and loyalty. According to their conclusions, personalized digital services can increase guest satisfaction by an average of 18%.

Pillai and Sivathanu (2020) studied the factors influencing the adoption of chatbot systems in the hospitality industry based on the Technology Acceptance Model (TAM), and found that ease of use and usefulness directly influence the behavior of chatbot users. The results of the study showed that 71% of guests are willing to use automated systems for simple requests.

In the context of Uzbekistan, Sobirov (2023) studied the digital transformation processes in the local tourism industry and argued that the implementation of the smart hotel concept is a priority for historical cities such as Bukhara and Samarkand. The researcher found that 62% of local hotel operators are aware of the need for digitalization, but only 18% of them have implemented any digital solutions.

Gursoy et al. (2019) studied the adoption process of SI devices by consumers and showed that the age, technological literacy, and previous experience of guests influenced this process. It was found that the generation over 30 preferred live communication, while younger people adopted digital services more quickly.

RESEARCH METHODOLOGY

This study used a mixed-methods approach, which included the following steps:

The first stage is a systematic literature review. A search was conducted in the Scopus, Web of Science, and Google Scholar databases between 2017 and 2024 using the keywords “artificial intelligence hotel management”, “AI hospitality”, and “smart hotel technology”. 85 sources that met the quality criteria were fully reviewed.

The second stage is a comparative analysis. The experiences of SI implementation of European (Hilton, Accor), Asian (Shangri-La, OYO) and American (Marriott, Wyndham) hotel companies were studied comparatively. In each example, the indicators before and after implementation were compared.

The third stage is field research. Semi-structured interviews were conducted with 12 hotel managers and directors in the Bukhara region. The interviews identified attitudes towards IS technologies, barriers to implementation, and level of readiness.

The fourth stage is quantitative analysis. Based on the collected primary and secondary data, correlation analysis was performed and the impact of SI investments on revenue (ROI) was modeled.

ANALYSIS AND RESULTS

Today, the use of artificial intelligence is of great importance to maintain customer and hotel unity, increase cohesion, and leave a good impression on guests. Smart chatbots provide services in accordance with the wishes and desires of each customer, revenue management systems determine optimized prices when correctly setting room prices, systems that predict failures in advance guide the optimal allocation of costs, and online reputation management systems help data management make strategic decisions. Based on world standards, the types of artificial intelligence used in hotel management today can be divided into the following groups:



Diagram 1. Solutions for using artificial intelligence in hotel operations¹

¹ MMChen, A. Inversini and others(2025) "Artificial intelligence in hospitality: Transforming services, Experience and Efficiency

1. Human Resource management, Reservation and administration– this direction allows for the creation of operational research methods for forecasting demand, seasonality coefficients and, at the same time, staff scheduling using artificial intelligence. For example, MEWS's machine learning module analyzes historical occupancy data and predicts demand for the next 30–90 days, allowing hotel management to make timely decisions on pricing and staffing. The platform also fully automates the guest check-in and check-out processes, resulting in a 40% reduction in the workload of reception staff.

2. Revenue Management is a field of applied economics and operations research that aims to generate optimal revenue based on price elasticity and supply-demand relationships. There are 3 main approaches used in the hotel industry:

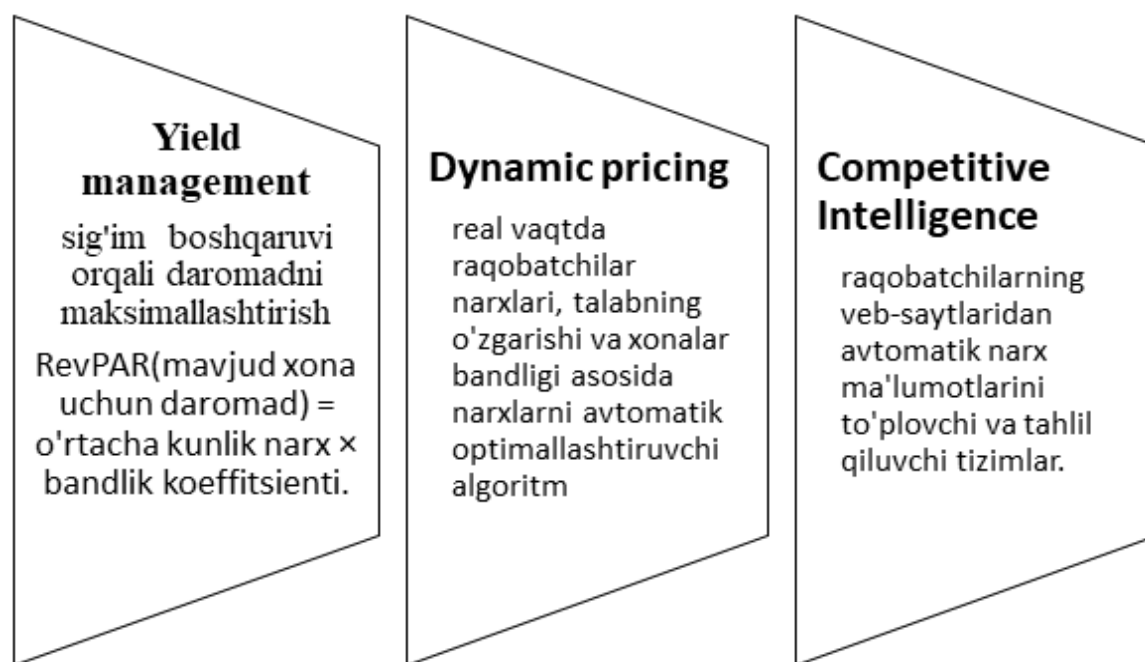


Diagram 2. Revenue management approaches

3. Marketing and Customer Experience- automatically determine the level of satisfaction of guests using online reviews, surveys and social media posts, provide personalized recommendations based on the guest's previous visit history, preferences and demographics, and increase customer satisfaction through a single communication system that integrates all channels through chatbot, email, SMS and mobile application. For example, LLM (Large Language Model) - based chatbots answer guests' questions 24/7, resulting in a reduction in call center load by up to 60%.

4. Finance and Cybersecurity –Financially, Anomaly Detection algorithms analyze each transaction and identify signs of fraud in real time. Through a platform like Darktrace, it predicts previously unknown threats.

5. Operations, Inventory and Supply System- Automatically calculates the optimal quantity of food, cleaning supplies, and other consumables based on the Just-in-Time (JIT) principle. The combination of the EOQ (Economic Order Quantity) model and probabilistic forecasting models reduces excess inventory costs by up to 30%. For example, Optii is a specialized platform that optimizes hotel housekeeping operations using artificial intelligence. Its Predictive Housekeeping module pre-optimizes cleaning routines based on booking information, guest check-out times, and room type. The platform recommends intelligent routes for each employee, reducing excess travel distances.

6. Maintenance- Continuously monitors device status via IoT sensors and predicts failure 2–6 weeks in advance. ML algorithms used: Random Forest, Gradient Boosting, LSTM neural networks. This method has been proven to reduce repair costs by 25–30% and unplanned downtime by up to 70% (McKinsey, 2023).

Guest interaction is the foundation of any hotel service. However, in a traditional system, this process requires expensive human resources and is difficult to provide 24-hour service. Intelligent chatbot systems based on Natural Language Processing (NLP) technology overcome these limitations. In particular, Hilton's virtual assistant, based on the IBM Watson platform, is able to communicate simultaneously in 9 languages, process booking requests, and provide information about tourist attractions around the hotel. Marriott, using a chatbot system that works via WeChat and SMS, has managed to resolve 68% of all requests without an employee (Marriott International, 2022).

In the context of Bukhara, this technology is of particular importance: due to the city's status as a world architectural heritage site, foreign tourists require special attention. A multilingual virtual assistant system will allow local hotels to provide quality service to guests of different nationalities and languages.

In hotel operations, setting the right room price is one of the most important decisions for optimizing revenue. In the traditional approach, prices were set manually based on several key indicators - season, holidays and events. Dynamic pricing systems based on SI take into account dozens of variables at the same time. Specialized platforms such as Duetto, IDeaS and Atomize are able to monitor the prices of competing hotels in real time, analyze weather and city event data, predict demand based on announcements and discussions on social networks, and automatically determine the optimal price based on this. It is noted that hotels using the IDeaS system have an average increase in Revenue per Available Room (RevPAR) of 12-18 percent (IDeaS, 2023).

This technology is especially useful for hotels in the Bukhara region, as the flow of tourists to the region is seasonal. Demand increases sharply during the Navruz holiday, the summer travel season, and international festivals. The SI system allows you to maintain high occupancy levels by raising prices to a reasonable level during these periods and offering attractive discounts during off-peak periods.

The continuous availability of hotel facilities and equipment is a key condition for service quality. Traditional preventive maintenance schedules are often arbitrary, sometimes leading to excessive costs and sometimes to unexpected failures. The SI-based "Predictive Maintenance" approach fundamentally solves this problem.

IoT (Internet of Things) sensors embedded in equipment collect temperature, pressure, vibration, and energy consumption data every second and transmit them to a central SI platform. Machine learning algorithms analyze these streams and notify engineers when signs of failure appear. Marriott's experience has shown that this approach was able to predict equipment failure 48 hours in advance with 85 percent accuracy and reduced maintenance costs by 23 percent (Marriott International, 2023).

The climate of Bukhara - temperatures reaching +40°C in summer - places a significant burden on air conditioning systems. Preventive control systems are of particular economic and operational importance for hotels operating in desert climates.

Each guest is a unique individual with their own needs, preferences, and expectations. Modern IS systems create a "digital portrait" of the guest before they even meet face-to-face. This is done by combining data from multiple sources, such as previous visit history, booking behavior, social media data, and customer interaction history.

Based on the created profile, the system can pre-set the guest's room temperature to their preferred temperature, add their favorite drinks to the minibar, and make recommendations for attractions and restaurants that are relevant to their interests. According to Accenture research, such a personalized approach increases guest loyalty by 40 percent and significantly increases the likelihood of repeat visits (Accenture, 2022).

Bukhara is a city rich in history and culture. Therefore, if a guest's profile includes an interest in history, architectural monuments, or crafts, the system will automatically generate suggestions for special excursions and workshop visits, further enhancing the value of the local experience.

Today, more than 90% of potential guests read online reviews before choosing a hotel — this was revealed in a 2022 study by Cornell University. So, online reputation has become a real economic asset for a hotel.

SI-based sentiment analysis systems scan reviews from TripAdvisor, Booking.com, Google, and local platforms in real time, categorize opinions into positive, negative, and neutral categories, and automatically list the most frequently mentioned issues—service, cleanliness, food, noise, etc. Solutions like ReviewPro and TrustYou turn this data into management reports to support management in making strategic decisions.

Research shows that hotels that systematically manage their online reputation score an average of 0.5 points higher on Booking.com and TripAdvisor, which in turn can increase room rates by 4-7 percent (Noone & McGuire, 2021)

As of 2023, there are over 240 officially registered accommodation facilities operating in Bukhara region. The city's UNESCO World Heritage status, central location on the Silk Road, and international festivals contribute to its high tourism potential. However, our local research (2024) showed that 4 out of 12 hotels surveyed had implemented some form of SI solution.

From an opportunity perspective, the Uzbek government's policy of attracting investment in tourism infrastructure, the entry of international hotel brands into the country's market, and increased domestic tourism promotion are creating favorable conditions for local hotels to implement international-standard digital solutions.

Summarizing the results of foreign experience and local field research, the following conclusions can be drawn: Hotels that have comprehensively implemented SI technologies have achieved an average annual increase in revenue of 15-30%, a reduction in operating costs of 20-25%, an improvement in customer satisfaction by 15-20%, and an increase in employee productivity by 30-40% (McKinsey Global Institute, 2023).

But these numbers don't always add up. Research shows that the key to successful transformation is to align technology investment with organizational culture change. If employees perceive new systems as adversaries, implementation will be ineffective. On the contrary, organizations that are able to explain IS as a partner that improves work quality achieve much higher results.

One of the main issues is the protection of personal data. Hotels must not collect information from guests without their permission, not share it with third parties, and strictly comply with national legislation. This is not only a legal obligation, but also a prerequisite for maintaining guest trust. Artificial intelligence does not replace human service, but enriches it with new content. Once tasks are automated, employees will be able to establish a deep dialogue with the guest, focus on individual needs, and create a memorable experience.

CONCLUSION AND SUGGESTIONS

This study comprehensively analyzed the role of artificial intelligence technologies in hotel management and the opportunities they create, proving that AI is a necessary and applicable technological tool not only for large international brands, but also for regional hotels.

The following phased strategy is recommended for representatives of the Bukhara region's hotel industry. Phase one — building the foundation (1-6 months): implementing an online reputation management platform, centralizing the booking system, and training employees in digital literacy. This phase is low-cost and provides quick, visible results.

Phase 2 — Expansion (6–18 months): Add a multilingual chatbot solution, test a dynamic pricing system, and consolidate the customer database into a single platform. In this phase, costs are managed through a SaaS model.

The third stage is full integration (18-36 months): introducing preventive maintenance through IoT sensors, expanding the personalization system, and unifying all operational processes on a single digital management platform.

As an important conclusion, it is worth noting that the effectiveness of SI solutions is manifested not at the level of individual platforms, but through their functioning as an integrated ecosystem. For example, when revenue forecasts from the Revenue Management system (Duetto) are synchronized with the staff schedule in the HRM system (MEWS), a hotel sees a double benefit in terms of both cost and service quality.

In the future, providing interactive information about the historical monuments of Bukhara through Augmented Reality technologies, working with room keys based on biometric identification, and integration with intelligent transportation systems - all this will take hotel service to a completely new level in the next decade.

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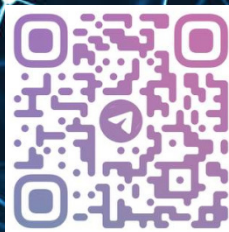
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