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A systematic review of the impact of artificial intelligence in the hospitality industry

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Abstract

Purpose: The purpose of this review is to assess the impact of artificial intelligence (AI) on the hospitality industry, focusing on how AI technologies are transforming customer experiences, operational processes, and decision-making within the sector. With AI becoming an integral part of modern business, this review aims to consolidate existing research on the integration of AI tools such as chatbots, robotic assistants, predictive analytics, and personalization systems in hospitality settings.

Design/methodology/approach: The methodology involves a systematic review of peer-reviewed journal articles, industry reports, and case studies published over the last decade. The collected data were analyzed to identify key trends, challenges, and benefits associated with AI implementation in hospitality. The article examines various articles by different criteria such as by year, by author, organization, countries, by document type and by field of knowledge.

Findings: The findings indicate that AI significantly enhances customer service efficiency, personalizes guest experiences, and optimizes pricing and inventory management. For example, AI-driven chatbots have improved response times and reduced staffing costs, while predictive analytics has allowed hotels to tailor offers based on guest preferences and behavior patterns. However, challenges such as high initial costs, data privacy concerns, and the need for employee retraining remain significant barriers to widespread adoption.

Originality: We confirm that we are the original creators of this research and that no part of this work has been previously published or submitted for publication in any other venue.

Keywords: artificial intelligence, impact, hospitality industry, systematic literature review, innovation, chat-bot, customer experience

Introduction

The hospitality industry is currently undergoing a major transformation as artificial intelligence (AI) and robotics become increasingly integrated into daily operations and customer service. Traditionally, hospitality has been known for its personal and high-contact interactions with guests. However, the industry is now working to find the right balance between maintaining this human-centered service and benefiting from the efficiency and innovation that technology can provide. Broad overviews and sector-focused studies also document this transition (Iberamia, 2016; Bhushan, 2021; Citak et al., 2021; Dangwal et al., 2023; Jabeen et al., 2022; Nannelli et al., 2023; Samala et al., 2022; Smrutirekha et al., 2023).

The COVID-19 pandemic played a significant role in accelerating this shift toward digital solutions. Hotels and tourism businesses were forced to adopt new technologies to improve safety, streamline operations, and create more personalized experiences for guests (Bauer, 2023). Related research has examined pandemic-driven automation, biosecurity, hygiene, and post-COVID recovery (Afaq & Gaur, 2021; Ivanov, Webster, Stoilova, & Slobodskoy, 2022; Marques et al., 2022; Perić & Vitezić, 2021; Pillai et al., 2021; Van et al., 2020; Vuong & Tung, 2021; Zeng et al., 2020).

Today, AI is used in many areas of hospitality. For example, automated check-in systems allow guests to access their rooms quickly without waiting in line, while robotic concierges can assist with information and simple tasks. In addition, intelligent chatbots provide round-the-clock customer support, helping hotels respond to guest requests faster and more efficiently (Blöcher & Alt, 2021; Huang, 2021). These technologies not only streamline service delivery but also address persistent challenges such as labor shortages and increasing service expectations (Rasheed, 2023). Despite the obvious benefits of automation, researchers emphasize the importance of maintaining emotional intelligence and human empathy when interacting with guests, as their loss can lead to a weakening of personal connection (Yeh, 2020). Research also covers robot hotels, intelligent rooms, digital service systems, and technology-based responses to labor shortages (Bowen

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& Morosan, 2018; Gupta et al., 2022; Lai & Hung, 2018; Leonidis et al., 2013; Morosan & Bowen, 2022; Mustafa, 2022; Nam et al., 2021; Reis et al., 2020; Singh et al., 2023; Verma et al., 2021).

However, despite a significant increase in the number of scientific papers devoted to the implementation of artificial intelligence in the hospitality industry, existing studies are fragmented. Most focus either on individual technologies or the short-term effects of their application, with insufficient attention paid to the integration of bibliometric and systematic approaches. This gap highlights the need for a comprehensive summary of global scientific trends to more accurately understand the current state of research and identify promising areas. The fragmented evidence base has therefore prompted systematic, bibliometric, and conceptual reviews (Doborjeh et al., 2022; Hossain et al., 2022; Kumar Singh et al., 2022; Mariani & Wirtz, 2023; Osei et al., 2020; Saydam et al., 2022; Sharma, K., Dhir, & Ongsakul, 2022; Singh, Tyagi, Singh, et al., 2022; Yang & Chew, 2021).

The purpose of this study is to analyze the development of scientific research on the application of artificial intelligence in the hospitality industry. Specifically, the work aims to identify key research trends, the most influential authors, leading academic institutions, and key thematic clusters. Furthermore, special attention is paid to identifying the conceptual and methodological approaches that shape the current academic agenda in this field.

To achieve this goal, the following research questions were formulated:

1. What are the main thematic areas and trends characterizing research of AI implementation in the hospitality industry?
2. Which countries, authors, and academic organizations are making the greatest contribution to the development of this field?
3. What research gaps exist, and what promising areas can be proposed for future research?

The conceptual framework of this study is based on a model of technological innovation adoption, which emphasizes the relationship between the efficiency achieved through the use of AI, customer satisfaction, and the interaction between employees and intelligent technologies in the service sector. Technology-adoption studies examine guest attitudes, organizational intention, perceived value, repurchase intention, and service-robot acceptance (Alma Çallı et al., 2023; Ayyildiz et al., 2022; Binesh & Baloglu, 2023; Ho et al., 2022; Huang, 2022; Ivanov et al., 2018; Lei et al., 2023; Lv, Luo, Liang, et al., 2022; Meidute-Kavaliauskiene et al., 2021; Nazir et al., 2023; Nozawa et al., 2022).

In recent years, the hospitality industry has been undergoing rapid digital transformation, driven by both technological advances and the need for post-pandemic recovery. Despite the existence of several review studies on the application of AI in the hospitality industry, a comprehensive analysis based on systematization and bibliometric processing of the data remains lacking. Therefore, conducting a structured literature review appears relevant and necessary to consolidate disparate scientific findings and form a holistic understanding of the development of this field. Studies of digital transformation further address software, digital marketing, competitiveness, business performance, big data, information architecture, and hotel technologies (Helgemeir & Cenzano, 2019; Ispahi, 2023; Kapoor & Kapoor, 2021; Kumar et al., 2023; Sharma, K., Jain, & Dhir, 2022; Sharma, M., Bathla, Kaushik, et al., 2023; Singh & Munjal, 2021; Stylos & Zwiegelaar, 2019; Sultanow et al., 2021; Voronova et al., 2020).

The scientific novelty of this study lies in the integration of a systematic literature review, conducted using the PRISMA methodology, with bibliometric visualization tools. This approach allows for a more in-depth and comprehensive analysis of the evolution of scientific research related to the application of AI in the hospitality industry.

At the same time, several limitations of the study should be considered. In particular, the analysis is based exclusively on publications indexed in Scopus, which may lead to the exclusion of relevant works presented in other scientific databases. Second, only English-language publications were considered, which may restrict the diversity of perspectives represented in the review. Finally, bibliometric visualization conducted through VOSviewer involves a degree of interpretation, which may influence how the results are understood.

Background

Artificial intelligence (AI) has become an important driver of change in the hospitality industry, influencing how businesses interact with customers, manage operations, and use data to support decision-making. Over the past decade, academic research has increasingly examined how AI technologies — such as service robots, chatbots, and predictive analytics — are being integrated into tourism and hospitality services (Ivanov & Webster, 2020; Huang et al., 2022). The application landscape also includes food-and-beverage

automation, process automation, robotics, the metaverse, and AI-enabled resource management (Dani et al., 2022; Goyal & Singh, 2021; Ivanov, Webster, & Berezina, 2022; Khaliq et al., 2022; Nair et al., 2023; Rosete et al., 2020; Ruel & Njoku, 2020; Singh & Chaudhary, 2023).

Many scholars highlight the potential of AI to improve operational efficiency, enhance service personalization, and strengthen customer engagement (Goel et al., 2022). For instance, AI-powered chatbots can respond to guest inquiries in real time, while predictive analytics helps hotels forecast demand and adjust pricing strategies more effectively. Furthermore, robotic technologies can support service delivery by performing routine operations, ensuring greater service consistency and helping to reduce operating costs (Kim et al., 2022; Yordanova, 2023). As a result, their implementation allows hospitality businesses to more effectively adapt to changing customer expectations, especially in the post-COVID-19 period. Empirical work additionally addresses customer analytics, demand forecasting, decision support, loyalty, emotion recognition, and online-review analysis (Akdim, 2021; Al-Hyari et al., 2023; Buckley et al., 2014; Caicedo-Torres & Payares, 2016; Chen, 2017; Chen et al., 2021; Claveria et al., 2015; C.-Sánchez et al., 2022; González-Rodríguez et al., 2020; Hajek & Sahut, 2022).

However, despite these advantages and the growing interest in the use of artificial intelligence, a number of unsolved problems and research gaps remain in this field. In particular, much existing work focuses primarily on the technological potential of AI systems, while the managerial, ethical, and cultural aspects that significantly influence the success of their implementation in the hotel industry remain understudied. Issues such as employee adaptation, data privacy, and human–robot interaction require deeper exploration (Herrera et al., 2023; Rawal et al., 2023). Furthermore, previous reviews have primarily been narrative rather than systematic, lacking comprehensive bibliometric mapping of research trends and collaboration networks. Human-centered research examines employee outcomes, technological competencies, career concerns, job displacement, and workforce readiness (Alipour et al., 2021; Bhargava et al., 2021; Ersoy & Ehtiyar, 2023; Hopf et al., 2018; Hsu & Tseng, 2022; Kong et al., 2021; Lestari et al., 2022; Lestari et al., 2021; Li et al., 2019; Yeh et al., 2020).

This background thus establishes the need for a systematic review and bibliometric analysis that synthesizes existing studies, identifies dominant themes, and highlights gaps in AI research within hospitality.

In the context of Central Asia, and particularly Kazakhstan, the integration of AI technologies into hospitality and tourism management is still at an early stage. Local studies mainly address digitalization and smart tourism, yet there remains a lack of bibliometric synthesis reflecting regional trends. Incorporating Kazakhstan's perspective is important for understanding how global AI developments align with emerging markets and post-Soviet innovation systems (Lv, H., Shi, S., & Gursoy, D., 2022). Contextual applications span halal tourism, GIS, smart and green hospitality, health tourism, eco-friendly technologies, and social-media safety analysis (Battour et al., 2022; Chaudhuri & Ray, 2018; Tan & Wright, 2022; Wang et al., 2022; Xess et al., 2021; Zeng et al., 2023).

This study, which combines quantitative mapping and qualitative interpretation, aims to develop a more holistic understanding of how artificial intelligence is transforming the hospitality industry and to identify areas requiring further research.

Methodology

This study uses a combined methodological approach, including a systematic literature review and bibliometric analysis, to examine the development dynamics, scope, and thematic structure of research on the application of artificial intelligence in the hospitality industry. The methodology employed complies with the PRISMA 2020 (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) guidelines, ensuring the transparency and reproducibility of the research process.

3.1 Database Selection and Search Strategy

Scopus was chosen as the primary data source due to its broad coverage of high-quality peer-reviewed scientific publications and its suitability for bibliometric analysis. Furthermore, Scopus integrates effectively with visualization tools such as VOSviewer, facilitating the visual presentation and analysis of scientific data (Pranckutė, 2021).

The study`s timeframe spans from January 2010 to February 2024, allowing us to trace the evolution of scientific trends both before and after the COVID-19 pandemic. Publications were searched in February 2024 using keywords included in titles, abstracts, and author keywords, such as "artificial intelligence" AND "hospitality industry" OR "tourism" OR "robotics".

To ensure the quality and relevance of the selected sources, the following inclusion criteria were established:

– Publications between 2010 and 2024;
– Articles in peer-reviewed journals, conference proceedings, and review papers;
– Publications in English;
– Studies specifically focused on the application of AI in hospitality and tourism.

Exclusion criteria included:

– Non-scientific materials (editorials, book reviews, short communications);
– Publications unrelated to AI or devoted to other fields;
– Duplicate records resulting from overlapping search queries.

3.2 Selection and Screening Process

The initial search in the Scopus database identified 421 publications. During the pre-processing stage, 170 duplicate records were identified and removed, leaving 251 unique studies for further analysis.

The next step involved a detailed analysis of titles, abstracts, and author keywords to assess the relevance of the publications to the study objectives. Following this stage, 96 studies that did not meet the established relevance criteria were excluded from the sample. The main reasons for exclusion included the absence of a clear focus on the hospitality or tourism sector, limited relevance to artificial intelligence applications, or a primary focus on other industries.

Following this stage, 155 publications remained and were considered suitable for further analysis. These studies directly addressed the use and role of artificial intelligence in hospitality and tourism and therefore formed the final dataset for the bibliometric and qualitative analysis.

A summary of the selection procedure is presented in Table 1 (Summary of the PRISMA Study Selection Process).

3.3 Bibliometric and Visualization Analysis

The bibliometric data from the 155 selected publications were exported from the Scopus database in CSV format and analyzed using VOSviewer (version 1.6.19). This software was used to visualize relationships within the dataset, including co-authorship networks, keyword co-occurrence patterns, and citation links among publications.

The analysis focused primarily on identifying relationships based on co-occurrence and citation, with author keywords and countries serving as the primary units of analysis. The study utilized a full-count method, in which each element occurrence and each relationship were weighted equally, reflecting their cumulative presence in the analyzed dataset.

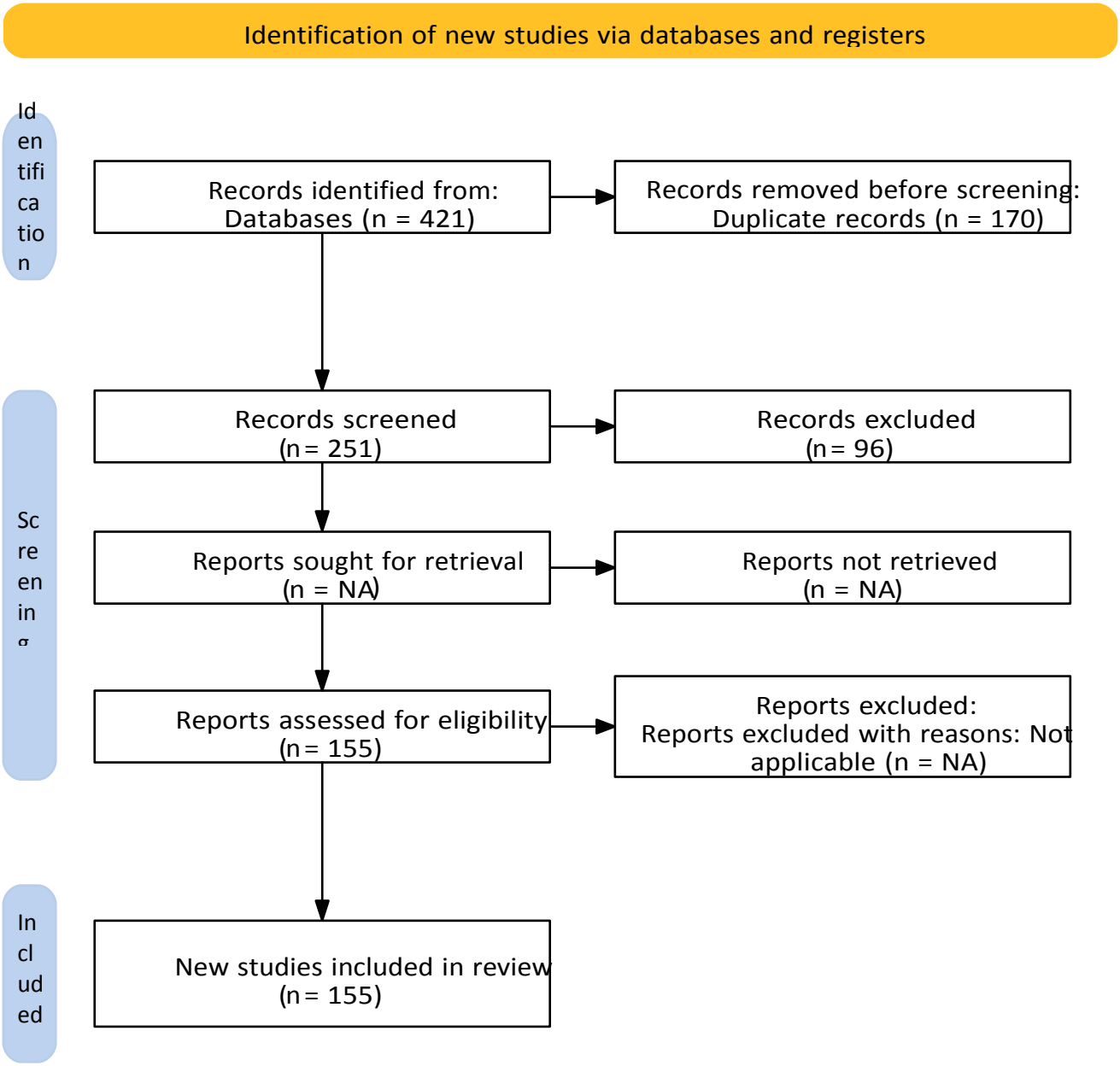
To enhance the relevance of the results, a minimum threshold of at least five occurrences for each keyword was established. This allowed us to focus on the most frequently used terms in the scientific literature. Additionally, a normalized association strength method was used to standardize the relationships between elements, which, in turn, facilitated their comparison and enabled a clearer identification of clusters and structural relationships within the network. Taken together, these parameters allowed us to identify key thematic areas and uncover key research patterns in the field.

3.4 Limitations of the Methodology

Despite the use of a systematic approach, this study has several limitations. First, the analysis is based exclusively on publications indexed in Scopus and presented in English, which may exclude relevant studies published in other languages or included in alternative scientific databases.

Second, while bibliometric tools such as VOSviewer provide meaningful quantitative metrics reflecting the relationships between scientific publications, they do not allow for a full assessment of the qualitative depth of content and methodological rigor of individual studies. For this reason, the findings should be interpreted with caution. These limitations are acknowledged in the conclusion, where the need for complementary qualitative approaches is also discussed in order to achieve a more comprehensive understanding of AI research in the hospitality industry.

Table 1. Summary of the PRISMA Study Selection Process



Results

The thematic review articulates its findings through nine analytical dimensions that collectively offer a detailed understanding of artificial intelligence research in the hospitality industry. The key aspects include publication trends over time, the contribution of leading organizations and authors, citation patterns, geographical research distribution, main thematic areas and their interdisciplinary links, sources of research funding, keyword co-occurrence and thematic clusters visualized with VOSviewer, author collaboration networks, and interpretive insights into emerging research trends.

This comprehensive, multidimensional approach allows for an in-depth exploration of how AI-related studies have developed across regions and over time, highlighting increasing interdisciplinarity in the field. This review goes beyond simply counting the number of scientific papers. Using a combination of publication statistics (bibliometrics) and semantic content analysis (concept analysis), we uncover the underlying structure of research in the field of artificial intelligence for the hospitality industry. We identify key areas in which this research is developing. Concept-mapping methods have also been applied to organize knowledge in the hospitality sector (Fornells et al., 2015).

To identify key themes, we used VOSviewer. It groups keywords based on how frequently they appear together. We established that a word or phrase must appear at least five times to be included in the analysis. A normalization method was used to assess the strength of relationships between words. Initially, the program identified five topic groups. These groups were then reviewed and slightly adjusted manually to ensure their logical consistency. The result was clearly defined thematic areas reflecting the main research directions in this literature.

4.1 Publication Trends by Year

The analysis shows that interest in the application of AI in hospitality has been steadily growing over the past decade. From 2010 to 2016, the number of publications was small and mostly theoretical or exploratory, consistent with the initial stage of development of this field.

However, since 2017, there has been a rapid increase in the number of studies. This suggests that scholars increasingly recognize the potential of AI to transform the hotel industry and customer service. A particularly noticeable surge occurred after 2020, largely due to the COVID-19 pandemic, which accelerated the adoption of digital and contactless technologies in the industry.

This trend indicates that AI is now viewed as an important strategic tool for maintaining competitiveness and ensuring the sustainability of the hotel industry. The steady annual growth in the number of publications also demonstrates that AI research has evolved from a niche topic to a recognized field within tourism and hospitality management research (Fig. 1).

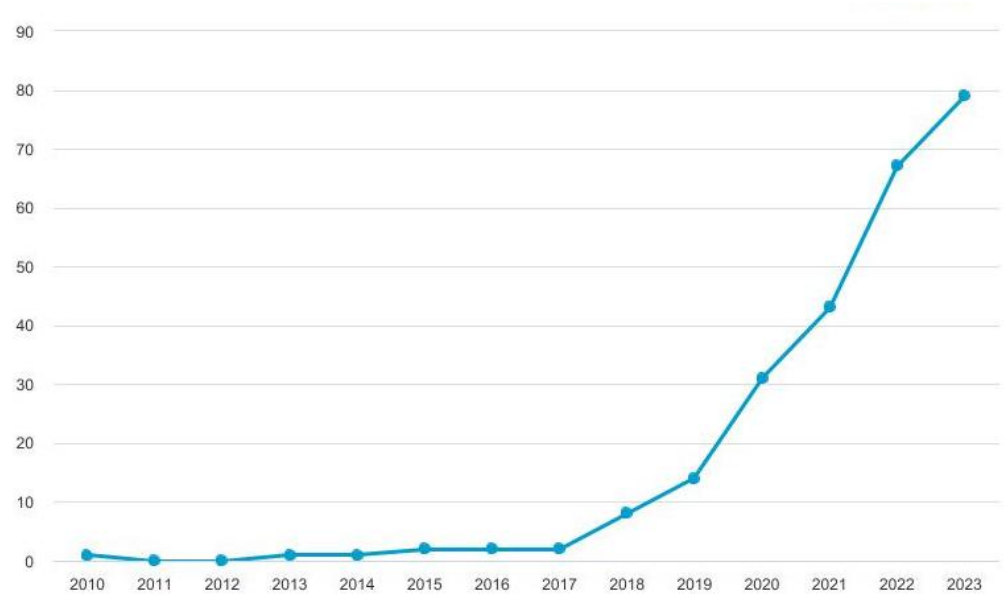


Figure 1. Documents by year

4.2 Centers of Excellence in AI Research in Hospitality and Their Productivity

The analysis shows that cutting-edge research in artificial intelligence for the hospitality industry is concentrated in a small number of reputable academic centers, primarily located in technologically advanced countries. Notable among these are the Hong Kong Polytechnic University, Cornell University, and the University of Surrey, which have made significant contributions to the theoretical and empirical foundations of this field (Sharma, S., Rawal, Y. S., Soni, H., & Batabyal, D., 2023).

A key factor in the success of these universities is their commitment to an interdisciplinary approach. Collaboration between specialists in hospitality management, computer science, and data analytics enables comprehensive research into the application of AI in the service sector and the development of innovative solutions.

The success of these leading institutions is supported by factors such as research funding, access to cutting-edge technologies, strong academic ties, and partnerships with industry representatives. However, there is limited participation from institutions in developing regions, highlighting the need for greater global engagement. Expanding the geographic scope of participants can bring new perspectives, research contexts, and methodological approaches, contributing to a more inclusive and globally relevant understanding of the role of AI in the hospitality industry (Fig. 2).

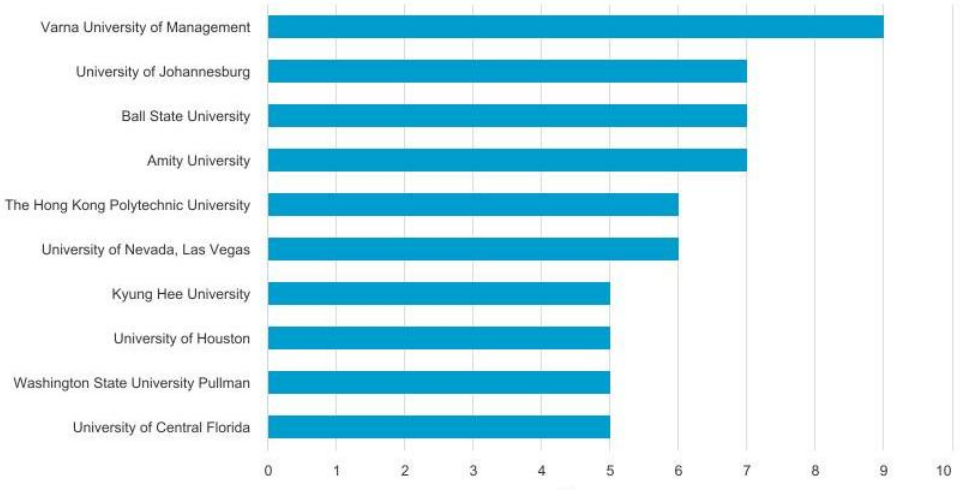


Figure 2. Documents on organizations

4.3 Influential Figures and Academic Networks in AI for Hospitality

The analysis revealed that several prominent scholars have played a decisive role in shaping the field of AI research in the hospitality industry. Among the most significant are Stanislav Ivanov, Craig Webster, Dogan Gursoy, and Oh Haemun Chi (Chi, O. H., Denton, G., & Gursoy, D., 2020). Their research has provided valuable insights into service automation, robotics implementation, and consumer perceptions of AI technologies in the hotel industry (Lu, L., Cai, R., & Gursoy, D., 2019). The contributions of Ivanov and Webster also include analyses of demographic change and robot-based tourism futures (Webster & Ivanov, 2020a; Webster & Ivanov, 2020b).

A citation network analysis reveals close academic ties between these researchers, indicating active collaboration and ongoing exchange of ideas within the academic community. These interconnected networks contribute to the progressive development and refinement of theoretical concepts related to the integration of AI in hospitality.

Furthermore, the presence of cross-references between works on hospitality and marketing demonstrates the growing interdisciplinary nature of this field. The high citation rate of these authors indicates that the research has reached a more advanced stage of conceptual development and is moving toward the formation of a well-established theoretical framework. This growing body of research lays a solid foundation for future research on the role of artificial intelligence in the hospitality sector (Fig. 3).

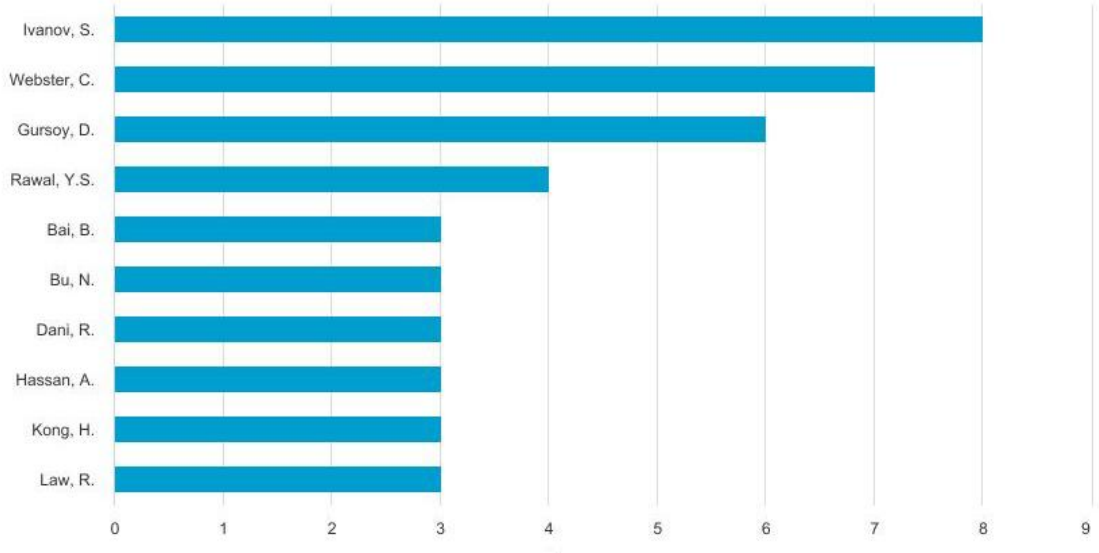


Figure 3. Documents by authors

4.4 Geographic Distribution of Research

An examination of the geographic distribution of scientific publications on artificial intelligence in the hospitality industry reveals a distinct concentration in East Asia, North America, and Western Europe. These regions boast both high levels of technological development and mature hospitality sectors. The leading author countries are China and the United States, followed by South Korea, the United Kingdom, and Australia. The significant presence of these countries is due to their developed research infrastructure, access to financial resources, and early adoption of AI technologies in the service sector, including hospitality and tourism, which contribute to a favorable environment for technological innovation and academic research.

At the same time, research from emerging economies, particularly Central Asia, remains relatively limited. This imbalance highlights the need for more contextualized research that takes into account the specific cultural, infrastructural, and socioeconomic factors influencing AI implementation in various regional hospitality contexts. Expanding the geographic scope of research will allow for a more comprehensive understanding of the impact of artificial intelligence on tourism and hospitality across diverse regional and cultural environments (Fig. 4).

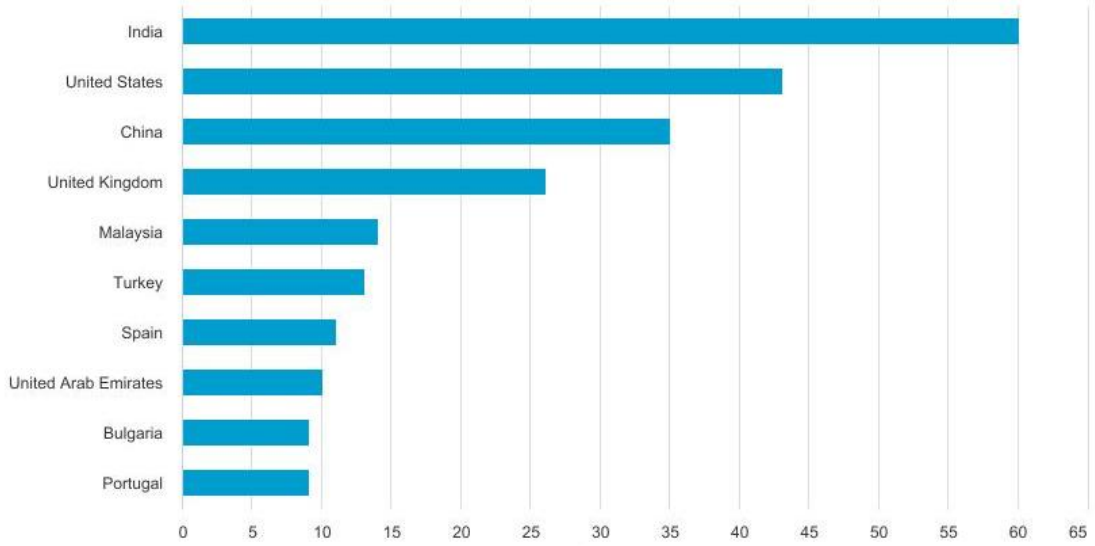


Figure 4. Documents by countries

4.5 Key Areas and Interdisciplinary Links

Research in artificial intelligence for the hospitality industry is characterized by an interdisciplinary approach. Experts from disciplines such as management, computer science, psychology, and data analysis contribute to this field. This diversity of specialists reflects the complex nature of AI implementation in the service sector. Thematic mapping revealed three main research areas. The first area focuses on technological innovation and automation, studying the integration of AI technologies into the operational activities of hospitality businesses. The second area centers on customer experience and satisfaction, exploring how AI-based services influence guest perceptions and service quality. The third theme addresses human–AI interaction and ethical considerations, including issues related to trust, acceptance, and the role of human employees in increasingly automated service environments. The interdisciplinary scope extends to indoor environmental quality, Industry 5.0, education, healthcare, sensory systems, blockchain, e-learning, and smart landscapes (Bangwal et al., 2023; Chourasia et al., 2023; Guo, 2021; Hacikara, 2023; Ilapakurti et al., 2018; Jahan, 2021; Liu, 2023; Patzer et al., 2018; Puri et al., 2023; Tien et al., 2021).

The relationships between these themes suggest that hospitality research is gradually moving beyond purely operational concerns. Instead, scholars are increasingly adopting broader perspectives that also consider behavioral, ethical, and managerial dimensions of AI adoption. Behavioral and ethical research additionally considers empathy, vocal warmth, cuteness, social presence, resistance, and acceptance in human-robot encounters (De Kervenoael et al., 2020; Huang & Sénécal, 2023; Pelau et al., 2021; Pitardi et al., 2022; Rauf et al., 2022; Singh et al., 2021; Vitezić & Perić, 2021; Wang et al., 2023; Zhong et al., 2020; Zulfakar et al., 2023).

In addition, the presence of interdisciplinary links with fields such as marketing and human resource management indicates that artificial intelligence is being studied not only as a technological innovation but also as a driver of organizational change and evolving service cultures within hospitality businesses (Fig. 5). Organizational implications include recruitment, digital human-resource management, emotional intelligence, fairness, transparency, and AI-enabled surveillance (Dominique-Ferreira et al., 2022; Johnson et al., 2020; Prentice, 2023; Sharma, S., Rawal, Pal, & Dani, 2022; Zhao et al., 2023).

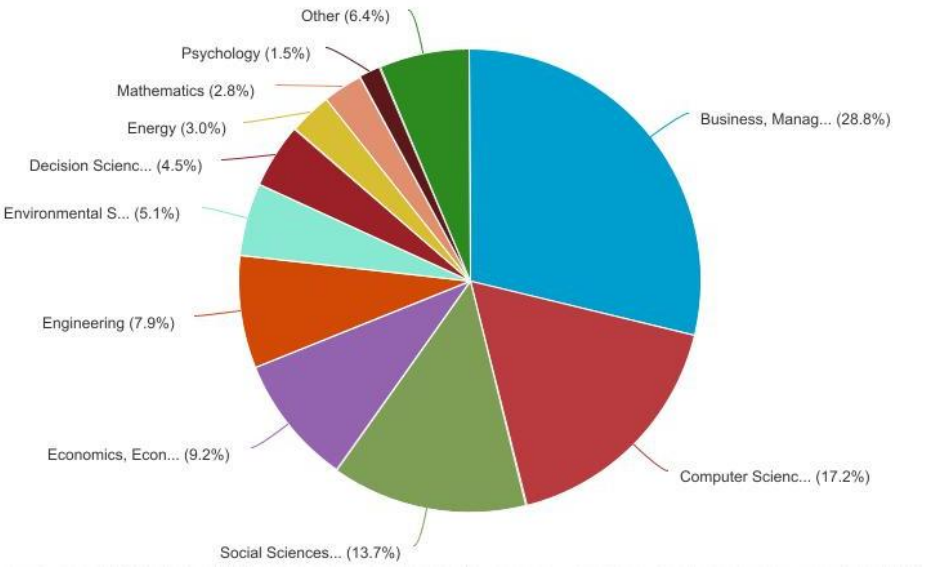


Figure 5. Documents on the field of knowledge

4.6 Funding Sources

The analysis indicates that many studies in this research area do not clearly report their funding sources, which makes it difficult to identify broader patterns of financial support within the field. Among the publications that do disclose funding information, most are supported by national science foundations, university research councils, or government innovation programs. Such funding is particularly common in countries like China, the United States, and South Korea.

These funding bodies often prioritize research initiatives related to digital transformation and smart tourism, reflecting national strategies aimed at encouraging the adoption of artificial intelligence within the service sector, including hospitality and tourism (Wong, I. A., Huang, J., Lin, Z. C. J., & Jiao, H., 2022).

At the same time, the analysis shows relatively limited involvement from industry-funded research. This suggests a potential gap between academic studies and practical implementation within the hospitality industry. Strengthening collaboration between academic institutions and industry partners could help address this gap by increasing the practical relevance of future research and facilitating the translation of theoretical findings into real-world applications (Fig. 6).

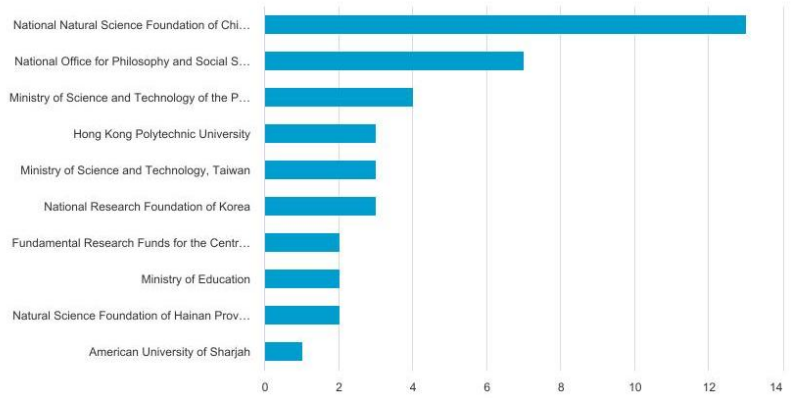


Figure 6. Documents on the funding sponsor

4.7 Keyword Co-occurrence and Thematic Clusters (VOSviewer)

The keyword co-occurrence analysis conducted with VOSviewer helps reveal the main conceptual connections within the research on artificial intelligence in the hospitality industry. The most frequently appearing keywords include "artificial intelligence," "service automation," "chatbots," "customer satisfaction," and "robotics." These terms highlight both the technological aspects of AI implementation and its influence on guest experience within hospitality services. These clusters are reflected in studies of customer-robot interaction, automated review management, ChatGPT, explainable machine learning, voice assistants, and service recovery (Huang et al., 2021; Katsiuba et al., 2022; Kaur et al., 2023; Koc et al., 2023; Lee et al., 2021; Lee et al., 2022; Limna & Kraiwanit, 2023; Liu & Xu, 2023; Lv et al., 2021; Rasheed, Chen, Khizar, & Safeer, 2023; Rasheed, He, Khizar, & Abbas, 2023; Ruiz-Equihua et al., 2023; Sharma et al., 2021; Xu & Liu, 2022).

Contemporary AI publications increasingly incorporate new keywords such as "ethics", "privacy", "sustainability", and "human-AI collaboration". This demonstrates that research is moving beyond purely technical issues to encompass the broader social, ethical, and governance implications of AI. An analysis of thematic clusters revealed three main themes: AI-enabled personalization, operational optimization, and human adaptability. Taken together, these themes demonstrate the evolution of research toward a more holistic understanding of the role of AI in hospitality. The keyword structure also reflects the growing conceptual maturity and interdisciplinary nature of the field, as scholars increasingly explore not only technological breakthroughs but also the organizational and societal challenges associated with AI integration (Fig. 7).

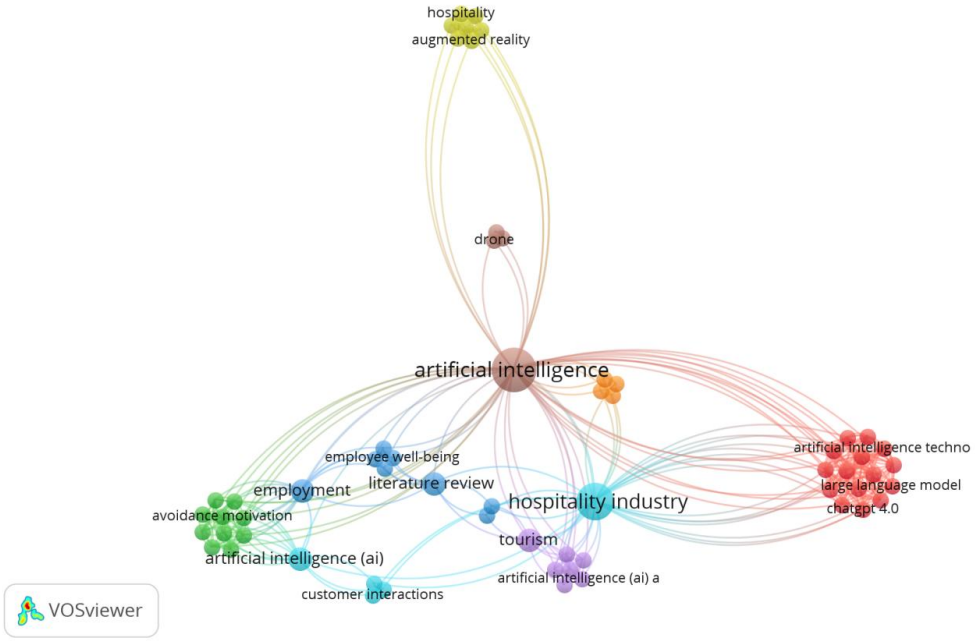


Figure 7. Thematic Clusters in Artificial Intelligence Applications within Hospitality

4.8 Development of Collaborative Research Efforts

The analysis demonstrates a clear trend toward increased research collaboration in the field of artificial intelligence applications in the hospitality industry. Recently, co-authorship models have become international, and interactions between institutions have become closer. This demonstrates a growing trend for researchers from different countries and academic networks to collaborate on AI-related issues in the hospitality and tourism sectors.

The collaborative network is formed around several interconnected clusters of researchers, particularly from Asia and Europe. These clusters represent dynamic research communities that play a key role in advancing the field and shaping current academic debates.

The high degree of network connectivity also indicates the presence of effective global knowledge transfer mechanisms. Through such collaborations, researchers are able to more effectively exchange ideas, methodologies, and findings.

However, the study also found that partnerships with researchers from developing regions remain underdeveloped. Expanding these connections could be key to addressing existing knowledge gaps, integrating more diverse research perspectives, and fostering a more inclusive global vision of AI in the hospitality industry (Fig. 8).

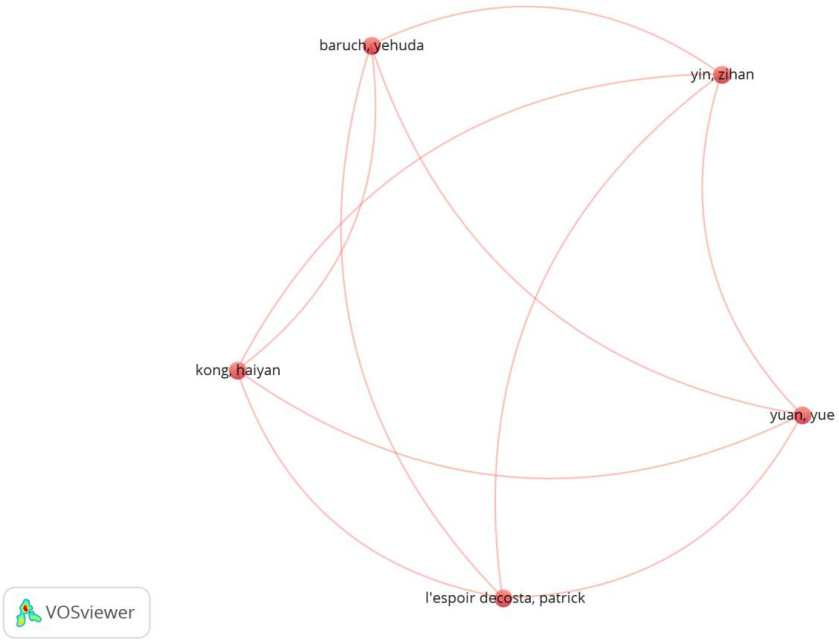


Figure 8. Collaboration Network of Key Authors in AI and Hospitality Research

4.9 Analysis of Results and Future Directions

A general overview of AI research in the hospitality industry demonstrates rapid growth in both volume and depth. There is a clear shift from purely technological developments to more comprehensive studies encompassing human-AI interaction, ethical aspects, and management challenges. This underscores the recognition that successful AI implementation requires considering not only technical capabilities but also human factors and organizational processes.

An important trend has been the strengthening of interdisciplinary collaboration between specialists from computer science, tourism, marketing, and management. This approach allows for a deeper understanding of the impact of AI on service quality and customer experience.

Modern research has also begun to address broader topics such as sustainable development and psychological well-being, signaling a shift toward a human-centered research agenda. Bibliometric analysis shows that the field has moved from descriptive case studies to conceptual and analytical models, demonstrating its academic maturity.

Data visualization revealed a diversity of AI applications in the hospitality industry, from customer interaction to decision support. The authors` collaborative networks confirm the global nature of the research and identify key players.

These findings help identify both existing knowledge gaps and emerging trends, forming a foundation for future research. Strengthening interdisciplinary collaboration and exploring understudied areas will be particularly important for the further development of the field.

Discussion and Conclusion

This study confirms the dynamic development of AI research in the hospitality industry. This progress is driven by technological advances and evolving consumer demands. Bibliometric analysis identified five key thematic areas demonstrating the impact of AI on hospitality operations. These themes range from customer engagement and service automation to broader issues such as ethics and sustainability.

The analysis of publication trends shows a clear increase in research output beginning around 2018, with an even sharper rise after the COVID-19 pandemic. This pattern supports earlier findings by Stanislav Ivanov and Craig Webster (2020), as well as Dogan Gursoy and colleagues (2022), who identified the pandemic as a major driver of digital transformation in hospitality (Webster, C., & Ivanov, S. 2020). During this

period, the industry increasingly relied on technological solutions to improve operational efficiency and maintain safety standards. In contrast to previous narrative reviews, the present study applies a systematic bibliometric approach to map the development of the field and reveal the relationships between technological, managerial, and human-centered aspects of AI adoption (Chi, O. H., Gursoy, D., & Chi, C. G., 2022).

The thematic clustering also suggests that research on AI in hospitality has evolved over time. Earlier studies focused primarily on operational efficiency and technological implementation. Recently, the focus of AI research has shifted toward human-AI interaction, employee adoption, and ethical issues. This shift is consistent with the assertion by Rawal et al. (2023) that successful AI adoption requires not only technological capabilities but also workforce readiness and consumer trust. Our study advances this idea by quantifying the prevalence and interrelationships of these topics in the global academic literature, offering a clearer understanding of their manifestations (Rawal, Y. S., Soni, H., Dani, R., & Bagchi, P., 2023).

Another important finding concerns the geographic imbalance in research. Developed countries, particularly the United States and China, dominate publications and funding. Meanwhile, the contribution of developing countries remains limited, although there has been gradual growth, particularly in applied AI research in tourism and hospitality. This imbalance highlights the need for further research on regional differences in AI adoption, innovation potential, and industry readiness.

Methodologically, this study contributes to the literature by combining a systematic review with bibliometric analysis. Rather than simply summarizing existing work, it maps the relationships between topics, authors, and institutions. Co-occurrences and citation network analysis provide a structured overview of the collaboration patterns and intellectual foundations shaping AI research in the hotel sector.

Practical Relevance

From a management perspective, the findings demonstrate that the implementation of artificial intelligence can significantly improve not only service quality and personalized customer engagement, but also strategic planning and long-term sustainability in hospitality organizations. AI technologies enable companies to analyze vast amounts of data, anticipate customer needs, and more effectively optimize work processes. Practical applications include revenue simulation, e-procurement, purchase-duration prediction, digital feedback systems, booking-cancellation models, robot-hotel review analysis, and technology amenities (Jie Seah et al., 2019; Li et al., 2023; Luo et al., 2021; Mathew & Abdulla, 2022; Mathew & Abdulla, 2021; Narayan et al., 2022; Rakesh et al., 2022; Ramnarayan et al., 2022; Zhang et al., 2023).

Furthermore, the bibliometric data collected during this study can help hospitality executives and other industry stakeholders better navigate current research developments. By identifying leading research centers, key research areas, and emerging topics, organizations can compare best practices and anticipate the skills and competencies required in an increasingly AI-centric service environment.

Limitations and Prospects for Further Research

Despite its comprehensive approach, this study has several limitations. First, the analysis was limited to publications indexed in Scopus and written in English, potentially excluding relevant studies published in other languages or indexed in alternative databases.

Future studies could address this limitation by incorporating additional databases, such as the Web of Science and regional academic repositories, to obtain a more comprehensive view of global research. Furthermore, while bibliometric analysis provides valuable quantitative data, qualitative methods — such as interviews, surveys, or case studies — could provide a deeper understanding of the human, organizational, and ethical aspects of AI implementations in hospitality.

Conclusion

In conclusion, artificial intelligence is rapidly transforming the global hospitality industry, enabling improved operational efficiency, data-driven personalization, and contactless service. The results of this bibliometric review contribute to a clearer understanding of how AI has evolved both as a research topic and as a practical tool in hospitality and tourism

By identifying key thematic areas, research gaps, and models of academic collaboration, this study provides a structured overview of the development of AI-related research in the hospitality industry. These findings may be useful for both future academic research and the practical implementation of AI technologies.

Overall, this research contributes to the scientific understanding of AI in hospitality by systematically examining the relationships between technological, managerial, and human-centered dimensions of AI adoption. Unlike earlier descriptive reviews, the present study combines bibliometric evidence with interpretive

analysis, demonstrating how the research focus has gradually shifted from operational efficiency toward broader considerations such as human interaction, ethics, and sustainable AI integration within the hospitality industry.

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