

## A BIBLIOMETRIC ANALYSIS OF ARTIFICIAL INTELLIGENCE ADOPTION IN TOURISM AND HOSPITALITY RESEARCH

### ANALISIS BIBLIOMETRIK ADOPSI KECERDASAN BUATAN DALAM PENELITIAN PARIWISATA DAN PERHOTELAN

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#### ABSTRAK

This bibliometric study investigates the research trends and intellectual structure related to artificial intelligence (AI) adoption in the tourism and hospitality sectors. Using keyword co-occurrence analysis with VOSviewer, the study systematically examines peer-reviewed journal articles indexed in leading academic databases. The findings reveal distinct thematic clusters, including user acceptance, service automation, sustainability, and emerging technologies such as generative AI. The analysis highlights the prevalence of behavioral theories like the Technology Acceptance Model (TAM) and Unified Theory of Acceptance and Use of Technology (UTAUT) in existing research, while also identifying gaps in the theoretical integration of novel AI applications. Limitations related to database selection and analytical methods are acknowledged. Recommendations for future research emphasize methodological diversification, interdisciplinary collaboration, and theoretical synthesis to advance the responsible and effective integration of AI within the tourism and hospitality industry.

**Keywords:** Artificial Intelligence, Bibliometric, Hospitality, Tourism

#### ABSTRAK

*Studi bibliometrik ini menyelidiki tren penelitian dan struktur intelektual yang berkaitan dengan adopsi kecerdasan buatan (AI) dalam sektor pariwisata dan perhotelan. Dengan menggunakan analisis co-occurrence kata kunci melalui VOSviewer, penelitian ini secara sistematis mengkaji artikel jurnal bereputasi yang ditinjau sejawat dan terindeks dalam basis data akademik terkemuka. Temuan penelitian mengungkapkan kluster tematik yang berbeda, termasuk penerimaan pengguna, otomatisasi layanan, keberlanjutan, serta teknologi baru seperti AI generatif. Analisis ini menyoroti dominannya penggunaan teori perilaku seperti Technology Acceptance Model (TAM) dan Unified Theory of Acceptance and Use of Technology (UTAUT) dalam penelitian yang ada, sekaligus mengidentifikasi adanya kesenjangan dalam integrasi teoretis terhadap aplikasi AI yang bersifat novel. Keterbatasan yang berkaitan dengan pemilihan basis data dan metode analisis diakui. Rekomendasi untuk penelitian selanjutnya menekankan diversifikasi metodologis, kolaborasi interdisipliner, serta sintesis teoritis guna mendorong integrasi AI yang bertanggung jawab dan efektif dalam industri pariwisata dan perhotelan.*

**Kata Kunci:** Artificial Intelligence, Bibliometric, Pariwisata, Perhotelan

#### 1. INTRODUCTION

Artificial Intelligence (AI) has emerged as a pivotal force in transforming industries worldwide, with tourism and hospitality sectors among the most significantly impacted. As service oriented domains heavily reliant on consumer experience, personalization, and operational efficiency, tourism and hospitality have embraced AI technologies to gain competitive advantage and meet evolving customer expectations (Bock, et.al 2020; Huang and Rust, 2021). Applications of AI ranging from chatbots and virtual assistants to robotic concierges and intelligent recommendation engines have been implemented across customer touchpoints, enabling enhanced service delivery, efficient operations, and data-driven decision-making (Gursoy, et.al, 2019; Chi et al., 2020).

The urgency of understanding AI adoption in tourism is underscored by the rapid pace of technological evolution and the increasing demand for digital transformation in the post-pandemic era. COVID-19 accelerated digital adoption across industries, and AI-driven solutions became instrumental in reducing human contact, maintaining health protocols, and ensuring business continuity in tourism services (Toubes et.al, 2021). Moreover, travelers have grown more accustomed to intelligent services, such as AI-based itinerary planners or predictive pricing tools, which further necessitates an in-depth understanding of AI deployment from both managerial and consumer behavior perspectives.

The rapid adoption of AI technologies in tourism and hospitality has led to a growing body of literature that spans diverse topics, including consumer behavior, organizational transformation, and service design. Early studies focused on the feasibility of AI in service contexts, with particular attention to automation and labor substitution (Tussyadiah, 2020; Jabeen et al, 2022). As the field matured, researchers began investigating the socio-technical implications of AI, examining its influence on customer satisfaction, trust, and service personalization (Tussyadiah, 2020)

A central theme in the literature is the use of AI to enhance the customer experience. Chatbots, voice assistants, and intelligent recommendation systems are frequently explored for their ability to provide seamless, personalized, and round-the-clock service (Pillai & Sivatnahu, 2020; Buhalis & Moldavska, 2022). Several studies have examined how these technologies impact customer satisfaction, perceived usefulness, and willingness to adopt AI-enabled services (Prentice et al, 2022; Jabeen et al., 2022; Gajić et al., 2024).

In terms of organizational outcomes, AI adoption has been linked to improved operational efficiency, revenue management, and strategic decision-making (Pillai & Sivatnahu, 2020; Kuo et al., 2017). Machine learning algorithms, for example, are employed to optimize pricing, forecast demand, and enhance marketing strategies based on consumer data (Núñez et al, 2024; Tussyadiah, 2020). Robotics in front-line services—such as robotic concierges or room service bots—have also gained attention for their potential to reduce costs and address labor shortages, especially in the aftermath of COVID-19 (Zeng et al, 2020; Park & Kim, 2024).

Another key stream of research involves consumer perceptions of AI. Scholars have applied models such as TAM, UTAUT, and UTAUT2 to study user attitudes and intentions (El Archi & Benbba, 2023; Cai et al, 2019; Palos-Sanchez et al, 2021). Variables such as trust, perceived risk, enjoyment, and social influence have been identified as critical in determining AI acceptance (Roy et al, 2024; Huang et al, 2024; Gajić et al, 2024).

Ethical concerns surrounding AI adoption have also been explored, particularly issues of data privacy, surveillance, and algorithmic bias (Hu & Min, 2025; Ivanov & Umbrello, 2021; Dwivedi et al., 2021). These studies highlight the need for transparent and responsible AI deployment that aligns with consumer rights and societal norms.

Theoretical diversity is another characteristic of the literature. While TAM and UTAUT dominate studies of consumer behavior, other theories such as Service-Dominant Logic (Vargo & Lusch, 2004), Actor-Network Theory (Latour, 2005), and the Diffusion of Innovations (Rogers, 2003)—have been employed to understand systemic change and technology diffusion in tourism firms (Mariani & Borghi, 2019). However, theoretical fragmentation remains a challenge.

The methodological approaches vary widely, from qualitative case studies to quantitative surveys and experimental designs. Increasingly, researchers are integrating big data analytics and machine learning to gain real-time insights (Chen, 2024; Mariani, 2019). However, few studies adopt longitudinal or cross-cultural perspectives, which limits generalizability.

Despite the growing attention to AI in tourism and hospitality research, the existing body of knowledge is fragmented (Kong et al, 2020). Scholars have examined AI from various angles technological innovation, service automation, customer experience, and labor dynamics

but often without cohesive theoretical grounding or standardized constructs (Gursoy et al., 2019; Mariani et al, 2022). While some studies adopt the Technology Acceptance Model (TAM) or the Unified Theory of Acceptance and Use of Technology (UTAUT) to assess consumer adoption (Vitezić & Perić, 2021; Kim et al., 2022), others apply frameworks such as the Service Dominant Logic (SDL) or Diffusion of Innovations Theory (Grundner & Neuhofer, 2021; Gallarza et al, 2023) to explain broader organizational shifts. However, the inconsistency in theory application limits the ability to synthesize findings across contexts and develop a comprehensive understanding of AI's role (Doborjeh et al, 2022).

In addition to theoretical inconsistencies, there is also a lack of clarity in the operationalization of variables. Key constructs such as perceived usefulness, trust in AI, user satisfaction, perceived risk, and service quality are variably defined and measured, hindering comparative analysis across studies (Bulchand-Gidumal, et al, 2023; De Bruyn et al, 2020). This variation underscores the necessity for a structured review that consolidates and categorizes the variables and theories used in prior research.

Bibliometric analysis offers a robust method for addressing these challenges. Unlike traditional literature reviews, bibliometric approaches allow researchers to quantitatively map the intellectual structure of a field, identify influential publications, authors, and institutions, and detect thematic clusters and emerging research trends (Koseoglu et al., 2016; Knani et al, 2022). In the context of AI in tourism and hospitality, bibliometric techniques such as co-citation analysis, keyword co-occurrence, and thematic mapping can reveal how the research field has evolved and what theoretical or conceptual gaps remain (Kirtil & Aşkun, 2021). Donthu et al. (2021) and Aria & Cuccurullo (2017) emphasized the value of mapping scientific knowledge to reveal intellectual structures and research trends. Sengel & Iskin (2024) conducted a bibliometric study using VOSviewer, identifying clusters such as AI ethics, robotics in hospitality, and smart tourism systems. Similarly, Knani et al. (2022) revealed key themes including consumer trust, digital service design, and predictive analytics.

This study aims to conduct a comprehensive bibliometric analysis of artificial intelligence (AI) applications in tourism and hospitality research. By examining the co-occurrence patterns of keywords across a large body of scholarly literature, the study seeks to map the conceptual landscape of the field, identify dominant research themes, and reveal the evolving focus of academic inquiry. The central positioning of the keyword “artificial intelligence” in the co-occurrence network confirms its role as an integrative concept that bridges diverse areas such as service automation, user interaction, ethical adoption, and data-driven decision-making. Through this analysis, the study highlights how AI has transitioned from a niche interest to a foundational element in tourism and hospitality scholarship.

The study further aims to delineate distinct thematic clusters within the literature, including user acceptance of AI technologies, trust and ethics in service robotics, emerging applications such as generative AI and ChatGPT, and operational uses of big data analytics. By systematically analyzing these clusters, the research seeks to uncover which theoretical frameworks such as the Technology Acceptance Model (TAM) or Unified Theory of Acceptance and Use of Technology (UTAUT) underpin existing studies, and how new technological developments are being integrated into the academic discourse. Ultimately, the study endeavors to guide future researchers by offering a visual and conceptual synthesis of the field's structure, highlighting well-explored areas, surfacing research gaps, and suggesting potential pathways for theoretical innovation and interdisciplinary exploration.

In doing so, this study responds to recent calls for more integrative and systematic reviews that can unify fragmented insights and pave the way for a more cohesive and theoretically grounded research agenda (Kim & So, 2022; Knani et al, 2022). As AI continues to reshape the tourism and hospitality landscape, it is essential for both scholars and practitioners to understand the conceptual underpinnings and empirical patterns of its adoption (Pillai &

Sivatnahu, 2020; Shin & Jeong, 2020). Through bibliometric mapping and analytical synthesis, this article aspires to provide a foundational reference for advancing scholarly discourse and informing strategic decision-making in the industry.

## 2. METHODOLOGY

This study employed a bibliometric analysis approach to systematically investigate the intellectual structure, thematic development, and theoretical underpinnings of artificial intelligence (AI) research within the tourism and hospitality sectors. Bibliometric analysis is a quantitative research method used to analyze large volumes of academic literature, uncover trends, and visualize relationships between key concepts, authors, institutions, and publications (Donthu et al., 2021). The methodology applied in this study comprised four primary phases: data retrieval, data cleaning, bibliometric mapping, and thematic interpretation.

### Data Retrieval

The data were sourced from the Scopus database, one of the most comprehensive and widely used bibliographic databases for peer-reviewed academic literature. Scopus was selected for its extensive coverage of tourism, hospitality, and information systems research (Muritala, 2020). A search string was constructed to capture publications related to artificial intelligence in tourism and hospitality, combining keywords such as "artificial intelligence," "AI," "machine learning," "chatbots," "robotics," and "intelligent systems" with domain-specific terms like "tourism," "hospitality," "travel," and "hotel." The search was conducted on 28<sup>th</sup> of May 2025 and results were limited to journal articles written in English to ensure consistency and relevance. Articles from 2020 until 2025 were included to capture the historical development and recent trends. To ensure scholarly rigor, the search was restricted to peer-reviewed journal articles and book chapters using the filtering options provided by the database, resulting in a final dataset of 446 peer-reviewed journal articles.

### Data Cleaning and Preparation

After retrieval, the records were exported in CSV format and processed to remove duplicates and irrelevant documents. The metadata fields retained for analysis included author names, article titles, publication year, source titles (journals), abstracts, keywords, and references. Additional manual checks were conducted to eliminate articles that were not directly related to AI applications in tourism and hospitality. The final cleaned dataset of 227 articles provided a robust foundation for bibliometric mapping and thematic analysis.

### Bibliometric Mapping Using VOSviewer

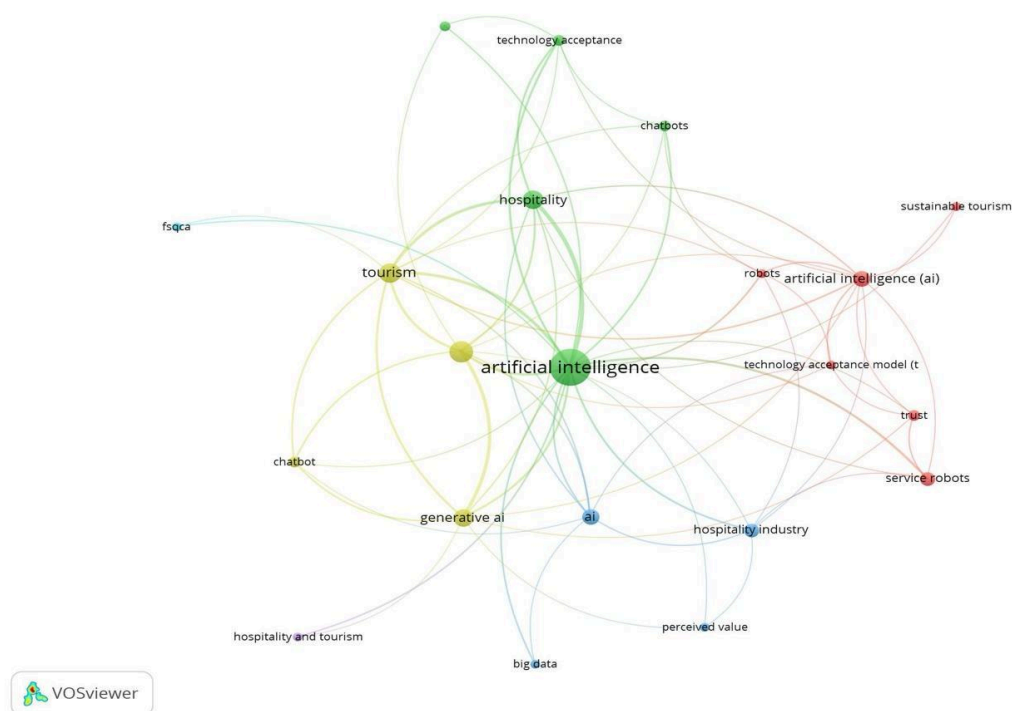
VOSviewer 1.6.20 was utilized to perform the bibliometric mapping. VOSviewer is a powerful software tool for constructing and visualizing bibliometric networks based on keyword co-occurrence, co-authorship, citation, and bibliographic coupling data (Van Eck & Waltman, 2010). In this study, keyword co-occurrence analysis was employed to identify dominant themes, frequently studied variables, and emerging research directions. The tool automatically identifies keyword terms from the author keywords and keywords plus fields, with a minimum occurrence threshold set to 5 to ensure significance.

The co-occurrence map was generated using the fractional counting method to normalize data and reflect the strength of associations between keywords. Clustering algorithms embedded in VOSviewer grouped related keywords into color-coded clusters, each representing a thematic area. The resulting visual map facilitated the identification of conceptual hotspots, cluster centralities, and interlinkages among research topics. Key terms

such as “artificial intelligence,” “chatbots,” “trust,” “big data,” “generative AI,” and “hospitality industry” formed central nodes, indicating their prominence in the literature.

### 3. RESULTS AND DISCUSSION

To gain a comprehensive understanding of the research landscape surrounding artificial intelligence (AI) in the tourism and hospitality industry, a keyword co-occurrence analysis was conducted using VOSviewer. This method enables the identification of dominant research themes, interrelated concepts, and emerging trends by analyzing the frequency and co-occurrence patterns of keywords across a large body of literature. By visualizing the relationships among key terms, the analysis reveals how scholarly attention has been distributed and clustered over time. The approach is particularly valuable for highlighting the conceptual structure of a field and detecting both well-established areas of inquiry and newer, evolving topics. In this study, VOSviewer was employed to analyze a dataset of 227 Scopus-indexed articles, producing a network map of frequently co-occurring keywords. The resulting visualization not only illustrates the core focus areas of AI research in tourism and hospitality but also serves as a basis for identifying potential research gaps and guiding further qualitative analysis.



The keyword co-occurrence analysis, performed using VOSviewer, provides a comprehensive view of the intellectual and thematic structure of AI-related research within the tourism and hospitality industry. Based on the analysis of 227 articles retrieved from Scopus, a set of high-frequency keywords was extracted, resulting in a network visualization comprising terms that met the minimum co-occurrence threshold. This map reveals not only the dominant research foci but also the relationships among key concepts, the density of scholarly interest, and the clustering of ideas across thematic domains.

At the core of the visualization lies the keyword **“artificial intelligence”**, which unsurprisingly emerges as the most central and influential node. Its prominence in both node size and network connectivity indicates that it is not only the most frequently used term but also interlinks multiple subfields such as customer interaction, service automation, ethical design, and data-driven management. This finding reinforces the view that AI has become a foundational concept, interfacing with a wide range of subtopics within the domain. It aligns with a broader trend in service research where AI is no longer viewed as a niche tool but as a strategic resource reshaping organizational capabilities and customer experiences (Liu & Hung, 2022; Doborjeh et al, 2022; Chatuverdi et al, 2023).

The co-occurrence network reveals several distinct clusters, each representing a major thematic concentration in the literature. The **green cluster**, for instance, includes keywords such as hospitality, chatbots, technology acceptance, and anthropomorphism. This cluster appears to focus on user interaction with AI technologies in hospitality service settings. Research within this area often explores how customers perceive AI-enabled services and what factors influence their adoption. The presence of technology acceptance and anthropomorphism suggests a consistent application of behavioral models such as the Technology Acceptance Model (TAM), Unified Theory of Acceptance and Use of Technology (UTAUT), and related psychological constructs to understand how users respond to AI-based service experiences. The inclusion of hospitality and chatbots underscores the practical focus on AI-enabled interfaces, such as automated front desk agents or conversational agents in hotels and restaurants, while highlighting the role of perceived usefulness, ease of use, and anthropomorphism in shaping customer attitudes (Le et al, 2024; Go et al, 2020; Chang et al, 2022).

Another major group is the **red cluster**, which includes keywords like trust, service robots, technology acceptance model, and sustainable tourism. This cluster represents a stream of research focused on the human-technology relationship, particularly examining ethical and behavioral concerns. The appearance of trust as a prominent term in this cluster is notable, as trust is frequently cited as a key antecedent to AI adoption in service settings. The credibility of the system, transparency in decision-making, and user control are all contributing factors (Chen & Wei, 2024; Yang et al, 2022; Sousa et al, 2024). Moreover, the cluster's connection to sustainable tourism suggests a growing discourse on how AI can align with the principles of ethical tourism, a concern increasingly highlighted in the wake of rapid technological adoption (Manthiou et al, 2021).

The **yellow cluster** introduces newer and fast-evolving concepts such as chatbot, ChatGPT and generative AI which are already influencing the discourse in significant ways despite being relatively recent. This cluster suggests an emergent research focus that reflects the technological innovations of the past few years, research in this domain may include the application of large language models in customer service and tourism marketing. These technologies offer novel applications in tourism, including personalized content creation, itinerary generation, and conversational service automation (Le et al, 2024; Ghorbandazeh et al, 2025; Štilić et al, 2025). This trend highlights a shift in focus from traditional rule-based or scripted AI systems to more advanced, adaptive, and language-based systems.. The co-occurrence of chatbot and tourism with these newer terms suggests that scholars are actively investigating the implications of these technologies for tourist experiences and service automation. However, their rapid integration into practice has often outpaced scholarly analysis, revealing a lag between technological deployment and theoretical conceptualization. This underscores the need for longitudinal studies and grounded theory development that account for user adaptation, policy implications, and the unintended consequences of AI usage in tourism.

The **blue cluster** includes terms like big data, hospitality industry, perceived value, and AI. This cluster appears to reflect an operational and managerial dimension of AI research. The

association between big data and perceived value suggests that AI is discussed in the context of enhancing efficiency, personalization, and profitability through advanced analytics and decision support systems (Zhang et al, 2022; Jabeen et al, 2022; Huang et al, 2021). These studies often focus on performance metrics, revenue management, and resource optimization enabled by machine learning and predictive analytics (d'Angella et al, 2024). The presence of the hospitality industry as a central term in this cluster highlights the practical orientation of this stream, where AI is viewed not just as a service interface but as a back-end enabler of competitive advantage.

Interestingly, the visualization also reveals more peripheral terms such as fsqca (fuzzy-set Qualitative Comparative Analysis), which appear in isolation or with limited co-occurrence. This suggests that while alternative methodologies are being introduced into the field, their integration into mainstream research remains limited. The sparse connections between fsqca and other central nodes may indicate opportunities for methodological diversification and innovation. While dominant paradigms remain quantitatively driven, the integration of alternative approaches could enrich theory development and offer more nuanced explanations of causality and complexity (Geremew et al, 2024; Kumar et al, 2022).

The map also highlights a conceptual gap between long-established behavioral theories and the recent emergence of advanced AI tools. For instance, while constructs like trust and perceived usefulness remain central (Alam et al, 2023; Choung et al, 2022), few studies appear to extend these models to account for newer capabilities such as context-awareness, autonomy, or generative functionality. Bridging this gap would require adapting existing models or developing hybrid frameworks that consider the evolving nature of AI capabilities (Dogru et al., 2023; Li et al, 2021; Sylos, 2020)

Overall, the keyword co-occurrence map offers a rich depiction of the field's intellectual architecture. It demonstrates that AI in tourism and hospitality is being approached from multiple angles: behavioral, technological, managerial, and ethical. The clustering of terms not only reflects current scholarly interests but also indicates potential synergies and gaps. For example, while trust and technology acceptance models are well-developed, there appears to be less integration between emerging technologies like generative AI and long-standing behavioral theories. Similarly, while operational aspects are well-covered, connections to sustainability and ethics, though growing, remain fragmented. Moreover, the field would benefit from interdisciplinary collaboration, drawing on insights from computer science, psychology, ethics, and tourism studies. As AI continues to transform the landscape of service delivery, scholarly attention must evolve accordingly, ensuring that research remains both theoretically robust and practically relevant.

#### 4. CONCLUSION

This bibliometric study offers a comprehensive overview of the intellectual landscape surrounding AI adoption in the tourism and hospitality sector. By leveraging VOSviewer to conduct keyword co-occurrence analysis, the research reveals the dominant themes, theoretical frameworks, and emerging trends that characterize current academic discourse. Central concepts such as artificial intelligence, technology acceptance, trust, and big data dominate the field, signifying a growing integration of AI technologies into the core of tourism and hospitality research and practice.

The thematic clusters identified ranging from user perception and service automation to sustainability and generative AI reflect a field that is simultaneously mature in its foundational theories and dynamic in its responsiveness to technological innovation. The presence of established models such as TAM and UTAUT across multiple clusters suggests a strong behavioral orientation, while the inclusion of emergent terms like ChatGPT and generative AI indicates the field's agility in adapting to rapid technological shifts. However, the

fragmented integration of these new technologies into existing theoretical frameworks points to a significant opportunity for scholarly synthesis and model development.

In addition, the peripheral appearance of less common methodologies, such as fsQCA, underscores the need for methodological diversification. Embracing a wider range of analytical tools, including qualitative and mixed-method approaches, could enable more nuanced insights into the complexity of AI adoption. As AI continues to evolve and reshape the service landscape, future research must prioritize interdisciplinary collaboration and the refinement of conceptual frameworks to ensure theoretical robustness and practical relevance.

Ultimately, this study lays a foundation for more targeted content analysis and empirical inquiry, encouraging scholars to build upon the identified trends, bridge theoretical gaps, and explore underexamined areas of inquiry. In doing so, the academic community can contribute to the responsible and impactful integration of AI into tourism and hospitality contexts.

Despite its contributions, this study has several limitations. First, the reliance on Scopus-indexed articles may have excluded relevant work published in other databases or in non-English languages, potentially narrowing the scope of the analysis. Second, the keyword co-occurrence method, while effective for mapping broad thematic structures, depends on author-supplied keywords and may overlook nuances in full-text content. Third, emerging concepts such as generative AI and ChatGPT are rapidly evolving, and their treatment in the literature may lag behind industry developments; thus, our snapshot may underrepresent the latest advances. Finally, the predominance of quantitative bibliometric techniques limits the depth of insight into contextual and qualitative dimensions of AI adoption. Future research should address these limitations by incorporating multiple data sources, applying mixed-method approaches, and conducting longitudinal studies to capture the dynamic evolution of AI in tourism and hospitality.

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