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Bibliometric analysis of the role of artificial intelligence in tourism destination management

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ABSTRACT

This study performs an in-depth bibliometric analysis to explore the role of artificial intelligence (AI) in managing tourism destinations. Its objectives are to uncover current trends, key contributors, collaboration networks, and emerging research themes. A total of 87 publications from Scopus and Web of Science were examined, selected through a precise search strategy and strict inclusion criteria. The methodology consisted of five stages: database selection, query formulation, screening, data extraction, and visualization using RStudio and VOSviewer. Findings indicate a significant rise in research output since 2018, with prominent contributions in machine learning, sentiment analysis, and recommender systems. China, Spain, and the United Kingdom are leading contributors, supported by robust international collaborations. AI enhances operational efficiency, personalization, and decision-making in tourism destinations, though challenges such as data privacy, infrastructure, and ethical concerns remain. This study advances academic understanding by offering a dual-database visualization of AI applications in tourism. Its insights are valuable for researchers, policymakers, and practitioners seeking to promote sustainable, data-driven tourism management.

Contribution/ Originality: This study uniquely integrates the Scopus and Web of Science databases to provide a comprehensive bibliometric mapping of artificial intelligence in tourism destination management. It includes analysis of collaboration networks, thematic trends, and key applications. This research offers the first dual-database visualization of global research dynamics in this emerging interdisciplinary field, highlighting its significance and potential for future development.

1. INTRODUCTION

Over the past decade, artificial intelligence (AI) has emerged as a transformative force across numerous economic sectors, with tourism being a prominent beneficiary [1]. Tourism destination management, a critical element in fostering sustainable development and enhancing sectoral competitiveness, has experienced substantial advancements through the integration of AI technologies [2]. These technologies facilitate process automation, enable personalized visitor experiences, and enhance the operational efficiency of destination management organizations [3].

The incorporation of AI in tourism destination management encompasses a wide array of applications, including personalized recommendation systems driven by user behavioral data and the optimization of tourist flows through predictive algorithms [4-6]. Such advancements allow for real-time and precise adaptations to tourists' needs and expectations, thereby increasing visitor satisfaction and bolstering the global competitiveness of tourism destinations [7]. Furthermore, AI enables destination managers to anticipate market trends and respond agilely to dynamic demand changes.

Despite the burgeoning body of research on AI applications in tourism destination management, significant gaps remain in achieving a comprehensive understanding of its impact and potential [8]. Existing studies have often adopted a fragmented approach, focusing on specific applications or benefits of AI without providing a cohesive framework to map the evolution of knowledge in this domain. Consequently, there is a paucity of research holistically examining the dynamics of scientific collaboration and the development of this interdisciplinary field.

This study seeks to address these gaps by conducting a bibliometric analysis of AI's role in tourism destination management. Utilizing high-impact academic databases such as Scopus and Web of Science, this study aims to identify prevailing research trends and emerging areas of study, determine the most influential authors and countries contributing to the field, and map collaboration networks among researchers and institutions. Additionally, it seeks to highlight the main opportunities and challenges associated with AI implementation in tourism destination management.

By employing bibliometric techniques, this study provides a systematic visualization of the current state of knowledge and offers insights into the intellectual structure and future directions of research in this domain.

The following questions were posed to guide this research: What are the current trends in research on the application of artificial intelligence in tourism destination management? Which authors, journals, and countries are most influential in this area? What are the most significant collaborative and cocitation networks in this field? What are the main applications of artificial intelligence in tourism destination management, and how have they evolved in the last decade? What opportunities and challenges are present in implementing artificial intelligence to improve the competitiveness and sustainability of tourism destinations?

This study aims to enrich academic discourse by establishing a robust framework that serves as a benchmark for tourism industry scholars and practitioners. Through an in-depth examination of the trends and dynamics associated with the application of artificial intelligence (AI) in destination management, this study facilitates the formulation of more efficacious strategies and policies. They are designed to advance sustainability, competitiveness, and operational efficiency in global tourism management. The significance of this analysis is underscored by the pivotal role of digitalization and technological innovation in shaping how tourism destinations evolve, market themselves, and respond to the demands of an increasingly sophisticated and dynamic tourism market.

The remainder of this manuscript is organized as follows. Section 2 provides a comprehensive review of the existing literature on the application of artificial intelligence in tourism destination management. Section 3 details the methodology used for bibliometric analysis, including the selection of databases and tools for data processing. Section 4 presents the main results, such as publication trends, prominent authors, leading sources, affiliated institutions, and collaborative networks. Section 5 interprets these findings within the context of tourism development and discusses associated challenges and opportunities. Finally, Section 6 summarizes the key conclusions and suggests directions for future research.

2. LITERATURE REVIEW

Artificial intelligence (AI) has become a transformative force in the tourism sector, particularly in tourism destination management, where it streamlines operations and enhances visitor experiences [1]. Since the 2010s, scholarly research on AI applications in tourism has exhibited exponential growth, spanning domains such as personalized service delivery, operational automation, and the predictive modeling of tourist behaviors through sophisticated algorithms [8, 9].

Tourism destination management encompasses a coordinated array of activities aimed at planning, developing, promoting, and administering tourism resources [10]. AI has been instrumental in optimizing these activities through the deployment of tools such as customer relationship management (CRM) systems, geographic information systems (GIS), and big data analytics platforms [11]. These technologies enable real-time insights into tourist

consumption patterns and preferences, facilitating data-driven, personalized decision-making that improves visitor satisfaction and resource efficiency [12, 13].

AI technologies have revolutionized destination management through tools, such as recommender systems, which utilize algorithms to tailor activity and service offerings to tourists' prior preferences and behaviors [4]. Furthermore, predictive analytics powered by machine learning has been employed to forecast the economic trajectory of tourism from 2022 to 2030, providing a robust framework for anticipating future trends [14]. These advancements are particularly significant for destinations that aim to balance visitor attraction with the preservation of cultural and natural heritage.

The adoption of AI in tourism destination management is not without challenges, including dependence on high-quality data, demand for advanced technological infrastructure, and ethical concerns surrounding privacy and personal data usage [11]. However, these obstacles also present opportunities for scholarly inquiry, particularly in exploring sustainable and ethical approaches to technological integration [5].

Bibliometric analyses have played a crucial role in identifying trends and collaboration networks in tourism research Kim et al. [15]; Nguyen et al. [16] and Li et al. [17]. These studies have been pivotal in charting the evolution of emerging fields such as AI applications in tourism destination management. Nonetheless, the literature lacks comprehensive insight into adapting AI technologies to diverse regional contexts and developmental stages.

This bibliometric analysis aims to address these gaps by providing a comprehensive view of the evolution of AI research in tourism destination management. Using databases such as Scopus and Web of Science, this study maps the trends, key authors, and institutions, as well as the collaborative networks that have contributed to the development of this field.

The selection of studies for the literature review was based on data retrieved on October 8, 2024, ensuring the inclusion of the most recent and relevant contributions available at that time.

3. METHODOLOGY

This research conducted an extensive bibliometric analysis to systematically evaluate the scholarly literature on artificial intelligence (AI) applications in tourism destination management. Bibliometric techniques facilitate a quantitative examination of academic output, capturing patterns in publications, citations, collaborations, and thematic progression. In contrast to prior studies that often relied on a single database or narrow metrics, this study synthesizes data from both Scopus and Web of Science to enhance coverage and robustness. It employs co-authorship and co-citation analyses, keyword co-occurrence mapping, and productivity indicators, utilizing advanced tools such as RStudio and VOSviewer. This multifaceted methodology not only delineates scientific trends but also uncovers structural dynamics within collaboration networks and thematic evolution, providing comprehensive insights into AI's transformative role in tourism destination management.

This study utilized a bibliometric analysis to discern research trends, identify leading authors and countries, map collaborative networks, and highlight emerging research areas. The methodological framework was structured in five phases, which included the selection of appropriate databases, the formulation of the search query, the definition of inclusion and exclusion criteria, the extraction and processing of data, and finally, the analysis and visualization of results.

3.1. Selection of Appropriate Databases

This study selected Scopus and Web of Science (WoS) as primary databases due to their extensive coverage and suitability for bibliometric analyses. Both platforms are renowned for hosting a vast collection of peer-reviewed articles, ensuring the quality and relevance of scholarly content [18]. Scopus, indexing over 25,000 active titles, excels in linking data across diverse disciplines, including social sciences and business management, which are critical for research on tourism and technological innovation [19]. Conversely, Web of Science offers access to high-impact

interdisciplinary research, making it particularly valuable for examining the convergence of technology and tourism services [20]. To prioritize high-impact publications, the Social Sciences Citation Index (SSCI) and Science Citation Index Expanded (SCI-EXPANDED) collections within WoS were utilized, encompassing publications from 1956 and 1900, respectively [21-23].

3.2. Formulation of the Search Query

The search queries were tailored to each database to ensure precision. For Scopus, the query TITLE-ABS-KEY ("artificial intelligence" AND "tourism destination") was employed, while in Web of Science, the query TS= ("artificial intelligence" AND "tourism destination") was utilized. These searches were executed on October 8, 2024.

3.3. Determination of Inclusion and Exclusion Criteria, Data Extraction and Processing

The utilization of Scopus and Web of Science (WoS) databases is well-established for conducting thorough bibliometric analyses [24]. To ensure the relevance and quality of the selected literature, specific inclusion and exclusion criteria were defined for both databases, facilitating a precise evaluation of the current research landscape on artificial intelligence in tourism destination management [25].

For Scopus, the analysis encompassed all subject areas available in the database to ensure comprehensive coverage and minimize selection bias. Various document types, including articles, book chapters, and conference papers, were included to capture a holistic representation of scholarly contributions in the field. Additionally, a language filter was applied, restricting the selection to English-language publications to maximize the inclusion of internationally recognized and cited studies.

In the case of WoS, a comparable approach was adopted, incorporating all available disciplinary categories to ensure broad coverage. However, the document type was limited to articles, as this format is widely regarded as the primary medium for disseminating high-quality empirical research and systematic reviews in academia. Consistent with the Scopus criteria, only English-language publications were included to ensure compatibility and extensive coverage across both databases.

3.4. Analysis and Visualization of Results

The bibliometric analysis encompassed four essential components to better understand the dynamics of research on the subject. First, it examined productivity and citation patterns. Second, it analyzed the main sources of publication, including journals and conferences. Third, it evaluated the contribution of institutions and countries to the development of the field. Finally, it explored the intellectual structure through co-citation networks and thematic relationships.

For data analysis, RStudio was used together with the R language (version 4.4.1). The tidyverse library was employed to process and analyze data on authors, journals, and countries. VOSviewer software (version 1.6.20) was also utilized for network analysis, enabling the identification of collaboration structures and co-citation patterns among authors, as well as thematic trends through keyword analysis.

4. RESULTS

The initial search resulted in 94 documents in Scopus and 14 in WoS. After applying the inclusion and exclusion criteria, a total of 91 documents were selected, with 81 in Scopus and 10 in WoS. Subsequently, the "left_join" function of the "dplyr" package was used to identify duplicate documents between both scientific databases. Four duplicate documents were found, leaving a total of 87 documents to be analyzed: 81 in Scopus and 6 in WoS.

The bibliometric analysis was structured along several key dimensions. First, a productivity and citation analysis was carried out to identify the most prolific authors and the most cited papers. Second, the main sources were analyzed, such as the journals and publishers that published the papers. Likewise, the institutions and countries most

active in this area of research were evaluated, identifying the main contributions at the international level. Finally, an analysis of the intellectual structure was conducted using networks of co-citation of authors, institutional collaboration, and co-occurrence of keywords.

4.1. Productivity and Appointment Analysis

In Figure 1, the productivity and citation analysis of the study on *'The Role of Artificial Intelligence in Tourism Destination Management'* is presented, which reveals a significant increase in the number of published papers since 2018. Productivity has increased from two papers in 2016 to 15 in 2021, representing an increase of 650%. Subsequently, stabilization was observed in 2022 and 2023, with an average of 12 papers per year, and then increased by 171% in 2024, reaching 19 papers. As for citations, there were notable increases in 2017 and 2019, with 187 and 231 citations, respectively, marking increases of 1458% and 1136% compared with 2016 (12 citations). The maximum peak was reached in 2021, with 255 citations, implying 317% growth in 2019. Although a 74% decrease was observed in 2020 (61 citations), citations in subsequent years showed relatively constant volumes. These data suggest a significant impact of this study on the academic community.

Zhang et al. [26], with 215 citations, represented the most impactful research in this analysis. Utilizing deep learning and data mining techniques, the authors analyzed 35,356 tourist photographs taken in Beijing to explore visitor perceptions and behaviors. By classifying the images into 103 distinct scenes and conducting statistical comparisons across tourists from different continents, this study overcame the limitations of traditional manual methods for visual content analysis. The findings provide a nuanced understanding of tourist cognition, offering valuable insights for destination management organizations aiming to enhance visitor experiences through data-driven strategies.

The second most influential study, which garnered 135 citations, was conducted by Kim et al. [27]. This study employs a hybrid text mining approach to analyze 19,835 tourist reviews in Paris, identifying key sources of dissatisfaction in tourism destinations. The results highlight transportation issues, such as lack of punctuality and unclear information, and restaurant service challenges, including inconsistent quality and poor value for money, as the primary causes of tourist complaints. By applying advanced AI techniques such as sentiment analysis and term co-occurrence, this study extracts actionable insights from large-scale user-generated data. These findings underscore the role of AI in enabling the real-time identification of problem areas, facilitating the development of targeted improvement strategies, and enhancing the competitiveness and sustainability of tourism destinations through personalized service optimization.

The third most cited study, with 112 citations, is a comprehensive review by Doborjeh et al. [28], which synthesizes 146 articles published between 2010 and 2021 on AI applications in the tourism and hospitality industry. The authors outlined the application of AI algorithms in areas such as demand forecasting, personalizing tourism experiences, and intelligent destination management. Key findings emphasize the transformative potential of AI-driven technologies, including virtual and augmented reality, automation, chatbots, and virtual assistants in reshaping consumer interactions and experiences. The study also highlights AI's capacity to develop smart tourism platforms capable of predicting behavioral patterns and tourist preferences through personalized data analysis, thereby advancing strategic destination management.

This study emphasizes the efficiency of different AI methods, highlighting the use of deep neural networks (ANN and LSTM) to handle large multimodal datasets, as well as clustering models to analyze tourist behavior patterns. Finally, the authors propose new research directions, such as the development of interdisciplinary approaches to integrate AI and neuroscience, thus creating an emerging field called "Neuro-Tourism."

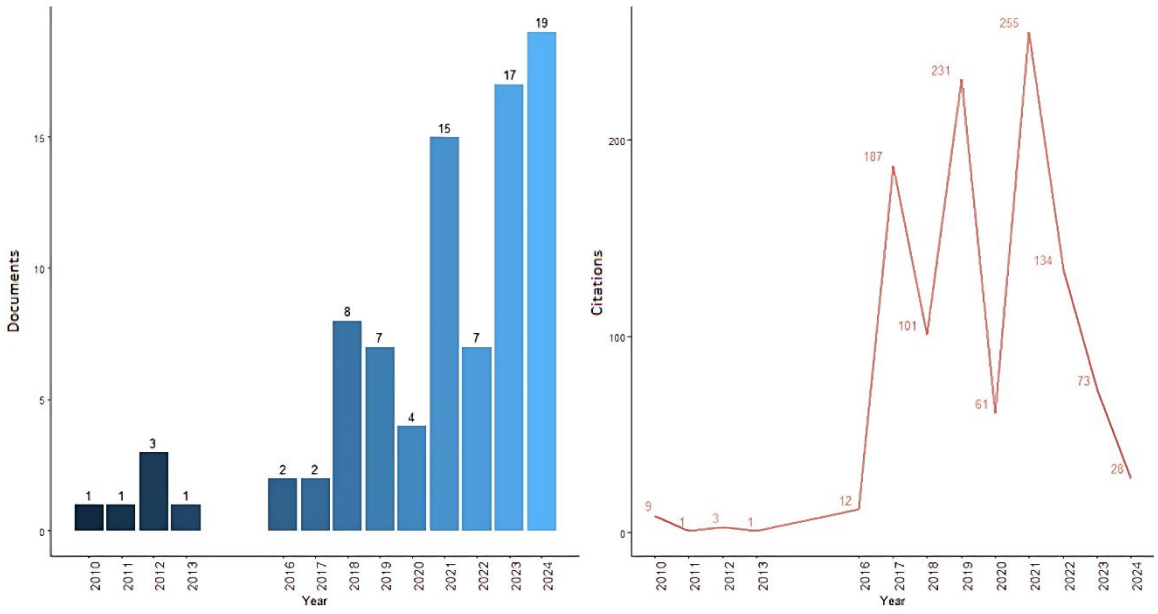

Figure 1. Annual evolution of productivity and citations.

4.2. Source Analysis

Articles related to AI-Driven Adaptive Learning Systems and their implementation in educational environments were distributed across 65 different journals. The journals with the highest number of papers are detailed in Table 1, while those with the highest impact in terms of citations are listed in Table 2.

Table 1 shows the most relevant journals and conferences in the publication of articles related to the subject; the table highlights 10 journals with the highest number of published papers.

First, the journals ACM International Conference Proceeding Series and Sustainability (Switzerland) have published the most papers, with a total of 5 each (5.74% of the total). Other notable journals include the International Journal of Contemporary Hospitality Management and SUSTAINABILITY, each with 4 papers (4.59% of the total).

At an intermediate level of productivity is the journal Technology Application in Tourism in Asia: Innovations, Theories, and Practices, which has three documents (3.44% of the total). In addition, other publications, such as APTISI Transactions on Technopreneurship, Advances in Information Sciences and Service Sciences, Journal of Business Research, Journal of Quality Assurance in Hospitality and Tourism, and Proceedings of the 3rd International Conference on Informatics and Computing, each have two papers. The analysis revealed a diverse range of sources, encompassing international conference proceedings (e.g., ACM International Conference Proceeding Series), specialized journals in sustainability (e.g., Sustainability and SUSTAINABILITY), and tourism (e.g., International Journal of Contemporary Hospitality Management). This diversity underscores an interdisciplinary research approach that integrates perspectives on technology, sustainability, and tourism management. For instance, Chamboko-Mpotaringa and Tichaawa [29] explored advanced applications of artificial intelligence, including virtual reality, chatbots, and neural networks, to enhance customer experience and optimize data management within the tourism sector. Their study further demonstrated how these technologies contribute to sustainability by promoting efficient resource use and service personalization. By applying AI to smart destination management, this research highlights its role in enabling precise demand forecasting and informed decision-making, thereby enhancing the competitiveness and sustainability of tourism destinations and aligning with a comprehensive, multidisciplinary framework.

Similarly, Farinha et al. [30] employed an AI algorithm to analyze survey data from key stakeholders in the Algarve tourism sector, including hotels and restaurants. Their findings identify shared perceptions regarding sustainability challenges, such as natural resource management, biodiversity, and safety, while noting divergences in

areas such as sustainability initiatives and internet access. This interdisciplinary methodology provides a holistic understanding of the critical issues affecting destination competitiveness and sustainability, laying the groundwork for improved governance and stakeholder collaboration. By contrast, Miedes-Ugarte et al. [31] examined a cooperative platform in France that leverages social economy principles and digital technologies to manage tourism destinations inclusively and sustainably. The study illustrates how the platform fosters collaboration between local communities and tourism stakeholders, promoting the shared utilization of territorial and cultural heritage. Notably, the technological model prioritizes collective intelligence over sole reliance on artificial intelligence, facilitating greater human interaction and personalized tourism experiences. This integration of technological and social principles supports a governance model that emphasizes residents' well-being and destination sustainability.

Table 1. Top 10 journals and conferences with the highest number of papers.

Journal	Documents
ACM International Conference Proceeding Series	5
Sustainability (Switzerland)	5
International Journal of Contemporary Hospitality Management	4
Sustainability	4
Technology Applications in Tourism in Asia: Innovations, Theories and Practices	3
APTISI transactions on technopreneurship	2
Advances in information sciences and service sciences	2
Journal Of Business Research	2
Journal of Quality Assurance in Hospitality and Tourism	2
Proceedings of the 3rd International Conference on Informatics and Computing, ICIC 2018	2

Table 2 presents the sources exerting the most significant influence within the scientific community as determined by citation counts. *Tourism Management* has 215 citations, establishing itself as a preeminent source in this research domain. Closely following is the *International Journal of Contemporary Hospitality Management*, with 208 citations, recognized as a key reference for studies at the intersection of tourism and technology [32]. Other journals demonstrating substantial impacts include *Technological Forecasting and Social Change*, with 135 citations, and the *Journal of Destination Marketing and Management*, with 88 citations, both contributing significantly to scholarship on technological forecasting and tourism destination management. Journals such as the *International Journal of Sustainable Development and World Ecology*, with 52 citations, and *Proceedings of the International Conference on Electronic Business (ICEB)*, with 42 citations, also hold notable relevance, underscoring the importance of sustainability and e-business perspectives in tourism research [33]. Additionally, sources such as *Sustainability (Switzerland)* with 41 citations, the *Journal of Business Research* with 32 citations, *SUSTAINABILITY* with 28 citations, and *Regional Research* with 26 citations have made meaningful contributions to the academic discourse, serving as vital resources for research on artificial intelligence applications in tourism and sustainability.

Table 2. Top journals and conferences by number of citations.

Magazine	Subpoenas
Tourism management	215
International journal of contemporary hospitality management	208
Technological forecasting and social change	135
Journal of destination marketing and management	88
International journal of sustainable development and world ecology	52
Proceedings of the International Conference on Electronic Business (ICEB)	42
Sustainability (Switzerland)	41
Journal of Business Research	32
Sustainability	28
Regional research	26

4.3. Average Number of Citations Per Document

This average enables the evaluation of the relative influence of each publication, highlighting the greater academic impact concerning the number of documents published.

First, the journal *Tourism Management* stands out for its 215 citations, despite not being on the list of the most productive in terms of the number of papers. This suggests that each article published in this journal has a high individual impact, since, although fewer papers are published, they are highly cited.

The *International Journal of Contemporary Hospitality Management* presents 208 citations distributed across 4 papers, resulting in an average of 52 citations per paper. This data reflects a high level of relevance to the articles published in this journal, indicating that each publication receives considerable attention in the academic community.

On the other hand, *Technological Forecasting and Social Change* accumulates 135 citations but is not among the most productive journals in terms of the number of papers. This implies that the few articles published in this journal generate a significant impact, with a high average number of citations per article.

In the case of the *Journal of Destination Marketing and Management*, which has 88 citations and does not appear in the list of the most productive, it can be deduced that its documents are cited with high frequency. This indicates that the articles in this journal are of great importance in the subject of tourism destination management.

As for *Sustainability (Switzerland)*, this journal appears in both tables, with 5 papers and 41 citations, resulting in an average of 8.2 citations per paper. This indicates a moderate impact per paper, suggesting that, although it publishes a significant number of papers, each paper has a relatively moderate influence compared to other high-impact sources.

Finally, *SUSTAINABILITY* has 4 papers and 28 citations, resulting in an average of 7 citations per paper. This average indicates a similar impact to *Sustainability (Switzerland)*, with a moderate influence per publication.

4.4. Analysis of Contribution of Institutions and Countries

The analysis of the academic collaboration network illustrated in Figure 2 shows the connections between various universities and institutions in the field of scientific research on artificial intelligence and tourism destination management.

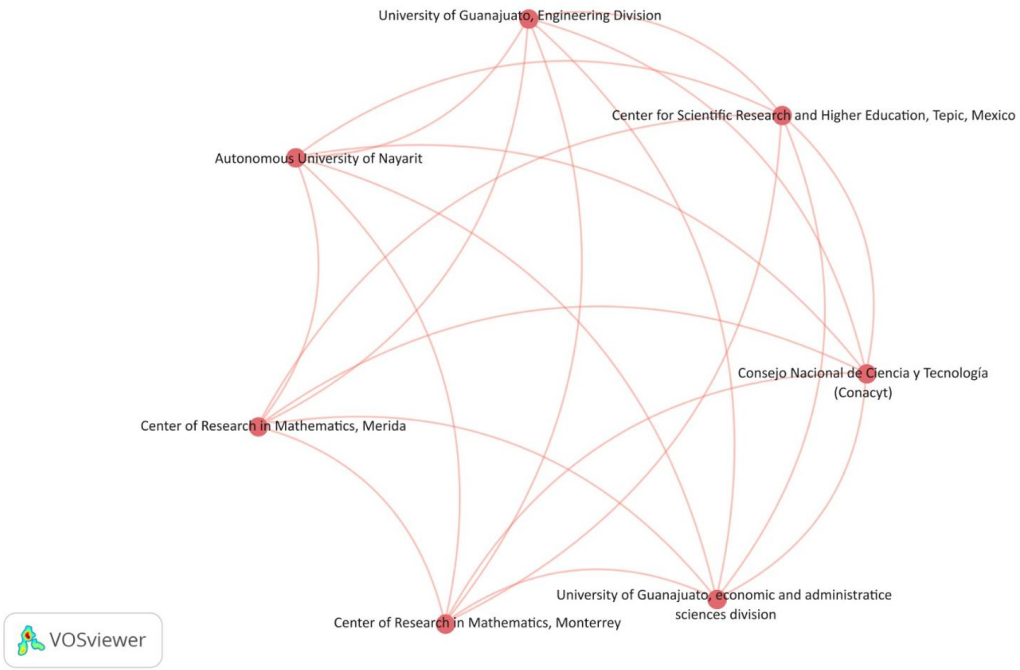

Figure 2. Academic collaboration network.

Several interconnected institutions are observed, such as the *University of Guanajuato*, the *Autonomous University of Nayarit*, and several research centers, including the *Center for Scientific Research* and the *Center for Research in Mathematics*. The nodes represent the institutions, and the lines connecting them indicate the frequency and strength of their collaborations. The connections are multiple and cross-connected, suggesting frequent and close collaboration between these institutions, forming a dense and well-connected network. The universities and research centers mentioned stand out as major players in this network, evidencing a significant collaborative effort in scientific production in this field. Figure 2, therefore, reflects a consolidated and multidisciplinary academic cooperation structure.

Figure 3 shows a network of collaboration between countries in research on artificial intelligence and tourism destination management. The graph visualizes the relationships and the intensity of collaboration between different countries, represented as interconnected nodes.

The nodes represent the countries involved in the research, and their size reflects the number of publications or the relevance of the country in the collaborative network. The countries with the largest nodes, such as *China (n=17 papers)* and *Spain (n=14 papers)*, indicate that they are major players in this area of research, showing high participation in international studies and collaborations. In China, Borrajo-Millán, et al. [34] applied sentiment analysis using artificial intelligence to evaluate the quality of tourist destinations in Spain and China. Leveraging data generated in social networks (e- WoM), the study analyzes the perceptions and comments of tourists to identify areas for improvement and promote sustainability in destinations. The authors highlight how this methodology, based on real data rather than traditional surveys, allows for more accurate insights into tourism experiences. They also emphasize the importance of employing these techniques to manage destinations more effectively, thereby improving competitiveness and aligning with sustainability principles. Another research from China analyzes emerging technologies in Asian tourism (AI, blockchain, augmented reality), highlighting their impact on personalization, sustainability, and post-COVID-19 adaptation to improve competitiveness and operational efficiency [35].

The lines connecting the nodes indicate collaboration between countries. A thicker and closer line suggests greater and more frequent collaboration. For example, *China* and *Spain* show strong connections with other countries such as the *United Kingdom* and *Australia*, evidencing consolidated collaboration networks. In addition, the proximity between nodes suggests which countries work in closer collaboration; in this sense, the *UK* is connected to several countries, standing out as a hub between them.

In terms of groups and distribution, closer collaboration sub-networks or clusters are observed. For example, *China*, *Australia*, and *India* form a cluster on the left side, while, on the right side, *France* and *Italy* appear further apart, which could indicate less frequent or more specialized collaborations compared to the other clusters.

Finally, some countries such as *France* and *Italy* appear with smaller nodes and fewer visible connections. This could indicate that, although they are present in the research network, their level of collaboration or influence is lower compared to major players such as *China*, *Spain*, and the *United Kingdom*.

In addition, Figure 2 highlights *China*, *Spain*, and the *United Kingdom* as the leading countries in international research and collaboration in the field of artificial intelligence and destination management. The structure of the network shows the centrality of these countries and how they connect with other important players, while other countries appear with less connectivity, suggesting opportunities for increased collaboration in future research.

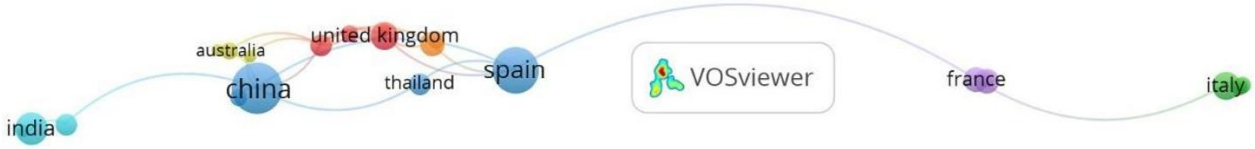

Figure 3. International collaboration map.

4.5. Intellectual Structure Analysis

Figure 4 presents a map of co-occurrence of keywords in research on artificial intelligence applied to tourism. At the center of the map is the term *artificial intelligence*, indicating its central role in the research network. From this main node, multiple connections extend that relate to specific topics within the field of tourism, showing how artificial intelligence is integrated into various areas of study.

On the left side of the figure, concepts such as *smart tourism*, *deep learning*, and *sentiment analysis* are grouped, reflecting a focus on digitization and data analysis in the tourism sector. The term *smart tourism* is connected with *digitization* and *chatbot*, suggesting a close relationship between the implementation of smart technologies and user experience in tourism destinations.

At the top and center-right of the map, terms such as *sustainable tourism*, *city design*, and *destination branding* appear, indicating a line of research oriented toward sustainability and urban planning. This shows how artificial intelligence is used not only for destination management but also for the development and design of sustainable tourism cities, integrating aspects of sustainability and destination marketing.

Finally, at the bottom, there are topics related to *machine learning* and *AI algorithms*, as well as *destination image formation*. This suggests an interest in how machine learning techniques and AI algorithms are applied in the formation of the image and perception of tourist destinations.

Thus, Figure 4 reflects a diverse thematic network in research on artificial intelligence applied to tourism, highlighting the interrelationship between technology, sustainability, urban design, and destination marketing.

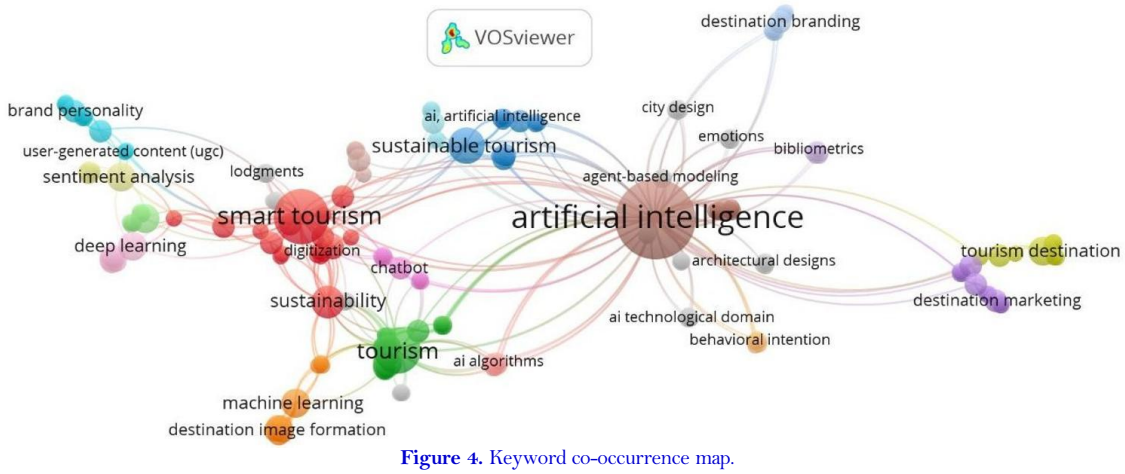

Figure 4. Keyword co-occurrence map.

Related to the keyword "sentiment analysis," through a natural language processing sentiment analysis task, they assessed tourist satisfaction. They managed to effectively identify areas of improvement to better meet tourists' expectations and increase their satisfaction [36]. On the other hand, Kang [37] developed a smart tourism application that provides information to tourists about tourist destinations and festivals by analyzing Call Data Records, offers credit card usage patterns of tourists, and includes recommended travel products, my travel products, tourist destinations, and tourist information such as accommodations and restaurants.

Li et al. [17] use a deep learning model, based on BERT and Transformer, to analyze online travel notes and determine the attractiveness of tourist destinations. This approach allows the extraction of chapter-level semantic features and classification of destination attractions through attention analysis, overcoming the limitations of traditional statistical methods. The results of the model applied to destinations such as Chengdu and Shanghai identified key elements such as food and local and cultural attractions, demonstrating that the approach is effective in capturing the essence of tourism destinations and improving their management. Furthermore, Ouaddi et al. [38] highlighted a notable gap in the academic literature on the impact of chatbots within the tourism industry. The development of chatbots presents significant challenges for software developers, necessitating the development of a

broad spectrum of artificial intelligence (AI) competencies.

Additionally, Li and Liu [39] investigated the determinants of users' propensity to share electronic word-of-mouth (eWOM) on tourism platforms. Employing a system dynamics model alongside structural equation modeling, this study identifies critical variables that influence posting behavior, including perceived usefulness, social identity, tourism experience, and the agenda-setting function of platforms. The findings indicate that these factors positively influence users' intention to post eWOM, whereas perceived ease of use does not exert a significant effect. This study establishes a theoretical framework for elucidating the dynamic mechanisms underpinning eWOM posting behavior and offers practical recommendations for tourism platform operators. Specifically, it advocates enhanced user engagement through the integration of features and incentive structures designed to stimulate platform activities.

5. DISCUSSION

This study employs a comprehensive bibliometric analysis to evaluate the impact and research trends associated with the application of artificial intelligence (AI) in tourism destination management. Over the past decade, there has been a marked increase in scholarly output in this field, reflecting heightened interest in leveraging advanced technologies to enhance the competitiveness and sustainability of tourism destinations [1, 8]. This growth is evident not only in the volume of publications but also in the breadth of topics explored, encompassing process automation, predictive analytics [14, 40], and experience personalization [41, 42]. The surge in publications since 2018 underscores the recognition of AI's transformative potential in destination management, particularly in personalizing visitor experiences and optimizing tourism flows [2, 6]. This trend is supported by the development of advanced technologies, such as predictive analytics and recommender systems utilizing machine learning to anticipate tourist behaviors and preferences [12, 43]. Recent scholarship also emphasizes AI's integration into augmented and virtual reality tools, enabling destinations to deliver immersive experiences that enhance tourists' knowledge and optimize their journeys [14].

Bibliometric findings indicate that China, Spain, and the United Kingdom are the leading contributors to this research domain, with significant international collaboration driving technological advancements (Figure 3). These countries, in partnership with institutions in Australia and the United States, are pioneering AI solutions that allow destinations to dynamically adapt to tourist needs and global market demands [7]. Transnational collaborations have also facilitated the development of predictive models to evaluate post-pandemic tourism demand, aiding destinations in planning with greater precision and sustainability [35]. The concentration of publications in specialized journals and conferences, such as *Tourism Management* and the *International Journal of Contemporary Hospitality Management* (Table 1 and 2), highlights the interdisciplinary approach required to address the multifaceted challenges of destination management in the digital era. The integration of AI into sustainability initiatives and the promotion of personalized tourism experiences have emerged as central research focuses, drawing interest from diverse disciplines. For instance, AI algorithms for sentiment analysis and data mining on platforms like electronic word-of-mouth (eWOM) enable tourism managers to capture real-time visitor perceptions, thereby supporting the continuous improvement of tourism offerings.

Despite these advancements, significant barriers hinder the widespread adoption of AI technologies. The reliance on robust technological infrastructure and high-quality data poses challenges, particularly in resource-constrained destinations [5]. Ethical concerns surrounding data privacy [44] and user trust [45] remain critical issues requiring resolution to ensure stakeholder acceptance. Furthermore, disparities in technological access and training across destinations exacerbate inequalities in AI implementation, limiting its global impact. The lack of standardized tools and methodologies for integrating AI in destination management also complicates the comparability and replicability of research outcomes [11]. International collaboration is essential to address these challenges, with joint initiatives promoting ethical and regulatory frameworks to ensure responsible and sustainable AI use. The collaborative networks identified in this study demonstrate considerable potential for advancing projects that integrate technology

and sustainability, particularly in the context of tourism digitization and sustainable destination management. Strengthening these networks could enhance knowledge and resource exchange, especially for emerging destinations aiming to adopt technology effectively.

Future research should prioritize adapting AI applications to specific regional contexts, accounting for variations in technological infrastructure and development levels. The use of AI in urban planning and sustainable destination design represents an emerging field with significant potential to bolster the competitiveness and resilience of the tourism sector amid global challenges. Additionally, the long-term impacts of AI on the social, economic, and environmental sustainability of destinations warrant further exploration, with particular attention to social inclusion, local employment, and cultural heritage preservation.

6. CONCLUSIONS

This study demonstrates the fundamental importance of artificial intelligence (AI) in tourism destination management, as it optimizes operational efficiency and offers personalized tourism experiences. A bibliometric analysis revealed a notable increase in research since 2018, suggesting a global recognition of the benefits these technologies bring to the sector.

6.1. Implications

These findings offer significant insights for academics, policymakers, and tourism managers by highlighting global research trends, emerging technologies, and essential collaboration networks. This study emphasizes the need to incorporate AI into sustainable tourism strategies, establish appropriate regulatory frameworks, and foster international cooperation to drive the digital transformation of destinations.

6.2. Limitations

The analysis was based on data collected until October 8, 2024, exclusively from the Scopus and Web of Science databases. Consequently, relevant studies published after that date or indexed on other platforms (such as Dimensions or Google Scholar) may have been omitted. Furthermore, although bibliometric methods allow the identification of structural patterns, they do not assess the practical effectiveness of AI applications in real-world situations.

6.3. Future Research Directions

Future research could expand this analysis by including qualitative evaluations and case studies to determine the actual impact of AI implementation on tourism destinations. Similarly, research must explore how AI can adapt to diverse regional and socioeconomic contexts and address emerging concerns related to ethics, data privacy, and inclusiveness in AI-driven tourism governance.

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