Review

Artificial Intelligence in the Tourism Industry: An Overview of Reviews

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Abstract: This study aims to comprehensively synthesize existing literature on AI in tourism, highlighting key themes, strengths, and limitations, and illuminating pathways for future research, including the identification of emerging areas within this context. AI technology is rapidly transforming various sectors, including tourism, by augmenting customer service, improving operational efficiency, personalizing travel experiences, and supporting sustainability initiatives. Despite the growing body of research on this topic, there is a need for a comprehensive and systematic summary of the existing literature to illuminate the most effective uses of AI in this context and to identify gaps for future research. We employed the 'overview of reviews' methodology, which involved systematically locating, appraising, and synthesizing the results of previous review articles. Using Web of Science, we identified and analyzed 31 previous review articles on the application of AI in tourism. Their synthesis presents a comprehensive perspective on the present status of AI technology in the tourism sector. It provides valuable insights, not only for practitioners contemplating the implementation of AI solutions but also for academics aspiring to advance this study area. Moreover, the academic implications of this study reaffirm its objective to shape future inquiries into AI applications within tourism, advocate for the efficacious and sustainable employment of AI, and provoke scholarly exploration at the nexus of technology and sustainability in this sector.

Keywords: artificial intelligence applications; tourism industry; overview of reviews

1. Introduction

Artificial intelligence (AI), a domain within computer science, seeks to formulate algorithms and methodologies that equip machines with capabilities typically necessitating human intellect, encompassing learning, reasoning, and understanding (Russell et al. 2010). AI is a remarkable testament to human ingenuity, effectively merging a multitude of disciplines including philosophy, mathematics, computer science, psychology, and neuroscience (Kumar and Thakur 2012). Tracing back to its inception through pioneering studies in the mid-20th century (McCulloch and Pitts 1943; Turing 1950), the evolution of AI is etched into a copious body of scientific literature and punctuated by significant milestones (Domingos 2012; Goodfellow et al. 2014; He et al. 2015; Minsky and Papert 1969; Vaswani et al. 2017).

The societal implications of AI are profound and multifaceted, presenting both beneficial and potentially detrimental outcomes, hence being considered either a "curse or a blessing" (Aly 2020). The future role of AI evokes a myriad of emotions, oscillating between fascination and apprehension (D'Cruz et al. 2022). On the positive side, AI technology has the potential to revolutionize various sectors by augmenting employment and productivity (Yang 2022). However, the advent of AI is not without its challenges, which include privacy and data security, as well as the ethical considerations associated with AI utilization (Gerke et al. 2020).

As we increasingly incorporate AI into the fabric of our societies, predicting with precision which human occupations will be most affected by automation is a complex task. It is contingent on various factors such as industry specifics, economic trends, and government policies. Generally, occupations entailing repetitive tasks are expected to bear the brunt of automation. Examples of such jobs encompass lower-level tasks in the service sector, including customer service and data processing (Luitse and Denkena 2021). Yet, amidst these uncertainties, one thing remains clear: the rise of AI should not be viewed solely as a threat to human labor. Rather, it holds the promise of fostering innovation and creativity by relieving humans of mundane tasks. There is consensus on the need for humans to adapt and collaborate with AI, requiring new knowledge and skills. While AI can have significant labor market impacts, it also presents opportunities for job creation, augmentation of human capabilities, and positive economic effects (Yeh et al. 2020). This could potentially pave the way for a 'hybrid intelligence' ecosystem, where humans and AI collaboratively drive progress (Dellermann et al. 2019). The idea of human-AI co-creation is gaining traction across diverse domains (Yuan et al. 2022), underpinning the potential for AI to augment, rather than replace, human capabilities.

In the meantime, in the aftermath of the COVID-19 pandemic, the global tourism industry has witnessed significant recovery. As reported by the World Tourism Organization (UNWTO 2023), the first quarter of 2023 saw double the number of international travelers compared to the same period in 2022, totaling an estimated 235 million tourists. This recovery trajectory is projected to persist, with international arrivals anticipated to recuperate 80% to 95% of pre-pandemic levels by the end of 2023. This rebound is particularly pronounced in Asia and the Pacific, with China's reopening to international tourism in January 2023 catalyzing the recovery process. Global inbound tourism spending is expected to regain 83% of its peak 2019 levels, with a full rebound anticipated by 2024 (Euromonitor International 2023).

The recovery of the global tourism industry post-COVID-19 requires a multi-stakeholder approach to address perceived health risks and restore tourist confidence, with governments playing a crucial role in providing financial support, managing the virus, and implementing effective marketing strategies. Mitigating subjective risk factors and promoting domestic tourism are essential for reviving the industry and addressing evolving consumer trends (Matiza 2020). The COVID-19 pandemic has severely impacted the global tourism industry, exposed its unsustainable practices, and highlighted the need for resilience. Through a resilience-based framework, involving governments, market players, technology innovators, and local communities, the tourism sector has the potential to evolve in a more sustainable and inclusive manner post-pandemic, with smaller-scale players leading the way in facilitating sustainable tourism and benefiting less-developed tourism destinations (Sharma et al. 2021).

Despite the robust recovery, the tourism industry continues to grapple with substantial economic hurdles. Inflation and rising oil prices have escalated transport and accommodation costs, potentially curtailing the resurgence of global tourism. Moreover, the ongoing cost-of-living crisis in Europe and North America has dampened global inbound tourism spending. Industry stakeholders continue to stress the importance of innovation, collaboration, and diversification for a sustainable recovery. As the industry navigates these challenges, the integration of sustainable practices, digital technologies, and diversified tourism offerings remains paramount. Simultaneously, the tourism industry is undergoing a significant transformation in response to evolving consumer preferences and economic challenges. Euromonitor International (2023)'s research indicates a shift towards values-based tourism products and services, which are expected to outperform standard packages over the 2023–2027 period, with an average value growth of over 12% per annum. Wellness packages and nature-based tourism, in particular, have seen increased consumer interest. Additionally, sustainability has become a key focus within the industry.

As we will discuss later, the integration of AI in the tourism industry offers significant opportunities, as it can enable growth between 7% and 11.6% of total revenue in the sector

(Kirtil and Askun 2021). This growth can be achieved through various AI applications. Thayyib et al. (2023) have identified several emerging research trends in this field, including areas such as eWOM, service recovery, customer satisfaction, brand/destination image, service quality, big data, netnography, Travel 2.0, Web 2.0, e-tourism, green experience, smart tourism, and the application of Artificial Neural Networks (ANNs), Support Vector Regression (SVR), and neural network models in tourism forecasting. Topics such as "task analysis-training," "deep learning-convolutional neural networks," and "optimization" have emerged as highly influential during the COVID-19 pandemic (Soliman et al. 2023). Challenges such as data complexity, algorithmic bias, financial concerns, and socio-ethical considerations need to be addressed to fully harness the potential of these technologies in tourism (Samara et al. 2020).

The primary objective of this study is to provide a comprehensive synthesis of the existing literature on AI applications in the tourism industry, pinpointing key themes, strengths, and limitations. It further seeks to guide future research towards the effective, responsible, and sustainable use of AI in tourism. Through an extensive review of systematic literature reviews from the past five years, we illuminate the principal areas where AI has been deployed, emphasizing its applications and potential implications. This examination of the state of research and advancements in the field offers insights into common AI applications, elucidates challenges, and identifies opportunities for implementation. An additional aim of this study is to uncover emerging avenues of research within the realm of AI applications in the tourism industry.

Based on the provided objective, the research questions can be formulated as follows:

- RQ1: What are the key themes, strengths, and limitations in the application of artificial intelligence (AI) within the tourism industry as identified in the existing literature?
- RQ2: What are the common applications of AI within the tourism industry and what potential implications do they hold?
- RQ3: What are the potential future lines of research within AI applications in the tourism industry, as suggested by the existing literature and current trends in the field?

Although there is an abundance of research related to the application of AI in various sectors, including tourism, our study brings a unique contribution. Unlike previous studies, we have adopted the 'overview of reviews' methodology, which offers a more comprehensive and systematic understanding of the subject matter. This methodology allowed us to not only review individual studies but also synthesize findings from numerous reviews, thereby providing a more holistic view of the state of AI applications in the tourism industry. This approach contributes to the existing literature by filling a gap in the comprehensive synthesis of previous reviews, thus increasing the differentiation and value of our study. Given the existing research gap regarding the application of intelligent robots to augment the tasks performed by top-level tourism staff, such as marketers and financial directors (Ivanov et al. 2019), this study serves as a valuable reference for researchers, practitioners, and organizational leaders, equipping them with informed insights to guide decision making and explore the potential advantages and drawbacks associated with the integration of artificial intelligence in the analyzed context.

The structure of this paper is as follows: identification of a relevant research problem (Introduction section), explanation of the qualitative methodology employed (Materials and Methods section), presentation and discussion of results (Results section), and finally, conclusions and implications of the findings (Conclusion section).

2. Materials and Methods

Our manuscript offers a comprehensive overview of the application of AI in the tourism industry during the past five years. The term 'overview' in our manuscript refers to a systematic summary of evidence from systematic reviews, aligning with the commonly used terminology as described by Hunt et al. The primary objective of producing overviews is to assist decisionmakers (Thomson et al. 2010) by providing a comprehensive summary of the key aspects of a discipline (Grant and Booth 2009) and guiding readers to more

detailed materials found in systematic reviews and primary studies (Worswick et al. 2013), thereby addressing the existing research gap. Overviews are most frequently employed where, as it is our case, multiple systematic reviews already exist on similar or related topics (Hunt et al. 2018). The overview of reviews method has demonstrated significant effectiveness in disciplines as rigorous as medicine which is often considered a pioneer in the application of this approach. This is echoed by respected institutions such as Cochrane, a globally recognized leader in health research methodology, which has developed its own approach towards systematic review synthesis (Pollock et al. 2020).

Overviews of reviews represent a relatively recent approach to evidence synthesis that aims to systematically gather and summarize the findings of multiple systematic reviews (Lunny et al. 2018). The objective of overviews is not to replicate searches evaluating study eligibility, which may introduce bias from the included studies, but to offer a comprehensive overview of the findings (Blackwood 2016). Overviews facilitate the integration of research synthesis outcomes, particularly when they yield inconsistent results (Cooper and Koenka 2012).

The number of published overviews has witnessed a steady rise in recent years, primarily driven by the increasing number of systematic reviews (Lunny et al. 2016). Furthermore, there has been a growing interest in overviews of reviews (Pieper et al. 2012), making them the most downloaded content in specific evidence synthesis journals (Denise Thomson 2014). With the mentioned increase in the number of systematic reviews available (e.g., following Page et al. (2016), approximately 22 new medical systematic reviews are published daily) the logical next step to provide decisionmakers with the evidence they require is conducting reviews of these existing systematic reviews (Aromataris et al. 2015) in varied problem areas (Cooper and Koenka 2012).

By taking advantage of the comprehensive searches undertaken in systematic reviews, overviews provide direct access to evidence from a much larger body of typically high-quality primary studies. Overviews are especially helpful for policymakers when a holistic synopsis of a research field is the desired product (Lunny et al. 2016). Given their objective of synthesizing extensive data in a user-friendly format, overviews of reviews have been gaining momentum as a valuable knowledge synthesis product to facilitate decision-making and application of knowledge (Michelle Pollock et al. 2016).

Overviews aim to use explicit, reproducible, and systematic methods to search for, identify, and extract outcome data from original reviews (Michelle Pollock et al. 2016). Overviews are, in this sense, similar to reviews, but the unit of searching, inclusion, and data analysis is the systematic review rather than the primary study (Pollock et al. 2020). Our overview of reviews has been carried out based on the Aromataris et al. proposal (Aromataris et al. 2015), employing an a priori peer-reviewed protocol with detailed inclusion and exclusion criteria, as well as search strategies and methods for data extraction and appraisal, followed by replicable methods for the synthesis and summary of selected data.

To conduct this review, the researchers followed the Preferred Reporting Items for Systematic Reviews and Meta-Analysis (PRISMA) protocol (Moher et al. 2009), recently updated by Page et al. (2021), which sets out criteria for high-quality scientific publications. As established, this research was characterized by transparency and clarity of purpose (Hartling et al. 2015; Kelly et al. 2016) in respect to the four-stage process: identification of relevant studies, selection of studies, mapping of data, and synthesis and reporting of results.

The overview of reviews method allows for a comprehensive and broad insight into the field of study by including multiple systematic reviews, each of which has already undertaken a rigorous search, evaluation, and inclusion of primary studies. Our approach, therefore, ensures a wide and rich coverage of relevant literature, supporting the validity and scientific rigor of the findings.

Inclusion and exclusion criteria were specified in advance and documented, as shown in Table 1. To guarantee the effectiveness of the overview (Thomson et al. 2010), we

have only included updated systematic reviews, in particular studies published between 2019 and 2023. Literature of official origin was not considered following the purpose of identifying and analyzing proposals based on scientific studies.

Thorough search of the Web of Science database was conducted in June 2023. The equation finally used was: (tourism or hospitality) and ("artificial intelligence" or AI or robotic) in title, abstract, author keywords, and keywords plus. Later, the search was refined by document type (review article). A total of 131 manuscripts were identified. Once the inclusion and exclusion criteria were applied, the literature search resulted in 110 citations. Evidence screening was later carried out based on title and abstract examination. The two researchers worked in pairs and sequentially evaluated the titles and abstracts of the publications identified in the search as potentially relevant. Discrepancies in study selection and data extraction were resolved through consensus and discussion. After screening, 55 of the results were eliminated due to their inability to meet the objective of the study. A total of 14 reports were not retrieved, and, in conclusion, 31 documents were included in the qualitative synthesis. Figure 1 shows the inclusion decision flowchart with the steps of the review decision process (identification, screening, retrieval, and inclusion) according to the PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) standard:
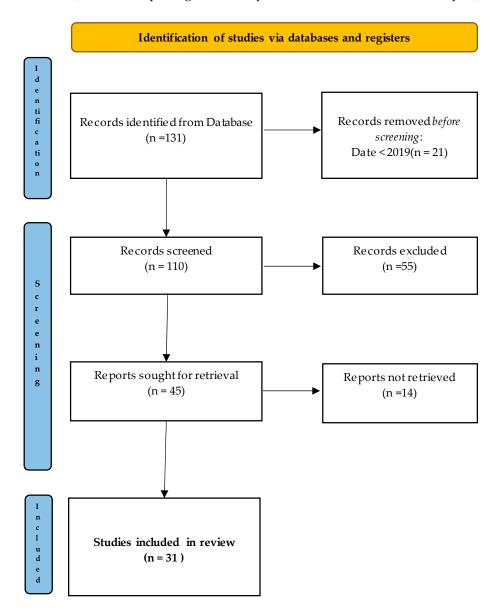

Figure 1. Inclusion decision flowchart.

Table 1. Inclusion and exclusion criteria.

Inclusion Criteria	Title 2
Reviews published in scientific journals. Period 2019–2023 Written in English	Official literature Other secondary data analysis

3. Results

The collected data from all included articles were added in a charting table (Appendix A) with all the relevant evidence to inform the overview objectives:

- Basic information about systematic reviews (e.g., title; first author; year of publication; journal). Full references are presented in the bibliography;
- Keywords;
- Outcomes.

In the attached table (Table 2), we have summarized the authors that present the variables which we have identified during our qualitative study. This table serves as a concise reference for the source material that underpins our findings and discussions.

Table 2. Summary of results.

Categorization	Authors	Main Contribution
Forecasting	Song et al. (2019)	Discuss traditional methodologies in tourism forecasting and emphasize the emergence and success of AI models in this field.
	Liu et al. (2019)	Highlight the use of AI in tourism forecasting since 2009, despite concerns about the 'black box' nature of AI models.
	Doborjeh et al. (2022)	Discuss how AI can aid in forecasting future business conditions, revenues, and trends in guest/tourist demand.
	Essien and Chukwukelu (2022)	Focus on high-frequency forecasting techniques using big data from mobile devices for predicting and managing crowdedness in tourism destinations.
	Lv et al. (2022)	Emphasize the importance of diverse data sources like professional databases, government databases, and operation data for effective forecasting in hospitality and tourism management.
	Chen et al. (2022b)	Identify BI and IT-driven solutions as the most effective methods for leveraging growth trend in the hospitality industry.
	Liu et al. (2019)	Discuss recent aggressive application of big data analyses, machine learning, and use of search engine data and web search intensity in tourism forecasting research.
	Li et al. (2021b)	Highlight some limitations and challenges related to the use of internet data in tourism forecasting, such as quality of search engine data and presence of noise or irrelevant information in social media data.

Table 2. *Cont.*

Categorization	Authors	Main Contribution
Improving operational efficiency	Song et al. (2019)	Outlined the roles of traditional methods in tourism forecasting and the increasing use of AI-based methods.
	Liu et al. (2019)	Highlighted the growing use of AI methods in tourism forecasting but noted their limitations including the need for large amounts of data and their complexity.
	Jiao and Chen (2019)	Discussed the challenges of using AI methods in tourism forecasting, including the difficulty of interpretation and the need for significant computational resources.
	Li et al. (2021b)	Highlighted some limitations and challenges related to the use of internet data in tourism forecasting.
	Yang and Chew (2021)	Discussed the potential of intelligent robotics to address challenges in the hospitality industry.
	Ivanov et al. (2019)	Outlined the application of AI in the tourism industry with specific use-cases like the deployment of robots as bartenders, waiters, and receptionists.
	Cain et al. (2019)	Highlighted the prominence of AI applications in the tourism industry, including the use of robots in various roles.
Enhancing customer experiences	Elkhwesky et al. (2022)	AI demonstrates considerable promise in augmenting customer experiences.
	Cain et al. (2019)	Implementation of customized recommendations and suggestions encompasses the integration of cloud robotics and robotic navigation.
	Li et al. (2021a)	Service engagements enhanced by AI-integrated media contribute to customer satisfaction, loyalty, and positive recommendations.
	Chen et al. (2022a)	Use of IoT platforms can remember guests' specific comfort preferences, leading to improved customer experiences.
	Lv et al. (2022)	Big data from user-generated content is used to investigate visitor attitudes, satisfaction, and preferences in the travel industry.
	Samara et al. (2020)	AI facilitates trust-based recommendations in the tourism industry.
	Cain et al. (2019)	AI-powered chatbots and virtual assistants like small, multi-lingual robots are used to answer customer inquiries.
	Chi et al. (2020)	Virtual multi-lingual personal cruise assistants improve customer experiences.
	Doborjeh et al. (2022)	CRM built on big data and AI empowers chatbots to offer personalized travel services.
	Essien and Chukwukelu (2022)	Transfer learning in deep learning improves accuracy and efficiency in providing personalized recommendations to tourists.
	Giotis and Papadionysiou (2022)	AI technologies help tourism companies target customers with personalized marketing messages.

Table 2. *Cont.*

Categorization	Authors	Main Contribution
	Al-Nafjan et al. (2023)	Neuro-tourism utilizes neuroscience to enhance the tourism industry's marketing strategies.
	Li et al. (2021a)	Use of Virtual Reality significantly amplifies tourists' service experiences.
	Das et al. (2021)	AI can offer substitutes for travel experiences through augmented reality.
	Loureiro et al. (2022)	AI technologies enhance visitor experiences at cultural heritage sites.
	Gaur et al. (2021)	Robots' contactless services are particularly important after the COVID-19 pandemic.
	Doborjeh et al. (2022)	There is a shift towards developing customer-centric chatbot platforms that can understand customer behavior, emotions, and intentions.
	Chi et al. (2020)	AI-powered devices can enhance customer experiences through stress management, emotional intelligence, and virtual personal assistants.
	Cain et al. (2019)	Understanding how customers will accept and engage with robots and AI is vital for their adoption and success.
	Leung (2020)	Traveler co-creation will play a significant role in shaping the future of tourism service delivery.
	Osei et al. (2020)	Customers' reluctance to use new technologies can pose a challenge for tourism firms.
	Elkhwesky et al. (2022)	AI demonstrates considerable promise in augmenting customer experiences.
Sustainability	Gaur et al. (2021)	AI-powered systems can optimize resource allocation, minimize energy consumption, enhance waste management, and improve health and safety measures, promoting sustainable tourism initiatives and reducing the industry's ecological footprint.
	Lv et al. (2022)	The use of big data to examine environmental performance of hospitality operations shows that greater corporate social responsibility involvement can result in higher environmental performance.
	Rahmadian et al. (2022)	Big data is utilized in ecotourism to understand visitor patterns, attractions, impacts on natural resources, identify conservation areas, and develop smart tourism strategies.
	Giotis and Papadionysiou (2022)	Technology reduces paper consumption, minimizes waste generation, and contributes to overall sustainability efforts by replacing traditional printed materials like brochures and posters.
	Loureiro et al. (2022)	The rise of AI, VR, and AR technologies can prevent damage to cultural heritage sites by providing virtual experiences and predicting tourist flow.

Table 2. *Cont.*

Categorization	Authors	Main Contribution
	Elkhwesky et al. (2022)	Drones may be used to provide live virtual tours of open-space tourist locations, contributing to eco-friendly innovation.
	Tussyadiah (2020); Rahmadian et al. (2022)	The integration of AI tools, IoT, and big data in the tourism value chain supports the concept of smart tourism ecosystems, improving visitor experiences and promoting sustainable practices.
	Kirtil and Askun (2021)	AI-powered chatbots and virtual assistants can promote responsible tourism practices by encouraging tourists to make informed decisions about their travel and activities.

4. Discussion

Through the assembly and categorization of the findings predicated upon their semantic affinity, the procedural course entailed the amalgamation of the results to engender a series of statements that holistically epitomize the findings. The principal aim revolved around the creation of a cohesive compilation of synthesized findings, thereby serving as a robust substratum for evidence-based praxis. Subsequently, these categories were subjected to a synthesis to guarantee a comprehensive and harmonized methodology.

Our synthesis of the literature reveals a diverse array of applications of AI, from forecasting and operational efficiency to enhancing customer experiences and promoting sustainability.

The attached table 'Mapping of Articles to Research Questions' (Table 3) delineates key articles that address each research question posed in our study.

Table 3. Mapping of Articles to Research Questions.

Research Question	Key Articles
RQ1: What are the key themes, strengths, and limitations in the application of artificial intelligence (AI) within the tourism industry as identified in the existing literature?	Cain et al. (2019); Ivanov et al. (2019); Jiao and Chen (2019); Leung (2020); Li et al. (2021b); Loureiro et al. (2022); Osei et al. (2020); Samara et al. (2020); Tussyadiah (2020)
RQ2: What are the common applications of AI within the tourism industry and what potential implications do they hold?	Cain et al. (2019); Chen et al. (2022b); Chi et al. (2020); Das et al. (2021); Doborjeh et al. (2022); Elkhwesky et al. (2022); Essien and Chukwukelu (2022); Gaur et al. (2021); Giotis and Papadionysiou (2022); Ivanov et al. (2019); Kirtil and Askun (2021); Leung (2020); Li et al. (2021b); Loureiro et al. (2022); Lv et al. (2022); Chen et al. (2022a); Ndaguba et al. (2022); Osei et al. (2020); Rahmadian et al. (2022); Samara et al. (2020); Soliman et al. (2023); Tussyadiah (2020); Yang and Chew (2021)
RQ3: What are the potential future lines of research within AI applications in the tourism industry as suggested by the existing literature and current trends in the field?	Cain et al. (2019); Gaur et al. (2021); Ivanov et al. (2019); Jiao and Chen (2019); Leung (2020); Osei et al. (2020); Samara et al. (2020); Tussyadiah (2020)

The studies reviewed provide valuable insights into key themes in the application of AI in the tourism industry (RQ1). These include the increasing use of AI for forecasting (Song et al. 2019; Liu et al. 2019), improving operational efficiency (Liu et al. 2019; Jiao and Chen 2019), enhancing customer experiences (Elkhwesky et al. 2022; Li et al. 2021a), and promoting sustainability (Gaur et al. 2021; Lv et al. 2022).

With respect to the common applications of AI in the tourism industry (RQ2), our review highlights the prevalent use of AI models for forecasting (Song et al. 2019; Liu et al. 2019; Doborjeh et al. 2022), the utilization of intelligent robots to augment tasks performed by tourism staff (Yang and Chew 2021; Ivanov et al. 2019), and the application of AI technologies

to enhance customer experiences and satisfaction (Elkhwesky et al. 2022; Li et al. 2021a; Chi et al. 2020).

Looking towards future lines of research within AI applications in the tourism industry (RQ3), our review suggests that the 'black box' nature of AI models (Liu et al. 2019), the need for large amounts of data and significant computational resources (Jiao and Chen 2019), and customer reluctance to adopt new technologies (Osei et al. 2020) represent, between others, potential areas for further investigation and improvement.

The presentation of outcomes adopts a narrative style, except when textual amalgamation was impracticable. In the synthesis process, exclusively conclusive and trustworthy findings were duly considered.

4.1. Forecasting

In the field of tourism forecasting, there are four main categories of methodology that have been traditionally used to plan demand: explorative methods, speculative methods, normative/explicative methods, and integrative methods. These categories encompass a range of techniques such as time series analysis, the Delphi method, and Bayesian statistics, which are used for quantitative forecasting. Additionally, judgmental methods can be applied to both qualitative and quantitative forecasting (Song et al. 2019). Artificial intelligence-based methods have been widely used in tourism forecasting research since 2009 (Liu et al. 2019). Despite concerns about the "black box" nature of AI models, their success in predicting tourism demand has led to their widespread application (Song et al. 2019). The use of AI in the tourism industry has revolutionized the field of forecasting by providing advanced predictive analytics and modeling capabilities. By harnessing the power of AI algorithms and machine learning techniques, organizations can make more accurate predictions and forecasts, enabling them to anticipate future trends, demand patterns, and market fluctuations, thus facilitating informed decision-making and strategic planning.

AI can help in forecasting future business conditions and revenues, as well as identifying current and potential trends in guest/tourist demand (Doborjeh et al. 2022). Essien and Chukwukelu (2022) focus on utilizing high-frequency forecasting techniques using big data from mobile devices to predict and manage crowdedness in tourism destinations. Effective forecasting, which is vital for hospitality and tourism management and industry growth, utilizes diverse data sources like professional databases, government databases, and operation data (Lv et al. 2022). BI and information technology-driven solution are identified as the most effective and novel methods for levering the hospitality growth trend (Chen et al. 2022b).

Time series models and artificial intelligence-based methods, including neural networks, genetic algorithms, and support vector regression, were the methods used primarily in the final stage of tourism forecasting research. In recent years, new research methods such as big data analyses, machine learning, and the use of search engine data and web search intensity have been aggressively applied in tourism forecasting research (Liu et al. 2019). Hybrid models that combine different AI techniques have also emerged as a promising approach to improve forecasting accuracy. However, the complexity and difficulty of implementing AI methods have limited their widespread adoption in tourism forecasting. Firstly, the above-mentioned techniques require a significant amount of data to train and validate the models, which may not always be available in the tourism industry. Secondly, the selection and combination of different AI techniques to create hybrid models can be challenging, as each technique has its own strengths and weaknesses. Thirdly, the interpretation and explanation of the results generated by AI models can be difficult, as they often involve complex mathematical algorithms and may not be easily understandable to non-experts. Finally, the implementation of AI models may require significant computational resources and expertise, which may not be available to all tourism organizations (Jiao and Chen 2019). Li et al. (2021b) *also* highlight some limitations and challenges related to the use of internet data in tourism forecasting. For example, the quality of search engine data,

including the coverage and accuracy of keywords, can affect the performance of tourism forecasting. Additionally, social media data may contain noise or irrelevant information that can affect the accuracy of forecasting models.

4.2. Improving Operational Efficiency

The application of AI has proven to be a valuable tool in improving operational efficiency. The traditional hospitality industry can benefit from intelligent robotics to address challenges in employee quality, human resource management, and language barriers (Yang and Chew 2021). By leveraging AI technologies, businesses can automate routine tasks, optimize resource allocation, and streamline processes, ultimately leading to cost savings, enhanced productivity, and improved overall operational performance. These technologies can perform tasks efficiently and continuously, contributing to productivity gains. Furthermore, they can address the issue of seasonal employment and high turnover rates in the industry. Their adoption also enhances operational and employee efficiency by better planning and improved decision-making. When effectively implemented, they can significantly enhance supply chain efficiency in hospitality firms, with technologies like the Internet of Things fostering smarter and more streamlined processes, promoting increased integration with suppliers, and facilitating collaborations that make the supply chain smoother and more efficient (Osei et al. 2020).

(Yang and Chew 2021) highlights the leadership of Germany, the United States, and China in robotics research, particularly in engineering and computer science, and proposes a taxonomy of service robots in the hospitality industry, including hotel and restaurant robots, mobile navigation, information robots, marketing robots, entertainment robots, and library robots. The utilization of robots as museum guides, waiters, luggage-storage staff, delivery robots (Ivanov et al. 2019), receptionists, concierges, butlers, and in-room assistants, as well the deployment of robots as bartenders, have become prominent applications of AI in the tourism industry (Cain et al. 2019). Ye et al. (2022) found that among hospitality and tourism consumers, non-humanoid service robots were more acceptable than humanoid robots, and consumers preferred moderated humanoid robots such as machine-like or animal-like robots. However, robots with human-like features such as voice and language style were perceived to have more positive service consequences. Additionally, anthropomorphism influenced consumers' expectations, with anthropomorphizing robot servers receiving higher expectations.

IoT hotel applications use wireless controllers and sensors to detect the usage of customer rooms and adjust the control systems of air conditioning and lighting in the room according to the actual needs, so as to maximize the rational allocation of energy usage and achieve energy savings and cost reduction. The use of IoT devices can facilitate cost control of energy, labor, and management in the hotel business process, with savings of up to 25–80% (Chen et al. 2022a).

Otherwise, the primary challenge faced by hospitality firms in adopting these technologies is the substantial financial costs, which include acquisition, installation, maintenance, software updates, adaptations to premises for robot mobility, hiring specialists, and staff training, though these costs may be partially mitigated by the potential for renting or leasing robots instead of purchasing them outright (Osei et al. 2020).

4.3. Enhancing Customer Experiences

The integration of AI has emerged as a significant approach to enhance customer experiences in various industries, including the hospitality sector. By leveraging AI technologies, businesses can personalize interactions, provide tailored recommendations, and optimize service delivery to meet the evolving needs and preferences of today's consumers.

According to Elkhwesky et al. (2022), AI demonstrates considerable promise in augmenting customer experiences. To achieve this, the implementation of customized recommendations and suggestions encompasses the integration of cloud robotics and robotic navigation, as stated by Cain et al. (2019). Service engagements enhanced by AI-integrated media offer

valuable information, evoke emotional responses in customers, elevate customers' perception of knowledge value, and ultimately contribute to customer satisfaction, loyalty, and positive recommendations (Li et al. 2021a). For example, the use of IoT platforms can remember guests' specific comfort preferences, such as temperature, lighting, and TV channels, and automatically set the room for the next stay (Chen et al. 2022a).

Social media emerges as a crucial marketing tool for small and medium-sized enterprises (SMEs) in the hospitality industry to effectively address the ever-changing and sophisticated demands of contemporary consumers. Big data, primarily from user-generated content like online reviews, is increasingly used to investigate visitor attitudes, satisfaction, and preferences in the travel industry, potentially reducing biases inherent in traditional survey research. Analytical tools can systematically evaluate influencing factors such as hotel attributes and service quality, with studies revealing that satisfaction is determined by both tangible and intangible factors, and that cultural differences significantly impact evaluations of hospitality and tourism services (Lv et al. 2022). Moreover, AI facilitates trust-based recommendations in the tourism industry by utilizing the concept of directly and indirectly trusted peers, enhancing the convenience and reliability of personalized suggestions (Samara et al. 2020).

Personalized responses to customer inquiries also have big potential. Some examples are AI-powered chatbots and virtual assistants like small, multi-lingual robots answering questions at Tokyo airport and hotel check-ins (Cain et al. 2019), or virtual multi-lingual personal cruise assistants (Chi et al. 2020). By 2025, it is expected that 85% of customers will interact with companies without human involvement (Doborjeh et al. 2022). CRM built on big data and AI empowers chatbots to know travelers better than any staff and to offer them personalized travel services (Leung 2020). Transfer learning can also be used to make personalized recommendations. Transfer learning in deep learning involves utilizing a pre-trained model as a starting point for a new task. In the context of exploring tourists' urban image with geotagged photos, transfer learning enables training a deep learning model on a large dataset of images and fine-tuning it on a smaller dataset specific to a tourist destination, leading to improved accuracy and efficiency in providing personalized recommendations and suggestions to tourists (Essien and Chukwukelu 2022).

AI technologies can help tourism companies target customers with personalized marketing messages based on their preferences and past behavior. For example, AI algorithms can analyze customer data to identify customers who are most likely to be interested in a particular travel package or destination and target them with personalized marketing messages (Giotis and Papadionysiou 2022).

Al-Nafjan et al. (2023) provide an in-depth examination of "neuro-tourism", an innovative approach that utilizes neuroscience to enhance the tourism industry's marketing strategies by understanding tourists' conscious and unconscious brain activities. Furthermore, it explores the application of various neuromarketing techniques, such as brain-computer interface, eye-tracking, and galvanic skin response, which provide real-time data, offering a comprehensive understanding of tourists' experiences and emotions.

The utilization of Virtual Reality (VR) significantly amplifies tourists' service experiences through the creation of a simulated environment that engulfs them, allowing for a heightened level of immersion. Certain hotels offer VR experiences that enable customers to visually acquaint themselves with the hotel's environment and facilities. This allows customers to select their preferred guestrooms and expedite the check-in process, reducing the need for extensive interactions with frontline staff and minimizing potential social exposure risks (Li et al. 2021a). Das et al. (2021) show how AI can offer substitutes for travel experiences through augmented reality by creating virtual experiences that simulate real-life travel experiences. For example, AI-powered virtual tours of popular tourist destinations can provide users with an immersive experience that closely resembles an actual visit. It enhances visitor experiences at cultural heritage sites by providing immersive and interactive experiences too (Loureiro et al. 2022). These technologies offer the possibility of a "contactless journey" in the future, with facial recognition technology (Das et al. 2021).

Robots' contactless services refer to the use of robots in the hospitality industry to provide services to guests without any physical contact. This is particularly important after the COVID-19 pandemic, where social distancing and minimizing physical contact were crucial to prevent the spread of the virus. Examples of robots' contactless services include self-check-in and check-out facilities, face recognition systems, cleaning robots, and digital key services (Gaur et al. 2021).

Furthermore, there is a shift towards developing customer-centric chatbot platforms that can understand customer behavior, emotions, and intentions, known as emotion-related chatbots (Doborjeh et al. 2022). AI-powered devices can enhance customer experiences through stress management, emotional intelligence, and virtual personal assistants. Interactive bellboy robots and facial recognition technology are examples of AI-powered devices that can improve customer service in the hospitality industry (Chi et al. 2020). Cain et al. (2019) emphasize the importance of human skills in conjunction with technology to create a personalized and enjoyable experience for customers. They also note that understanding how customers will accept and engage with robots and AI is vital for their adoption and success.

Leung (2020) suggests that traveler co-creation will play a significant role in shaping the future of tourism service delivery. This means that travelers will have more opportunities to participate in the design and delivery of travel services, which will make their travel experience more engaging and memorable. On the other hand, customers' reluctance to use new technologies can pose a challenge for tourism firms, as they may prefer human-delivered services, be intimidated or afraid of the technology, perceive high-tech service as inferior, or be less willing to pay for such services, all of which could ultimately lead to the failure of the implemented technology (Osei et al. 2020).

4.4. Sustainability

The incorporation of AI in the tourism sector has the potential to significantly contribute to sustainable practices and environmental conservation. AI-powered systems can optimize resource allocation, minimize energy consumption, and enhance waste management, thereby promoting sustainable tourism initiatives and reducing the industry's ecological footprint. AI can also aid businesses in becoming more sustainable by enhancing services and improving health and safety measures (Gaur et al. 2021).

Utilizing multiple sources of big data for analysis, studies have also leveraged official data from governments and national and international bodies to examine environmental performance of hospitality operations, finding that greater corporate social responsibility involvement can result in higher environmental performance (Lv et al. 2022).

An aspect of tourism that supports socio-economic, socio-cultural, and socio-political development without harming the environment is ecotourism. Big data is utilized in ecotourism to understand visitor patterns, attractions, and impacts on natural resources. Techniques include social big data analysis, spatial modelling in GIS, and the use of user-contributed geo-referenced photographs. These have been applied to help ensure sustainable use of tourism resources, identify conservation areas, and develop smart tourism strategies (Rahmadian et al. 2022).

The utilization of technology not only presents a wide range of practical advantages but also demonstrates its potential for yielding significant environmental benefits. By obviating the need for traditional printed materials such as brochures and posters, it can reduce paper consumption, minimize waste generation, and contribute to overall sustainability efforts (Giotis and Papadionysiou 2022).

The rise of AI, VR, and AR technologies can help prevent damage to cultural heritage sites by providing virtual experiences. AI with data mining can predict tourist flow and assist in reorganizing it to aid in cultural heritage preservation (Loureiro et al. 2022). In a similar vein, drones may be used to provide live virtual tours of open-space tourist locations, a concept that would be an eco-friendly innovation (Elkhwesky et al. 2022).

The integration of artificial intelligence tools and the Internet of Things, alongside the collection, distribution, and transformation of data in the tourism value chain, provides the

necessary infrastructure to support the concept of smart tourism ecosystems (Tussyadiah 2020). Smart tourism is a burgeoning concept that integrates advanced technology applications, such as sensors, big data processing, open data, open APIs, and multi-device connectivity (including IoT, RFID, and NFC) in the tourism industry. It aims to intelligently collect, store, process, and utilize large amounts of data to inform business innovation, operations, and services. Smart tourism plays a key role in sustainable tourism, enabling services like AI-supported integrated tourism, non-invasive indoor location-aware architectures, smart beach visit planning, and smart cultural tourism services, among others. All of these are designed with the goal of improving visitor experiences and promoting sustainable practices (Rahmadian et al. 2022). AI-powered chatbots and virtual assistants can further promote responsible tourism practices by encouraging tourists to make informed decisions about their travel and activities (Kirtil and Askun 2021).

With the increase in unrestricted access at airports providing luxurious lifestyle retail options, there is a need to advance studies on how artificial intelligence will shape airport cities. The drivers of airport cities include land availability, transport networks, accommodation facilities, commercial and recreational activities, and are essential for the sustainability of the sector (Ndaguba et al. 2022).

5. Conclusions and Future Research

By leveraging AI's capabilities, businesses can deliver personalized services, optimize operations, and contribute to sustainable practices. AI-powered chatbots and virtual assistants can provide instant and personalized responses to customer inquiries, improving customer satisfaction and reducing response times. Machine learning algorithms can analyze vast amounts of data, such as customer preferences and behavior, to offer tailored recommendations and suggestions for travel itineraries, accommodations, and activities. AI can also optimize operational efficiency by analyzing historical data on booking patterns, occupancy rates, and pricing trends, providing revenue management insights, and streamlining back-end operations such as inventory management and supply chain logistics. Additionally, AI algorithms can analyze data on energy consumption, waste management, and environmental impact to identify areas for improvement and support the implementation of sustainable practices in the tourism industry.

Through the synthesis of systematic reviews, key findings were summarized, areas of AI application were identified, and their potential implications were highlighted. However, this study does have some limitations. The inclusion of systematic reviews published between 2019 and 2023 restricts the temporal coverage of the analyzed research, a choice adopted given the rapid pace at which technology evolves. Additionally, the search was limited to studies published in English, which potentially excludes relevant research in other languages. Furthermore, the complexity and difficulty of implementing AI methods can hinder their widespread adoption in the tourism sector.

In drawing our conclusions, we align our findings with the initial objectives set out at the beginning of this study. This systematic review has synthesized existing literature on AI applications in the tourism industry, providing a comprehensive understanding of the current state of this field. The key themes, strengths, and limitations identified in our review serve as significant theoretical contributions, enriching the academic understanding of AI's role and impact in the tourism sector. Our findings further indicate potential areas for future research, advocating for more focused studies on effective, responsible, and sustainable AI use in tourism.

From a practical perspective, this review offers valuable insights for industry professionals and policymakers. The identified themes can guide the implementation of AI solutions in tourism, informing strategies and decision-making processes. Moreover, the highlighted strengths and limitations of AI applications can serve as a roadmap for practitioners, aiding them in leveraging AI's benefits while mitigating its potential risks.

Therefore, the conclusions of this study not only fulfill our initial objectives, but also contribute valuable theoretical knowledge and practical guidance for the future development of AI in the tourism industry.

This study, providing an overview of reviews on the application of artificial intelligence (AI) in the tourism industry, bears several implications for academic research in this field. First, by summarizing and evaluating existing literature, we identified recurring themes, strengths, and limitations of AI applications in tourism. These findings can guide researchers in pinpointing areas where further research is needed and formulating more effective research questions. Second, our work offers deeper insight into how AI can be effectively applied within the tourism industry. Lastly, our study underscores the need for responsible and sustainable use of AI in tourism, which can be an area of interest for researchers seeking to explore the intersection of technology and sustainability in tourism.

Based on the results and identified limitations of the study, several areas for future research in the application of artificial intelligence in the tourism industry can be suggested. Firstly, there is a need to investigate approaches that address challenges related to the interpretation and explanation of AI model results. As AI models often involve complex mathematical algorithms, making the results more understandable and reliable for non-experts is crucial. This could involve developing methods or tools that provide clearer explanations of the underlying processes and decision-making of AI models, allowing stakeholders to trust and comprehend the outputs.

Secondly, overcoming financial and technical barriers to the widespread adoption of AI in the tourism industry is an important area for further exploration. The implementation of AI technologies may require significant financial resources, including costs associated with acquisition, installation, maintenance, software updates, and staff training. Finding ways to mitigate these costs, such as exploring collaborative models for sharing AI resources or identifying cost-effective AI solutions, could promote broader accessibility and utilization of AI in the tourism sector. Additionally, addressing technical challenges and ensuring the availability of necessary computational resources and expertise are crucial for successful AI implementation.

Furthermore, exploring new AI applications to improve sustainability and customer experience in tourism is an area that holds promise for future research. While the study identified examples of AI's contribution to sustainability efforts, such as optimizing resource allocation and enhancing waste management, there is still much to explore in this domain. Investigating how AI can further support sustainable tourism practices, such as reducing carbon emissions, promoting responsible tourism behavior, and enhancing conservation efforts, can contribute to the industry's long-term environmental goals.

Similarly, there is room for further investigation into how AI can enhance customer experiences in the tourism sector. While the study highlighted various AI-powered technologies and their impact on personalization and service delivery, there are opportunities to delve deeper into specific applications and their effectiveness. Exploring the potential of emerging technologies, such as natural language processing, sentiment analysis, and emotion recognition, in tailoring customer experiences and improving satisfaction levels could lead to significant advancements in this area.

Appendix A

Table A1. Documents included in qualitative synthesis.

Year	1st Author	Title	Journal	Keywords
(2023)	Al-Nafjan, A	Systematic Review and Future Direction of Neuro-Tourism Research	Brain sciences	artificial intelligence; attention; brain; brain-computer interface; electroencephalography; eye-tracking; neuro-tourism; neuromarketing; neuroscience; tourist emotion
(2019)	Cain, LN	From sci-fi to sci-fact: the state of robotics and AI in the hospitality industry	Journal of hospitality and tourism technology	animacy; artificial intelligence (ai); challenges; future; hospitality technology; intelligence; literature review; management; quality; robotics; service; special issue; technology; tourism
(2022)	Chen, MY	Overviews of Internet of Things Applications in China's Hospitality Industry	Processes	cost reduction; efficiency; Internet of Things (IoT); smart hotels
(2022)	Chen, YL	Big Data and Predictive Analytics for Business Intelligence: A Bibliographic Study (2000–2021)	Forecasting	bibliographic study; big data; business intelligence; CiteSpace; data science; predictive analytics; strategic value; trends
(2020)	Chi, OH	Artificially intelligent device use in service delivery: a systematic review, synthesis, and research agenda	Journal of Hospitality Marketing & Management	acceptance; adoption; artificial intelligence; attitudes; behavior; consumers; experiences; framework; healthcare; hospitality; hospitality; intentions; interaction; review; service; social robots
(2021)	Das, G	Pandemics and marketing: insights, impacts, and research opportunities	Journal of the Academy of Marketing Science	7p model; artificial intelligence; disease; frugal; industry sectors; less; macro-level forces; marketing implications; outcomes; pandemics; performance; price; research opportunities; resource scarcity; strategy; uncertainty
(2022)	Doborjeh, Z	Artificial intelligence: a systematic review of methods and applications in hospitality and tourism	International Journal of Contemporary Hospitality Management	ai algorithms; ai applications; ai methods; algorithms; applications; artificial intelligence; augmented reality; demand; future studies; future studies-in-tourism; hospitality; machine; model; prediction; spiking neural-networks; tourism; tourism; travel
(2022)	Elkhwesky, Z	Driving hospitality and tourism to foster sustainable innovation: A systematic review of COVID-19-related studies and practical implications in the digital era	Tourism and Hospitality Research	COVID-19 pandemic; digital technology; hospitality; hotels; performance; sustainability; sustainable development; sustainable innovation; tourism; trends

Table A1. *Cont.*

Year	1st Author	Title	Journal	Keywords
(2022)	Essien, A	Deep learning in hospitality and tourism: a research framework agenda for future research	International Journal of Contemporary Hospitality Management	artificial intelligence; big data; deep learning; hospitality management; information; internet; machine learning; neural network; progress; representations; sentiment analysis; smart tourism; systematic literature review (slr); tourism management; tourism research; trends
(2021)	Gaur, L	Role of artificial intelligence and robotics to foster the touchless travel during a pandemic: a review and research agenda	International Journal of Contemporary Hospitality Management	artificial intelligence and robotics; cleanliness and sanitation; COVID-19 pandemic; health care and wellness; hospitality; hotels; innovation; management; service; systems
(2022)	Giotis, G	The Role of Managerial and Technological Innovations in the Tourism Industry: A Review of the Empirical Literature	Sustainability	adoption; business performance; destination; employee creativity; empowering leadership; firms; managerial innovation; mobile technology; organizational innovation; service innovation; social media; sustainable tourism development; technological innovation
(2019)	Ivanov, S	Progress on robotics in hospitality and tourism: a review of the literature	Journal of Hospitality and Tourism Technology	artificial intelligence; education; research agenda; robonomics; robot adoption; robotics; rservice; service robot; servicescape
(2019)	Jiao, EX	Tourism forecasting: A review of methodological developments over the last decade	Tourism Economics	accuracy; algorithm; arrivals; combination; demand; forecasting; internet; new trends; prediction; regression-model; review; time series; tourism demand; volatility
(2021)	Kirtil, IG	Artificial intelligence in tourism: a review and bibliometrics research	Advances in Hospitality and Tourism Research-ahtr	artificial intelligence; bibliometric; co-citation analysis; co-occurrence analysis; collaboration; hospitality; hospitality and tourism; lessons; management; network analysis; patterns; science; search; thematic analysis; travel; trends
(2020)	Leung, XY	Technology-enabled service evolution in tourism: a perspective article	Tourism Review	a-service; e-service; m-service; service evolution; smart experience
(2021)	Li, ML	A systematic review of AI technology-based service encounters: Implications for hospitality and tourism operations	International Journal of Hospitality Management	artificial intelligence (ai); artificial intelligence ai; customer satisfaction; experience; impact; industry; measurement scales; media; moderating role; public health emergency; responses; service encounter; service experience; systematic review; virtual reality

Table A1. *Cont.*

Year	1st Author	Title	Journal	Keywords
(2021)	Li, X	Review of tourism forecasting research with internet data	Tourism Management	arrivals; big data analytics; demand; destinations; google trends; internet data; online reviews; search; search engine; sentiment classification; social media; social media; systematic review; tourism forecasting; volume
(2019)	Liu, H	Hot topics and emerging trends in tourism forecasting research: A scientometric review	Tourism Economics	accuracy; bibliometric analysis; CiteSpace; cocitation; demand; flows; genetic algorithms; international tourism; knowledge mapping; model; regenerative medicine; research frontiers; scientometrics; time-series; tourism forecasting
(2022)	Loureiro, SMC	Culture, heritage looting, and tourism: A text mining review approach	Frontiers in Psychology	context; cultural heritage looting; cultural heritage preservation; destruction; heritage destruction; human rights; property protection; protection of cultural property; public access
(2022)	Lv, H	A look back and a leap forward: a review and synthesis of big data and artificial intelligence literature in hospitality and tourism	Journal of Hospitality Marketing & Management	artificial intelligence; bibliometric analysis; big data; customer satisfaction; data analytics; hospitality; hotel performance; information search; learning model; literature review; online reviews; smart tourism; social media; tourism; tracking data; word-of-mouth
(2022)	Ndaguba, EA	A Systematic Review of a City in a City: An Aerotropolitan Perspective	Land	aerotropolis; built cities; CiteSpace; new urban extension; technology; transit-bound tourism; transitional cities; transportation; urbanisation; urbanization; VOSviewer
(2020)	Osei, BA	Prospects of the fourth industrial revolution for the hospitality industry: a literature review	Journal of Hospitality and Tourism Technology	challenges; context; fourth industrial revolution; future; hospitality; hospitality revolution 4; information; prospects; service; smart tourism; technologies; tourism
(2022)	Rahmadian, E	A systematic literature review on the use of big data for sustainable tourism	Current Issues in Tourism	analytics; artificial intelligence; behavior; big data; Chinese tourists; countries; demand; destination image; flow; Internet of Things; patterns; search; social media; sustainable tourism; systematic literature review
(2020)	Samara, D	Artificial intelligence and big data in tourism: a systematic literature review	Journal of Hospitality and Tourism Technology	architecture; artificial intelligence; attraction recommendation; big data; business value; demand; future; fuzzy time-series; hospitality; information technology; integration; literature review; recent trends; sustainable tourism; tourism

Table A1. *Cont.*

Year	1st Author	Title	Journal	Keywords
(2023)	Soliman, M	Exploring the Major Trends and Emerging Themes of Artificial Intelligence in the Scientific Leading Journals amidst the COVID-19 Era	Big Data and Cognitive Computing	ai leading journals; artificial intelligence (ai); bibliometric analysis; bibliometric analysis; COVID-19; impact; scopus; tourism; visualization
(2019)	Song, HY	A review of research on tourism demand forecasting	Annals of Tourism Research	artificial intelligence model; cointegration analysis; econometric forecasts; econometric model; economic-crisis; forecast combination; inbound tourism; international tourism; judgment forecasts; neural-network model; support vector regression; time series; time-varying parameter; tourism demand; travel demand; united-states
(2023)	Thayyib, PV	State-of-the-Art of Artificial Intelligence and Big Data Analytics Reviews in Five Different Domains: A Bibliometric Summary	Sustainability	ai; artificial intelligence; bibliometric analysis; big data; big data analysis; big data analytics; business models; deep learning; evolution; expert systems; future; fuzzy logic; healthcare; i4; industry 4.0; insights; internet; knowledge; management; neural networks; nlp; robotics
(2020)	Tussyadiah, I	A review of research into automation in tourism: Launching the Annals of Tourism Research Curated Collection on Artificial Intelligence and Robotics in Tourism	Annals of Tourism Research	artificial intelligence; automated tourism; foundations; future; information technology; innovation; intelligent automation; internet; negative attitudes; research agenda; service robot; service robots; sustainability transitions; things; user acceptance
(2021)	Yang, JJ	A Systematic Review for Service Humanoid Robotics Model in Hospitality	International Journal of Social Robotics	artificial intelligence; capabilities; robot in hospitality; service humanoid robotics
(2022)	Ye, HY	A Review of Robotic Applications in Hospitality and Tourism Research	Sustainability	experience; hotel; management; robot; robotic applications; service; state; technology; tourism
(2020)	Yeh, CCR	Labor Displacement in Artificial Intelligence Era: A Systematic Literature Review	Taiwan Journal of East Asian studies	ai; artificial intelligence; automation; computers; employment; future; humans; impact; labor displacement; labor market; robots; technology; work

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