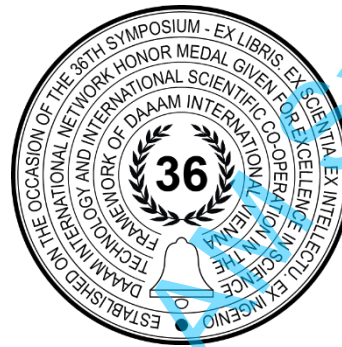


APPLICATION OF ARTIFICIAL INTELLIGENCE IN TOURIST DESTINATION MANAGEMENT

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Abstract

This paper examines the application of Artificial Intelligence (AI) in tourist destination management, with a focus on its potential to enhance operational efficiency, decision-making, and visitor experience. The study analyses key AI tools, including recommendation systems, chatbots, virtual assistants, dynamic pricing, big data analytics, and service robots, supported by illustrative examples such as the humanoid robot Josie Pepper and the smart Hajj bracelet. Findings indicate measurable improvements in tourist satisfaction, loyalty and conversion rates, as well as in resource allocation and sustainability monitoring. AI technologies enable destinations to personalise services, predict demand and mitigate environmental impacts through real-time data processing. However, the paper also highlights potential challenges, including data privacy concerns, algorithmic bias, energy consumption and the digital divide affecting smaller destinations and enterprises. The research concludes that strategic investment in digital infrastructure, staff competencies, ethical standards and pilot implementation is essential to ensure that AI contributes to both sustainable and inclusive tourism development while maintaining the authenticity of local experiences.

Keywords: Artificial Intelligence; Tourism Management; Destination Competitiveness; Visitor Experience; Sustainable Tourism.

1. Introduction

The swift advancement in artificial intelligence (AI) is affecting many sectors, including the tourism industry, and requires transforming operations into higher technology and advanced practices. Thus, the following research question is explored: How does AI influence efficiency, decision-making, and visitor experiences in the management of tourist destinations? As tourism significantly contributes to global GDP and employment, this question is paramount for stakeholders keen to understand how this technological development is impacting the sector. The linkage between AI and tourism management has become increasingly significant. This review examines how AI technologies are transforming the management of tourist destinations by analysing how they can improve efficiency, assist in decision-making, and enhance visitor satisfaction.

AI has become an integral part of tourism management innovations and developments in areas such as machine learning, natural language processing, and robotics. AI applications, such as recommendation systems and big data analytics, facilitate informed decision-making by personalising travel experiences. The humanoid robot, Josie Pepper, at

Munich airport has proven how this technology helps to improve efficiency and visitors' experiences. Also, the smart Hajj bracelet created by Saudi Arabia is another example that enhances services and visitor satisfaction. Furthermore, AI helps develop sustainability objectives, such as monitoring environmental impacts in real-time and tracking carbon emissions. Hence, the effects of AI on tourism should be thoroughly studied and considered.

The research question is addressed through a systematic review of the use of AI technologies to enhance efficiency, inform decision-making, and improve visitor experiences in the management of tourist destinations. Various recent academic works from publishers such as Wiley and Sons, Scopus and Springer that explored current trends, issues and opportunities relating to AI's impact on tourism were analysed. Moreover, the practical implications and findings were examined for various stakeholders, including tourism managers, policymakers, and tourists themselves, to gain a better understanding of how AI supports the goals and aims of the tourism sector.

The study of AI's effect on tourism management employed a systematic review and critical analysis of case studies and empirical evidence, drawing on systematic reviews, analyses of published searches and case studies in the tourism management domain. Approaches involved a comparative analysis of AI effectiveness, a critical evaluation of data sources and a thematic synthesis of findings. Furthermore, some quantitative data were integrated, such as a 30% decrease in congestion from intelligent systems, while qualitative insights, including improved satisfaction due to AI-enabled personalisation, were also reviewed.

The increasing integration of AI in tourism operations is now supported by research and development that has led to numerous applications, including AI-based recommendations, chatbots, virtual assistants, and dynamic pricing. Over the next decade, AI in the tourism market is expected to continue growing and becoming more relevant and widely utilised by the industry as innovations and technologies emerge. Challenges and limitations remain as a topic for discussion and further research.

The impact of AI on tourism is reviewed in the following order:

- Chapter 2: AI-Technologies in Tourism Management, covering AI-based services for destinations;
- Chapter 3: Impact on Operational Management, analysing AI's contribution to the operations of tourism providers and its impact on destinations;
- Chapter 4: Impact on Visitor Experiences, evaluating how AI-based technologies will improve visitors' experiences in destinations;
- Chapter 5: findings, summarising findings and their implications for tourism management.

2. AI Applications in Tourism Management

The introduction of AI in tourism management has significantly enhanced customer service by offering continuous and multilingual assistance to tourists through chatbots and virtual assistants. By promptly addressing customer inquiries, fulfilling reservations, and offering personalised recommendations, the waiting time and overall convenience for customers have been significantly improved. Customer satisfaction has improved as a result, leading to enhanced customer retention (e.g., a 30% increase in customer loyalty following the implementation of a virtual assistant by WestJet). These advancements suggest that AI-led applications and resources are becoming an essential function within the organisation and replacing human roles. In contrast, while AI systems can answer basic inquiries, their understanding of culturally diverse and more complicated customer requests remains an area for development. Customer preferences can be identified by analysing customers' behaviour patterns. Thus, personalised recommendations, such as holiday destinations, accommodations, and activities, are provided to customers to increase the likelihood of making a purchase. Companies like Booking.com and Airbnb are utilising AI-generated personalisation, resulting in significant business outcomes, including a 20% rise in bookings and a 25% increase in conversion rates. [1] The collection of customer information through AI for personalisation may trigger concerns surrounding data security, privacy breaches and misuse.

AI applications also offer real-time feedback from customers to improve service quality. Quick identification of errors allows time for improvements to take place before new customers arrive. By implementing corrective measures in response to customer feedback businesses can improve their quality of service. [2] However, customer interaction cannot be left solely to artificial intelligence, as it may overlook vital aspects of human connection and feedback, aiming to achieve better service quality.

Continuous and reliable customer service applications can handle a high volume of communication and services, thereby benefiting the industry by reducing costs and improving profits. [3] However, it must be noted that someone will need to control these systems and keep them updated with the changing demands of customers in different languages to maintain their use and profitability.

Data analytics are used to enhance marketing. The data and information gathered by AI-based systems include customers' purchase history, online activities, and preferences. This is used to create personalised ads, leading to higher sales and revenue returns. By tracking demand, competitor pricing policies and market trends online travel agencies can enhance their pricing and resource management strategies. For example, the Lighthouse dynamic pricing mechanism enabled automated pricing, resulting in a 20% increase in revenue generation. However, dynamic pricing may be considered exploitative for customers when prices change frequently and are determined algorithmically by the travel agencies.

Machine learning (ML) is being used to analyse customer data and thus forecast emerging travel trends. [4] This allows marketing to be targeted and timely increasing the likelihood of conversion for customers and therefore remaining

competitive in the market. Nevertheless, the effectiveness of forecasting depends on accurate and representative datasets. It may thus not be appropriate in highly disruptive tourism industries due to the risk of overfitting to historical data.

Predictive behaviour algorithms support the efficient distribution of marketing efforts by identifying high-value customer segments and anticipating consumer purchasing decisions. This enables more efficient and targeted campaign planning resulting in higher customer conversion rates. Another tool is sentiment analysis of customer views which involves analysing online reviews and social media posts. Tourism organisations can measure travel experiences and trends through this AI system leading to the modification of customer relationship policies. Nevertheless, the accuracy of predicting marketing trends, as well as determining travel habits, relies on the collection and processing of accurate and up-to-date data.

The use of AI and robots for service delivery introduces new approaches to operational management within the tourism industry. Hotel check-ins, room service, scheduling of housekeeping and other tourism-related tasks can be completed more efficiently and with a lower likelihood of errors. Employees, therefore, may be tasked with providing guest-centric services leading to an elevation of human connection and improved service quality.



Fig. 1. Tourism management infographic [18]

Wang and Karia estimated that within the next 10 years, up to 25% of hotel jobs will be automated. There are discussions surrounding employees losing their jobs, highlighting the need for companies to help them reskill with different skills and knowledge.

AI-based systems operate continuously without requiring downtime, unlike humans. These advancements enable the service of high volumes of tourists and guests. For example, at airports or bigger hotels, there is an increase in global customers and a decrease in waiting time when AI systems are implemented for a wide variety of applications. Problem that can arise with AI-led services is that they become too impersonal and fail to emotionally or mentally connect with the consumer. Humans generally prefer human interaction, leading some consumers to dislike talking to a robot for a more personal connection; therefore, improvements are still necessary for the systems.

89% of organisations in the tourism industry that utilise digital platforms demonstrate the essentiality of their infrastructure. The digital platforms feature integrated applications for tasks such as AI-generated listings, pricing updates, and personalisation. These applications ensure efficiency, resource allocation and control within back-office operations increasing productivity. Moreover, nearly 95% of the companies agree that technology is vital to development within the tourism sector. Although digital platforms enhance efficiency and marketing, ongoing investment is necessary to improve them continually. Cybersecurity is a growing concern for all organisations, as well, with the increasing amount of customer data, systems must be kept up to date with high standards.

AI platforms connect partners within the tourism industry, often including hotels, restaurant owners, and destination management organisations (DMOs). [5] This enhances communication between stakeholders leading to increased

efficiency in delivering services. Data privacy and digital connectivity can lead to increased exposure and risk including hacking and the theft of sensitive information. Cybersecurity is a concern for all organisations and companies that use digital platforms as part of their operations and thus must be emphasised during the initial stages.

The global market for AI in tourism is estimated to increase from USD 487.7 million to USD 9.8 billion from 2023-2033, growing at a compound annual growth rate (CAGR) of 35%. This statistic illustrates the increase in interest for AI in tourism, with more organizations and companies using it to create competitive advantage and thus improve operation efficiency and customer service. More companies should also strengthen their use of AI in personalisation, as most companies are currently only utilising AI on basic systems, such as personalised recommendation engines. More opportunities are found in tourism business models to be innovated, such as incorporating AI, to include real-time experiences and the ability for customers to ask an AI system to create personalised trip itineraries. [6] The ethical debates about AI, as discussed previously, need to be considered in future AI implementations for tourism. This includes data ownership and algorithmic accountability.

In summary, the use of AI in tourism management enables businesses to deliver better customer service and enhance their operational systems. It plays a significant role in customer engagement, effective marketing, and service improvements. However, it should be used and modified accordingly to achieve better benefits while ensuring that ethical concerns are addressed.

3. Impact on Tourist Destinations Operations

AI-driven systems optimise traffic and crowd management at tourist destinations by analysing real-time data from surveillance cameras, mobile applications, and GPS trackers. For instance, Hangzhou's "City Brain" system has reduced congestion rates in the West Lake region by 30%. This contributes to a higher level of visitor satisfaction and improves the overall flow of traffic within the city. The AI system accurately predicts peak hours and identifies anomalous trends, prompting timely interventions such as rerouting traffic and reallocating resources to optimise efficiency. Although AI advances efficiency, it is necessary to establish governance policies that address the ethical considerations of privacy. AI helps to coordinate tourism-related activities with transport providers, emergency services and other authorities by using algorithms to predict and act upon data. This improves safety as responses become evidence-based and quicker. [7] Nonetheless, data policies and practices that respect the privacy and consent of travellers are imperative to maintain long-term visitor assurance.

The application of AI has made tourism practices 128% more efficient than traditional methods. It enables resource management through real-time logistics and demand forecasting. Prediction models of visitor patterns allow maintenance schedules to align with needs, thereby decreasing costs. Nonetheless, the systems require continuous modification of algorithmic models and learning new information to accommodate operational shifts. Artificial intelligence has generated approximately \$ 400 billion for the global tourism market. It correlates with tourism GDP contribution (correlation coefficient = 0.750, p-value = 1.55E-05) and provides economic value if included in national development strategies. However, technology-poor countries may face exclusion if international investment in AI applications is not prioritised. [8] Through real-time environmental monitoring AI can alert destination managers to contamination or the exploitation of ecological resources. This information enables the conservation of biodiversity. AI-implemented systems provide sustainability support at tourist sites, improving environmental credibility. Moreover, carbon tracking applications allow the calculation of individualised carbon emissions for visitors, providing transparency into CO₂ impact and facilitating the optimisation of travel behaviour. The usefulness of the information, however, depends on the accuracy of the environmental data and widespread behavioural changes among travel stakeholders. Artificial intelligence supports adaptive management in the natural environment. AI-implemented surveillance enables the prompt response to harmful or illegal actions in protected areas. Additionally, data-based risk mitigation measures are now used in reserve management and national park oversight. Despite the public benefits, these actions raise concerns about privacy in the context of surveillance. It is necessary to highlight the positive results of AI usage as it continues to monitor and make predictions of the state of our environment. There is a surge in consumer demand for ethical and sustainable tourism. It is therefore necessary for operators to incorporate AI-driven technologies into their efforts to meet the expectations of a market segment that prioritises environmental concerns.

Artificial intelligence can address the problems of oversaturated destinations, as seen in the Denmark pilot project of deep learning. This study utilises AI to predict where tourists are heading and then directs them to less crowded locations using digital signage, promotional platforms, and incentives. In doing so, it not only improves flow in overcrowded areas but also diversifies tourism to previously neglected areas, thereby spreading economic benefits.

Operational cost savings can be achieved with automated AI concierge services. These services can address customer requests via chat and send delivery services where required. Furthermore, AI can customise travel recommendations. These services can often deliver better service than a concierge, but depersonalization is an area that must be addressed through emotionally intelligent design.

Establishing objectives of AI use and performance benchmarks is the digital foundation for effective decision-making. As part of digital transformation, tourism entities can comprehensively measure and optimise outcomes, such as visitor satisfaction. Also, AI can be applied on a pilot project basis, but iterative testing must be conducted to calibrate the optimal AI to cater to unique operational characteristics.

Despite the numerous positive aspects of AI applications within the industry, some tourism sectors are more advanced

than others in terms of integration. Data from the OECD indicate that, by 2023, 11% of travel agencies and tour operators, as well as 4% of accommodation and food service activities, had adopted at least one AI technology. The digital divide presents barriers, including high initial capital costs, a lack of digital literacy, and limited infrastructure, which can hinder the growth of small to medium-sized enterprises (SMEs). To bridge this divide policymakers must focus on democratising AI to ensure its effective use by the broader sector and avoid productivity gaps.

AI adoption is accompanied by an increasingly large electricity demand with some studies predicting a doubling of data centre energy consumption by 2026. [9] The balance between improved productivity through digital applications and climate-related negative impacts is the key challenge in the ongoing digitalisation transformation. As the sector expands its efforts, AI-based solutions, energy-efficient algorithms, and data centre design must be further explored and researched for sustainable digitalisation strategies.

In a survey conducted in Egypt, the adoption of AI applications among tourists reached over 75%. When the results are applied in linear regression, the analysis highlights a significant influence of AI applications on overall service quality and assurance. [10] To maximise positive visitor assurance outcomes, tourists need to have prior experience and trust in these technologies, as well as have appropriate training on application functions.

The global market size for AI in sustainable tourism is expected to increase from USD 17.7 billion in 2022 to USD 54.5 billion by 2030. With better destination management, an integrated technology-based ecosystem, and tailored services and recommendations, destinations will be able to cater to a global market and create revenue. With data-driven analysis, destinations will be able to enhance efficiency in multiple aspects of operations while also satisfying customer preferences. This, in turn, will strengthen the relationships and bonds with the visitors, ensuring long-term loyalty and support. Proper establishment and recognition of data ownership and control are essential when introducing digital transformation. The appropriate establishment and recognition of data ownership and control are crucial when introducing digital transformation.

The 2025 Mahakumbh festival in India is expected to attract approximately 40 million visitors. It is imperative to monitor the crowds that will be moving throughout the festival areas, as density can be challenging to oversee. The application of AI surveillance, such as monitoring and mapping crowds, enables security control, monitoring and analysis during dynamic conditions. [11] Facial recognition enables faster detection and action on missing person reports, and predictive analyses using AI help facilitate real-time adjustments to facilities and operations.

4. Enhancing Visitors' Experience

The employment of AI technology enhances the visitor experience in tourism by providing highly personalised recommendations and services tailored to visitors' demographics and preferences. For example, using AI-powered recommendation tools, Booking.com and Airbnb have increased bookings by up to 20% and conversion rates by 25%. Ethical considerations must be addressed to make AI technologies more reliable, improve visitors' data privacy and prevent data bias.

The implementation of AI-powered recommendation tools has been found to influence customers' consumption by 30% significantly. [12] Marketing strategies, such as cross-selling and product bundling can be utilised in these tools to attract customers. Implementing AI technologies for product and service promotion can benefit both, destination marketers and destination operators. However, the implementation of AI in marketing must be handled with caution and transparency, as the over-personalisation of recommendations or the excessive promotion of products may make customers uncomfortable or feel pressured into purchasing unnecessary services.

The adaptability of AI-powered personalisation mechanisms which employ machine learning algorithms ensures the relevance of all recommendations based on visitor preference history, travel context, and behavioural patterns. The implementation of AI-enabled personalisation mechanisms enables catering to individual visitors' demands, thereby enhancing the appeal of destinations. Machine learning technology can be trained and adapted to travel preferences and behavioural data collected from visitors. The training dataset can consist of historical traveller information and past transaction information. However, data and machine learning models can become rigid with the accumulation of traveller information, making them inadequate for coping with emerging travel trends. Thus, there are certain shortcomings in the use of machine learning models for personalisation.

The ability of travel agencies and destination marketers to recommend individualised services attracts more customers, strengthens their brand, increases customer loyalty and leads to repeat purchases. Ultimately, travel agencies with higher satisfaction scores tend to gain a larger market share than those with lower scores. [13] AI-based personalisation mechanisms cater to customers' preferences exclusively. Thus, specific experiences that do not cater to their interests may never be recommended to them, hindering their possibilities to try something new.

Service robots and virtual assistants enhance service quality for tourists by addressing a range of visitor needs and providing them with convenience through multilingual services, real-time assistance, and prompt responses, thereby reducing service wait times and minimising language miscommunication. At Munich Airport, for example, the "Josie Pepper" robot guides passengers in various languages to the check-in gates and answers questions related to the airport. However, they cannot act out emotions, nor can they understand visitors' feelings; they are incapable of making decisions in various cases, which may result in certain limitations when it comes to coping with multiple events of the visitors.

Humanoid robots in Swiss restaurants have demonstrated their capability in operational efficiency by being used to serve food and perform repetitive tasks. They can handle complex tasks, communicate with guests, and process complex

transactions quickly and accurately allowing restaurant staff to be reassigned to tasks that require creativity and innovation. Humanoid robots can also work long hours without fatigue, and they do not require additional space like other service robots. However, humanoid robots in restaurants also carry many drawbacks. They can sometimes be limited when interacting with individuals of different ages, with disabilities and with special requests. The presence of these robots may also make employees' work more competitive and stressful.

Virtual assistants are widely used for 24/7 customer support, language translation, and booking management to improve visitor convenience and ensure tourism inclusivity. [14] This has helped in increasing tourists' travel satisfaction. However, the effective use of virtual assistants in tourism greatly depends on robust natural language processing, as they need to be capable of communicating effectively in a variety of languages and must understand nuances to ensure that virtual assistants provide comprehensive and contextually accurate guidance for tourists worldwide.

AI-driven AR experiences in museums and other tourist sites significantly enhance visitor immersion, engagement, emotional arousal, knowledge transfer, and recall, ultimately impacting visitor stay length and return rates. In general, approximately 78.9% of the variance in visitor engagement scores is attributed to AI-driven AR features. Thus, the use of AI in delivering AR experiences can potentially contribute to cultural sustainability and support local economies. However, immersive technologies need to be balanced in their implementation to ensure they enhance visitors' experiences at museums and sites, rather than diverting them from the traditional and authentic culture. Generally, higher personalisation enhances visitor knowledge acquisition. Visitor engagement scores increased when the level of personalisation of the AR experience was increased. The diversity of input data must be considered to prevent alienation or marginalisation of specific groups. Additionally, AR experiences must provide value and benefits to all visitors, regardless of their preferences for immersive content.



Fig. 2. Tour planning with tickets on smartphone screen [19]

The use of AI in enhancing immersive experiences can minimise the difference between the accessible and non-accessible visits for people from varied backgrounds. AI applications, such as AR or AI-driven personalisation mechanisms significantly improve overall visitor satisfaction scores for all visitor demographics. However, despite the effectiveness and potential advantages, not all destinations or museums can afford to invest in this technology and provide it at a reasonable price. In general, AI-driven immersive experiences can be utilised to enhance visitor retention and repeat visits by encouraging greater emotional connection and knowledge transfer. The longer length of stay can, in turn, boost

the local economy, thereby contributing to the community's economic development. [15] These advances have led to a new level of effectiveness in visitor retention, ultimately contributing to the increased competitiveness of destinations. However, it is also crucial to remain aware of which values should be preserved, and which elements need to be replaced with AI enhancements.

In smart hotels, AI technology is utilised to manage operational costs and environmental impacts, resulting in savings of up to 40% in labour costs and approximately 22% in energy. This aligns with sustainability goals, making smart hotels an ideal alternative for environmentally conscious and economically minded visitors, and is a significant factor in sustainable hospitality development. However, despite the promising advantages of implementing AI in hospitality, the initial investment in smart hotel infrastructure may pose substantial financial burdens, thereby limiting the feasibility for smaller hotels.

The technology of AI enables hotel operators to personalise guest rooms for individual travellers. Today, over 75% of hotels utilise online booking platforms, automated check-in systems and personalised preference mechanisms. Surveyed visitors with experience in smart hotels reported positive reviews and higher satisfaction scores compared to those without experience. [16] Thus, there are apparent advantages in employing AI applications that can be further improved through continued implementation and improvement. These smart hotels can provide much more accurate, personalised services for each customer by obtaining and memorising their preferences and can make real-time adjustments.

Increasing consumer demand for sustainability is prompting hoteliers to adopt AI-enabled systems. Thus, by implementing such technologies, smart hotels are meeting the expectations of growing traveller demand for sustainable options. With the implementation of green technologies, sustainable hospitality has undergone extensive development. Therefore, it can be inferred that consumers prefer AI technologies at hotels due to the implementation of green practices. These advancements lead not only to improved hospitality sustainability but also to increased brand loyalty. However, it is also worth noting that the implementation of certain AI practices can increase overall hotel electricity use. *Moreover, evidence from the DAAAM community indicates that explainable AI (XAI) enhances transparency and user trust in AI-enabled service systems, which is highly relevant for intelligent hotel assistants and service robots.* [17]

The recommendations generated by AI can be personalised to offer equal opportunities to visitors, taking into consideration factors such as accessibility and the user's language or cultural interests. Recommendations that are more accurate and helpful can be offered to a more diverse range of visitors with the implementation of newly developed visitor preference classification mechanisms. A structured framework should be incorporated into AI recommendation tools to filter out redundancies and inconsistencies, thereby increasing the accuracy of personalised recommendations and avoiding the potential exclusion of visitors from underrepresented demographic groups.

AI can also provide various real-time assistance tools that contribute to the safety, convenience and general visitor satisfaction levels. One such example of an AI-powered device for real-time visitor safety is the smart Hajj bracelet. The wearable tracking device enables the quick identification of distressed visitors based on their GPS location and medical or contact information stored within the device, thereby enhancing their safety and improving overall trip quality. The safety advantages also allow visitors to experience less stress during their trip and promote recommendations for visits from relatives and friends. However, this also raises concerns about privacy issues that need to be resolved and minimised to prevent any unintended data utilisation, as this will significantly impact the trustworthiness of tourism services to potential new customers.

The application of AI-enabled chatbots and tour guides not only enhances satisfaction for individual tourists but also helps make destinations more competitive overall, for instance, by improving the level of safety and fun tourists can expect to experience on tours and during activities. AI chatbots may be incorporated to cater to tourism services by delivering tourism information. AI tour guides and AI tour companions can increase visitor satisfaction by more than 30% compared to human tour guides. However, AI chatbots and tour guides may lack storytelling which can be crucial in allowing tourists to build a connection between the AI and the destination they are visiting.

In conclusion, AI technologies, such as those used in recommendation systems, immersive experiences and sustainable accommodations, help enhance the overall visitor experience in various ways. Addressing any ethical, operational and inclusivity challenges associated with its implementation enables the maximisation of AI technology's impact on improving tourism. These advances lead to new dimensions for global tourism management, which will be further discussed in the next chapter on concluding perspectives.

5. Conclusion

This scientific review aims to analyse the transformation of artificial intelligence in contemporary tourism destination management. The research aimed to investigate how AI has transformed operational processes and informed data-driven decisions. It also examined the ethical and practical implications for tourism stakeholders. By reviewing a variety of scholarly articles this research attempted to illustrate the opportunities and challenges of AI in the sector. The research questions centred on how AI enhances efficiency, decision-making and visitor satisfaction.

Through analysis, this research demonstrates that AI has significantly transformed the tourism industry in several key areas. Regarding operations, automation and data analysis have improved efficiency, scalability, and consistency. Customer service channels powered by AI offer continuous multilingual support to tourists. In marketing and resource

management, machine learning enables dynamic pricing strategies and customised advertising leading to increased bookings and higher conversion rates. In visitor experience, AI-based recommendations improve the experience for diverse visitor demographics. Additionally, robot automation in service delivery enables staff to provide more personalised care to visitors. Finally, in destination operations, AI has enabled proactive traffic and crowd control, as well as real-time monitoring in emergencies. These elements support the position that digital transformation powered by AI is increasingly essential for competitiveness.

This scientific review suggests that the research objective has been successfully achieved. By addressing all the research questions, the synthesis indicates that AI can enhance various aspects of tourism ranging from operational management to marketing strategy. Research cited in this report demonstrates how data collection and the automation of marketing campaigns have contributed to higher revenue conversions and enhanced operational efficiency. AI-enabled improvements to operations and visitor experience are highlighted with several examples.

The synthesis conducted in this study has also helped clarify the position and relationship of this analysis within the broader scholarly and industry conversation. Several existing studies support the value of adopting AI-based technology across various sectors including tourism. They assert that these tools enhance efficiency, effectiveness and sustainability for stakeholders who embrace this shift. This research reinforces those themes while providing additional insight. This scientific review can provide a deeper understanding of the opportunities, ethical challenges and technical requirements necessary for implementing digital transformation. It can also encourage further exploration into the complex relationship between visitor behaviour and the automation of tourism practices.

With these results in mind, there are, of course, some limitations regarding the interpretation and application of the findings of this study that must be clarified. First, as a literature-based scientific review, this report relies exclusively on secondary sources to compile insights into the subject matter. As such, any conclusions or suggestions drawn by the author are based solely upon what others have studied and published. In addition, publication bias is a relevant topic to consider in this evaluation. This effect arises as publishers tend to accept only papers that display significant results. The authors may often exaggerate their findings, thereby risking overinterpretation of their data. Another limitation of this study lies in the rapid transformation and evolution of technology. The results of this review may already be obsolete within a few years. Moreover, the implementation of these technologies varies between markets. This makes it nearly impossible to apply the findings of case studies to broader trends or sector analyses.

Further research can support a greater understanding of these complex issues by undertaking primary empirical analyses. Such studies can involve the collection of long-term, cross-sectional data. This will clarify the effect of AI implementation on workforce development. This could be pursued by examining how training in these skills encourages economic opportunity or by exploring best practices for increasing the representation of women in AI-related positions. Further empirical work can focus on the social and behavioural impacts of AI in service encounters with clients, the impact of robot staff on customer experiences, and the impact of real-time visitor data feedback collection on improving tourism-based services. More research can also analyse the implications of AI technology for the sustainable development of the tourism industry.

Based on the conclusions presented in this study, we recommend that policymakers and sector leaders invest in digital infrastructure upgrades, provide training for existing employees on how to use these technologies, develop clear regulatory frameworks that allow for future flexibility, and establish incentive programs for the industry. These actions can support a more profitable, sustainable and ethically responsible tourism industry that maximises stakeholder benefit.

In conclusion, the authors reflect on the core motivation for this research study: To explore the intricate relationship between the complex service systems of tourism and the transformative power of technological innovation. To achieve this, this scientific review has incorporated multiple viewpoints, perspectives, and evidence-based insights to gain a deeper understanding of the complex phenomenon of digitalisation and its connection to the tourism sector. The findings offer direction for future sector development and support decision-makers as they navigate the ongoing transition.

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