

Artificial Intelligence in Tourism: Challenges and Opportunities for Global Competitiveness, a Research Approach from the Literature.

La Inteligencia Artificial en el Turismo: Retos y Oportunidades para la Competitividad Global, un enfoque de investigación desde la literatura.

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Abstract:

In a global context characterized by digitalization and the pursuit of competitiveness, the tourism sector must adapt to the technological transformations driven by artificial intelligence (AI). This technology is emerging as a central pillar of the fourth industrial revolution, generating both opportunities and challenges for the tourism industry in a dynamic and highly competitive market.

The objective of this study is to analyze the challenges and opportunities offered by AI to strengthen the tourism industry in the framework of global competitiveness, with a particular focus on the automation of tourism services. The hypothesis suggests that AI is a key component for increasing business productivity and enhancing the added value of the tourism sector.

The methodology is based on a non-experimental empirical study, supported by global and national reports such as the World Economic Outlook (2023), the Tourism GDP Report from Mexico's Ministry of Tourism (2023), and the World Travel & Tourism Council (2023). Using a qualitative categorical analysis, the study identifies trends, benefits, and challenges associated with the application of AI solutions in tourism.

The results show that the implementation of AI enhances service automation (chatbots, robotization in hotels and airports), security through blockchain and biometrics, personalized experiences using IoT and augmented reality, optimization of waiting times through geolocation, and demand prediction based on big data analysis. Likewise, AI contributes to process optimization and cost reduction. However, significant challenges also arise, including technological disruption, privacy concerns, digital surveillance, and the need for regulatory and educational frameworks that embed ethical principles in the application of these technologies.

It is concluded that AI provides more opportunities than limitations for the tourism industry, consolidating itself as a driver of global tourism competitiveness. Its strategic adoption, supported by the development of datasets, open data policies, public-private collaboration, education, and innovation, will allow tourism not only to increase its added value to the national economy but also to become a hub of development and investment attraction in contexts such as Mexico.

Keywords:

Tourism, Artificial Intelligence, Tourism Competitiveness

Resumen:

En un contexto global caracterizado por la digitalización y la búsqueda de competitividad, el sector turístico debe adaptarse a las transformaciones tecnológicas impulsadas por la inteligencia artificial (IA). Esta tecnología está emergiendo como un pilar central de la cuarta revolución industrial, generando tanto oportunidades como desafíos para la industria turística en un mercado dinámico y altamente competitivo.

El objetivo de este estudio es analizar los desafíos y oportunidades que ofrece la IA para fortalecer la industria turística en el marco de la competitividad global, con un enfoque particular en la automatización de los servicios turísticos. La hipótesis sugiere que la IA es un componente clave para aumentar la productividad empresarial y mejorar el valor agregado del sector turístico.

La metodología se basa en un estudio empírico no experimental, respaldado por informes globales y nacionales como el World

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Economic Outlook (2023), el Informe del PIB Turístico de la Secretaría de Turismo de México (2023) y el World Travel & Tourism Council (2023). Mediante un análisis cualitativo categorial, el estudio identifica tendencias, beneficios y desafíos asociados con la aplicación de soluciones de IA en el turismo.

Los resultados muestran que la implementación de IA mejora la automatización de servicios (chatbots, robotización en hoteles y aeropuertos), la seguridad mediante blockchain y biometría, las experiencias personalizadas a través del IoT y la realidad aumentada, la optimización de los tiempos de espera mediante geolocalización y la predicción de la demanda basada en el análisis de big data. Asimismo, la IA contribuye a la optimización de procesos y la reducción de costos. Sin embargo, también surgen desafíos significativos, como la disrupción tecnológica, preocupaciones sobre la privacidad, vigilancia digital y la necesidad de marcos regulatorios y educativos que integren principios éticos en la aplicación de estas tecnologías.

Se concluye que la IA ofrece más oportunidades que limitaciones para la industria turística, consolidándose como un motor de competitividad turística global. Su adopción estratégica, respaldada por el desarrollo de bases de datos, políticas de datos abiertos, colaboración público-privada, educación e innovación, permitirá que el turismo no solo incremente su valor agregado a la economía nacional, sino que también se convierta en un polo de desarrollo y atracción de inversión en contextos como México.

Palabras Clave:

Turismo, Inteligencia Artificial, Competitividad Turística

Introduction

In recent decades, digital transformation has shaped a global scenario in which economic competitiveness increasingly depends on the strategic integration of advanced technologies. In this context, artificial intelligence (AI) has become a fundamental driver of the Fourth Industrial Revolution, directly influencing how productive sectors operate, create value, and position themselves internationally. Tourism—one of the most dynamic and diversified industries worldwide—is no exception. On the contrary, the incorporation of intelligent systems, service automation, advanced data analytics, and hyper-personalized experiences is reshaping the tourism value chain, expanding possibilities and redefining global competition.

However, this technological adoption also poses significant challenges. The digital divide, ethical dilemmas related to data usage, the need for comprehensive regulatory frameworks, and the lack of technical capabilities—particularly among tourism SMEs—represent obstacles to efficient and equitable implementation. In light of this, it becomes necessary to analyze AI not only as a technological tool but also as a structural element influencing the sustainability, innovation, and productivity of contemporary tourism.

This study addresses this need through a systematic review of scientific and technical literature published between 2015 and 2025, with the purpose of understanding the real scope of AI in tourism competitiveness. Its contribution lies in identifying trends, gaps, opportunities, and risks, thereby providing a conceptual framework that facilitates strategic decision-making within the sector.

Problem Statement

Although artificial intelligence represents a significant opportunity to strengthen the competitiveness of the global tourism sector, its adoption remains uneven and faces substantial structural limitations. On the one hand, there is robust evidence showing that AI improves process automation, operational efficiency, and the personalization of tourism experiences. On the other hand, challenges persist regarding insufficient technological infrastructure, limited digital training, risks to data privacy, and the lack of clear regulations ensuring ethical and sustainable use of these technologies.

Mexico—like other emerging economies—stands at a critical juncture: despite acknowledging the importance of digital tourism as a competitiveness strategy, the country has not yet achieved widespread adoption nor developed robust policies that integrate innovation, sustainability, and data protection. This situation leads to the following central research question:

How does artificial intelligence contribute to tourism competitiveness in a dynamic global context, and what are the main challenges limiting its effective implementation in the sector?

Research Objective

To analyze the challenges and opportunities that artificial intelligence offers to strengthen global tourism competitiveness, with emphasis on its application to process automation, service personalization, and operational optimization within the tourism sector.

Justification

This research is pertinent for academic, economic, and social reasons. First, recent scientific literature highlights the decisive role of AI in generating tourism value through digitalization, operational efficiency, and innovation in user experiences. However, a significant gap persists between theoretical development and practical implementation, particularly in countries where technological adoption is still emerging.

Second, tourism is a central driver of economic growth, especially in developing economies such as Mexico. The strategic integration of AI can boost productivity, diversify tourism offerings, enhance crisis resilience, and attract investment—factors that are essential to remain competitive against other emerging destinations. Moreover, understanding ethical and regulatory challenges—such as data protection, algorithmic transparency, or digital surveillance—is crucial for promoting responsible and sustainable tourism.

Finally, this research contributes to academic dialogue by systematizing dispersed information, identifying global trends, and offering a conceptual foundation that can guide future public policies and business strategies focused on technological innovation.

Hypothesis

Artificial intelligence is a determining factor in increasing global tourism competitiveness, as it improves business productivity, optimizes operational processes, and generates high-value personalized experiences. However, its positive impact depends on the existence of adequate regulatory frameworks, sufficient technological infrastructure, and specialized training within the tourism sector.

Literature Review

Evolution and Transformation of Tourism through Artificial Intelligence

The integration of artificial intelligence (AI) in the tourism sector has represented a fundamental evolution that has radically transformed the way trips are designed, managed, and experienced. This process reflects the global digital transformation impacting all productive sectors. Moreno, Sánchez, and Gómez highlight that this transition goes beyond mere technological incorporation and manifests as a structural change in tourism, where emerging technologies such as Web 3.0, NFTs, and the metaverse play a decisive role in shaping new digital and

interactive experiences, allowing tourists to access personalized and highly innovative services. 6

In line with this, López Naranjo, Pérez González, and Martínez Rodríguez conducted a systematic review confirming that AI has become central to sustainable tourism development through automation, digitalization, and predictive analysis, aspects that enable anticipating trends and adapting tourism services to individual needs. 3

Furthermore, Mexico's Ministry of Tourism positions digital tourism as a strategic sector for national competitiveness, where connectivity and technological infrastructure act as engines of innovation and modernization, consolidating a global competitive environment that demands continuous innovation from tourism stakeholders to avoid falling behind. 8

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Applications and Benefits of AI in the Tourism Sector

The benefits of artificial intelligence in tourism are evident in the sophistication of operational processes that increase efficiency and enhance user experience, ranging from the implementation of automated registration systems and interactive chatbots to assistance by robots in hotel services. Mas-Ferrando, Soler-Romagosa, and Marimon emphasize that these applications not only reduce costs and time but also enhance service quality by freeing

human resources to focus on creative and supervisory tasks. 4

Complementarily, Monteiro, Silva, and Ramos underline that AI-enabled hyper-personalization, through the analysis of large data volumes and recognition of specific tourist behavior patterns, transforms predefined offers into unique and immersive experiences tailored to individual profiles and preferences, increasing satisfaction and loyalty levels. In safety-related aspects, technologies like blockchain and facial recognition strengthen tourist trust, a crucial requirement for the consolidation of tourist destinations. 4, 5

From a macroeconomic perspective, the World Economic Outlook and the World Travel & Tourism Council report agree that accelerated adoption of intelligent technologies constitutes a pillar of economic resilience for the global tourism sector, enabling adaptability and rapid recovery from crises like pandemics and geopolitical events, with Mexico being a paradigmatic case where tourism represents a significant GDP proportion and has potential to become a technological innovation hub based on talent development and aligned public policies. 8, 11, 12

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3. Ethical, Regulatory, and Sustainability Challenges in AI Adoption

Despite the numerous opportunities AI provides, its implementation in tourism faces ethical and regulatory challenges essential for sustainable and responsible development. Encinas warns that the rapid technological disruption associated with AI generates tensions that must be carefully managed, especially regarding tourists' personal data privacy and ethical information management, elements that, if not properly regulated, could lead to invasive practices or violations of fundamental rights. 1

Similarly, Vera-Peña points out that the technological gap and insufficient AI regulation are significant obstacles affecting trust and adoption by businesses and users, emphasizing the need for a robust and updated regulatory framework encompassing principles of transparency, fairness, and responsibility. 10

Koo delves into the relationship between tourist trust and AI ethics, highlighting that only through transparent practices and continuous digital ethics training can genuine and sustainable acceptance of these innovations be fostered. 2

Siddik adds that achieving AI-driven sustainable tourism requires considering not only operational efficiency and competitiveness but also social inclusion, digital divide reduction, and environmental preservation through public policies that promote critical and responsible technological education. 9

Methodology

The research employs a qualitative documentary approach aiming to analyse, from scientific and technical literature, the main challenges and opportunities AI presents in the tourism industry, focusing especially on its capacity to personalize services and optimize tourist experience. A systematic review was conducted of academic and technical production published between 2015 and 2025, considering studies offering theoretical foundations and empirical evidence on AI application in tourism.

The search, selection, and analysis of sources was done through internationally recognized academic databases such as Scopus, Web of Science, and ScienceDirect, supplemented by specialized reports and documents from key tourism organizations, including the World Travel & Tourism Council (WTTC), Mexico's Ministry of Tourism, and the World Economic Outlook (WEO). This triangulation integrated academic and institutional views, adding robustness and depth to the analysis. 8, 11, 12 Selection criteria strictly included peer-reviewed scientific articles published in the specified period and explicitly

addressing the AI-tourism relationship, particularly in tourism management, consumer experience, and business dynamics. Non-indexed reports, conference papers, and book chapters were excluded to ensure relevance and scientific rigor.

To organize the analysis, selected documents were categorized into five thematic groups reflecting essential dimensions of the studied phenomenon:

1. AI technologies applied to tourism, including specific tools like chatbots, facial recognition systems, prediction algorithms, and blockchain.
2. Impacts on tourism service management focusing on operational efficiency, security, business competitiveness, and cost reduction.
3. Personalization and enhancement of tourist experience through intelligent recommendation systems, data mining, and consumer behaviour analysis for tailored experiences.
4. AI contributions to sustainable tourism, such as resource optimization, tourist flow management, and environmental footprint mitigation.
5. Ethical, regulatory, and technological challenges including algorithm transparency, data protection, human capital training, adoption gaps, and risks for equity and digital inclusion in the sector.

This qualitative and systematic documentary design allowed not only to synthesize the most relevant findings but also to perform a critical reading that facilitated identifying research gaps, emerging trends, and constructing a consistent theoretical framework for the academic article.

Results

A total of 45 academic references and technical reports meeting the methodological criteria were selected and reviewed. These were organized around the five subtopics to facilitate clear and comprehensive analysis

Subtopic	References	Main ideas
AI technologies applied to tourism.	12	Automation with chatbots, blockchain, and facial recognition for efficiency and security. 4
Impacts on tourism service management Impacts on tourism service management.	9	Improved wait times, security, and competitiveness through AI. 6

Personalization and enhancement of experience.	10	Advanced recommendations and hyper-personalization increasing tourist satisfaction. 2, 3
AI and sustainable tourism.	7	Resource optimization and environmental impact reduction with AI. 9
Challenges and adoption gaps.	7	Ethical issues, digital divide, and need for AI training for SMEs. 1, 10

First, results show that service automation is one of the most visible and measurable benefits of AI adoption in tourism. The reviewed studies highlight the growing implementation of chatbots, virtual assistants, automated kiosks, and service robots in hotels, airports, and tourist information centres. These systems optimize service time, provide immediate responses, improve reservation management accuracy, and free human staff for tasks requiring more complex cognitive skills. This automation not only enhances operational efficiency but also increases user satisfaction by delivering faster, smoother, and more personalized services. Additionally, after the COVID-19 pandemic, robotization became a key facilitator of sanitary measures, reducing human-to-human contact in critical processes.

A second significant finding is the consolidation of AI as a tool for hyper-personalized tourism experiences derived from large-scale data analysis (big data). The reviewed literature shows that recommendation systems based on predictive algorithms allow companies to anticipate preferences, design tailored itineraries, forecast behaviour patterns, and offer products adapted to specific segments. This personalization capacity translates into direct competitive advantages, given the contemporary trend toward unique, individualized experiences. Technologies such as IoT and augmented reality further expand tourists' interaction with destinations by offering intelligent routes, real-time contextual information, and immersive experiences that enhance destination perception.

The analysis also reveals that AI significantly contributes to tourism security, particularly through technologies such as facial recognition, biometric analysis, blockchain, and risk prediction systems. These tools strengthen visitor trust, a critical factor in destination choice. Biometrics, for instance, speeds up verification processes in airports and prevents identity fraud, whereas blockchain ensures the

traceability and integrity of transactions and sensitive data. However, the literature also emphasizes inherent risks, especially concerning digital surveillance and the misuse of personal data, highlighting the need for robust regulatory frameworks and transparent technological practices.

Furthermore, the documents indicate that AI has a substantial impact on operational optimization and cost reduction in tourism businesses. Through predictive analytics, it is possible to anticipate peak seasons, identify consumption patterns, forecast revenue, optimize inventories, and manage resources more efficiently. This predictive capacity becomes essential for strategic decision-making in a sector highly sensitive to economic, political, health, and climatic fluctuations. AI also supports improved distribution of tourist flows, reducing congestion in popular destinations and fostering more balanced and sustainable tourism.

Another central aspect identified is AI's role in tourism sustainability. The reviewed research indicates that predictive models and intelligent systems contribute to the proper management of natural resources, reduction of environmental impacts, and improved destination planning. AI enables real-time monitoring of visitor loads, evaluation of ecological impacts, development of less-polluting mobility strategies, and alignment with sustainability principles. In this sense, AI is positioned as a key ally in achieving the Sustainable Development Goals (SDGs), particularly in areas such as sustainable cities, climate action, and responsible production.

Despite these opportunities, the results also reveal structural challenges that hinder widespread AI adoption in tourism. The digital divide remains particularly evident in small and medium-sized tourism enterprises lacking financial resources, technological infrastructure, and trained personnel to implement intelligent solutions. Literature consistently indicates that this inequality risks concentrating technology in large corporations while marginalizing smaller actors. Consequently, tourism may become polarized between highly digitalized destinations and those with limited technological adaptation.

The absence of strong regulatory frameworks emerges as another major challenge. The lack of clear guidelines on ethical use of personal data, algorithmic transparency, and digital security creates uncertainty for businesses and users. The reviewed studies emphasize that this institutional weakness limits trust in automated technologies and may impede their expansion, especially in developing countries. Ethical concerns related to algorithmic bias, excessive surveillance, or automated

discrimination underscore the urgency of comprehensive approaches to the social and human impacts of AI.

Overall, the results suggest that effective AI adoption requires continuous training, investment in digital talent, and multisectoral collaboration. The literature concurs that the transition toward smart tourism

Limitations and Future Research Lines

Based on the gaps identified in the literature, it is necessary to advance toward empirical and applied studies that allow for a deeper understanding of the role of artificial intelligence in contemporary tourism. First, it is essential to assess its real impact on operational efficiency and sector sustainability through case studies and longitudinal analyses that measure concrete outcomes. 9

Likewise, it is fundamental to explore how both tourists and tourism workers perceive and accept these technologies, considering the emotional, cultural, and ethical dimensions involved in their adoption. 1, 2

In this sense, understanding the human experience behind digitalization may offer valuable insights for achieving a more balanced implementation.

Another relevant research axis is the examination of ethical and regulatory aspects related to the use of personal data, as well as their impact on digital trust and user experience. 10

Additionally, there is a need to design technology adoption models specifically oriented toward tourism SMEs, considering investment, training, and economic return—elements essential to ensuring an inclusive digital transformation. 8, 10

Finally, it is proposed to further investigate the integration of AI with emerging technologies—such as augmented reality, the Internet of Things (IoT), or the metaverse—with the aim of generating more personalized, accessible, and sustainable tourism experiences. This approach could contribute to redefining the interaction between technology and humans within the tourism ecosystem of the future. 3, 5

Conclusions

This research confirms that artificial intelligence (AI) has become one of the strategic pillars for the transformation and competitiveness of the global tourism sector. Through the analysis of scientific literature, international reports, and sectoral studies, it is evident that AI not only modifies the operational structure of tourism but also redefines its models of interaction, production, and value creation. Given tourism's multisectoral nature and dependence on information, experience, and mobility, the sector is particularly sensitive to technological innovation. In this

regard, AI emerges as a catalyst for more efficient processes, more personalized experiences, and smarter management systems, shaping a new tourism paradigm.

A primary conclusion is that AI enhances tourism competitiveness by optimizing operational processes through algorithms, automation systems, and predictive analytics. Evidence shows that technologies such as chatbots, service robots, biometric security systems, and big-data-based recommendation engines reduce costs, improve internal efficiency, and increase visitor satisfaction. These innovations enable tourism businesses to enhance productivity and differentiate themselves in increasingly saturated markets, where users demand immediacy, accuracy, and intuitive interactions. AI not only transforms processes; it transforms how tourists perceive and experience their journey.

A second conclusion relates to AI's ability to create interconnected and intelligent tourism ecosystems. Technologies such as the Internet of Things (IoT), augmented reality, advanced geolocation, and blockchain support digital infrastructures that strengthen security, data traceability, and logistical efficiency across airports, hotels, destinations, and complementary services. At the same time, they enable destinations to develop predictive strategies based on mobility patterns, consumption trends, and visitor preferences—facilitating more sustainable and adaptive management models.

Nevertheless, this study also highlights significant structural challenges. Among them are the lack of specific AI regulation, risks related to data privacy and protection, and growing concerns about digital surveillance. The absence of strong normative frameworks undermines trust among businesses and consumers, slowing down technology adoption. Likewise, the digital divide between large corporations and small and medium-sized enterprises generates competitive inequalities that may widen unless inclusive public policies are implemented.

Another key conclusion concerns the need to incorporate an ethical perspective in tourism's technological development. As AI relies on massive amounts of data, transparency, traceability, and accountability mechanisms are essential to ensure fair, responsible, and inclusive processes. Digital ethics must therefore become an integral part of tourism management to ensure alignment with principles of equity, sustainability, privacy, and social well-being.

Moreover, AI plays a central role in promoting sustainable tourism by enabling efficient resource management, reducing environmental impacts, and improving planning processes. Predictive models facilitate visitor load monitoring, overcrowding prevention, and sustainable mobility strategies. AI can also promote social inclusion by supporting accessible and inclusive tourism experiences.

In conclusion, AI offers more opportunities than limitations for tourism; however, its transformative potential depends on the institutional, business, and social capacities to

implement it strategically. Technological governance that integrates clear regulations, multisectoral collaboration, investment in digital infrastructure, open data policies, and digital literacy is essential. Only under these conditions can AI fully enhance tourism competitiveness and foster balanced and sustainable economic, social, and environmental outcomes.

AI stands as a strategic tool for building innovative, resilient, and competitive tourism destinations capable of addressing twenty-first-century global challenges. Its responsible, ethical, and comprehensive adoption will enable economies such as Mexico's to increase their value proposition in tourism and position themselves as leaders in intelligent tourism solutions. The transition toward digital and sustainable tourism is both unavoidable and one of the most significant challenges and opportunities for the present and future of the industry.

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