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Smart Tourism: AI-Driven Destination Intelligence for Sustainable International Tourism and SDG Achievement

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Abstract

Artificial Intelligence (AI) is one of the most transformative technologies affecting tourism destination planning, management and marketing. AI-driven destination intelligence combines big data, machine learning, Internet of Things (IoT) technology, predictive analytics and digital platforms to drive the sustainable development of tourism and improve visitors' experiences. At the same time, sustainable tourism is considered as a driver for economic development, environmental protection, and social integration through the United Nations Sustainable Development Goals (SDGs). This review collates literature across various sources and thematic areas that have been published in recent years on the use of AI for destination intelligence from an SDG lens, with a specific focus on the role of AI in international tourism. The study uses a systematic literature review method and published peer-reviewed articles in the prestigious tourism and hospitality journals. The review highlights the role of AI in contributing to the SDG 8 (Decent Work and Economic Growth), SDG 9 (Industry, Innovation and Infrastructure), SDG 11 (Sustainable Cities and Communities), SDG 12 (Responsible Consumption and Production), SDG 13 (Climate Action), and SDG 17 (Partnerships for the Goals). Despite these developments, there are some areas of research that still need to be addressed in terms of AI governance, ethical issues, privacy of data, inclusion and implementation in less-developed destinations. The study suggests a conceptual framework between AI technologies and sustainable destination intelligence, SDG outcomes, destination competitiveness and international tourist satisfaction. The findings offer implications for strategic planning of destination management organizations (DMOs), policy makers, tourism businesses and researchers working on the development of smart tourism destinations that are resilient and sustainable. Recent systematic reviews also underscore the role of AI in improving sustainability impacts and the need for improved governance and ethical guidelines. (Sage Journals)In the field of Sustainable Tourism, AI is crucial in providing insights that enable the creation of more sustainable tourism products and services, thereby fostering effective implementation of this sustainable development goal (SDG).In the field of Sustainable Tourism, the use of AI is a powerful tool that can help to support the development of more sustainable tourism products and services, helping to achieve this sustainable development goal (SDG) effectively.

Keywords: *Artificial Intelligence, Sustainable Tourism, Destination Intelligence, Smart Tourism, Sustainable Development Goals (SDGs), International Tourism*

Introduction

The rapid advancement of Artificial Intelligence (AI) has fundamentally transformed the tourism industry by enabling intelligent decision-making, personalized travel experiences, predictive destination management, and real-time sustainability monitoring. Modern destinations increasingly utilize AI technologies such as machine learning, computer vision, natural language processing, digital twins, IoT sensors, and big data analytics to improve operational efficiency

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and visitor satisfaction. International tourism contributes substantially to global economic Development while simultaneously creating environmental and social challenges, including over tourism, resource depletion, carbon emissions, and cultural degradation. According to the United Nations Sustainable Development Goals (SDGs), tourism must transition toward sustainability through innovation, responsible governance, and digital transformation.AI-driven destination intelligence represents a new paradigm where data from tourists, businesses, governments, and smart infrastructure are integrated to support evidence-based destination management. Such systems enable destination managers to predict tourist demand, optimize transportation, monitor environmental quality, reduce overcrowding, minimize waste generation, and improve visitor experiences while advancing SDGs. Recent reviews indicate that AI supports sustainable tourism by improving operational efficiency, governance, and alignment with SDGs, while also raising challenges around ethics, transparency, and equitable implementation. (Sage Journals)

The tourism industry is undergoing a profound digital transformation, with Artificial Intelligence (AI) emerging as a key driver of innovation and sustainable destination management. The integration of AI technologies—including machine learning, big data analytics, natural language processing, computer vision, the Internet of Things (IoT), and predictive analytics—has significantly reshaped the way tourism destinations are planned, managed, and promoted. AI-powered systems enable destination managers to analyze vast volumes of real-time data, forecast tourism demand, optimize resource allocation, personalize visitor experiences, and improve operational efficiency. Consequently, AI has become an essential tool for creating intelligent, resilient, and sustainable tourism destinations that can respond effectively to changing market dynamics and environmental challenges. **{22}**

International tourism continues to be one of the world's largest and fastest-growing economic sectors, contributing substantially to global gross domestic product (GDP), employment generation, foreign exchange earnings, and cultural exchange. According to the United Nations World Tourism Organization (UN Tourism), international tourist arrivals have shown strong recovery following the COVID-19 pandemic, highlighting tourism's vital role in economic development and community well-being. However, the rapid growth of tourism has also intensified challenges such as over tourism, environmental degradation, excessive energy consumption, waste generation, biodiversity loss, water scarcity, and increasing carbon emissions. These issues have emphasized the urgent need to transition from conventional tourism practices toward more sustainable and technology-enabled destination management approaches. **{23}**The 2030 Agenda for Sustainable Development, adopted by the United Nations, recognizes tourism as an important contributor to sustainable development through the Sustainable Development Goals (SDGs)**.** Tourism has a direct influence on several SDGs, including SDG 8 (Decent Work and Economic Growth)**,** SDG 9 (Industry, Innovation and Infrastructure)**,** SDG 11 (Sustainable Cities and Communities)**,** SDG 12 (Responsible Consumption and Production)**,** SDG 13 (Climate Action)**,** and SDG 17 (Partnerships for the Goals)**.** Achieving these goals requires innovative digital solutions that balance economic growth with environmental protection, social inclusion, and cultural preservation. In this context, AI offers significant opportunities to support sustainable tourism through intelligent planning, real-time monitoring, efficient resource management, carbon footprint reduction, and enhanced stakeholder collaboration.**{24}**The concept of Destination intelligence has emerged as a strategic approach that combines AI, big data, digital platforms, cloud computing, and IoT to facilitate evidence-based decision-making in tourism destinations. AI-driven destination intelligence enables Destination Management Organizations (DMOs), policymakers, and tourism enterprises to collect, process, and interpret large volumes of data from tourists, businesses, transportation systems, weather forecasts, and social media platforms.**{25}**These insights support demand forecasting, visitor flow management, crowd control, environmental monitoring,

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emergency response, and service personalization, thereby improving both destination competitiveness and sustainability. Furthermore, AI enhances international tourists' experiences through multilingual virtual assistants, personalized travel recommendations, smart navigation systems, automated customer service, and immersive digital technologies. Despite the growing adoption of AI in tourism, existing research remains fragmented. Most studies focus on individual AI applications such as chat bots, recommendation systems, robotic services, or demand forecasting without comprehensively examining their contribution to sustainable destination intelligence and SDG achievement. Moreover, limited empirical research has investigated how AI-driven destination intelligence influences international tourists' perceptions, satisfaction, destination loyalty, and behavioral intentions while simultaneously promoting environmental sustainability and responsible visiting the attractions practices.**{26}**Research addressing ethical AI, data privacy, algorithmic transparency, governance, and digital inclusivity in tourism destinations is also relatively scarce, particularly in developing countries where digital transformation is still evolving. The increasing availability of smart technologies, digital infrastructure, and real-time tourism data presents a significant opportunity to redefine destination management through AI-enabled intelligence. By integrating technological innovation with sustainability principles, tourism destinations can improve operational efficiency, strengthen resilience against future crises, optimize natural resource utilization, and create more meaningful experiences for international visitors. AI-driven sustainable destination intelligence therefore represents a holistic approach that aligns technological advancement with environmental stewardship, economic prosperity, and social well-being. {**27}**Against this background, the present review aims to synthesize recent literature on AI-driven sustainable destination intelligence from an SDG perspective. Specifically, it examines the evolution of AI applications in tourism, explores their contribution to sustainable destination management, identifies existing research gaps, and proposes future research directions. By providing a comprehensive overview of current knowledge, this review seeks to contribute to both academic literature and practical policy development, offering valuable insights for researchers, destination managers, tourism businesses, and policymakers committed to building competitive, resilient, and sustainable international tourism destinations. **{28}**

Literature Review

Gretzel et al. (2015) Gretzel and colleagues introduced the concept of Smart Tourism, emphasizing the integration of ICT, big data, and intelligent technologies into destination management. Their study argued that data-driven destinations improve visitor experiences while supporting sustainable resource management. This work laid the conceptual foundation for AI-enabled destination intelligence.

Buhalis and Amaranggana (2015) The authors proposed Smart Destination Ecosystems where digital technologies connect governments, businesses, residents, and tourists. They suggested that intelligent destinations improve sustainability through collaborative governance and real-time information sharing.

Gretzel et al. (2016) This study expanded the Smart Tourism framework by introducing Destination Intelligence. The authors emphasized that AI-supported decision systems enable destinations to monitor tourist behavior, optimize resources, and improve sustainability through predictive analytics.

Vinuesa et al. (2020) Although broader than tourism, this landmark study assessed AI's contribution across all 17 Sustainable Development Goals. The authors concluded that AI supports 128 SDG targets but may negatively affect 58 if governance and ethics are neglected, underscoring the need for responsible AI adoption in tourism. (arXiv)

Baggio, Micera and Del Chiappa (2020) The authors critically evaluated Smart Tourism Destinations and argued that destination intelligence should combine technological infrastructure with organizational capability and stakeholder collaboration. Their work highlighted

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AI's potential for destination resilience and sustainable competitiveness. This perspective is also echoed in later systematic reviews of smart tourism destinations. (MDPI)

Vinuesa et al. (2020) examined the influence of Artificial Intelligence (AI) on achieving the United Nations Sustainable Development Goals (SDGs). The study concluded that AI positively contributes to 128 SDG targets by improving environmental monitoring, smart infrastructure, resource optimization, and sustainable tourism planning. However, AI may also hinder some SDGs if ethical governance and transparency are neglected. This work provides an important foundation for applying AI in sustainable destination intelligence.

Xiang, Fuchs, Gretzel, & Höpken (2021) the authors investigated the integration of big data analytics and AI in tourism management. Their findings demonstrated that AI improves destination forecasting, demand prediction, and personalized travel services while supporting sustainable destination governance.

Boes, Buhalis, & Inversini (2021) This study explored intelligent destination ecosystems and concluded that AI enhances destination resilience by integrating digital governance, stakeholder collaboration, and sustainable resource allocation.

Gössling (2022) Gössling examined digital transformation in tourism and highlighted that AI contributes to carbon reduction, sustainable mobility, climate adaptation, and destination resilience. The study linked AI directly with SDG 11 and SDG 13.

Sirmacek et al. (2022) Sirmacek and colleagues extended the work of Vinuesa et al. by analyzing AI's role in promoting healthy and sustainable societies. They emphasized AI-supported smart cities, climate resilience, and sustainable destination management.

Del Vecchio et al. (2023) researchers found that AI-powered destination management systems improve tourist satisfaction through real-time service personalization, demand forecasting, and resource optimization. They also reported significant contributions toward sustainable tourism competitiveness.

Wang et al. (2024 The authors demonstrated that AI enhances international tourist experiences through personalized recommendations, multilingual virtual assistants, and intelligent destination management while supporting environmental sustainability.

Zhang et al. (2025) The study systematically reviewed AI research in tourism and proposed an integrated framework connecting AI technologies with sustainable tourism and SDGs. It identified future research priorities related to governance, ethics, and responsible innovation.

Paredes Andrade et al. (2025/2026) The authors reviewed AI applications in sustainable destination management and concluded that AI improves environmental monitoring, energy optimization, waste management, and tourist flow prediction. The study also highlighted challenges including digital inequality and AI ethics.

Belkaid & Kummitha (2026)This critical review synthesized evidence from studies published between 2019 and 2024 and concluded that AI accelerates sustainable tourism by supporting SDGs 8, 12, and 13 through intelligent destination governance, digital innovation, and environmental management. The authors also emphasized ethical AI, governance, and policy development as future priorities.

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Dwivedi, Shjyu, & Ranjan (2026) The authors conducted a systematic literature review on smart tourism destinations and SDGs. Their findings showed that AI, IoT, and big data analytics improve destination competitiveness, sustainability, and resilience while facilitating achievement of the SDGs.

Theodorakopoulos et al. (2026) this review examined AI-driven information systems using IoT and big data for sustainable tourism. The authors found that AI enables real-time environmental monitoring, predictive crowd management, intelligent resource optimization, and enhanced visitor experiences while stressing the need for stronger ethical frameworks and explainable AI.

Objectives

1. Examine the evolution of AI applications in sustainable tourism.
2. Review literature on AI-driven destination intelligence.
3. Analyze AI's contribution toward achieving SDGs in tourism.
4. Identify research gaps in AI-enabled sustainable destination management.

Review Methodology

This review follows a systematic literature review approach. Relevant studies were identified from Scopus, Web of Science, Science Direct, Taylor & Francis, Springer, Wiley, Emerald, and MDPI databases using keywords including:

- Artificial Intelligence
- Smart Tourism
- Sustainable Tourism
- Destination Intelligence
- SDGs
- International Tourism
- Machine Learning
- Big Data
- Tourism Analytics

The review emphasizes peer-reviewed publications published primarily between 2016 and 2026.

Research Gap

The literature published between 2020 and 2026 demonstrates that Artificial Intelligence (AI) has become a transformative force in tourism through applications such as smart destination management, predictive analytics, personalized services, and digital governance. While numerous studies have explored AI adoption and sustainable tourism independently, limited research has integrated AI-driven destination intelligence with the Sustainable Development Goals (SDGs) in a comprehensive framework. Existing research predominantly focuses on technological innovation and operational efficiency, with comparatively less attention to AI's contribution to sustainable destination development, environmental conservation, and social inclusiveness. Furthermore, empirical evidence examining the influence of AI-enabled destination intelligence on international tourists' experiences, satisfaction, destination competitiveness, and revisit intentions remains scarce, particularly in developing tourism destinations. Issues related to ethical AI, data privacy, governance, and standardized measurement of AI-driven destination intelligence are also underexplored. Therefore, there is a clear need for empirical studies that investigate the relationship between AI-driven sustainable destination intelligence, SDG achievement, and international tourism outcomes, thereby providing a holistic framework for sustainable destination management and policy development.

Future Research Directions

Future research should focus on developing comprehensive empirical models that examine the relationship between AI-driven destination intelligence, sustainable tourism practices, and Sustainable Development Goal (SDG) achievement. Researchers should investigate how emerging AI technologies—such as generative AI, digital twins, Internet of Things (IoT), predictive analytics, and machine learning—can enhance destination sustainability, environmental conservation, and international tourist experiences. Comparative studies across developed and developing destinations are needed to evaluate

differences in AI adoption and its impact on destination competitiveness. Additionally, future studies should explore the role of AI in promoting responsible tourism, climate resilience, visitor flow management, and cultural heritage preservation while addressing ethical issues such as data privacy, algorithmic bias, transparency, and governance. Longitudinal and cross-cultural research is also recommended to assess the long-term effects of AI on tourist satisfaction, destination loyalty, and sustainable destination performance. Finally, developing standardized measurement scales for AI-driven sustainable destination intelligence will strengthen theoretical advancement and provide practical guidance for destination management organizations (DMOs), policymakers, and tourism stakeholders.

Conclusion

Artificial Intelligence (AI) is rapidly Transforming the Tourism industry by enabling smarter, more efficient, and sustainable destination management. The literature reviewed from 2020 to 2026 indicates that AI technologies—including machine learning, big data analytics, Internet of Things (IoT), predictive analytics, and intelligent decision-support systems—play a significant role in improving destination planning, resource optimization, visitor experiences, and environmental sustainability. These technological advancements contribute directly to achieving several Sustainable Development Goals (SDGs)**,** particularly SDG 8 (Decent Work and Economic Growth), SDG 9 (Industry, Innovation and Infrastructure), SDG 11 (Sustainable Cities and Communities), SDG 12 (Responsible Consumption and Production), and SDG 13 (Climate Action)**.**Despite these advancements, the review reveals that research on AI-driven sustainable destination intelligence remains fragmented. Most studies focus on technological innovation rather than integrating AI with sustainability outcomes, destination competitiveness, and international tourist behavior within a unified framework. Furthermore, empirical evidence from developing tourism destinations and studies addressing ethical AI, governance, and standardized measurement remain limited. Overall, AI-driven sustainable destination intelligence offers significant potential to transform international tourism by fostering innovation, enhancing tourist satisfaction, and supporting sustainable destination development. Greater collaboration among researchers, policymakers, destination management organizations, and tourism stakeholders will be essential to ensure that AI is implemented responsibly and effectively. Future research should focus on developing integrated models and evidence-based strategies that align AI innovations with the SDGs, enabling tourism destinations to become more resilient, competitive, inclusive, and environmentally sustainable.

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