

# Smart Tourism and Sustainable Tourism : Converging Paths in Digital Era

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**Abstract** – In this digital age, innovation and cutting-edge technology are driving a sea change in the tourism business. Sustainable tourism is on the rise, with an emphasis on eco-friendly activities, conservation programs, and community involvement, as more and more tourists become conscious of the environmental harm they cause. At the same time, smart tourism takes advantage of digital innovation to offer tailored and better vacations by employing AI, the metaverse, and the Internet of Things (IoT). In this chapter, we'll look at the tourism industry's dual goals of sustainability and innovation, and how those two goals could complement one another. By diving into traveller tastes and behaviors and how they interact, this chapter emphasizes the expanding role of digital technology in encouraging sustainable tourism practices and transforming travel habits. This study digs at the ways stakeholders may create an atmosphere that fosters smart and sustainable tourism. It emphasizes the necessity of teamwork and new digital technologies, and it provides insights into how the sector can employ tech to meet sustainability goals and enhance the experience for tourists. This chapter provides the notion that sustainable practices and innovative technology must work together to meet the demands of modern visitors who are looking for ethical and pleasant vacations if the tourism industry is to thrive.

**Keywords** – Sustainable Tourism, Smart Tourism, Tourists, Technology, Innovation, Trends.

## 1. Introduction

Tourism in the twenty-first century is increasingly defined by its use of digital technologies, as attractions, experiences, and services respond to the growing desire for more intelligent, personalized, and accessible travel options. The emergence of smart tourism, which combines immersive platforms such as virtual realities (VR), smart tourism technologies (STTs), and information and communication technologies (ICTs), is changing the way travelers interact with destinations, as well as the ways in which tourism stakeholders generate, market, and provide value. Sustainable and intelligent tourism requires collaboration among all stakeholders as well as a deep understanding of global and local concerns in order to promote responsible and innovative sector progress. This paper describes a strategy for using big data and deep learning to reveal comprehensive, multifaceted (e.g., local, cultural, national, and international) and objective insights about a topic (Alsahafi et al., 2023). This paradigm shift is inextricably linked to the larger framework of smart cities, user-generated content, and digitally improved experiences that meet various user wants and expectations. This paper provides a comprehensive assessment of scholarly research on the adoption, effects, and limitations of smart tourism technology and virtual experiences. The selected literature covers a wide range of tourism-related topics, such as the role of ICT in museums, the impact of social media on visitors, the effect of smart technology on visitor satisfaction and return intentions, and the growing interest in smart technology as a means of accessibility and marketing. Collectively, these studies provide a complete view of the growth of smart tourism, its future potential, and the problems that must be overcome for larger and more equal deployment. Sustainable tourism has emerged as a new paradigm in the tourism sector, considerably contributing to environmental preservation and sustainable community development. It is seen as an emerging specialization that combines tourism tactics with environmental awareness and ethical travel behavior. Nonetheless, despite increased interest from academics and professionals, the information base on eco-tourism remains fragmented and lacks a cohesive structure. This study uses a bibliometric approach to extensively examine global research trends and new directions in eco-tourism during the last several decades. This study aims to conduct an objective analysis of academic publications and citations in order to provide a comprehensive overview of the evolution and future direction of eco-tourism scholarship. Sustainable tourism has grown significantly in response to growing awareness of environmental, social, and economic issues in global travel. The literature highlights that sustainable tourism aims to limit negative consequences while increasing benefits to host communities, the environment, and the tourism industry. The United Nations World Tourism Organization (UNWTO) defines sustainable tourism as "tourism that takes full account of its current and future economic, social, and

environmental impacts" (Niedziolka, 2015). The notion gained popularity through international announcements such as the Brundtland Report (1987), which characterized sustainable development as meeting "the needs of the present without compromising the ability of future generations to meet their own needs" (Niedziolka, 2015). In India, government programs such as the Sustainable Tourism Criteria for India (STCI) have consistently reinforced this paradigm, emphasizing responsible tourist behavior, cultural preservation, and local economic development. Sustainable tourism is based on the "Triple Bottom Line" paradigm, which balances environmental sustainability, sociocultural accountability, and economic viability (UNEP, 2006; Sustainable Tourism-2, 2006). Tourism in coastal and marine protected areas must be strictly regulated to prevent habitat damage, wildlife disruption, and community displacement. Case studies, such as Cancun, Mexico, show how unregulated tourism development can lead to urban congestion, ecological loss, and infrastructure failure (Sustainable Tourism-2, 2006). In contrast, well-designed tourist regulations in India have provided rural communities with alternative forms of income while promoting cultural heritage and eco-tourism (Sustainable tourist, 2012). These include community-based tourism, capacity building for local youth and women, and the creation of sustainable infrastructure. The combination of Information and Communication Technologies (ICTs) and Intelligent Technologies is transforming the field of sustainable tourism. The increased usage of the internet and mobile applications for trip planning highlights the emergence of "high-order Internet uses," such as social media and user-generated content, which influence travel decisions. These technologies allow for more informed, personalized, and ethical travel practices (Xiang et al., 2015). Fennell (2021) investigates Personalized Interactive Real-Time Tours (PIRTs) that use 5G-enabled 360° experiences. These virtual tourism platforms allow users, particularly seniors and people with disabilities, to enjoy destinations remotely, reducing the environmental effect of traditional travel while increasing inclusivity (Fennell, 2021). The industry was pushed to go from recovery to resilience and transformation, with ideas such as traveler micro-segmentation, partnership-based innovation, and prioritizing sustainability as a core component of travel design. The findings highlight the changing landscape of eco-tourism research, pinpointing current focal points and emerging trends that reflect global sustainability challenges. This literature-based perspective provides a solid framework for theoretical investigation and practical application in ecotourism planning and management (Lin et al., 2023). The tourism industry is at a critical crossroads, with the combination of sustainability and technological innovation altering travel habits. Recent research has highlighted the growing demand for sustainable tourism practices and the incorporation of smart technologies to enhance tourist experiences. This essay investigates the convergence of sustainable and smart tourism in the digital era. The goal is to study recent research from 2021 to 2025 to better understand the cohabitation and mutual support of sustainability and technological innovation in the tourism industry. The study will look at visitors' preferences and activities, emphasizing the role of digital tools in developing sustainable tourism practices and changing travel habits. The study intends to identify gaps in previous research and make recommendations on how stakeholders may develop an environment that encourages both sustainable and intelligent tourism.

## 2. Literature Review

### 2.1 Sustainable Tourism: Concept and Value Addition

The tourism sector is experiencing a significant transformation, driven by the dual demands of sustainability and technological progress. This literature study examines two pivotal domains: Sustainable Tourism and Smart Tourism, focusing on their concepts, contributions to the tourism and travel sector, and insights from recent studies conducted between 2021 and 2025. Since the inception of the Sustainable Development Goals (SDGs) in 2015, the management of sustainable tourism has been facilitated by a framework of structured and systematic objectives. The research examines the existing knowledge framework (co-citation analysis), prospective trends (co-occurrence of keywords analysis), and significant historical publications (document citation analysis) on SDG implementation in the travel and hospitality industry (Fauzi, 2025). Infrastructure and accessibility, cultural and social preservation, economic advantages, environmental sustainability, visitor satisfaction and experience, and compliance with laws and regulations are all critical factors in tourism sustainability. The AHP investigation identified environmental sustainability as the paramount issue, highlighting the necessity of tourist practices that protect the village's ecosystems and natural environment. The subsequent focus was on Economic Benefits, highlighting the community's acknowledgment of tourism as essential for local job creation, money generating, and economic advancement. Ecological preservation and the village's economic objectives are essential for sustainable development, and their integration reveals a substantial correlation (Gherdan et al., 2025). Sustainable tourism enhances local economies by generating employment opportunities and fostering local products and services. Allied Industry Research (2023) reports that the sustainable tourism sector was valued at \$3.248 trillion in 2022 and is projected to reach \$11.413 trillion by 2032, reflecting a compound annual growth rate (CAGR) of 14.0% from 2023 to 2032. This augmentation underscores the expanding

economic influence of sustainable tourism practices globally (Deshmukh, 2023). The significance of environmental conservation in sustainable tourism is crucial. The "Green Growth National Action Plan 2021 to 2025: Tourism Sector" provides strategies for integrating green growth objectives into tourism, emphasizing the conservation of natural resources and the promotion of environmentally sustainable practices. Earth-Changers.com (2025) predicts a rise in wildlife tourism, which will enhance conservation initiatives and positively affect biodiversity (Smith, 2025). Cultural tourism, a significant facet of international travel, fosters artistic, social, and economic advancement. This paper analyzes essential principles for the management and enhancement of sustainable cultural tourism. It looks at well-known models such as UNESCO's Sustainable Cultural Tourism Theoretical Framework, Poria, Butler, and Airey's Heritage Tourism model, McKercher and du Cros' Cultural Tourism model, Richards' Creative Tourism model, and Butler's Tourism Area Life Cycle (TALC). This project seeks to examine sustainable tourism practices in Varanasi through the integration of historical preservation, community engagement, and responsible tourist behaviors. It is concluded that Varanasi and other ancient cities should formulate a tourism strategy that safeguards their unique heritage while offering enriching and engaging experiences for visitors of all ages, emphasizing environmental and cultural sustainability. Sustainable tourism is crucial for the preservation of cultural heritage. The Strategic Plan for Sustainable Tourism Development 2021-2025 underscores the significance of cultural preservation, specifying measures to protect and enhance cultural assets within the tourism sector (Tourism & Region, 2025). The Global Sustainable Tourism Council (GSTC) emphasizes the importance of sustainable practices in the tourism sector, stressing the necessity to mitigate adverse effects and enhance beneficial outcomes. Research published in the *Journal of Sustainable Tourism* similarly investigates how smart technology is transforming the tourism industry by redefining business models and influencing passenger behavior. Involving local people is essential for sustainable tourism. In Kenya, community-based initiatives are redefining the conservation paradigm by integrating local populations into tourism operations, enabling them to gain financially while also aiding conservation efforts. This strategy fosters a sense of ownership and the conservation of local traditions and ecosystems (Holland, 2024). Policy frameworks are useful in developing sustainable tourism. The data indicate that perceived benefits significantly mediate support for ecotourism, and community participation in tourism yields positive effects. Conversely, there was no affirmative mediation of perceived costs. These findings underscore the necessity of incorporating local populations in ecotourism planning and management, as well as how the perception of advantages can cultivate a conservation ethos and enhance commitment to sustainable travel (Trejo et al., 2025). The initial phase of this study's methodology on sustainable tourism involves perceiving tourism as a form of development reliant on the preservation of the resources that draw visitors. Using this perspective, tourism destinations try to maintain and improve their appeal to visitors, with sustainability as a fundamental priority. At the same time, tourism is an economic activity that both benefits and is influenced by global capitalism. As a result, there is a tension between sustainability and tourism (Bosak 2015).

## **2.2 Smart Tourism: Concept and Technological Integration**

### **Concept of Smart Tourism**

"Smart tourism" refers to a type of travel in which travelers use various electronic gadgets to improve their understanding and pleasure of their surroundings. According to the European Union, it is a website that uses information and communication technology to provide tourists with access to a variety of goods, services, destinations, and experiences. Currently, the term "smart city" refers to metropolitan areas that excel in using technology to improve people's quality of life, sustainability initiatives, economic possibilities, and access to equitable and efficient governance. The term "smartness" in the tourism industry refers to a highly integrated system that promotes technological advancements such as smartphones, smart cards, and smart TVs (Xiang et al., 2015). The use of the term "smart" to describe phenomena like tourism is not a new concept. Digital tourism can be viewed as the natural progression between electrical tourism and traditional travel. The rapid adoption of technology breakthroughs aided its early establishment. Emerging technical breakthroughs are enabling the digital transformation of real-world and governance components of travel, resulting in smart tourism, a game-changing breakthrough in the tourism industry. The autonomy of tourism systems modifies the industry's structure and the processes of creating, trading, consuming, and exchanging touristic experiences (Xiang et al. 2015). The growth and implementation of AI provide a serious worldwide challenge for social, political, and environmental issues. Furthermore, it has arisen as a major issue for the tourism industry. This editorial claims that, despite the relevance of AI and similar developing technologies, tourism research should take a broader perspective than simply studying their financial impact and consumer perceptions and use. We argue that academics should focus on various levels of AI effects in tourism research in order to achieve significant advances in smart tourism (Hall & Cooper, 2025). This includes understanding the effects, advantages and downsides, and long-term ramifications of AI on businesses, locations, consumers, society, and the

environment. This study outlines three key components enabled by data gathering, processing, and sharing: digital experiences, digital business ecosystems, and digital destinations. This suggests that smart tourism differs from traditional e-tourism in that it uses technological advancements to enhance the traveler experience (Gretzel et al., 2015). Smart tourism is built around five pillars: a tourist-centered strategy, accessibility, innovation, sustainability, and technology. The study provides a revised definition of smart tourism, focusing on the connection between smart technologies and human experiences through five components (Elena Canorea, 2022). Rapid technological improvements are benefiting an increasing variety of sectors, including the tourism industry. Commercial enterprises. Applications and mobile technology (smartphones) are becoming increasingly important for travelers. Their continued development and critical role in the industry have not resulted in a thorough understanding of their applications or integration (Birenboim et al., 2023). Traditional monitoring, evaluation, analysis, and tracking are rendered impracticable due to the massive number of various data, hindering businesses' capacity to collect critical information and ultimately impeding decision-making. Individuals have limited time to connect with relevant information, thus the industry must put out significant effort and investment in providing high-quality data (Madyatmadja et al., 2021). In response to the industry's rapid expansion, novel digital solutions are being developed to suit the needs of a large number of tourists while ensuring the excellent quality of their tourism-related products and services (Binghamton & Hawor, 2016). Technological advancements have made formerly difficult operations remarkably simple, and the results are nothing short of extraordinary. In the modern interconnected world, the "travel and tourism" sector dominates the web realm. Mobile phones have grown into smartphones, which can access a wide range of services at any time and from almost anywhere. Smartphones have changed visitors' impressions of attractions due to their widespread use and growing popularity (Kadam & Sen, 2023). Technological advancements boost post-purchase support, including the capacity to express and receive feedback. A visit to an attraction represents a positive opportunity for the long-term growth of local tourism (Access, n.d.).

### **2.3 Linking Sustainable Tourism and Smart Tourism: An Integrated Perspective**

In recent years, the tourism industry has encountered a twofold challenge: the pressing necessity to mitigate the environmental and social impacts of mass tourism, alongside the chance to innovate services and destinations using emerging digital technologies. Sustainable tourism and smart tourism, albeit originating from distinct disciplinary and strategic viewpoints, are progressively examined as complementary frameworks in academic and policy discussions (Buhalis & Amaranggana, 2021; Sigala, 2022). This section examines the relationship between these two concepts and how their integration may yield a more inclusive, efficient, and environmentally sustainable tourism ecosystem.

#### **2.3.1 Conceptual Synergy between Sustainable and Smart Tourism**

The UNWTO (2022) defines a trip as sustainable when one considers its financial, social, and environmental consequences both now and in the future. Simultaneously, smart tourism uses artificial intelligence (AI), big data, ICT like the internet of things (IoT), and technology to give visitors better and more customized experiences (Gretzel et al., 2022). While smart travel uses data to customize services, sustainable destination management concentrates on maximizing visitor flows. The two methods are united by this common focus on structural optimization. Research by Wang et al. (2023) and Yu et al. (2024) indicates that smart travel systems can increase efficiency and offer data-driven insights. Great for sustainability initiatives, these advantages help to monitor and reduce the effects of tourism on the surroundings. Using smart sensors in tourist parks is one approach to help to maintain biodiversity. In delicate environments, these sensors can track visitor movement and assist to prevent overtourism (Alonso-Almeida et al., 2023).

#### **2.3.2 Smart Tourism Technologies Supporting Sustainability Goals**

According to experts such as Xiang and Fesenmaier (2023), smart technologies serve as both convenient and effective instruments for environmental management. Hotels and tourist attractions can diminish their water and energy consumption through the implementation of automated systems, intelligent lighting, and sensors. Web of Things and Intelligent Buildings "Cavallaro and Cioppi, 2021" Overtourism can be effectively handled by the implementation of intelligent travel systems that utilize big data analytics to forecast travel demand and subsequently allocate it to off-peak times or other locations (Shafiee et al., 2023). Machine Learning for Predictive Analysis in Augmented and Virtual Reality for Enhanced, Immersive Education: To mitigate carbon emissions, virtual technologies enable individuals to experience cultural and natural heritage sites without physical travel (Lee & Jeong, 2023). Accountable Supply Chains Utilizing Blockchain Technology: Jin et al. (2022) assert that traceability systems guarantee compliance by travel service providers with ethical sourcing and equitable labor policies.

A study by Guo and Liu in 2024 revealed that communities implementing Smart City regulations and tourism strategies generally achieve superior scores on sustainability indices, including waste reduction and community engagement.

**2.3.3 Empirical Evidence of Convergence in Destination Management**

Empirical Research have demonstrated the reciprocal enhancement of smart and sustainable solutions. Barcelona's Smart Tourism Strategy includes sustainability parameters as key performance indicators. Its Smart Destination Platform enables waste management, air quality monitoring, and real-time visitor tracking, in addition to waste management. Smart kiosks in Seoul, South Korea, disseminate eco-tourism information and encourage visitors to use public transportation or support green-certified businesses (Kim and Park, 2022). The European Commission's Smart Tourism Capitals Program evaluates towns based on both digital innovation and sustainability practices, explicitly identifying them as interconnected dimensions of competitiveness (EC, 2023).

**3. Gaps In The Study**

Despite the extensive research on sustainable and smart tourism, certain gaps remain unaddressed. The following table presents a summary of these gaps identified in studies published between 2021 and 2025.

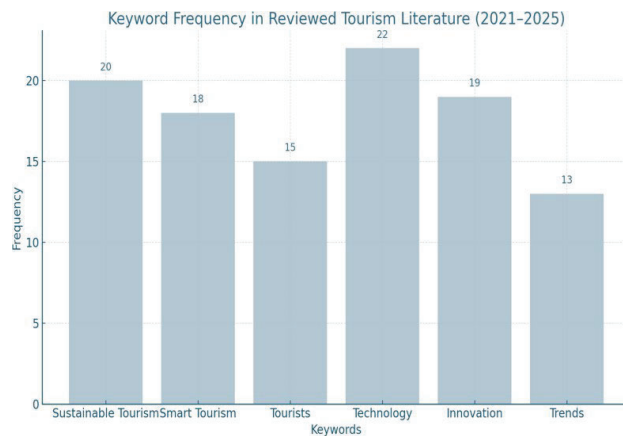
**Table 1. Summary of Research Gaps identified in studies published between 2021 and 2025.**

Year	Author(s)	Journal	Identified Gaps
2021	Gössling et al.	Journal of Sustainable Tourism	Lack of integration between smart technologies and sustainability practices.
2022	Li et al.	Tourism Management	Insufficient focus on local community involvement in smart tourism initiatives.
2023	Gretzel et al.	Annals of Tourism Research	Limited research on the long-term impacts of smart tourism on sustainability.
2024	Sigala	Tourism Review	Need for frameworks to assess the effectiveness of smart tourism in promoting sustainability.
2025	Buhalis et al.	Information Technology & Tourism	Underexplored potential of AI in enhancing sustainable tourism practices.

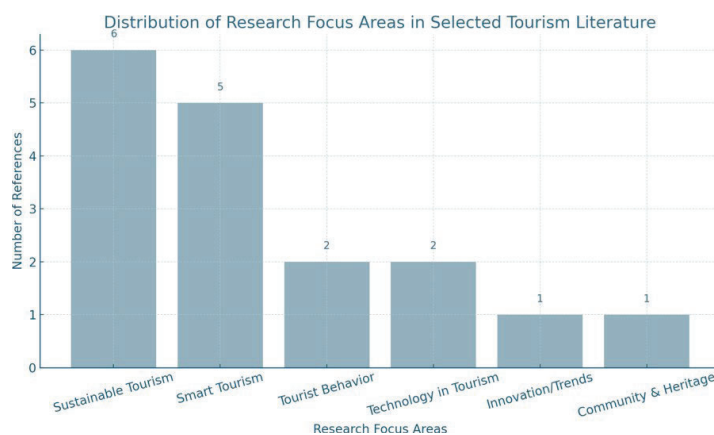
**4. Research Analysis**

The study were carefully and critically reviewed to grasp Smartphone Technology, Smart Travel, and the sustainability concept. The study focused on the important terms that caught interest during the years under analysis. Based simply on secondary data collected from numerous sources—including publications in journals, periodicals, newspapers, reports, websites, and other sources—this study is Thirty research publications published between 2021 and 2025 revealed thirty significant keywords—sustainable tourism, smart tourism, visitors, technology, innovation, and trends—found in frequency represented on a bar chart. Figure 1 provides insight on the evolving academic community focus and investigates the issue emphasis in modern travel research. This emphasizes the need of keeping an eye on changing customer preferences, business policies, and regulatory environments by means of future projections of changes.





(Figure 1 – Keyword Frequency in Reviewed Tourism Literature )



(Figure 2 –Showcase the distribution of research areas )

Figure 2 showcase the distribution and suggests that while sustainability remains a dominant research priority, smart and technological advancements are gaining rapid momentum. The blend of both highlights a growing academic consensus that future tourism must be both intelligent and ethical, driven by digital tools but anchored in sustainable values

## 5. Conclusion

Smart tourism and sustainable tourism together represent a significant shift in how the digital age perceives, operates, and experiences travel. From climate change and overt tourism to shifting tourist expectations and technological disruption, the tourism sector is facing rising challenges that demonstrate that neither sustainability nor digital innovation can operate in isolation. Rather, their combination provides a solid foundation for transforming travel into a force for good: financially viable, environmentally friendly, culturally sensitive, and experimentally rewarding.

This study found that smart tourism technologies such as IoT, artificial intelligence, big data, and immersive media can be significant enablers of sustainability goals. These technologies allow locations to distribute resources more effectively, assess environmental effects in real time, personalize guest experiences, and engage stakeholders in open, data-driven governance. Concurrent with the moral and strategic compass offered by the key objectives of sustainable tourism, such as conservation, community involvement, and socioeconomic fairness, is the ethical application of smart technology led by a moral compass? The combination of these two paradigms ensures long-term resilience while also improving the operational and experience components of tourism. Nonetheless, there are significant challenges in this integration. Data privacy, digital exclusion, and the potential over-automation of cultural events are all issues that deserve careful consideration. Thus, responsible innovation, in which technology is developed and deployed with sustainability at its core, must serve as the cornerstone for future tourism. Finally, the travel industry has reached a watershed moment. Pursuing sustainability alongside smart innovation is not a competition; rather, it is a strategic alignment required to meet

host community demands, modern traveler expectations, and planetary boundaries amid a crisis. Tomorrow's tourist destinations will be those who implement a comprehensive, integrated plan in which smart equals sustainable and sustainable equals smart.

## 6. Limitation And Future Scope

This study predominantly utilizes the internet to get secondary data from several sources (e.g., reports, journal articles, and review papers); however, future research may feasibly collect data in person and subsequently present the findings. This method would facilitate the examination of the impact of cellphones and mobile technologies on Smart tourism. This parallel scenario could stimulate further study focused on simultaneous advancements in technology and the tourism sector. This study employed solely a qualitative and extensive literature review; hence, a quantitative approach is recommended to examine many potential effects..

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