

## TRENDS IN SMART TECHNOLOGY USE IN THE TOURISM INDUSTRY

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Smart technologies are significantly transforming practices and experiences in the tourism industry, both for tourists and businesses. These technologies incorporate innovative approaches that enhance service quality, optimize processes, and personalize user experiences. By integrating digital tools and data, smart technologies are reshaping the travel experience, from trip planning and booking to on-site engagement and post-travel interactions. They aim to make tourism more efficient, personalized, convenient, and sustainable for both travelers and destinations.

This paper examines the significance and role of smart technologies and artificial intelligence in the tourism industry's development, as well as the key challenges and trends associated with their implementation.

**Keywords:** Smart Technologies, Artificial Intelligence, Smart Tourism, Smart Cities, Tourism Industry

The implementation of smart technologies has a significant impact on the development of the tourism sector. Notably, tourism was one of the first industries to adopt innovative smart technologies in business operations. Given the growing role of digitalization in tourism, the sector's development largely depends on the effective management of this process. The integration of digital solutions based on personalized data into business processes enhances the sector's competitiveness, diversifies tourism markets, and advances the industry as a whole.

Smart technologies are used in all information services that tourists rely on during their journeys, and smart tourism can be defined as a combination of environmentally friendly, ethical, and high-quality services provided at all levels of tourism service delivery.

Globally, the application of smart technologies in the tourism industry is steadily expanding, and Europe has seen the emergence of smart tourism cities. The European Capital of Smart Tourism initiative, launched by the European Union, aims to recognize and promote cities across the EU for their pioneering approaches in implementing smart tourism. In 2018, Singapore was named the global number one smart city. [1]

Since 2019, the EU has been selecting Smart Tourism Capitals. For 2024, Dublin was chosen as the Smart Tourism Capital, while the Italian city of Grosseto was recognized as Europe's pioneer in Green Tourism. As part of the award, the winning cities receive promotional support from the European Commission, including the production of promotional videos, installation of a distinctive hashtag sculpture, organization of various marketing activities, and enhanced visibility at both EU and international levels. Additionally, the winning city is granted the opportunity to join a strong network of smart destinations selected in the previous five editions of the competition, enabling knowledge sharing and mutual learning of best practices.

In November 2025, a European jury will announce the winners of the titles European Capital of Smart Tourism 2025 and European Green Pioneer of Smart Tourism 2025, selecting two cities for these prestigious awards. Cities from both EU and non-EU countries are

eligible to participate in both competitions. The European Capital of Smart Tourism competition is open to cities with populations exceeding 100,000, while the Green Pioneer competition targets cities with populations between 25,000 and 100,000. The overarching aim of both contests is to promote sustainable tourism growth that supports economic development, environmental protection, and social well-being. [2]

In the Smart City Index 2024, Zurich ranked first among the world's top 10 Smartest Cities, followed by Oslo, the capital of Norway, in second place, and Canberra, the capital of Australia, in third. The top ten also includes Geneva, Singapore, Copenhagen, Lausanne, London, and Helsinki. The index is compiled by the International Institute for Management Development (IMD) in Switzerland. It evaluates major cities based on economic and technological factors, as well as on aspects such as quality of life, environmental conditions, and inclusiveness. [3]

Today, the majority of tourists already utilize smart technologies through various tourism applications to access services, and this process is irreversible; it is expected to become even more diverse in the future. [4]

The principal directions for the application of smart technologies in the tourism industry can be summarized as follows:

➤ Online booking systems: Technologies such as online booking platforms (e.g., Booking.com, Airbnb) allow tourists to easily search, compare, and book hotels, tours, or transportation services.

➤ Artificial Intelligence (AI) and chatbots: The use of artificial intelligence facilitates fast and efficient responses to customer inquiries. AI-powered chatbots provide 24/7 support, thereby enhancing customer satisfaction.

➤ Virtual Reality (VR) and Augmented Reality (AR): VR technologies enable tourists to virtually explore destinations before visiting them in person. AR supports the delivery of enhanced information about local attractions. VR creates computer-generated environments that allow users to experience and interact with alternative realities, contributing to

sustainable tourism by reducing their environmental footprint.

➤ Mobile applications and the Internet of Things (IoT): Specialized travel apps, such as Google Maps, TripAdvisor, and Yelp, assist tourists with planning and navigating local environments. With the advancement of 5G networks, new applications are emerging that enable faster communication between devices. IoT devices, such as smart hotel rooms, enhance comfort and safety for travelers.

➤ Data analytics and big data: Today, every internet user leaves a digital footprint on social media and online platforms. Tourism companies analyze this data to study consumer behavior and develop personalized recommendations.

➤ Environmentally friendly technologies: Smart technologies support the tourism sector in achieving ecological sustainability, for example, through energy-efficient systems in hotels and electronic tickets that replace paper-based alternatives.

➤ Smart transport (intelligent mobility solutions): Smart taxis, electric vehicles, and GPS-based navigation systems contribute to more comfortable and safer travel experiences.

Virtual and augmented reality technologies allow travelers to gain immersive experiences, even before the journey begins, and provide enriched experiences in museums and tourist attractions. These technologies offer detailed explanations of everything from museums and art galleries to entire cities or regions. Virtual reality (VR) can transport visitors to different times and places, while augmented reality (AR) serves as an interpretive tool for reconstructing archaeological sites or artifacts on location. Smartphone applications such as 360 Cam, Panorama360, and Google Street View enable users to create 360° virtual panoramas with minimal technical preparation. These VR visuals can be used online or during travel to preview various destinations. [5]

Modern IT offers a range of widely used and promising applications for visitors, including virtual guides, mobile devices, special effects, virtual and augmented reality, holographic projection, 3D printing, robotics, and interactive surfaces. [6]

The concept of Smart Destinations or Smart Tourism has advanced the visitor experience over the years. However, a key challenge remains unresolved in the travel and hospitality industry: Integrating user data to deliver proactive and personalized information. The next phase of smart tourism, often referred to as Cognitive Tourism, goes a step further by leveraging first-party user data to recommend the next step in the visitor journey. That could include reminders about airport check-ins, invitations to leisure activities, or promotional restaurant coupons. Such capabilities allow users to plan their ideal vacations with just a click, significantly simplifying the process. [7]

However, the use of smart technologies may also produce unintended consequences, leading to negative travel experiences, inconvenience, or even more serious outcomes, especially when technology fails. That is most evident when tourism attractions and events rely heavily on technology; any system failure can disrupt or even ruin the overall experience. Such incidents occur while booking or baggage systems malfunction, power outages, or heating and cooling systems failures. More critical consequences may result from breakdowns in safety technologies, such as smoke detectors, air traffic control systems, aircraft technologies, early warning systems, or embedded safety mechanisms in theme park attractions.

**Conclusion.** Thus, the application of smart technologies in the tourism industry has become indispensable. Smart technologies are transforming the travel experience by integrating digital tools and data to improve all stages of travel, ranging from planning and booking to on-site engagement and post-travel interactions. This transformation is closely linked to the concepts of smart cities, artificial intelligence, big data, and virtual and augmented reality. The primary objective is to enhance the efficiency, competitiveness, and sustainability of tourism resource management through the use of innovative and environmentally friendly technologies.

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