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Digital transformation of safety in tourism with the use of artificial intelligence: A case study of Slovenia as a tourist destination

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Abstract

Artificial intelligence (AI) is transforming contemporary tourism by providing innovative tools to improve safety, which is one of the key elements of destination competitiveness, service quality and tourist trust. The purpose of this paper is to examine how digital transformation, supported by AI technologies, contributes to strengthening safety in Slovenia as a tourist destination. The study is based on qualitative research, using semi-structured interviews with experts in tourism, safety and technology. The findings show that AI facilitates faster and more accurate threat detection, improves crisis communication and enhances the perception of safety among tourists. At the same time, the research highlights challenges such as limited financial resources, insufficient digital competencies and lack of stakeholder collaboration. The study contributes to a better understanding of opportunities and barriers of digital transformation in tourism, and provides guidelines for innovative safety solutions to support the sustainable competitiveness of tourist destinations.

Keywords: tourism, safety, digital transformation, artificial intelligence, tourist destination

1. Introduction

Tourism is one of the fastest growing economic industries, yet also one of the most vulnerable, as it is strongly affected by global security threats – from terrorism and natural disasters to pandemics and political unrest (Ritchie et al., 2021; Gössling et al., 2020). When choosing a destination, modern tourists not only consider the attractiveness and price, but also the perceived level of safety and stability (George, 2003; Hall et al., 2012). Safety is therefore no longer an accompanying element of the tourist experience, but a key factor in destination competitiveness (Fuchs et al., 2006). Destinations that invest in safety and crisis management strengthen tourists' trust and secure long term competitive advantages (Ritchie, 2009; Tarlow, 2014). With the rapid development of digitalisation and artificial intelligence, tourism is facing new opportunities to ensure safety. Digital technologies enable real-time threat monitoring, automated data processing and innovative forms of crisis communication (Tussyadiah, 2017; Gretzel et al., 2015). AI-based solutions are increasingly recognised for their potential to anticipate and mitigate risks, improve responsiveness and foster personalised communication with tourists.

In this context, Slovenia as a tourist destination needs to seek new ways to integrate the digital transformation of safety into its development strategies, to become an even safer and more competitive destination. Slovenia is already internationally recognised as a safe and stable country, which represents one of its strongest competitive advantages in tourism. However, to sustain and further strengthen this position in the era of digital transformation, it is essential to examine how Slovenia integrates digital technologies into its tourism sector. Furthermore, the aim of this article is to examine the role of artificial intelligence in the digital transformation of safety in tourism and to identify the opportunities and challenges of its implementation in the Slovenian context (through qualitative research). The research is focused on understanding the challenges and opportunities brought by new technologies in terms of tourist safety, as well as on the cooperation among stakeholders in Slovenia, and it was designed based on four research questions (RQ):

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RQ1: In what ways (positive or negative) does artificial intelligence influence the state of safety at the tourist destination of Slovenia? For the first research question, we were interested in what impact artificial intelligence has on security – either positive or negative.

RQ2: What are the most common barriers to the implementation of digital safety solutions in tourism? With this question, we wanted to determine what specific obstacles tourist destinations and other stakeholders perceive when implementing digital security solutions.

RQ3: How does artificial intelligence contribute to the identification and prevention of safety threats? In this research question, we were interested in how AI contributes to greater tourist safety at the destination.

RQ4: How do different stakeholders cooperate in introducing artificial intelligence to ensure safety at the destination? For the last research question, we were interested in how cooperation takes place between various stakeholders in tourism for the purpose of ensuring safety at a tourist destination.

2. Literature review

Tourism and the importance of safety

Tourism is one of the most important economic sectors today, as it contributes to international cooperation, economic growth and cultural exchange (UN Tourism, 2025). However, due to global crises, it is also an extremely vulnerable sector. The sense of safety has become a decisive factor in destination choice, as tourists today seek not only attractive and affordable offers, but above all a safe and predictable environment (George, 2003; Ritchie et al., 2021). Research shows that security threats such as terrorism, crime, political instability, natural disasters, and health crises are among the most important reasons for a decline in tourist demand (Hall, 2002; Gössling et al., 2020). As Fuchs and Reichel (2006) point out, the perceived level of risk directly affects the image of a destination and thus tourist decision-making. Safety has become a strategic element of destination management, as it directly affects competitiveness and the long-term resilience of destinations (Hall et al., 2012). Destinations that position safety as a unique selling proposition (USP) build a positive image and differentiate themselves from competitors (Reeves, 1961; Mansfeld et al., 2006). Practical examples show that safety incidents can seriously damage a destination's reputation. After the terrorist attacks in Tunisia in 2015, tourism in the country significantly declined (World Travel & Tourism Council, 2016), while destinations such as Singapore and Japan, through active crisis communication and effective safety protocols, continue to reinforce their image as safe and trustworthy (Ho et al., 2024). In this context, Slovenia ranks among the safest countries in the world, as confirmed by the Global Peace Index (Institute for Economics & Peace, 2024). This represents a significant competitive advantage, as safety strengthens visitor trust, encourages tourist return, and contributes to the sustainable development of the destination.

Technology and safety in modern tourism

Technology plays a central role in managing risks, building trust, and enhancing experiences through tools such as mobile apps, Internet of Things (IoT) devices, and artificial intelligence (Tussyadiah, 2017; Gretzel et al., 2015). Technological innovations have transformed tourism, from reservation systems to smart destinations integrating IoT, Big Data, AI, and virtual reality (Buhalis et al., 2008; Gretzel et al., 2015; Neuhofer et al., 2015). Smart destinations, such as Gothenburg, Dublin, and Seville, use technology for safety, sustainability, and improved tourist experiences, combining digital tools with stakeholder collaboration (Boes et al. 2016; Gretzel, 2022). Real-time information, risk alerts, crowd management, and personalised services enhance both safety and competitiveness (Tarlow, 2014; Dinkosung et al., 2023). The integration of safety and technology forms the backbone of modern tourism, enabling destinations to remain resilient, attractive, and responsive in a rapidly changing global environment. In modern tourism, technology is not only supportive, but also central to ensuring safety, improving user experience and digital transformation (Dinkosung et al., 2023). Smart destinations, supported by advanced technologies such as IoT, AI, Big Data and mobile applications, increase tourist trust, reduce risks and create competitive advantages (Gretzel, 2022; Buhalis et al., 2013).

Smart destinations and digital transformation

The concept of a smart destination combines digitalisation, innovation and sustainable development. It involves the integration of technologies that enable efficient management of tourist flows, improved crisis communication and enhanced user experience (Gretzel et al., 2015). Based on multiple studies (Jeong et al., 2020; Baggio et al., 2020; Gretzel et al, 2015; Smart Tourism Destinations, 2021), smart destinations include:

- technological innovations (use of applications, IoT, Big Data, AI),
- sustainable development (promoting environmental, social and economic sustainability),
- stakeholders' participation (involving locals, businesses, municipalities and tourists in the co-management process),
- service personalisation (adapting content to individual target groups) and
- data management (collecting and analysing data, planning and optimising processes).

European smart tourism destinations like Gothenburg, Dublin, and Seville demonstrate how digital innovation, sustainability, and participatory planning enhance urban tourism. Gothenburg integrates IoT sensors for real-time environmental monitoring, and employs a digital twin to simulate urban development, optimise traffic, and involve citizens in decision-making, reducing environmental impact and improving quality of life (Göteborgs Stad, n.d.a; Göteborgs Stad, n.d.b; Gothenburg, n.d.). Dublin, recognised as the 2024 European Capital of Smart Tourism, combines AI-driven mobile apps, augmented reality, and accessible infrastructure to offer personalised cultural experiences while promoting sustainable mobility and local community participation (European Commission, b. d.; Fáilte Ireland, 2025). Seville uses AI-enabled Wi-Fi sensors, open data platforms, and accessibility-focused apps to manage tourist flows, support climate neutrality goals, and enhance visitor experiences, illustrating the integration of technology, sustainability, and social inclusion in smart destinations (Serrano, 2025; European Travel Commission, 2025; Smart Tourism, n. d.). Such practices illustrate how digital transformation contributes to the safety and sustainability of destinations.

Artificial intelligence in tourism

Artificial intelligence is one of the key technologies of digital transformation in tourism. It is defined as systems capable of human-like tasks such as learning, decision making and language processing (Russell et al., 2016) and is applied in different areas such as service automation and crisis management. In tourism, AI enables personalisation of services and recommendations (Liul, 2025), process automation (Bulchand-Gidumal, 2022), forecasting of tourist preferences and demands (George, 2024), identification and prevention of threats (Kumar et al., 2024). Chatbots, virtual assistants and automated translation improve accessibility and user experience (Tussyadiah, 2020; Ivanov et al., 2019); however, data protection remains a critical challenge in a modern, technologically supported world. Furthermore, ethical concerns also arise. A study conducted on the Airbnb platform showed that some hosts were less likely to accept reservations from guests with atypical names (such as African American or Latino names), meaning that algorithms consequently contributed to discrimination in access to accommodation. The systems learn from past bookings, which may reflect social biases and stereotypes. In this case, if a host had previously rejected certain groups, this pattern was continued and carried over into future AI decisions (Edelman et al., 2017). Overall, AI is becoming a cornerstone of modern tourism, but its benefits must be balanced with strong safeguards for privacy, ethics, and responsibility.

Additionally, artificial intelligence is increasingly integrated into safety management, transforming the way destinations respond to risks and build resilience. In this context, AI provides predictive analytics, anomaly detection, and decision support systems that enable destinations to anticipate risks and strengthen crisis management capacities (Ofusori et al., 2024; Kumar et al., 2018). Case studies demonstrate the practical use of AI in tourism: smart beaches equipped with IoT sensors monitor visitor flows and environmental conditions (Govekar et al., 2024), while AI-powered safety applications, such as Sitata, deliver real-time alerts and telemedicine support to travellers (Sitata, 2025). Biometric systems at airports, exemplified by Dubai's Unlimited Smart Travel, further enhance both security and efficiency (Travels Dubai, 2025).

3. Research methodology

For the empirical part of the study, we applied the interview method, which is one of the most commonly used qualitative approaches to collect data. A qualitative approach is appropriate in this study, as the implementation of artificial intelligence in tourism represents a new phenomenon with limited empirical evidence. We used semi-structured interviews to balance questions prepared in advance, with the flexibility for interviewees to answer freely. In total, five experts from Slovenia were interviewed, working at the intersection of tourism, safety and technology. The term expert is used in a gender-neutral way, referring equally to both men and women, and focuses primarily on their knowledge, skills, and competencies rather than gender. The participants were selected using purposive sampling based on their professional expertise, practical involvement and contribution to tourism development. The sample ensured heterogeneity – their professional backgrounds ranged from sustainable tourism and destination management to safety in tourism and stakeholder engagement. Collectively, they provided diverse perspectives grounded in both academic research and practical experience. Invitations for cooperation were sent via email, and interviews were conducted in August 2025, either live (one interview via Zoom) or in written form (four interviews via email). This hybrid approach enabled the experts to prepare detailed and reflective answers. The live interview lasted approximately 60 minutes and was audio recorded with consent, while written responses were treated equivalently to transcripts.

The data received was analysed through thematic analysis, which enabled the systematic identification of key themes, patterns and other findings. This method ensured a comprehensive understanding of how artificial intelligence and digital transformation intersect with safety in tourism. Terry et al. (2017) define thematic analysis as an approach to analysing textual data in which the researcher looks for patterns of meaning – so called themes. Themes are not frequent or repeated words, but they represent a broader meaning of what people are saying and how they understand a certain phenomenon. We used this method to better understand the perspectives of people. The analysis followed six phases according to Terry et al. (2017):

- familiarisation with the data (transcribing interviews, repeated reading, observations and impressions),
- coding (marking units in the data, creating codes),
- searching for themes (grouping codes into broader categories, identifying large patterns),

- reviewing themes (checking the relevance of the developed themes, merging and reshaping themes),
- defining and naming themes (identifying the core of each theme, forming the final themes that represent the main findings) and
- writing the report (presenting themes and analysing the data in relation to theory and research questions).

With this approach we identified four main sets of findings that correspond to the research questions. In Table 1, we gathered the identified themes with their corresponding codes and indicated in which interview they appeared. This type of presentation offers a clearer overview of the data analysis, followed by a more detailed explanation.

Table 1. Overview of themes, codes and their occurrence in interviews

Themes	Codes	Interviews in which we identified codes
The impact of artificial intelligence on safety in tourism	Threat identification, crisis communication, personalised tourist information, sense of trust, decision-making support, perception of potentially dangerous situations, improved destination reputation, dependence on technology, system vulnerability, privacy protection and data abuse, ethical dilemmas.	Interview 1, Interview 2, Interview 3, Interview 4, Interview 5
Barriers to implementing digital safety solutions	Lack of financial resources, high maintenance costs, legislation, GDPR, lack of cooperation between stakeholders, unclear legal framework, limited infrastructure, high costs, lack of qualified personnel, lack of knowledge of new technologies, reliability.	Interview 1, Interview 3, Interview 4, Interview 5
The contribution of artificial intelligence to identifying and preventing safety threats	Video analytics, biometric solutions, early warning systems, pattern recognition, predictive models, data analysis, automation, mobile applications, tourist information systems.	Interview 1, Interview 2, Interview 3, Interview 4, Interview 5
Stakeholder cooperation in implementing artificial intelligence in tourism	Separate actions of stakeholders, individual projects or pilot initiatives, lack of strategic coordination, not systemic, lack is pronounced, no systemic cooperation, lack of coordination.	Interview 1, Interview 3, Interview 4, Interview 5

Source: Authors' research

4. Research results and discussion

In this chapter, we present the findings of the conducted research. The results are structured according to the main themes that emerged from the thematic analysis and are discussed in relation to the research questions and existing literature. By combining empirical insights from expert interviews with theoretical perspectives, the chapter aims to provide a comprehensive understanding of the role of artificial intelligence in enhancing safety in tourism.

Theme 1: The impact of artificial intelligence on safety in tourism

The research results indicate that the use of artificial intelligence in tourist destinations is mostly perceived positively, primarily due to its ability to anticipate and prevent safety risks. The experts agreed that AI has a potentially positive impact on tourist safety, highlighting three main areas: faster threat detection, more effective crisis communication and strengthening the sense of tourist' trust. As one interviewee explained, AI-based solutions enable proactive risk management: "With the help of crowd analytics and AI powered video surveillance, we can detect potentially dangerous situations in advance and respond quickly" (Interviewee 2). Another participant emphasised the connection between safety, trust and destination competitiveness, stating that "Ensuring safety through AI increases tourist trust and enhances the destination's reputation, which influences its competitiveness" (Interviewee 1).

While the overall perception of AI was positive, the experts also identified potential risks, including overreliance on technology, vulnerability to cyberattacks, and concerns related to privacy. One expert noted that AI facilitates not only risk detection, but also personalised communication of threats to tourists, ensuring more responsive safety systems. However, as Interviewee 4 cautioned: "Technology is excellent, but we are dependent on its availability and accuracy. If an error occurs, it can lead to wrong decisions", highlighting the importance of system reliability and human oversight. These findings indicate that AI can enhance safety and service efficiency, yet ethical and technical challenges must be carefully managed. The results align with existing literature, which suggests that AI improves safety while introducing new challenges related to ethics and system reliability (George, 2024).

Theme 2: Barriers to implementing digital safety solutions

The experts identified several key barriers that are preventing the implementation of digital safety solutions in tourism. The main obstacles include financial constraints, a shortage of trained personnel, fragmented cooperation among stakeholders and an unclear legal framework. The regulatory environment was emphasised as particularly significant. As Interviewee 5 explained: “GDPR sets strict but necessary rules. The use of AI must be based on transparency, legality and data minimisation”, pointing to the balance required between innovation and compliance. Similarly, Interviewee 1 highlighted that regulatory fragmentation complicates implementation: “Each country has its own regulations, which makes it difficult to implement solutions.”

Coordination among destination actors was also identified as a challenge. Interviewee 5 observed: “Even the best technology won’t work if responsibilities and cooperation among different services are not clearly defined”, underscoring the importance of governance structures. Additional barriers included the lack of a strategic plan at the destination level and the high costs of implementation and maintenance. As Interviewee 1 noted: “Many destinations would like to use advanced systems, but the costs and maintenance of technology are simply too high for local budgets”, illustrating the financial limitations faced by smaller destinations. These findings are consistent with Ko et al. (2021), who note that smaller destinations often face barriers to implementing digital solutions due to limited resources and organisation complexity.

Theme 3: The contribution of artificial intelligence to identifying and preventing safety threats

Artificial intelligence enables various methods to enhance tourist safety, primarily through data analysis, risk prediction and process automation. The experts emphasised that AI also supports communication with tourists, which helps reduce risks. Despite optimism about AI’s potential, the participants stressed that technologies must be implemented thoughtfully, with respect for ethical principles and human rights. As Interviewee 3 explained: “Facial recognition and crowd analysis systems allow us to prevent potential incidents before they even happen”, demonstrating AI’s preventive capabilities.

The participants widely agreed that AI has become an indispensable tool to identify safety threats. Its applications include video analytics and smart surveillance systems, predictive models and data analysis, biometric identification and automated protocols, as well as mobile applications and tourist alert systems. As Interviewee 2 highlighted, AI-based tools already enhance real-time responsiveness: “Applications and smart systems notify tourists about dangers in real time – this is an important improvement compared to traditional methods”, illustrating how AI enhances responsiveness.

Despite these benefits, the experts noted that AI cannot fully prevent incidents, but can significantly shorten detection and response times. Interviewee 4 emphasised this limitation, stating: “AI cannot prevent an attack, but it can enable extremely fast investigation and identification of the perpetrator”, highlighting the role of AI as a supportive tool rather than a standalone solution. These findings confirm the work of Govekar et al. (2024), who argue that technology improves the tourist experience, increases safety and optimises resource use at destinations. AI thus enables proactive safety management, but its effectiveness depends on data quality and integration with other systems.

Theme 4: Stakeholder cooperation in implementing artificial intelligence in tourism

The analysis of interview results shows that cooperation among stakeholders is crucial for successful implementation of safety solutions. The public sector, local authorities, tourism providers and technology companies must all be involved and connected with each other. Interviewee 5 pointed out: “Without coordination between the municipality, police and providers, these solutions cannot be implemented effectively. Each actor must know their role and responsibilities”, underscoring the importance of structured collaboration.

However, current cooperation in Slovenia is limited and fragmented. Interviewee 4 noted: “In Slovenia, there are no major examples of systemic cooperation – only individual projects or pilot initiatives exist”, highlighting the absence of a comprehensive national strategy. Similarly, Interviewee 1 remarked: “Cooperation is improving but it is still not systematic. Strategic alignment among stakeholders and understanding of AI’s importance are missing”, indicating that stronger institutional frameworks are necessary. The experts agreed that the success of AI implementation depends directly on cooperation among the public sector, private companies, the academic world and local communities, and that the state should play a more active role in fostering coordination, financing and regulation. These observations support the findings of Gretzel et al. (2015) and Zvaigzne et al. (2023), who emphasise that stakeholder synergy is key to the success of digital innovation in tourism.

Based on the analysis of the interview results, several conclusions can be drawn. AI generally has a positive impact on tourist safety, although risks related to privacy and technology reliability must be addressed and managed. The main barriers to implementing digital safety solutions are of a financial, infrastructural and organisational nature, with stakeholder misalignment playing a crucial role. AI contributes to incident prevention and improves the tourist experience

through advanced analytics, process automation and service personalisation. The success of technology implementation depends on active cooperation and coordination among different stakeholders.

The research confirms that digital transformation, supported by artificial intelligence, offers new opportunities for enhancing safety in tourism. AI emerges as an important tool for early threat detection, real-time data analysis and crisis communication. Despite the recognised advantages, implementation in Slovenia remains limited due to financial constraints, insufficient digital competencies among tourism employees and the absence of strategic stakeholder cooperation. These findings align with Ko et al. (2021), who note that smaller destinations often lack sufficient resources for digital transformation. The future competitiveness of Slovenian tourism will therefore depend on the systematic integration of AI into destination development strategies. Although Slovenia ranks among the safest countries on the Global Peace Index, tourists increasingly expect safety to be supported by digital technologies.

5. Conclusion

Digital transformation has become one of the key drivers of modern society, with tourism being no exception as one of the fastest growing global sectors. Within tourism, safety has gained strategic importance, as it directly influences destinations, tourists and stakeholders. This article is focused on how digital transformation, particularly artificial intelligence, affects safety in tourism, with Slovenia serving as a case study. The aim was to explore how AI can contribute to greater tourist safety and strengthen Slovenia's position as a safe destination. While AI offers significant advantages in early threat detection, real-time data analysis and crisis communication, it also raises challenges such as ethics issues, privacy protection and technological limitations. Digital transformation of safety in tourism is therefore not only a technological matter, but also an organisational and legal process that requires the integration of people, processes and technology.

The empirical research, based on expert interviews, confirmed that AI is perceived as an opportunity to develop more resilient and competitive safety systems. Key findings show that AI improves data processing, risk prediction and communication with tourists – enhancing their sense of safety. However, the experts pointed out that successful implementation depends on stakeholder's cooperation, strategic planning and regulatory clarity. The digital transformation of safety in tourism is no longer optional, but necessary. Slovenia has many opportunities to adopt innovative solutions, but faces resource and coordination challenges. Destinations that effectively combine technology with collaboration and resources will gain a competitive advantage.

In conclusion, it can be emphasised that the digital transformation of safety in tourism represents an important area for the future development of the tourism industry. In this context, artificial intelligence has the potential to significantly enhance safety at destinations, but its success depends on careful and responsible implementation. Tourist destinations that manage to combine technological innovation, stakeholder collaboration, respect for ethical principles, and the strengthening of digital competencies will gain a significant competitive advantage in the future. For Slovenia, this represents an opportunity to position itself as a safe, innovative, and sustainable destination that can successfully integrate its natural and cultural assets with advanced technological solutions.

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