



TIJT, 35(1): 52-69
ISSN (print): 1974-2207
ISSN (online): 3034-9842
Received: 04-13-2026
Accepted: 09-08-2026
Published: 08-10-2026
DOI: 10.70732/tijt.v35i1.80
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Academic Research Paper

From smart cities to smart tourism: GenAI, aerotainment, and the future of tourist experiences

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Abstract:

Purpose - The digital transformation of urban systems is reshaping how tourism destinations are planned, managed, and marketed. Within this context, generative artificial intelligence (GenAI) offers emerging opportunities to enhance visitor experiences, operational efficiency, and sustainable destination development. However, existing research on GenAI-enabled aerotainment has primarily focused on airport-centred applications, such as passenger services, airport–visitor interactions, and airport–destination connectivity. This study aims to substantially extend this perspective by reconceptualizing GenAI-enabled aerotainment as a destination-wide governance capability within smart tourism cities. It develops a conceptual framework integrating airports, urban mobility systems, tourism stakeholders, destination management organizations, and public governance structures into adaptive, data-informed tourism ecosystems. The study also introduces the Urban Tourism Destination Pyramid as a conceptual model for analysing different levels of smart tourism maturity.

Design/methodology/approach - The study adopts a conceptual and prospective research design based on an integrative synthesis of literature addressing smart cities, smart tourism destinations, aerotainment, destination governance, digital twins, predictive analytics, and artificial intelligence. Rather than empirically testing causal relationships, the research develops a theoretically grounded framework through the conceptual integration of established knowledge across these fields. The

analysis identifies three complementary mechanisms through which GenAI can extend the conventional airport-centred understanding of aerotainment: predictive intelligence, adaptive personalization, and intelligent ecosystem coordination. These mechanisms are used to conceptualize how GenAI may support destination-wide decision-making, stakeholder interoperability, visitor-flow management, and adaptive tourism governance. Málaga is employed as an illustrative case to demonstrate how digital governance initiatives, technological infrastructure, and tourism policies can align with the proposed framework.

Originality/value - The study contributes to the emerging literature on GenAI-enabled aerotainment by substantially expanding its analytical scope from airport-centred applications to destination-wide governance. It integrates smart tourism city theory, systems thinking, and destination management to identify new mechanisms through which GenAI may influence tourism ecosystems. The Urban Tourism Destination Pyramid provides an additional conceptual tool for assessing smart tourism maturity. Future research should empirically validate the proposed relationships and examine their applicability across different tourism destinations and governance contexts.

Practical implications - The framework provides strategic guidance for destination management organizations, airports, tourism businesses, and public authorities seeking to integrate GenAI into smart tourism strategies. AI-supported personalization, predictive visitor-flow management, stakeholder coordination, and data-driven governance may strengthen destination capabilities and improve ecosystem responsiveness. However, effective implementation requires responsible approaches to data governance, interoperability, transparency, privacy protection, and sustainability. The framework therefore encourages stakeholders to view GenAI not simply as a technological tool, but as a potential capability for coordinating and governing increasingly interconnected smart tourism destinations.

Keywords: *Smart tourism cities, Generative artificial intelligence (GenAI), Aerotainment, Urban tourism management, digital visitor experience*

JEL Codes: L83, O33, R11

1. Introduction

In recent years, urban systems worldwide have experienced a profound transformation due to increasing digitalization. These changes have reshaped not only the physical infrastructure of cities but also the management of social, economic, and cultural activities. Tourism, in particular, has been significantly affected by these technological shifts, with cities leveraging digital tools to design, manage, and promote increasingly personalized and experiential tourism offerings. The integration of digital technologies—such as Internet of Things (IoT) devices, cloud computing, big data analytics, and mobile applications—enables cities to optimize resource allocation, enhance mobility, and improve the overall experience for residents and visitors alike.

Within this evolving context, the concept of smart cities has gained increasing attention. Smart cities are not merely technologically equipped; they are complex ecosystems where digital

infrastructure, governance, human capital, and urban services converge to create efficient, sustainable, and user-centered environments. The tourism sector has naturally emerged as a key arena for these developments, giving rise to the notion of smart tourism. Smart tourism emphasizes the use of advanced technologies to enhance visitor experience, optimize destination management, and promote sustainable and resilient tourism ecosystems. Within smart tourism, the distinction between "soft" dimensions—linked to cultural and social aspects—and "hard" dimensions—related to infrastructure and technological services—becomes particularly relevant (Myeong, Park, & Seo, 2018).

Despite the growing body of literature on artificial intelligence (AI) in tourism, the potential role of generative AI (GenAI) in the design and management of urban tourism destinations remains largely underexplored. GenAI, encompassing large language models, generative algorithms, and advanced predictive tools, offers unprecedented opportunities for creating personalized experiences, optimizing marketing strategies, and anticipating visitor behaviors. This study addresses this theoretical gap by examining the integration of GenAI with emerging technologies such as digital twins to develop predictive models, large-scale personalization strategies, and dynamic experience management in urban tourism contexts.

To achieve this, the study introduces the aerotainment paradigm, a holistic approach to destination management that integrates airports, transportation networks, and nearby attractions into a cohesive experiential system. Additionally, a theoretical framework—the Urban Tourism Destination Pyramid—is proposed to classify cities based on their smart tourism capabilities, infrastructure quality, and GenAI-enhanced services. Through this approach, the paper demonstrates how GenAI can serve as a transformative driver for urban tourism, fostering a democratization of experiences and promoting a shift toward data-driven destination management.

This article builds upon our previous conceptual study, towards a New Generation of Smart Tourism Cities: GenAI-Enabled Aerotainment (Florido-Benitez et al., 2025), which introduced the concept of aerotainment as an emerging paradigm for integrating airports, transport systems, and tourism attractions within smart tourism ecosystems. The previous work primarily established the theoretical foundations of GenAI-enabled aerotainment and proposed its initial conceptual architecture.

The present manuscript substantially extends that contribution in several respects. First, it develops a conceptual analysis explaining the causal mechanisms through which generative artificial intelligence transforms aerotainment from an infrastructure-oriented coordination model into a predictive and adaptive tourism ecosystem. Second, it advances the Urban Tourism Destination Pyramid by proposing an operational interpretation that distinguishes different stages of smart tourism maturity. Third, it broadens the theoretical framework by integrating smart cities, smart tourism, aerotainment, digital twins, and GenAI into a unified systems perspective. Fourth, it discusses the managerial and governance implications associated with AI-enabled destination management, including issues related to data governance, interoperability, and responsible AI. Finally, the paper illustrates the applicability of the framework through the Málaga Smart Tourism Destination case.

This article represents the next stage of the research programme initiated by Florido-Benítez and Coca-Stefaniak (2025). Whereas the previous study conceptualized GenAI-enabled aerotainment from an airport-centred perspective, the present article develops a broader destination governance framework and introduces additional theoretical constructs that substantially expand the scope of the original model.

2. Literature review and theoretical framework

2.1 Smart Cities, Smart Tourism, and the Role of Artificial Intelligence

Although the three concepts are closely related, they refer to different analytical levels. A smart city is understood as a digitally enabled urban ecosystem that integrates technology, governance, sustainability, and citizen participation with the aim of improving urban quality of life. A smart tourism destination (STD) refers to the application of smart technologies to destination management, tourism services, and visitor experiences, regardless of whether the destination is urban or rural (Gretzel & Koo, 2021). By contrast, a smart tourism city (STC) can be conceptualized as the intersection of these two domains, where an urban environment simultaneously functions as a smart city for residents and as a smart tourism destination for visitors. This study focuses on smart tourism cities because they appear to provide the institutional, technological, and infrastructural conditions that may support the implementation of GenAI-enabled aerotainment.

The smart city literature has emphasized that the digitalization of urban systems may represent an important factor in improving the efficiency, sustainability, and quality of urban life. Smart cities have been defined as complex ecosystems characterized by the integration of digital technologies, human capital, and institutional governance (Nam, 2011). Empirical studies have highlighted the role of information and communication technologies (ICT) in enabling more interconnected and data-driven urban systems (Neirotti, De Marco, Cagliano, Mangano, & Scorrano, 2014), suggesting that such systems may support more effective management of urban resources and services.

Similarly, the urban tourism literature has increasingly emphasized the importance of personalized experiences and service quality in destination competitiveness (Gretzel, Sigala, Xiang, & Koo, 2015). From this perspective, smart tourism has emerged as a conceptual extension of smart cities, focusing on the use of digital technologies to support visitor experiences and destination management processes. Within this literature, a distinction is often made between “soft” dimensions of tourism, associated with cultural and social experiences, and “hard” dimensions, related to physical infrastructure and technological systems (Myeong, Park, & Seo, 2018).

More recently, artificial intelligence (AI) has emerged as a significant area of innovation within tourism research. Existing studies have examined the role of AI in service automation, human–machine interaction, and tourism experience design (Liu, Li, & Zhang, 2025; Hall & Cooper, 2025). In particular, the development of large language models and generative artificial intelligence (GenAI) has opened new possibilities for the personalization of tourism experiences and the analysis of visitor behavior patterns (Gursoy, Chi, Lu, & Nunkoo, 2023; Hsu, Huang, & Chen, 2024). However, despite growing scholarly interest, the potential role of GenAI in territorial marketing and smart tourism destination design remains relatively underexplored (Dashkevych & Portnov, 2024).

The increasing use of social media, the sharing economy, and more immersive forms of tourism consumption has also contributed to the emergence of a more digitally engaged and information-intensive type of tourist. These visitors rely extensively on digital channels to access information related to airport services, flight connectivity, public transport availability and pricing, local attractions, accommodation, restaurants, and personalized tourism offerings. This information is

typically mediated by multiple actors within the tourism ecosystem, including destination marketing organizations (DMOs), online travel agencies (OTAs), and other stakeholders (McClanahan, 2024).

2.2 Aerotainment and Generative Artificial Intelligence in Smart Tourism Ecosystems

Within this evolving context, the concept of aerotainment has recently been introduced as a framework for understanding the integration of air transport infrastructure and tourism experiences. Florido-Benitez et al. (2025) conceptualized GenAI-enabled aerotainment as an emerging model in which generative artificial intelligence supports interactions among airports, tourism attractions, and destination stakeholders to improve visitor experiences. Their framework primarily focused on the airport as the central node of the tourism ecosystem, examining how GenAI could facilitate passenger services, information provision, stakeholder communication, and airport-related tourism activities. In this perspective, airports were conceptualized as strategic gateways connecting visitors with tourism destinations through intelligent digital services.

The present study should be understood as a conceptual extension of the framework proposed by Florido-Benitez et al. (2025), rather than as an alternative conceptualization. Whereas the original study conceptualized GenAI-enabled aerotainment primarily as an airport-centred model supporting passenger services, airport–visitor interactions, and airport–destination connectivity, this article expands its analytical scope by embedding aerotainment within the governance architecture of smart tourism cities. Airports therefore remain strategic gateways to destinations, but they are conceptualized as one component of a broader destination-wide ecosystem in which GenAI supports coordination among urban mobility systems, tourism services, destination management organizations (DMOs), public administrations, cultural attractions, accommodation providers, and local communities.

Consequently, the unit of analysis shifts from operational coordination within the airport ecosystem to strategic governance across the entire smart tourism ecosystem.

This broader perspective is consistent with recent research emphasizing that smart tourism cities can leverage digital innovation to strengthen the integration between transportation systems and tourism development (Marchesani & Masciarelli, 2025; Frétigny et al., 2024). Likewise, advances in information and communication technologies have enhanced both business-to-consumer (B2C) and business-to-business (B2B) interactions, enabling more informed decision-making and more integrated tourism services (Saravanan et al., 2024). Although proximity to airports often contributes to destination attractiveness, destinations characterized by exceptional cultural or natural heritage may achieve high competitiveness despite more limited accessibility (Napoli & Trapman, 2019; Canale et al., 2019). These observations suggest that airport connectivity should be interpreted as one component of a broader smart tourism ecosystem rather than as the sole determinant of destination performance.

Building on the concept of smart tourism cities (Gretzel & Koo, 2021), this study adopts a systems perspective originally proposed by Sessa (1988) and subsequently developed by Morrison et al. (2018) to capture the complex interactions among transportation systems, destinations, visitors, and stakeholders. Within this perspective, aerotainment is reconceptualized as a destination-wide subsystem of the smart tourism ecosystem in which GenAI supports predictive decision-making, adaptive service orchestration, and integrated governance across the tourism value network.

Accordingly, this article extends the conceptual framework proposed by Florido-Benitez et al. (2025) in three principal ways. First, it broadens the analytical scope from airport operations to

destination-wide governance by integrating the aerotainment concept with the theoretical foundations of smart tourism cities and destination governance. Second, it identifies three complementary theoretical mechanisms—predictive intelligence, adaptive personalization, and intelligent ecosystem coordination—through which GenAI may support strategic decision-making across interconnected tourism stakeholders rather than solely enhancing airport-related services. Third, it introduces the Urban Tourism Destination Pyramid as an operational conceptual model that explains different levels of smart tourism maturity and the governance capabilities required for AI-enabled destination development. Rather than proposing new empirical evidence, these contributions provide a theoretical extension of the original aerotainment framework and establish a foundation for future empirical research on GenAI-enabled smart tourism ecosystems.

Accordingly, this article should be understood as a substantially revised and expanded theoretical framework that extends the original aerotainment model beyond airport environments toward destination-scale governance and provides a foundation for future empirical research.

2.3 Conceptual analysis: How GenAI transforms aerotainment

The emergence of generative artificial intelligence (GenAI) has created new opportunities for extending the concept of aerotainment within smart tourism ecosystems. In its original formulation, aerotainment describes the integration of airports, transportation systems, visitor attractions, and tourism stakeholders within a coordinated destination network designed to enhance accessibility and visitor experiences (Florido-Benitez et al., 2025). Although this framework emphasizes coordination among multiple actors, decision-making remains largely based on predefined service configurations and historical information.

Building upon recent advances in artificial intelligence and smart tourism, this study proposes that GenAI may extend the aerotainment concept by introducing adaptive, data-driven decision-making capabilities. Previous studies have highlighted the growing role of AI in tourism personalization, service automation, and destination management (Gursoy et al., 2023; Hsu et al., 2024; Liu et al., 2025). However, the integration of GenAI into aerotainment has received limited scholarly attention. The present framework therefore conceptualizes three complementary mechanisms through which GenAI could reshape aerotainment within smart tourism cities.

The first mechanism is predictive intelligence. Research on smart tourism has demonstrated the value of predictive analytics for supporting tourism demand forecasting and destination management (Dashkevych & Portnov, 2024). Extending this literature, the proposed framework suggests that GenAI may enhance predictive capabilities by integrating heterogeneous data sources, including historical visitation patterns, flight schedules, weather forecasts, reservation systems, mobility data, and social media content. Such integration could assist destination managers in anticipating visitor demand, identifying potential congestion, and supporting more proactive resource allocation.

The second mechanism is adaptive personalization. Previous research has shown that artificial intelligence can improve recommendation systems by providing more personalized tourism experiences (Gursoy et al., 2023; Hsu et al., 2024). Building on these findings, the proposed framework argues that GenAI may move beyond conventional recommendation systems by dynamically generating contextualized itineraries that adapt to visitors' evolving preferences, real-time environmental conditions, transportation availability, accessibility requirements, and destination

capacity. Under this perspective, personalization becomes a continuous and adaptive process rather than a single recommendation generated before the trip.

The third mechanism is intelligent ecosystem coordination. The smart city and smart tourism literature emphasizes that effective destination management depends on collaboration among multiple stakeholders supported by interoperable digital infrastructures (Gretzel & Koo, 2021; Nam, 2011; Neirotti et al., 2014). Consistent with this perspective, the proposed framework suggests that GenAI may facilitate data exchange and coordinated decision-making among airports, transport operators, destination management organizations, accommodation providers, cultural institutions, and public authorities. By synthesizing information generated across the tourism ecosystem, GenAI could support the identification of operational bottlenecks, resource allocation decisions, and more coordinated communication among stakeholders. Taken together, these three mechanisms suggest a conceptual evolution of aerotainment. Rather than functioning solely as a coordinated infrastructure network, aerotainment may evolve toward a more adaptive ecosystem characterized by continuous learning and data-informed decision-making. Within this perspective, GenAI can be conceptualized as the cognitive layer of smart tourism cities, supporting the integration of transportation systems, tourism services, and destination governance through intelligent and adaptive processes.

It is important to emphasize that these mechanisms are proposed as theoretical propositions rather than empirically verified relationships. Their purpose is to provide a conceptual foundation for understanding how GenAI could contribute to the evolution of aerotainment and smart tourism ecosystems. Future empirical research should examine these propositions across different destination contexts and evaluate the extent to which the proposed mechanisms influence tourism management, visitor experiences, and destination performance.

3. Materials and methods

3.1 Research design

This study adopts a conceptual and prospective research design aimed at developing a theoretically grounded framework for understanding how generative artificial intelligence (GenAI) transforms aerotainment within smart tourism cities. Rather than testing causal relationships empirically, the study seeks to advance theory by integrating knowledge from several complementary research domains and proposing an analytical model that can guide future empirical research.

The research follows the principles of theory-building through conceptual synthesis. Specifically, it combines insights from smart city research, smart tourism destination studies, systems theory, aerotainment, and artificial intelligence literature to identify common constructs, explain their interrelationships, and develop a coherent conceptual framework. This approach is particularly appropriate for emerging phenomena, such as GenAI-enabled tourism ecosystems, where empirical evidence remains limited but theoretical integration is needed to support future hypothesis development and practical applications.

Accordingly, the study contributes by proposing a systems-based interpretation of smart tourism cities in which GenAI functions as the cognitive layer that enhances coordination among airports, transportation systems, tourism providers, destination management organizations (DMOs), local authorities, and visitors.

3.2 Literature selection

The conceptual framework was developed through a structured literature review designed to identify the principal theoretical contributions at the intersection of smart cities, smart tourism, artificial intelligence, and aerotainment. Although the review was not conducted as a formal systematic literature review or bibliometric analysis, a transparent and replicable search strategy was adopted to support the conceptual synthesis.

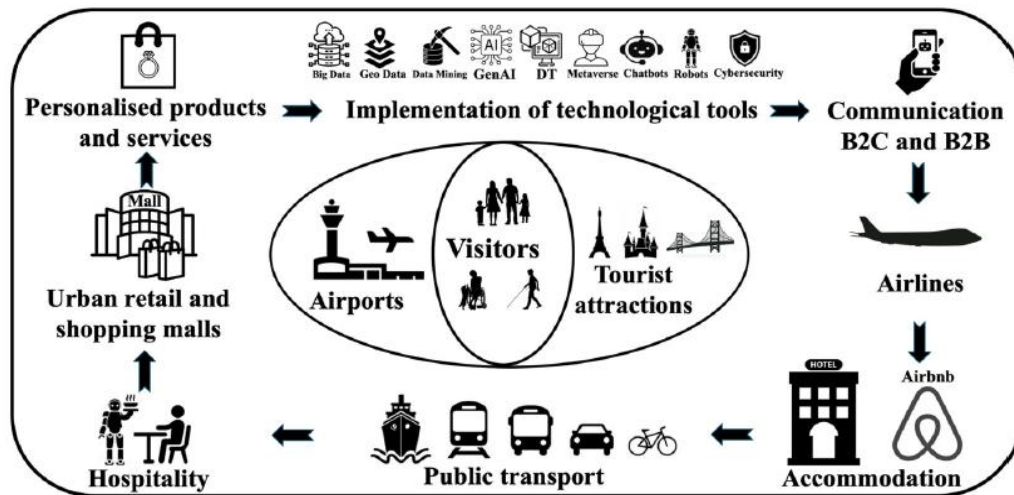
The literature search was conducted between January and April 2026 using the Scopus and Web of Science Core Collection databases, which were selected because of their broad coverage of high-quality peer-reviewed publications in tourism, management, information systems, and urban studies. To complement the academic literature, institutional reports and policy documents published by organisations such as the European Commission, UN Tourism, SEGITTUR, and the OECD were also consulted where relevant to provide contextual information on smart tourism policies and digital transformation. The search strategy combined keywords related to four main thematic areas: (1) smart cities and smart tourism ("smart city", "smart tourism", "smart tourism destination", "smart tourism city"); (2) artificial intelligence ("artificial intelligence", "generative artificial intelligence", "GenAI", "large language models"); (3) tourism management and destination governance ("destination management", "destination marketing", "visitor experience", "tourism ecosystem"); and (4) airport-related tourism ("aerotainment", "airport tourism", "airport connectivity", "air transport and tourism"). Boolean operators (AND/OR) were used to combine the search terms and identify publications addressing the intersections among these research domains.

The database searches initially identified 114 records. After removing 48 duplicate records, 66 publications remained for title and abstract screening. Screening excluded studies that (i) focused exclusively on technical aspects of artificial intelligence without implications for tourism or destination management; (ii) addressed aviation operations without considering tourism; (iii) examined tourism without reference to digital technologies or smart destinations; or (iv) were editorials, conference abstracts, book reviews, or non-peer-reviewed publications. Following this screening stage, 39 full-text publications were assessed for conceptual relevance.

The final corpus comprised 27 sources, including peer-reviewed journal articles, seminal theoretical contributions, and selected institutional reports. Priority was given to publications published between 2015 and 2025 to capture recent developments in generative artificial intelligence and smart tourism, while earlier foundational studies were retained where necessary to establish the theoretical foundations of systems theory, destination governance, and smart city research.

The selected literature was analysed using an iterative conceptual synthesis. During the first stage, the publications were coded according to their primary theoretical focus (smart cities, smart tourism destinations, aerotainment, artificial intelligence, destination governance, digital twins, and systems theory). In the second stage, recurring concepts, governance mechanisms, technological capabilities, stakeholder relationships, and destination management processes were compared across the different literature streams. Finally, the identified concepts were integrated into higher-order analytical categories that informed the development of the proposed conceptual framework and the three theoretical mechanisms through which GenAI may transform aerotainment within smart tourism cities.

Figure 1. Aerotainment in smart tourism destinations.



Source: Adapted from Florido-Benitez et al. (2025), *Towards a New Generation of Smart Tourism Cities: GenAI-Enabled Aerotainment*.

3.3 Framework development

Framework development followed an abductive and iterative process in which concepts from four complementary research domains were progressively integrated: (i) smart city research, (ii) smart tourism destination and smart tourism city literature, (iii) aerotainment theory, and (iv) artificial intelligence and generative AI applications in tourism.

Systems Theory (Sessa, 1988; Morrison et al., 2018) served as the overarching theoretical lens guiding this integration.

Under this perspective, smart tourism cities are conceptualized as adaptive socio-technical ecosystems composed of interconnected actors, infrastructures, technologies, and governance mechanisms.

Aerotainment represents the operational subsystem linking airports with tourism experiences, while GenAI constitutes the cognitive layer that enables continuous learning, predictive intelligence, adaptive personalization, and coordinated decision-making across the ecosystem.

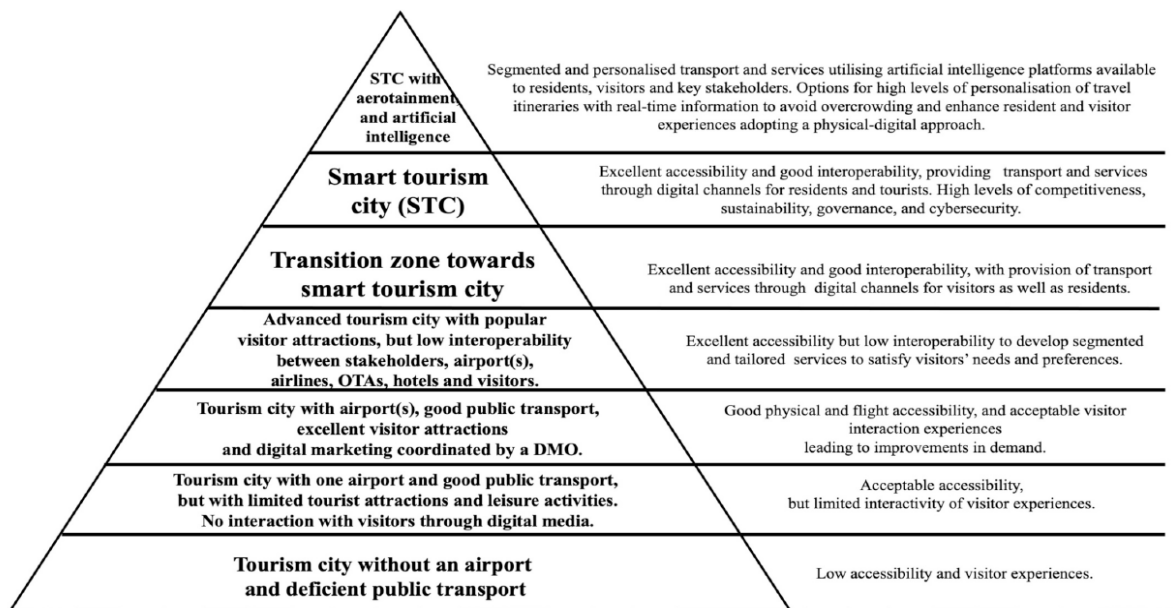
The conceptual analysis presented in Section 2.3 explains the mechanisms through which GenAI reshapes aerotainment.

Specifically, three complementary mechanisms—predictive intelligence, adaptive personalization, and intelligent ecosystem coordination—were identified as the principal processes through which GenAI enhances destination performance.

These mechanisms collectively underpin the proposed Urban Tourism Destination Pyramid, which illustrates the evolution from traditional tourism cities toward AI-enhanced smart tourism ecosystems.

Finally, the framework was illustrated through the case of Málaga. The case is not intended to validate the framework empirically but to demonstrate how its theoretical components can be interpreted within a real smart tourism destination and to identify opportunities for future empirical testing.

Figure 2. The urban destination tourism pyramid - from traditional tourism cities to AI-enhanced aerotainment.



Source: Adapted from Florido-Benitez et al. (2025), Towards a New Generation of Smart Tourism Cities: GenAI-Enabled Aerotainment.

3.4 Illustrative case study: Málaga

To illustrate the practical applicability of the proposed conceptual framework, this study adopts Málaga as an illustrative case study. In conceptual research, illustrative cases are used to demonstrate how theoretical constructs can be interpreted in real-world contexts rather than to provide empirical validation. Accordingly, the Málaga case serves to exemplify how the proposed systems-based framework may be applied to understand the integration of smart tourism policies, airport connectivity, stakeholder coordination, and emerging AI technologies within a smart tourism city.

Málaga was selected for three principal reasons. First, it is internationally recognised as one of Europe's leading Smart Tourism Destinations (STDs), reflecting sustained investments in digital transformation, sustainable governance, accessibility, and innovation. Second, the city benefits from strong international air connectivity through Málaga-Costa del Sol Airport, which functions as a strategic gateway to multiple destinations across the Costa del Sol and Andalusia. This regional connectivity closely reflects the aerotainment perspective adopted in this study, where airports facilitate access to interconnected tourism ecosystems rather than serving only individual urban destinations. Third, Málaga has progressively implemented integrated digital governance initiatives that make it an appropriate setting for illustrating the potential role of GenAI in coordinating destination stakeholders and enhancing visitor experiences.

Over the past two decades, Málaga has experienced sustained growth in tourism, logistics, and foreign investment while simultaneously investing in digital infrastructure, sustainable mobility, accessibility, and cultural heritage. These initiatives, aligned with the United Nations 2030 Agenda,

include the Sustainable Urban Mobility Plan (PMUS), the E-Mob Accelerator, the Zero Emissions Mobility to All (ZEM2ALL) programme, and the Andalusian Bicycle Plan. Collectively, these policies have strengthened urban resilience, environmental sustainability, and the digitalisation of tourism-related services.

At the national level, Spain has supported the digital transformation of tourism through the Smart Tourism Destinations (Destinos Turísticos Inteligentes—DTI) programme developed by SEGITTUR. The DTI framework promotes destination development across five strategic dimensions—governance, technology, innovation, accessibility, and sustainability—through diagnostic assessments, stakeholder collaboration, and continuous improvement plans. The programme provides an institutional environment that is highly consistent with the systems perspective adopted in this study, emphasizing collaboration among public authorities, tourism businesses, technology providers, local communities, and visitors.

The Costa del Sol, including Málaga, was among the first Spanish destinations to implement the DTI methodology. Previous studies (Sánchez-Teba et al., 2020) indicate that this approach has strengthened destination governance and encouraged more integrated and sustainable tourism management. Although earlier assessments identified challenges related to interdepartmental coordination and financial resources (Perea Medina et al., 2017), continued investments in digital governance, sustainability, and destination marketing have progressively enhanced Málaga's competitiveness and smart tourism capabilities.

From the perspective of the framework proposed in this study, Málaga illustrates how a smart tourism city can evolve into an adaptive tourism ecosystem in which airports, transportation systems, tourism providers, destination management organizations (DMOs), public authorities, and visitors operate as interconnected actors. While GenAI has not yet been fully integrated across all destination functions, Málaga's digital infrastructure, governance capacity, and collaborative ecosystem provide favourable conditions for the future implementation of AI-enabled aerotainment. The case therefore demonstrates how the proposed theoretical framework can support the interpretation of emerging destination management practices and offers a foundation for future empirical research examining the impact of GenAI on smart tourism ecosystems

4. Results

The proposed conceptual framework suggests that integrating digital technologies—including Internet of Things (IoT) infrastructures, predictive analytics, digital twins, and AI-based decision-support systems—may enhance the management of urban tourism destinations. Rather than providing empirical verification, the framework synthesizes existing knowledge to explain how these technologies could contribute to smarter destination governance. Previous empirical studies have reported associations between digital technologies and improvements in visitor-flow management, public transport coordination, resource allocation, and destination governance in leading smart tourism destinations such as Málaga, Singapore, Seoul, and Helsinki (Sánchez-Teba et al., 2020; Gretzel & Koo, 2021; Dashkevych & Portnov, 2024). These findings provide contextual evidence that is broadly consistent with the conceptual relationships proposed in this study but should not be interpreted as empirical validation of the present framework.

Based on the concept of aerotainment, urban tourism destinations can be conceptually classified according to the quality of services offered, including air connectivity, efficient public transportation, and the degree of technological support for visitor experiences. The proposed Pyramid of Urban Tourism Destinations (Figure 2) illustrates this theoretical spectrum. Cities with limited airport accessibility or underdeveloped public transportation systems occupy the base of the pyramid, whereas smart tourism cities integrating GenAI-enhanced services are positioned at higher levels, reflecting progressively greater capabilities to support personalized itineraries, contextualized recommendations, and adaptive visitor experiences.

From a theoretical perspective, the proposed framework suggests that GenAI-enabled aerotainment may generate several complementary mechanisms that could influence destination management. First, the framework proposes that GenAI may support more personalized and contextualized visitor experiences, which, under appropriate implementation conditions, could contribute to higher levels of visitor engagement and satisfaction. Second, intelligent automation and data-driven service customization may contribute to greater operational efficiency while expanding the diversity and quality of tourism offerings. Third, the integration of GenAI into destination management and digital communication strategies may contribute to strengthening destinations' online visibility and brand equity (Chan & Choi, 2025; Tian & Tang, 2025).

The framework further proposes that collecting and analysing real-time data from visitors, IoT devices, and digital platforms could enable more predictive approaches to tourism flow management. Such capabilities may assist destination managers in anticipating demand patterns, optimizing resource allocation, mitigating overcrowding, and improving service coordination. These potential benefits should be regarded as theoretical expectations derived from the conceptual framework and require empirical validation across different destination contexts.

The framework also acknowledges that, although proximity to airports is generally associated with destination attractiveness, notable exceptions exist, such as UNESCO World Heritage Sites, which continue to attract substantial visitor flows despite relatively limited accessibility. This observation suggests that destinations operating in geographically constrained contexts may nevertheless develop smart tourism models by leveraging digital technologies to improve destination visibility, facilitate access to attractions, and design alternative visitor itineraries. From this perspective, emerging technologies may support more adaptive and sustainable approaches to destination management (Dashkevych & Portnov, 2024; Kouroupi & Metaxas, 2023).

Rather than proposing a universal model, the framework suggests that destinations may position themselves at different levels of the Pyramid of Urban Tourism Destinations according to their strategic objectives, resource availability, and institutional capabilities. This perspective recognizes that smart tourism development is likely to be evolutionary rather than uniform, allowing destinations to adopt digital solutions incrementally and align technological investments with local priorities and stakeholder needs. Such flexibility may also facilitate the co-creation of tourism experiences involving public authorities, private operators, local communities, and visitors, thereby supporting destination resilience and long-term socio-economic sustainability.

The framework further proposes that the principal contribution of GenAI may extend beyond technological innovation to encompass organizational transformation. Whereas conventional smart tourism initiatives primarily digitalize existing services, GenAI could enable destinations to redesign decision-making processes around continuous learning, predictive adaptation, and data-informed

governance. Accordingly, the framework suggests that future destination competitiveness may increasingly be influenced by the ability to integrate heterogeneous data sources into intelligent decision-support systems rather than solely expanding digital infrastructure. This proposition remains theoretical and should be examined through future empirical research. From this perspective, the framework highlights the potential strategic importance of data governance, interoperability, and collaborative ecosystems involving airports, public administrations, tourism businesses, and local communities.

While GenAI presents significant opportunities for advancing smart tourism destinations, its implementation also raises important governance and ethical challenges. The increasing reliance on visitor data requires robust mechanisms to ensure privacy protection, data ownership, cybersecurity, and compliance with regulatory frameworks such as the General Data Protection Regulation (GDPR). Destination management organisations and public authorities should therefore establish transparent data governance policies that clearly define responsibilities for collecting, processing, and sharing tourism-related information.

Algorithmic bias represents another important challenge. Because GenAI systems learn from historical and user-generated data, recommendations may unintentionally reinforce existing inequalities, favour certain attractions over others, or underrepresent minority communities and less-visited destinations. Accordingly, explainable and transparent AI models are likely to become essential for maintaining public trust and promoting equitable tourism development.

Platform dependency also warrants careful consideration. Increasing reliance on proprietary AI platforms may reduce the strategic autonomy of destinations and increase dependence on external technology providers. Developing interoperable and open digital ecosystems could therefore strengthen institutional resilience while facilitating collaboration among airports, transport operators, tourism businesses, destination management organisations, and local governments.

Finally, the framework suggests that the implementation of GenAI should seek to balance visitor experiences with residents' quality of life and long-term sustainability. Intelligent tourism management should therefore pursue not only economic competitiveness but also environmental responsibility, social inclusion, and the equitable distribution of tourism benefits across local communities. From this perspective, responsible AI governance is conceptualized as a foundational component of future smart tourism ecosystems rather than as an empirically established outcome.

5. Discussion, conclusions, and future implications

This study contributes to the smart tourism literature by proposing an integrated theoretical framework that combines Systems Theory, the concept of smart tourism cities, aerotainment, and generative artificial intelligence (GenAI) into a unified analytical model. Rather than conceptualizing GenAI solely as a technological innovation, the framework positions it as the cognitive layer of smart tourism ecosystems, supporting adaptive coordination among airports, transport systems, destination management organisations (DMOs), tourism businesses, public authorities, residents, and visitors. In doing so, the study extends existing research on smart tourism by explaining the mechanisms through which GenAI may enhance ecosystem coordination through predictive intelligence, adaptive personalization, and intelligent stakeholder collaboration.

From a policy perspective, the framework suggests that the successful evolution of smart tourism cities depends not only on technological investments but also on effective governance and institutional capacity. Local administrations play a central role in establishing regulatory frameworks, promoting stakeholder collaboration, ensuring interoperability among digital platforms, and supporting responsible data governance. Likewise, reducing the digital divide remains an important prerequisite for the inclusive development of smart tourism ecosystems, requiring continued investment in digital infrastructure, digital literacy, and participatory governance that actively involves public institutions, private organisations, local communities, and visitors.

The framework also highlights the growing strategic importance of visitor data within destination management. Subject to appropriate ethical safeguards and regulatory compliance, the collection and analysis of information on visitor expectations, preferences, mobility patterns, and behaviour may support more adaptive tourism planning and more responsive destination management. In this context, GenAI has the potential to assist destination managers by synthesising heterogeneous information sources, generating contextual recommendations, and supporting evidence-informed decision-making. Rather than replacing human judgement, the framework conceptualizes GenAI as a decision-support capability that complements managerial expertise and facilitates coordination across tourism ecosystems.

The proposed framework further suggests that destination management may progressively evolve from reactive operational practices toward more adaptive and predictive governance models. As digital ecosystems mature, data-driven approaches could increasingly support transport coordination, visitor flow management, destination marketing, and resource planning. Similarly, adaptive personalization may become more widely accessible as AI technologies become increasingly integrated into tourism services, potentially broadening access to customized visitor experiences across different market segments.

However, the extent to which these developments occur will depend on technological maturity, institutional readiness, regulatory environments, and the availability of high-quality data.

Within this perspective, aerotainment represents more than an operational connection between airports and tourism attractions. The framework conceptualizes aerotainment as a strategic subsystem of smart tourism cities that integrates mobility infrastructure, tourism services, and stakeholder collaboration within a continuously learning ecosystem. GenAI extends this concept by supporting adaptive coordination and information exchange across the destination, thereby providing a theoretical basis for understanding how airports may contribute to broader destination governance rather than functioning solely as transport hubs. Like all conceptual research, this study has several limitations. The proposed framework has not been empirically tested, and the relationships among GenAI, aerotainment, and destination performance remain theoretical. Moreover, the illustrative case of Málaga is intended to demonstrate the applicability of the framework rather than to validate it. Consequently, the framework should be regarded as a foundation for future empirical investigation rather than as evidence of causal relationships.

Future research should therefore examine the proposed framework through comparative case studies, surveys, longitudinal analyses, and quantitative modelling across different categories of smart tourism cities. In particular, empirical studies could investigate whether the three mechanisms identified in this study—predictive intelligence, adaptive personalization, and intelligent ecosystem coordination—are associated with differences in destination governance, stakeholder collaboration,

visitor experience, operational performance, and sustainability outcomes. Comparative analyses across destinations with different levels of digital maturity would also contribute to refining the Urban Tourism Destination Pyramid and assessing its applicability across diverse institutional and geographical contexts.

Overall, this study argues that the future development of smart tourism cities is likely to depend not only on the adoption of advanced digital technologies but also on their integration within collaborative, adaptive, and well-governed tourism ecosystems. By conceptualizing GenAI as the cognitive layer of AI-enhanced aerotainment, the proposed framework offers a theoretically grounded perspective for understanding how intelligent technologies may support the evolution of next-generation smart tourism destinations while identifying a broad research agenda for future empirical validation.

Acknowledgments

No external funding was received for this study.

Conflict of interest

The author declares no conflicts of interest in this paper.

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