Tomorrow's Tourism: How Oran is Inspired by Barcelona to Become a Smart City

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Abstract :

This paper examines the potential of Oran, Algeria, to become a "smart" tourism destination by leveraging digital technologies and Artificial Intelligence (AI). The objective is to analyze the city's emerging initiatives and compare them with the proven strategies of a pioneering smart tourism city, Barcelona. The study adopts a qualitative, comparative approach combining a review of the literature on "smart cities" and "smart tourism destinations" with an analysis of current digitalization projects in Oran. The findings reveal that Oran's initiatives remain fragmented, lacking an integrated framework to connect technological innovation, governance, and tourism development. Drawing lessons from Barcelona's experience, the study proposes a strategic framework for Oran's transformation into a sustainable, citizen-centric smart tourism destination. The paper highlights the importance of cohesive governance, open data policies, and community engagement to ensure that digital tools effectively enhance the visitor experience, promote sustainability, and strengthen the city's global attractiveness.

***Key Words*:** Smart City, Tourism, Oran, Barcelona, Smart Tourism

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Introduction :

In recent years, the concept of the smart city has evolved from a purely technological ambition into a multidimensional paradigm that integrates innovation, sustainability, governance, and citizen participation (Almulhim & Yigitcanlar, 2025).Urban spaces are increasingly leveraging digital infrastructures, data-driven systems, and artificial intelligence to enhance efficiency, improve service delivery, and elevate quality of life (Bibri & Krogstie, 2020). Within this transformation, tourism one of the most dynamic and globally significant economic sectors has undergone a parallel shift, giving rise to the concept of the smart tourism destination, which combines urban intelligence with digital tools to deliver personalized and value-added visitor experiences (Pencarelli, 2020).

The Mediterranean region has been particularly active in this evolution. Among its leading examples, Barcelona stands out as a pioneering smart tourism city that has successfully integrated digital innovation, sustainability principles, and participatory governance within its urban and tourism management model (Ivars-Baidal & al, 2024) . This integrated approach illustrates how technologies such as artificial intelligence and data analytics can be used to balance tourism growth with environmental sustainability and residents' well-being (Guernier, 2023).

In contrast, although Oran, Algeria's second-largest city and a key cultural and economic hub on the southern Mediterranean coast, possesses significant tourism potential rooted in its history, architecture, and maritime identity (Perry, 2019). Despite its significant potential, Oran has not yet fully capitalized on digital transformation to structure its tourism development in an integrated and sustainable manner. However, recent national strategies such as "**Algeria Digital 2030 vision"**, along with emerging local initiatives in digital governance, suggest that the foundations for a smart transition are gradually being established and the conditions for transformation are emerging (Njoya, 2025).

This research aims to explore how Oran can draw lessons from Barcelona's successful smart city and smart tourism experiences to develop its own sustainable digital tourism model. The central research question guiding this study is: **How can Oran transition from fragmented digital initiatives to an integrated smart tourism strategy inspired by the Barcelona model?**

This study is based on the hypothesis that Oran's transition toward a smart tourism destination can be significantly accelerated by adopting an integrated framework inspired by successful international experiences, particularly the model developed by Barcelona. Such a framework would enable the city to overcome fragmentation, strengthen governance coordination, and enhance the use of digital technologies in tourism management.

To test this hypothesis, the study adopts a qualitative and comparative research design. It combines a systematic literature review on smart cities and smart tourism destinations with a case-study analysis of Barcelona's smart tourism model and Oran's current digital initiatives. This comparative approach allows for the identification of gaps, best practices, and transferable strategies applicable to Oran's context.

The research relies on multiple analytical tools, including: Literature review analysis to synthesize academic perspectives on smart cities and smart tourism; Comparative case study analysis between Barcelona and Oran; Thematic analysis to identify key dimensions such as governance, digital infrastructure, and citizen engagement; and Secondary data analysis from academic publications, policy documents, and official reports related to digital transformation and tourism development.

To address this question and test hypothesis, the paper first reviews relevant literature on smart cities and smart tourism destinations, then presents the methodology used for comparative analysis. It subsequently examines Barcelona's practices and Oran's current initiatives before discussing key insights and proposing a strategic framework for Oran's smart tourism transformation.

I. Literature Review

This section presents the key theoretical concepts and foundational frameworks supporting our research:

1. Smart Cities: From Technological Infrastructure to Integrated Urban Ecosystems

The concept of the smart city has undergone significant evolution over the past two decades. Early interpretations were largely technology-driven, emphasizing the deployment of information and communication technologies (ICTs) to improve urban efficiency and infrastructure management (Hall & al, 2000). However, subsequent research has progressively reframed smart cities as complex socio-technical systems that integrate technological, human, and institutional dimensions (Caragliu & al, 2011).

A widely cited definition by (Caragliu & al, 2011) conceptualizes smart cities as urban areas that invest in human and social capital, alongside traditional and modern communication infrastructure, to promote sustainable economic growth and a high quality of life, with wise management of natural resources through participatory governance. This perspective marked a shift toward a more holistic understanding, further reinforced by works such as those of (Hollands, 2008), who critically questioned purely techno-centric approaches, and (Nam & Pardo, 2011), who emphasized the interaction between technology, people, and institutions.

More recent contributions have expanded this framework by integrating sustainability and resilience as core components. For instance, (Bibri & Krogstie, 2020) highlight the role of big data analytics and artificial intelligence in enabling data-driven urban governance, while (Yigitcanlar & al, 2019) argue that smart cities must align technological innovation with environmental sustainability and social inclusiveness. Similarly, (Kummitha & Crutzen, 2017) propose a staged model of smart city development, evolving from technology-oriented to citizen-centric approaches.

Despite these advances, the literature points to persistent challenges, particularly in developing and emerging cities, where digital transformation is often hindered by institutional fragmentation, limited governance capacity, and insufficient stakeholder coordination (Angelidou, 2017). These limitations are especially relevant when considering the application of smart city principles to sector-specific domains such as tourism.

2. Smart Tourism Destinations: Conceptual Foundations and Key Dimensions

The notion of the smart tourism destination (STD) emerges at the intersection of smart city frameworks and tourism management. (Gretzel & al, 2015) define smart tourism destinations as ecosystems that integrate advanced technologies, data sharing, and stakeholder collaboration to enhance both tourist experiences and destination management. This definition emphasizes the systemic and networked nature of smart tourism, where value is co-created through interactions among tourists, businesses, and public institutions.

Building on this perspective, (Buhalis & Amaranggana, 2015) conceptualize STDs as destinations that leverage ICTs to achieve competitiveness, sustainability, and enhanced visitor satisfaction. Their model identifies key dimensions such as digital infrastructure, real-time data utilization, personalization of services, and stakeholder integration.

Recent studies have further enriched this framework by incorporating emerging technologies such as artificial intelligence, the Internet of Things (IoT), and big data analytics. For example, (Li & al, 2017) highlight how data-driven insights can optimize tourism flows and improve decision-making processes, while (Del Vecchio & al, 2018) emphasize the role of innovation ecosystems in fostering smart tourism development.

In parallel, sustainability has become a central concern in the STD literature. According to (Gössling, 2018), smart tourism must address environmental pressures and promote responsible travel practices.

Nevertheless, several scholars point out that many destinations struggle to move beyond isolated digital initiatives toward fully integrated smart tourism systems (Pencarelli T. , 2020). This gap highlights the importance of governance coordination, strategic vision, and institutional capacity factors that are particularly challenging in emerging contexts.

3. Governance, Data, and Citizen Engagement in Smart Tourism

Governance represents a critical dimension in both smart city and smart tourism frameworks. Effective smart tourism development requires coordinated action among multiple stakeholders, including public authorities, private sector actors, technology providers, and local communities (Bramwell & Lane, 2011).

Recent literature emphasizes the transition from hierarchical governance models to more collaborative and participatory approaches. For instance, (Koo & al, 2016) argue that smart tourism ecosystems rely on open data platforms and real-time information sharing to facilitate decision-making and enhance transparency. Similarly, (Neuhofer & al, 2015) highlight the importance of co-creation, where tourists actively participate in shaping their experiences through digital interactions.

Citizen engagement is also increasingly recognized as a key component of smart tourism. According to (Buhalis & al, 2019), involving residents in tourism planning contributes to social sustainability and improves the acceptance of tourism development. This is particularly important in addressing issues such as overtourism and urban congestion.

However, implementing such governance models remains challenging, especially in cities with limited digital maturity. Studies by (Meijer & Bolívar, 2016) indicate that institutional barriers, lack of interoperability, and insufficient policy alignment often hinder the effectiveness of smart initiatives.

4. Barcelona as a Benchmark for Smart Tourism Development

Barcelona is widely recognized as one of the most advanced examples of a smart tourism destination. Its success is largely attributed to the integration of digital technologies within a broader urban strategy that combines innovation, sustainability, and participatory governance (Ivars-Baidal & al, 2024).

The city has developed a comprehensive digital ecosystem, including open data platforms, smart mobility solutions, and real-time tourism management systems. Barcelona's approach enables authorities to monitor tourist flows, optimize resource allocation, and mitigate negative externalities associated with mass tourism.

Moreover, Barcelona has been at the forefront of using data analytics and artificial intelligence to enhance visitor experiences while ensuring residents' well-being (Bakici & al, 2012). Its governance model emphasizes collaboration between public institutions, private stakeholders, and citizens, thereby fostering innovation and resilience (Tomàs, 2024)

Despite its success, the Barcelona model is not without limitations. Scholars such as (Milano & al, 2019) highlight challenges related to overtourism and social tensions, suggesting that even advanced smart tourism destinations must continuously adapt their strategies. Nevertheless, Barcelona remains a valuable benchmark for cities seeking to develop integrated smart tourism frameworks.

5. Smart Tourism in Emerging Contexts: Challenges and Opportunities for Oran

While the smart tourism paradigm has been extensively studied in developed regions, its application in emerging contexts remains relatively underexplored. Cities in North Africa, including Oran, face specific challenges related to digital infrastructure, governance capacity, and resource constraints (UNWTO, 2022).

Existing studies on tourism development in Algeria emphasize the country's significant potential, particularly in coastal cities such as Oran, which benefit from rich cultural heritage and strategic geographic positioning (Perry, 2019). However, the integration of digital technologies into tourism management remains limited and fragmented.

Recent policy initiatives, such as Algeria's digital transformation strategies, indicate a growing awareness of the importance of digitalization. Nevertheless, as noted by (Njoya, 2025), these efforts often lack coordination and a clear strategic framework, limiting their overall impact.

This gap underscores the need for context-specific models that adapt global smart tourism principles to local realities. Comparative approaches, particularly those drawing on successful cases such as Barcelona, offer valuable insights into how emerging destinations can structure their digital transformation processes.

6. Research Gap and Contribution

Despite the growing body of literature on smart cities and smart tourism destinations, several gaps remain. First, there is a limited number of studies focusing on the application of smart tourism frameworks in North African cities. Second, existing research often lacks comparative analyses that link theoretical models with practical implementation in emerging contexts.

This study addresses these gaps by proposing a comparative analysis between Barcelona and Oran in order to identify transferable strategies and contextual adaptations. It contributes to the literature by extending the geographical scope of smart tourism research and by offering a structured framework for the development of smart tourism destinations in emerging urban environments.

II. Methodology

This study employs a qualitative comparative approach aimed at exploring how Oran can adapt lessons from Barcelona to design and implement a viable smart tourism strategy. The methodology combines documentary analysis and comparative case study methods to identify transferable practices, contextual challenges, and innovation pathways applicable to Oran's evolving urban and tourism systems.

1. Research Design

The research design integrates two complementary methodological components, ensuring both conceptual depth and empirical relevance:

Systematic Literature Review – A critical review of academic and policy sources addressing smart cities, digital transformation, and smart tourism destinations. This step provided the theoretical foundation and helped identify relevant frameworks (e.g., UNWTO, European Smart Cities Model).

Comparative Case Study Analysis – A structured comparison between Oran and Barcelona across selected analytical dimensions. This method allows the exploration of similarities and divergences between an established model (Barcelona) and an emerging city (Oran) that is in the process of digital transition.

The choice of Barcelona as a reference case is justified by its international reputation as a benchmark for smart urban governance and sustainable tourism management. Oran was selected as a case of potential transformation, representing a Mediterranean city seeking to modernize its tourism offer and governance practices through digitalization.

2. Data Collection

Data were collected from a diverse range of primary and secondary sources to ensure triangulation and analytical reliability. The corpus includes:

- Academic publications and conference papers (2010–2024) covering smart cities, AI applications in tourism, and Mediterranean urban innovation;
- Policy documents and institutional reports from Barcelona City Council, Turisme de Barcelona, and the European Smart Cities Observatory;
- Municipal and national Algerian documents related to digital governance, tourism development, and the Plan Numérique 2030;
- Statements, interviews, and public communications (2021–2024) from Oran's local authorities and tourism offices;
- Complementary secondary materials, such as press releases, media coverage, and NGO reports focusing on digital inclusion, urban sustainability, and cultural heritage.

All documents were reviewed through qualitative content analysis, identifying key themes, policies, and initiatives relevant to thefive analytical dimensions described below.

3. Analytical Framework

The comparative analysis is structured around five key dimensions, derived from the conceptual models of UNWTO (2019) and Giffinger et al. (2007), which provide a multidimensional understanding of smart destinations and cities:

- Governance and Coordination – Examining the institutional mechanisms, stakeholder networks, and policy coherence shaping smart tourism governance.
- Digital Infrastructure and Open Data – Assessing the role of ICT, data platforms, and interoperability in supporting digital tourism ecosystems.
- Sustainability and Mobility – Evaluating how environmental management and smart mobility solutions contribute to sustainable visitor experiences.
- Tourism Experience and Cultural Promotion – Analyzing digital tools used to enhance heritage valorization, tourist satisfaction, and destination branding.

- Citizen and Stakeholder Engagement – Investigating participatory approaches, co-creation practices, and the integration of residents into tourism planning.

This analytical framework allows for both vertical (within-case) and horizontal (cross-case) comparison, identifying contextual constraints and transferable lessons.

4. Limitations

This research is primarily exploratory and subject to certain limitations. The availability and transparency of official data in Oran remain partial, as many digital and tourism projects are either ongoing or unpublished. Consequently, the analysis relies mainly on secondary sources and qualitative assessments rather than on quantitative performance indicators or empirical fieldwork.

Nonetheless, the comparative approach offers a valuable preliminary framework for understanding Oran's positioning within the smart tourism paradigm. It also provides a basis for future empirical validation, including stakeholder interviews, on-site observations, and longitudinal monitoring once current initiatives mature.

III. Results

1. Barcelona's Smart Tourism Ecosystem

Barcelona has achieved global recognition as a smart tourism leader through a comprehensive and citizen-oriented approach. Its success relies on several interrelated components:

1.1. Governance and Strategy

The *Barcelona Smart City Strategy* integrates urban innovation with tourism policy through coordinated governance among municipal agencies, academia, and private stakeholders. The *Smart Tourism Office* monitors tourism sustainability indicators and ensures cross-departmental coordination.

1.2. Digital Infrastructure and Data Management

The city operates an *Open Data Portal* that provides public access to over 400 datasets. These datasets are used by startups and researchers to develop tourism-related services, enhancing innovation and transparency.

1.3.Sustainability and Mobility

Barcelona promotes sustainable mobility through electric buses, smart parking, and extensive cycling infrastructure. These initiatives align with its "Tourism for All" strategy, which aims to reduce environmental impacts and improve accessibility.

1.4. Tourism Experience

The *Turisme de Barcelona* digital platform employs AI to personalize tourist recommendations, manage booking systems, and provide real-time information through mobile apps. Virtual reality (VR) experiences and digital storytelling tools enhance visitor engagement with heritage sites.

1.5. Citizen Engagement

Public participation is central to Barcelona's model. Residents are involved in decision-making processes through participatory platforms such as *Decidim.Barcelona*, helping mitigate overtourism and balance residents' and visitors' needs.

2. Oran's Emerging Digital Tourism Initiatives

Oran's digital transformation efforts remain modest but promising. The municipality has launched several initiatives over the past decade, such as the creation of a digital municipal portal offering basic administrative services, pilot smart parking systems and surveillance infrastructure in central districts, free public Wi-Fi zones in the city center and near tourist attractions, and social media–based promotion of cultural and historical sites by the Directorate of Tourism. Academic collaborations with universities have also emerged to develop AI and GIS mapping tools for urban planning.

Beyond tourism, Oran has been selected as a pilot site for Algeria's national *smart city* program due to its innovation potential and its local authorities' commitment to modernization. The smart city vision for Oran aims to use digital technologies and data management systems to optimize municipal services, enhance energy efficiency, and improve residents' daily lives. This initiative reflects a broader ambition to make Oran a technologically driven, sustainable, and citizen-centered Mediterranean city.

Early pilot projects highlight several anticipated benefits. Smart mobility systems are being designed to reduce traffic congestion, improve air quality, and optimize urban transportation networks. Environmental management programs focus on resource conservation and emission reduction, contributing to a healthier urban environment. These initiatives mark a new era in which technology serves the tangible improvement of citizens' well-being while reinforcing Oran's attractiveness as a tourism destination.

However, these transformations are not without risks. The expansion of interconnected digital infrastructures raises legitimate concerns regarding data privacy and cyber-security. Increased surveillance and data monitoring while intended to enhance efficiency may challenge individual freedoms and trust in public institutions. Moreover, the financing of smart city projects has generated both enthusiasm and controversy. Public and private partnerships and international funding promise accelerated modernization, yet critics warn of potential indebtedness and unequal investment distribution that could compromise long-term sustainability.

Overall, Oran's experience illustrates both the transformative potential and the underlying tensions of smart urban governance in a developing context. Although the integration of technology, sustainability, and citizen engagement holds great promise, it requires transparent governance frameworks, equitable financing, and robust data protection policies to ensure inclusive and lasting benefits for all citizens.

Oran's pilot initiatives demonstrate early progress toward digital transformation but remain fragmented compared to Barcelona's integrated governance and mature data ecosystem.

3. Comparative Synthesis

The following table presents a comparative synthesis of key dimensions between Barcelona and Oran as smart tourism destinations.

Table1: Comparison Synthesis Barcelona- Oran

Dimension	Barcelona	Oran
Governance	Integrated and participatory smart city governance	Fragmented, sector-specific initiatives
Digital Infrastructure	Extensive IoT and open data systems	Limited digital infrastructure, no open data policy
Sustainability	Strong focus on green mobility and resource efficiency	Emerging awareness but weak integration
TourismExperience	AI-driven personalization, smart platforms	Traditional promotion with minimal interactivity
Citizen Engagement	Participatory platforms and co-creation	Minimal involvement of residents or SMEs

Source : Done by author

The comparison highlights that Oran's current approach is largely technology-driven but not strategy-driven, whereas Barcelona's success rests on integration, governance, and participation.

IV. Discussion

We discuss the main results in this section as follow:

1. From Fragmentation to Integration

The analysis reveals that Oran's efforts to digitalize tourism remain isolated and lack the systemic coordination necessary for true smart transformation. Barcelona's model demonstrates that success depends on governance integration ensuring all urban domains communicate through data and shared objectives. For Oran, creating a Smart Oran Office that coordinates between municipal departments, the tourism board, and universities would be a critical first step.

2. The Role of Open Data and Digital Infrastructure

Open data policies are central to Barcelona's innovation ecosystem, allowing private and public actors to collaborate on digital solutions. Oran should prioritize establishing a municipal open data portal and expanding broadband and (IoT) coverage in tourist zones. These measures would foster transparency and stimulate entrepreneurial innovation.

3. Sustainability and Smart Mobility

Both cities face environmental pressures linked to urban growth and tourism. Barcelona's integration of smart mobility and green policies provides a model for Oran to emulate. Initiatives such as electric buses, bike-sharing programs, and energy-efficient public lighting could help Oran align tourism development with environmental sustainability goals.

4. Enhancing the Tourist Experience through Technology

Oran can leverage digital technologies to create immersive visitor experiences. Mobile applications offering real-time tourist guidance, augmented reality (AR) tours of historical sites, and multilingual virtual assistants would modernize Oran's tourism offering. Partnerships with universities and tech startups could accelerate these innovations.

5. Citizen Engagement and Cultural Identity

Smart tourism must not only attract visitors but also empower residents. Barcelona's participatory platforms ensure that citizens have a voice in tourism planning. Oran could adopt a similar model through digital participation platforms and local innovation labs where citizens, youth, and entrepreneurs co-design tourism services.

Moreover, digital storytelling tools could promote Oran's unique cultural identity, integrating local music, cuisine, and architecture into digital narratives accessible to visitors worldwide. As (Hamidane, 2025) notes, cultural heritage remains a fundamental pillar of Oran's tourism identity. Smart technologies should therefore serve as tools for preserving and promoting this heritage, transforming cultural landmarks into interactive, digitally enhanced experiences.

V. Strategic Framework Proposal for Smart Tourism in Oran

Based on the comparative analysis, a **Smart Tourism Framework for Oran** is proposed. It encompasses three strategic phases and five key pillars:

1. Strategic Phases

- **Foundation Phase (2025–2027):**
  - Establishment of a *Smart Oran Office*
  - Development of a city-wide digital infrastructure plan
  - Launch of open data and transparency initiatives
- **Integration Phase (2028–2030):**
  - Interlinking digital tourism services with mobility, environment, and culture
  - Partnerships with universities and private actors for innovation projects
  - Implementation of smart mobility and energy efficiency programs
- **Consolidation Phase (2030–2035):**
  - Full integration of AI-driven tools in tourism management
  - Expansion of citizen participation and continuous monitoring
  - International positioning as a Mediterranean Smart Tourism Destination

2. Key Strategic Pillars

- **Governance:** Creation of a centralized coordination structure and legal framework for digital tourism.
- **Infrastructure:** Investment in IoT networks, smart grids, and open data platforms.
- **Sustainability:** Integration of environmental monitoring and green transport.
- **Experience Innovation:** Deployment of AI, AR, and mobile technologies for immersive tourism.
- **Community and Education:** Digital literacy programs and stakeholder capacity building.

This model ensures that technology serves as an enabler for social, cultural, and economic development rather than as an isolated goal.

Conclusion :

This study examined the prospects of transforming Oran into a Smart Tourism Destination (STD) by drawing strategic lessons from the Barcelona model. The analysis demonstrates that while Oran's digitalization efforts are promising, they remain fragmented and suffer from a lack of strategic integration. To address these gaps, the adoption of a coordinated governance framework centered on Open Data, sustainability, and citizen participation is essential to fostering an inclusive form of tourism.

The proposed framework provides a roadmap for policymakers and urban planners to guide this transformation. However, this evolution cannot be limited to a mere replication of the Catalan model; rather, it requires adapting fundamental principles to Oran's unique cultural and social specificities. The challenge lies in utilizing technology as a lever to enhance the human experience rather than as a substitute for it.

In conclusion, the transition toward smart tourism depends not only on technological adoption but on the systemic interaction between infrastructure, governance, and human capital. While digital marketing offers significant opportunities to transcend geographical boundaries, its effectiveness remains contingent upon a supportive ecosystem. Consequently, Oran's emergence as a leading Mediterranean hub depends on the construction of an integrated digital environment that successfully reconciles innovation with local identity.

While this study establishes a strategic foundation, it is not without limitations. The current analysis primarily focuses on governance and infrastructure from a theoretical and comparative perspective. Future research should incorporate empirical investigations into visitor perceptions and the readiness of local stakeholders to adopt smart technologies. Understanding the socio-economic impacts of these initiatives within the specific context of Algerian cities remains a critical area for exploration.

Furthermore, expanding the comparative scope would provide a more nuanced understanding of regional dynamics. Subsequent studies could benefit from comparing Oran with other Mediterranean port cities such as Tunis or Marseille. Such cross border benchmarking would help refine regional strategies and identify shared challenges and opportunities in the Mediterranean basin. By continuing to bridge the gap between global innovation and local application, future research will play a vital role in Oran's journey toward becoming a resilient and intelligent tourism hub.

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