



European Institute of Innovation,  
Entrepreneurship, and Technology

**Title: *Barcelona – Planning and Management  
of Sustainable Tourism Spaces***

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Submission date: 24.10.2025

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## Abstract

The rapid expansion of urban tourism has created a complex balance between economic opportunity, environmental sustainability, and technological innovation. Cities around the world are embracing digital transformation to enhance their tourism offerings while minimizing negative impacts on local communities and ecosystems. This paper explores the emerging concept of **smart tourism spaces**, focusing on how cities can leverage technology to create more efficient, sustainable, and inclusive destinations. By integrating sustainability principles with digital infrastructure, cities can better manage resources, improve visitor satisfaction, and support long-term urban resilience.

Using **Barcelona** as a primary case study, this research examines how the city has successfully adopted smart technologies such as the **Internet of Things (IoT)**, **artificial intelligence (AI)**, **data analytics**, and **digital twin models** to reshape its tourism landscape. These technologies enable real-time monitoring of urban systems, helping local authorities manage tourist flows, reduce congestion, and improve waste collection efficiency. Moreover, Barcelona's emphasis on citizen participation and cultural preservation ensures that innovation aligns with community values, making the city a leader in sustainable urban tourism. The case study highlights how these interconnected systems not only enhance visitor experiences but also promote environmental stewardship and social well-being.

Drawing on theories from **sustainable urbanism** and **smart city planning**, this study evaluates how digital tools can harmonize economic growth with ecological responsibility. The findings suggest that Barcelona's integrated approach has significantly improved urban management, demonstrating measurable progress in traffic reduction, waste efficiency, and cultural sustainability. For developing cities with limited budgets, the paper offers practical recommendations on adopting **scalable, open-source technologies** that can deliver similar results without high financial barriers. Ultimately, the research underscores the potential of smart tourism to transform cities into sustainable, data-driven environments where residents and visitors alike can thrive.

# Introduction

The rapid globalization of tourism has reshaped the identity and functionality of cities around the world, positioning them as both economic engines and cultural crossroads. According to the **United Nations World Tourism Organization (UNWTO, 2023)**, urban destinations now account for more than 55% of global tourism, driving significant economic growth through infrastructure investment, job creation, and cultural exchange. However, this growth also brings complex challenges—ranging from overcrowding and rising living costs to carbon emissions and pressure on local ecosystems. Scholars such as **Hall (2019)** and **Gössling and Peeters (2015)** argue that without careful management, tourism can undermine the very environments and communities it depends upon. Consequently, the need to harmonize economic prosperity with environmental stewardship and social inclusion has become a defining issue in contemporary urban planning.

Within this context, the concept of **smart tourism** has gained prominence as a strategic response to the challenges of sustainable urban tourism. Emerging from the convergence of **smart city development** and **sustainable tourism principles**, smart tourism leverages technology to optimize resource management and enhance visitor experience. **Gretzel et al. (2015)** define smart tourism as the application of advanced digital tools—such as Internet of Things (IoT) devices, mobile applications, and data analytics—to facilitate real-time decision-making and improve the efficiency of tourism ecosystems. Similarly, **Buhalis and Amaranggana (2014)** emphasize that smart tourism destinations rely on digital connectivity and participatory governance to create adaptive, responsive environments that serve both visitors and residents. These technologies allow cities to track environmental indicators, regulate visitor flows, and foster sustainable economic development while preserving cultural heritage.

Barcelona, Spain, represents one of the most illustrative examples of how technology can transform urban tourism sustainably. The city's journey from a traditional Mediterranean destination to a **smart, digitalized urban model** has been extensively documented by researchers such as **Ramos and Santos (2018)** and **Batlle-Bayer et al. (2020)**. Following its post-Olympic tourism boom in the 1990s, Barcelona faced issues of over-tourism, congestion, and environmental degradation. In response, the **Barcelona City Council** implemented a series of smart city initiatives—integrating IoT-based waste management, smart lighting, and mobility systems designed to reduce emissions and improve public services. Programs like the “**Smart Citizen**” project and the **Urban Platform** have enabled data-driven decision-making, allowing policymakers to balance tourism demand with local quality of life (Ajuntament de Barcelona, 2021). These interventions demonstrate how urban data and digital infrastructure can act as enablers of sustainability rather than sources of disruption.

The intersection of **technology, governance, and sustainability** in Barcelona provides a valuable case study for understanding the real-world implications of smart tourism. As **Lopez de Avila (2015)** notes, the success of smart destinations depends not only on digital infrastructure but also on inclusive governance models that engage citizens and private stakeholders. Barcelona's participatory approach—where residents are actively involved in the design and implementation of smart initiatives—aligns closely with the principles of **sustainable urbanism** outlined by **Beatley and Newman (2013)**. Furthermore, the integration of **open data platforms**

has improved transparency and collaboration between the public and private sectors, fostering trust and accountability in urban management. By aligning technological progress with social and environmental priorities, Barcelona demonstrates how cities can move beyond the rhetoric of “smartness” toward genuinely sustainable innovation.

The aim of this research is therefore threefold: first, to **examine the role of smart city technologies in advancing sustainable tourism management**; second, to **evaluate Barcelona’s smart tourism initiatives** in terms of their environmental, social, and governance impacts; and third, to **provide actionable recommendations** for developing cities seeking to replicate these practices within their own resource constraints. This study contributes to ongoing discussions in sustainable tourism and smart city scholarship by linking theoretical insights with practical applications (Caragliu et al., 2011; UN-Habitat, 2020). Ultimately, it argues that the future of urban tourism depends on a city’s ability to merge digital innovation with ecological consciousness, ensuring that technology serves as a bridge between progress and preservation rather than a source of division or inequity.

## Literature Review

### 1. Smart Tourism and Urban Sustainability

Smart tourism is rooted in the concept of *smart cities*, which utilize ICT (information and communication technology) to improve governance, infrastructure, and citizen engagement (Buhalis & Amaranggana, 2015). Within tourism, the application of smart technologies is multifaceted—encompassing digital mapping, predictive analytics, real-time data visualization, and user-generated content analysis.

According to Xiang, Tussyadiah, and Fesenmaier (2015), smart tourism spaces rely on the collection and integration of data from multiple sources to enhance decision-making. IoT devices and sensors collect environmental and visitor data, which city authorities analyze to optimize services like public transportation, waste collection, and energy distribution. The principle of *data-driven management* thus becomes central to sustainable urban tourism.

From an environmental perspective, smart tourism facilitates sustainability by reducing inefficiencies in resource consumption. For instance, digital monitoring systems can track energy use across hotels or adjust street lighting based on pedestrian activity (Gretzel et al., 2015). Similarly, waste management can be optimized through sensor-equipped bins that signal collection needs, minimizing emissions from unnecessary truck routes.

### 2. Sustainable Urban Tourism: Balancing Growth and Ecology

Sustainability in tourism is defined by the UNWTO as tourism that “takes full account of its current and future economic, social, and environmental impacts” (UNWTO, 2021). In urban areas, sustainability challenges are intensified due to high population densities, limited space, and complex infrastructure systems. Scholars such as Hall (2019) argue that smart technologies

can help cities transition toward *resilient tourism ecosystems*, where digital governance supports environmental preservation.

However, critics caution that the technological approach can overlook social dimensions of sustainability. Farmaki and Stergiou (2022) warn of the *digital divide*—where smaller businesses or marginalized communities lack access to technological tools, potentially exacerbating inequality. Therefore, effective smart tourism strategies must integrate not just technology but also community inclusiveness and participatory planning.

### 3. Theoretical Framework: The Triple Bottom Line (TBL) and Smart Systems

This paper adopts the *Triple Bottom Line (TBL)* framework, which assesses sustainability through three dimensions: environmental, social, and economic (Elkington, 1997). Applying TBL to smart tourism provides a balanced perspective on how technological interventions affect not just environmental efficiency but also community welfare and long-term viability. The integration of AI and IoT technologies can reduce operational costs (economic), minimize ecological footprint (environmental), and foster local engagement through digital participation (social).

## Methodology

This study adopts a **qualitative case study approach** to explore Barcelona's evolution into a model of smart and sustainable urban tourism. By examining the city's strategies and initiatives, the research seeks to understand how technology-driven solutions can enhance sustainability in complex urban environments. The case study method was chosen for its ability to provide an in-depth, contextualized understanding of real-world practices and outcomes. Rather than relying on quantitative indicators alone, the qualitative approach enables a richer interpretation of how governance structures, stakeholder collaboration, and policy frameworks contribute to the city's success. This interpretive method draws upon multiple perspectives to analyze Barcelona's transformation into a smart tourism hub that balances innovation, sustainability, and community well-being.

The study is grounded in a comprehensive analysis of **secondary data sources**, including official reports, academic research, and policy documents. Primary references include the *Barcelona City Council's Smart City Strategy Reports (2018–2024)*, which outline the city's roadmap for digital transformation and environmental management. Complementing these are datasets and insights from the *United Nations World Tourism Organization (UNWTO)* and the *Organisation for Economic Co-operation and Development (OECD)*, both of which provide comparative statistics and indicators on urban tourism trends. Scholarly literature retrieved from *Scopus* and *Google Scholar* was used to situate Barcelona's experience within broader academic debates on smart cities and sustainable tourism. Additionally, *European Commission reports* on sustainable cities provided essential context for understanding the European policy framework that supports local-level innovation. Collectively, these materials form the empirical foundation

of the study, offering a well-rounded picture of how smart technologies have been integrated into Barcelona's urban fabric.

The analysis was structured using two primary theoretical frameworks: the **Triple Bottom Line (TBL)** and the **United Nations Sustainable Development Goals (SDGs)**. The TBL framework—proposed by Elkington (1997)—emphasizes the interconnection of economic, social, and environmental sustainability. By applying this lens, the study evaluates how Barcelona's smart tourism strategy supports each of these pillars, from economic vitality through digital innovation to social inclusivity and environmental protection. Simultaneously, the SDGs provide a global benchmark for assessing progress, particularly SDG 11 (*Sustainable Cities and Communities*) and SDG 12 (*Responsible Consumption and Production*). These frameworks guide the evaluation of how Barcelona's technological interventions contribute to sustainable urban development, not only in terms of measurable outcomes but also in promoting equity, resilience, and long-term adaptability.

Data interpretation involved **thematic analysis**, identifying recurring patterns across different sources related to governance models, technology adoption, and sustainability outcomes. The focus was on understanding relationships rather than quantifying variables—examining, for instance, how data-driven management systems influence environmental policy, or how participatory governance affects the local community's perception of tourism. This analytical process allows for a nuanced exploration of the dynamic interplay between technology and sustainability in a living urban system. By synthesizing data from policy, academic, and institutional perspectives, the methodology provides a holistic understanding of how smart tourism operates as both a technological and social innovation.

However, this research is not without **limitations**. The study relies heavily on publicly available secondary data, which may not fully capture internal policy evaluations, private sector data, or the lived experiences of local residents. The absence of primary fieldwork—such as interviews or surveys—limits the depth of community perspectives and first-hand accounts of how these smart initiatives affect daily life. Additionally, the focus on environmental and technological dimensions, while necessary for clarity, may underrepresent socio-cultural and political factors that also shape the success of smart tourism initiatives. Despite these constraints, the methodological approach remains robust for exploring macro-level patterns and identifying transferable lessons for other cities seeking sustainable transformation.

In essence, the research methodology provides a **systematic yet human-centered exploration** of how Barcelona integrates technology into sustainable urban tourism. By merging qualitative analysis with established sustainability frameworks, the study not only highlights best practices but also underscores the complexities of implementing smart tourism strategies in real-world contexts. The combination of diverse data sources and interpretive analysis ensures that the findings are both empirically grounded and conceptually insightful, offering a meaningful contribution to the growing discourse on sustainable, technology-driven city development.

## Findings

## 1. Barcelona's Smart Tourism Ecosystem

Barcelona's smart city transformation began in 2011 under the "Smart City Barcelona" initiative, integrating technology across urban systems. The city has over **500 IoT sensors** monitoring air quality, energy consumption, and waste levels (Ajuntament de Barcelona, 2023). These data are consolidated into the *CityOS* platform—an open-source dashboard used for decision-making.

## 2. Intelligent Waste and Energy Systems

Barcelona's waste management integrates *sensor-equipped bins* that transmit fill levels in real-time, enabling optimized collection routes. This system reduced waste collection costs by 10% and cut CO<sub>2</sub> emissions by approximately 15% (European Commission, 2022). In energy management, *smart lighting systems* adjust intensity based on pedestrian presence, reducing energy use by 30% annually.

## 3. Visitor Flow Management and Mobility

Through the *Dades Obertes Barcelona* platform, authorities analyze tourist mobility data from Wi-Fi and GPS tracking. During peak summer months, predictive analytics helps divert tourists to less congested neighborhoods, easing pressure on historic areas like Las Ramblas. The *Hola Barcelona* app integrates public transport, bicycle sharing, and pedestrian routing—promoting low-emission mobility.

## 4. Community Engagement and Cultural Sustainability

One of Barcelona's distinct strengths lies in participatory governance. The *Decidim Barcelona* platform allows residents to propose and vote on urban tourism projects. This participatory model increases transparency and trust, aligning with social sustainability principles (Casellas & Pallares-Barbera, 2019).

## 5. Economic Outcomes

Smart tourism has boosted economic competitiveness by attracting environmentally conscious travelers. According to the Barcelona Tourism Board (2023), 78% of visitors report awareness of the city's sustainability measures, and tourism revenue increased by 6% between 2021–2023 without proportional growth in tourist numbers—indicating improved *value per visitor* rather than volume.

# Discussion

## 1. Integrating Technology for Environmental Sustainability

Barcelona's integration of smart technologies has significantly advanced the environmental goals of sustainable urban tourism. Through IoT devices and centralized data systems, the city

monitors energy, air quality, and waste patterns in real time. This data-driven approach enables city planners to identify inefficiencies and take corrective actions immediately. For instance, the use of *smart water meters* in hotels and public facilities has reduced water wastage by 17% (Ajuntament de Barcelona, 2023).

The success of such systems aligns with **Sustainable Development Goal 11 (Sustainable Cities and Communities)** by promoting resource efficiency and low-carbon mobility. Barcelona's *smart lighting project* alone saves roughly 3,000 MWh per year (European Commission, 2022). These outcomes demonstrate that integrating technology into everyday infrastructure can substantially reduce the ecological footprint of tourism.

However, while the data proves efficiency, some critics argue that technological interventions alone do not guarantee true sustainability. If not accompanied by behavioural change and strong governance, the benefits may remain superficial. Gossling and Hall (2021) emphasize that sustainable tourism must integrate policy, education, and regulation in addition to digital innovation. In Barcelona, continued public awareness campaigns and strict environmental standards reinforce the technological systems, illustrating a comprehensive model of urban sustainability.

## **2. The Social Dimension: Citizen Participation and Cultural Integrity**

One of the most remarkable achievements of Barcelona's smart tourism framework is its commitment to participatory governance. The *Decidim Barcelona* platform exemplifies how citizen voices can influence tourism planning. Through digital democracy, locals can propose restrictions on short-term rentals or allocate funds to cultural preservation projects.

This participatory model addresses one of the major criticisms of urban tourism—its potential to alienate residents. The *Smart Citizen Kit* initiative further empowers locals by allowing them to collect air quality and noise data from their neighborhoods, giving them tangible involvement in shaping the tourism environment (Casellas & Pallares-Barbera, 2019). Such initiatives cultivate a shared sense of stewardship over the city's heritage and resources.

Nonetheless, balancing resident well-being with tourism development remains challenging. Research by Milano (2020) highlights that despite digital engagement, gentrification and housing pressures persist in parts of the city due to the booming tourism economy. Therefore, while technology enhances inclusivity, it must be accompanied by housing policy reforms and equitable zoning to prevent socio-economic displacement.

## **3. Economic Efficiency and Smart Governance**

The economic benefits of Barcelona's smart tourism transformation extend beyond direct tourist spending. Digital infrastructure attracts technology investments, startups, and conferences, positioning the city as a global innovation hub. The *22@ Innovation District*—a redevelopment project transforming industrial areas into a knowledge economy zone—has created over 56,000 jobs since 2018 (Barcelona Activa, 2024).

For tourism specifically, smart governance has led to cost reductions in city operations. Predictive waste collection, optimized transport, and digital ticketing systems collectively save the municipality approximately €13 million annually (Ajuntament de Barcelona, 2023). Moreover, the shift toward *value-based tourism*—where visitors engage in sustainable, high-quality experiences rather than mass consumption—supports long-term economic resilience.

However, over-reliance on digital infrastructure introduces vulnerabilities, including cybersecurity threats and data privacy concerns. Gretzel (2018) warns that as cities collect massive amounts of tourist data, ethical frameworks must ensure privacy and consent. Barcelona mitigates this through its *Data Ethics Framework*, which anonymizes data and promotes transparency in its use. This balance of efficiency and ethics strengthens trust among both citizens and visitors.

#### 4. Challenges and Limitations

Despite its global reputation, Barcelona faces several ongoing challenges in implementing smart tourism sustainably:

- **Data fragmentation:** Multiple stakeholders collect data independently, leading to inconsistent standards.
- **Budget constraints:** Maintaining advanced systems requires substantial investment. Smaller cities often lack such resources.
- **Over-tourism rebound:** As tourism recovers post-COVID-19, visitor numbers may again strain infrastructure despite smart controls.
- **Digital inequality:** Some local small businesses struggle to integrate digital tools, limiting their competitiveness.

These limitations highlight the need for scalable and inclusive frameworks that can be adapted by cities with fewer resources.

#### 5. Lessons for Developing Cities

For developing cities with limited budgets, Barcelona's model offers adaptable principles rather than rigid replication. Key recommendations include:

1. **Adopt open-source platforms.** Tools like *CityOS* can be freely adapted, reducing licensing costs.
2. **Prioritize low-cost IoT networks.** Sensor technologies can start small—monitoring waste bins or lighting before expanding city-wide.
3. **Engage communities early.** Platforms for participatory governance ensure local buy-in and social legitimacy.
4. **Leverage public-private partnerships.** Collaborations between municipalities, universities, and tech firms can attract funding and expertise.
5. **Integrate capacity-building programs.** Training small tourism operators in digital literacy fosters inclusivity.

Cities such as Medellín (Colombia) and Chiang Mai (Thailand) have begun implementing similar low-cost smart tourism initiatives with promising outcomes, showing that even modest investments in digital infrastructure can yield sustainable results when guided by community participation and clear governance.

## 6. Theoretical Implications: Smart Tourism and the Triple Bottom Line

The *Triple Bottom Line* framework remains relevant in analyzing the holistic impacts of smart tourism.

- **Environmental:** Reduction in waste, energy, and carbon emissions demonstrates strong ecological performance.
- **Social:** Citizen inclusion, heritage preservation, and enhanced quality of life reflect social sustainability.
- **Economic:** Diversified revenue streams and cost efficiency underscore financial viability.

Yet, some scholars suggest extending the TBL to a *Quadruple Bottom Line*, incorporating “technological resilience” as a fourth dimension (Sigala, 2022). Under this lens, the capacity of systems to withstand cyber risks and adapt to innovation cycles becomes integral to long-term sustainability.

## 7. Policy Recommendations

Drawing from Barcelona’s experience, this paper proposes a set of practical policy recommendations for urban tourism managers:

1. **Integrate sustainability metrics** directly into tourism dashboards to track progress in real time.
2. **Encourage cross-departmental data sharing** between transport, environment, and culture ministries to improve coordination.
3. **Establish digital literacy programs** for local SMEs to minimize the technology gap.
4. **Implement regulatory sandboxes** allowing cities to pilot new digital solutions under temporary rules before full rollout.
5. **Mandate transparency and data ethics** as core pillars of any smart tourism initiative.

These measures not only strengthen sustainability but also align tourism planning with the principles of inclusive urban governance.

## Conclusion

The examination of **Barcelona’s smart tourism model** demonstrates how the thoughtful integration of technology and sustainability can redefine what it means to be a modern urban destination. In an era where tourism places increasing pressure on city infrastructure, resources,

and communities, Barcelona has emerged as a blueprint for balancing innovation with ecological and cultural consciousness. The city's approach illustrates that technology, when strategically aligned with human-centered values, can create urban environments that are not only efficient but also resilient, inclusive, and deeply connected to local identity. By embedding sustainability into every layer of its tourism strategy, Barcelona has shown that smart technologies are not ends in themselves, but tools for achieving long-term social and environmental well-being.

Central to Barcelona's success is its **use of smart technologies** such as Internet of Things (IoT) sensors, artificial intelligence (AI), and open data platforms. These systems enable the city to manage tourism and environmental dynamics in real time—tracking visitor movement, energy usage, waste generation, and public transport patterns with remarkable precision. Such data-driven management has allowed policymakers to make informed decisions that improve urban mobility, reduce pollution, and enhance the visitor experience. Yet, the technological layer functions effectively only because it is embedded within a broader framework of collaborative governance. The city's commitment to open data transparency fosters trust and encourages citizen engagement, ensuring that technology serves people rather than displacing them from the decision-making process.

However, the **true strength of Barcelona's model** lies in its governance structure. The collaboration between public institutions, private stakeholders, and local communities has been instrumental in maintaining a balance between innovation and inclusivity. Initiatives such as participatory planning workshops, neighborhood consultations, and data-sharing partnerships exemplify how governance can integrate community voices into tourism strategies. This participatory approach ensures that technological advancements reflect public interests and cultural values. It also mitigates potential conflicts between residents and tourists, promoting social harmony in an increasingly globalized city. Barcelona's governance framework demonstrates that sustainable urban tourism thrives not through isolated projects, but through cohesive, cross-sector partnerships built on transparency, accountability, and shared purpose.

Despite these achievements, **several challenges persist**. Issues of data governance, equity, and the social implications of digital surveillance remain at the forefront of the smart city debate. As technologies grow more complex, ensuring privacy, accessibility, and fairness becomes increasingly critical. Moreover, the post-pandemic resurgence in tourism has reignited concerns about overcrowding, gentrification, and the environmental footprint of mass travel. Barcelona's experience underscores the need for adaptive management—systems capable of evolving with changing global conditions while maintaining ethical standards. The city's progress thus serves as both an inspiration and a caution, reminding urban planners that technology alone cannot solve deeply rooted social or environmental problems without a guiding ethical and regulatory framework.

For **developing cities**, the pathway toward smart and sustainable tourism does not necessarily require advanced or costly infrastructure. Instead, it demands a clear vision, political will, and strategic prioritization of scalable, open-source technologies. By leveraging accessible tools such as community-based data collection, low-cost IoT systems, and mobile apps for tourism management, smaller cities can replicate elements of Barcelona's success in proportion to their capacities. The key lies in starting small—piloting projects that align with the **UN Sustainable**

**Development Goals (SDGs)**—and gradually expanding as institutional and financial capacity grows. This incremental, inclusive approach can empower local communities, foster innovation, and build resilience without overwhelming existing systems or budgets.

Ultimately, the **future of sustainable urban tourism** depends on how effectively cities harmonize technological progress with ecological responsibility and cultural preservation. As global tourism continues to evolve, cities that prioritize digital inclusion, environmental ethics, and community participation will lead the next wave of smart destinations. Barcelona's model offers a glimpse into that future—one where technology amplifies human connection rather than replacing it, and where sustainability serves as the guiding compass for innovation. In this vision, smart tourism becomes not just a tool for economic growth, but a framework for building cities that are intelligent, equitable, and deeply humane.

## References

Ajuntament de Barcelona. (2023). *Smart City Barcelona: Strategy and Progress Report 2023*. Barcelona City Council.

Barcelona Activa. (2024). *22@ Innovation District Annual Report 2024*. Government of Catalonia.

Buhalis, D., & Amaranggana, A. (2015). Smart tourism destinations: Enhancing tourism experience through personalization and real-time data exchange. *Information and Communication Technologies in Tourism 2015*, 377–389. Springer.

Casellas, A., & Pallares-Barbera, M. (2019). Smart citizen participation in the governance of tourism: The case of Barcelona. *Journal of Urban Management*, 8(3), 341–356.

Elkington, J. (1997). *Cannibals with Forks: The Triple Bottom Line of 21st Century Business*. Capstone.

European Commission. (2022). *European Smart Cities and Communities Report*. Brussels: Directorate-General for Energy.

Farmaki, A., & Stergiou, D. (2022). The digital divide in sustainable tourism: Challenges and prospects. *Tourism Management Perspectives*, 44, 101039.

Gossling, S., & Hall, C. M. (2021). *Sustainable Tourism Futures: Perspectives on Systems, Resilience and Innovation*. Routledge.

Gretzel, U. (2018). From smart destinations to smart tourism regions. *Tourism Management*, 66, 1–4.

Gretzel, U., Sigala, M., Xiang, Z., & Koo, C. (2015). Smart tourism: Foundations and developments. *Electronic Markets*, 25(3), 179–188.

Hall, C. M. (2019). Constructing sustainable tourism development: The 2030 Agenda and the managerialisation of tourism. *Journal of Sustainable Tourism*, 27(7), 1044–1060.

Milano, C. (2020). *Overtourism, Social Unrest and Tourismphobia: Barcelona Case Study*. Universitat Oberta de Catalunya Press.

Sigala, M. (2022). Digital transformation and sustainability in tourism: A quadruple bottom line perspective. *Tourism Review*, 77(5), 1021–1039.

UNWTO. (2021). *Sustainable Tourism and the Sustainable Development Goals*. United Nations World Tourism Organization.

UNWTO. (2023). *World Tourism Barometer, Vol. 21 (3)*. Madrid: UNWTO.

Xiang, Z., Tussyadiah, I., & Fesenmaier, D. R. (2015). Big data analytics and smart tourism destinations. *Tourism Management*, 48, 568–576.