

Multi-level evolutionary model for smart tourism transition: A pilot test in the Andalusian region (Spain)

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Abstract

The transition from traditional to smart tourism destinations requires structured theoretical models that can capture the complexity of stakeholder engagement and behavioural change. This study introduced and empirically tested the multi-level evolutionary model, which conceptualizes smart tourism development as a sequential process across four stages: knowledge, awareness, commitment, and action. The proposed framework was then validated based on a survey of 350 public and private tourism stakeholders in Andalusia (Spain) and partial least squares structural equation modelling analysis. The results confirmed significant and positive relationships between each stage and demonstrated that the adoption of smart tourism is not a one-time event but a gradual evolution requiring cumulative engagement. The findings provide empirical evidence that knowledge fosters awareness, awareness nurtures commitment, and commitment ultimately drives tangible actions towards smart tourism practices. The study offers actionable insights for destination managers and policymakers, while emphasizing the need for integrated strategies that align technological innovation, stakeholder participation, and sustainability goals to ensure the success of the smart destination transition.

Keywords: Smart tourism; smart destination; destination evolution; Stakeholder engagement; multi-level evolutionary model; tourism transition

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1. Introduction

Smart tourism management requires robust theoretical frameworks to ensure effective integration into destination governance and planning. Advances in technology and the sustainable practices have brought the concept of smart tourism to prominence, but there is still a significant gap in models that systematically explain how destinations transition from traditional to smart paradigms. This lack of a structured understanding impedes the strategic development of smart tourism and the effective governance of these evolving systems (Ivars-Baidal *et al.*, 2024; Micera *et al.*, 2025). Existing research has highlighted the importance of a multi-faceted approach in which knowledge dissemination, stakeholder awareness, and collaborative governance play crucial roles in the transformation towards smart tourism (Boom *et al.*, 2021; Chen *et al.*, 2024a; Errichiello & Micera, 2021). These processes are complex and require careful management of stakeholder expectations and contributions. As tourism destinations evolve, governance becomes paramount, particularly in facilitating public-private partnerships, ensuring accessibility, and promoting sustainability (Erdmenger, 2023, 2024; Samancioglu *et al.*, 2024).

The transition from traditional tourism models to smart tourism is an evolutionary process that does not occur uniformly or instantaneously. Rather, it involves the adoption of advanced technologies; infrastructure improvements; and the adaptation of management practices by destinations, businesses, and local communities. As destinations advance through the different levels and stages of this transition, it is essential to continuously evaluate and adjust strategies to ensure that smart tourism contributes meaningfully to sustainable development and the well-being of all stakeholders. Although implementing smart tourism presents technological risks related to security and privacy (Adnan *et al.*, 2020; Ghaderi *et al.*, 2024) and may encounter resistance from local communities (Johnson, 2023), it also demands strong stakeholder coordination and poses challenges for the application of appropriate policies and regulations (Ivars-Baidal *et al.*, 2023; Jasrotia, 2025).

Technological integration, sustainability, and innovation are crucial components for smart tourism destinations (Azis *et al.*, 2020; Fernández-Díaz *et al.*, 2023). Inclusive and adaptive governance frameworks have also been highlighted as a way to address these challenges. Active participation by local communities and diverse stakeholders is fundamental to ensuring a sustainable and cohesive shift towards smart tourism models (Ivars-Baidal *et al.*, 2024). Despite these advances, a significant gap remains in understanding the sequential progression that destinations undergo during the smart transition, particularly regarding the shift from knowledge acquisition to the active implementation of smart tourism initiatives. The stages of knowledge, awareness, commitment, and action are deeply interconnected and play a critical role in the successful evolution towards becoming a smart tourism destination (Lu *et al.*, 2021; Sustacha *et al.*, 2023).

This article addresses a structured theoretical model by introducing and testing a multi-level evolutionary model (MLEM) of smart tourism destinations in Andalusia (Spain). This model offers a systematic explanation of the transition from traditional to smart destinations. A total of 350 surveys were administered to public and private agents in the tourism sector from June to December 2023, using a computer-assisted telephone interviewing (CATI) methodology. Data analysis was conducted using partial least squares structural equation modelling (PLS-SEM), based on a 40-item Likert-scale questionnaire. This research contributes to the literature on smart tourism by providing empirical evidence of the mechanisms through which each stage in the model influences the next, thus offering actionable insights for policymakers and destination managers. The MLEM emphasizes the importance of an integrated approach that aligns stakeholder engagement, technological adoption, and sustainability goals to ensure that the transition from traditional to smart tourism is both effective and sustainable (Jeong & Shin, 2020; Mandić *et al.*, 2024).

2. Theoretical Background

The transition from being a traditional tourism destination to a smart destination is a complex and multi-faceted process that requires a structured theoretical foundation. While various studies have explored the components of smart tourism (Baggio *et al.*, 2020; Gretzel, 2018; Shafiee *et al.*, 2022), there remains a gap in our understanding of the evolutionary progression of stakeholder engagement in this transformation. The MLEM proposed in this study addresses this gap by integrating concepts from well-established theories in organizational behaviour, digital transformation, and behavioural sciences.

The maturation of global markets is driving tourism destinations and businesses to reconsider their strategic approaches to competitiveness through an increasing reliance on the integration of advanced technologies (Baiocco *et al.*, 2024; Guarda *et al.*, 2018; Sharma *et al.*, 2024). This trend indicates the need for a systemic model that incorporates strategic, relational, instrumental, and applied levels of smart tourism development (Ivars-Baidal *et al.*, 2019). The main components that have been emphasized so far in the literature regarding the evolution of smart tourism can be grouped into two major lines. The first includes models that integrate knowledge across destination intelligence, tourist experience, and perceived value, while identifying dimensions, variables, and relationships. In these frameworks, the smart dimension overlays conventional tourism experiences, thus encompassing mediating and moderating factors and outcomes (Belhaj & Azdimousa, 2023). The second includes models that conceptualize sustainability as a central concern and seek to create value not only for visitors but also for host communities, thus prioritizing social and environmental considerations alongside technological innovation (Absari *et al.*, 2024; Cavalheiro *et al.*, 2020).

While these contributions provide valuable insights, they often address isolated aspects of the transformation to a smart destination. A comprehensive, stage-based explanation of how stakeholder engagement evolves—from initial knowledge acquisition to the operationalization of smart tourism practices—remains underdeveloped. The proposed MLEM is positioned within this gap, and the following section presents the theoretical foundations of the MLEM, which proposes a sequential, behaviourally grounded pathway from knowledge acquisition to action implementation in smart destination development.

2.1. Theoretical foundations of the multi-level evolutionary model

The MLEM is structured based on four sequential stages: knowledge, awareness, commitment, and action. While these constructs have been explored in other disciplines (Ajzen, 2020; Kim *et al.*, 2020), their application to smart tourism remains underdeveloped. This section thus positions the MLEM within the two theoretical frameworks presented below and highlights its contributions.

2.1.1 The theory of planned behaviour

Ajzen's (1991) theory of planned behaviour (TPB) offers a well-established framework for understanding the factors that influence the decision-making processes of individuals and organizations. It suggests that human behaviour is guided by three primary determinants: attitude towards the behaviour, subjective norms, and perceived behavioural control. These elements influence intentions, which in turn predict behaviour. In the context of smart tourism, knowledge and awareness align with attitude formation, as stakeholders develop a cognitive understanding of the benefits of smart tourism. Commitment, on the other hand, is shaped by subjective norms; external influences such as government policies, technological trends, and competitive pressures thus play a role in reinforcing the intention to engage with smart tourism practices. Finally, action is driven by perceived behavioural control, as stakeholders assess the available resources, technical competencies, and regulatory conditions before implementing smart tourism initiatives.

This theoretical perspective is particularly relevant in the tourism sector, where decision-making is highly influenced by both individual and collective factors. Previous research has applied TPB to analyse technology adoption in tourism-related activities (Kim *et al.*, 2020), while demonstrating how external pressures and perceived ease of use affect stakeholders' commitment to adopting smart solutions. The integration of the TPB into the MLEM thus reinforces the argument that smart tourism adoption is not only a technological process but also a behavioural transformation influenced by perceptions, norms, and perceived control over resources.

2.1.2 *The diffusion of innovations theory*

The diffusion of innovations (DOI) theory (Rogers *et al.*, 2014) provides a complementary lens for understanding the adoption of smart tourism practices. This theory classifies adopters into categories ranging from innovators to laggards to explain how new ideas and technologies spread through social systems over time. DOI suggests that adoption is driven by factors such as relative advantage, compatibility, complexity, trialability, and observability. Within the MLEM, the knowledge stage aligns with the awareness and persuasion phases in DOI, when stakeholders evaluate the potential benefits of smart tourism. As they progress to the awareness stage, they actively compare new innovations with existing practices and assess the feasibility of integrating the innovations. The commitment stage corresponds to the decision phase in DOI, when stakeholders move beyond passive recognition and commit resources towards smart tourism adoption. Finally, the action stage represents the implementation and confirmation phases, when smart technologies become institutionalized in destination governance and management structures (Gómez & Thiel-Ellul, 2024).

Several studies have applied DOI to explain the adoption of digital tools in tourism (Buhalis & Sinarta, 2019) and emphasized the role of early adopters in influencing the broader industry transition. This study builds upon these insights by applying DOI not just to technological adoption but to the broader governance and strategic planning mechanisms that facilitate the transition to smart tourism. Understanding how different stakeholders engage with and react to technological diffusion can provide valuable insights for policymakers and destination managers seeking to accelerate the transformation process (Sorokina *et al.*, 2022).

2.2. *Hypothesis development*

The MLEM for smart tourism offers a comprehensive theoretical framework for understanding and guiding the transformation of destinations from traditional configurations towards smart governance and practices. This transformation is conceptualized as a gradual, sequential process structured around four core behavioural constructs: knowledge, awareness, commitment, and action. These stages synthesize cognitive, normative, and behavioural dynamics grounded in established theories of behaviour and innovation, such as TPB and DOI.

In the knowledge stage, stakeholders begin to form beliefs about smart tourism and evaluate its perceived value and relevance, thereby laying the cognitive foundation for deeper engagement. The awareness stage involves the internalization and contextual interpretation of smart destination principles. At this point, stakeholders begin aligning innovative practices with existing operations and assessing their potential applicability. The commitment stage marks a shift from passive understanding to strategic intention. Stakeholders demonstrate readiness to support smart tourism initiatives by allocating resources and assuming an active role in their promotion. Finally, in the action stage, intentions are translated into concrete implementation, and smart tourism practices become embedded in the governance and operational routines of the destination.

These stages are cumulative and interdependent: each builds upon the previous one, thus reinforcing the model's path-dependent logic of transformation. Three hypotheses are proposed to test this

framework empirically. The first hypothesis examines the relationship between stakeholders' knowledge of smart tourism and their awareness of its principles and implications, thus establishing knowledge as the foundation for change. The second hypothesis explores how heightened awareness translates into commitment, as stakeholders become more engaged and aligned with smart tourism strategies. The third hypothesis assesses the shift from commitment to action and focuses on the practical implementation of smart technologies and sustainable governance. Taken together, these hypotheses operationalize the MLEM logic and offer a theory-driven framework for understanding the processes involved in destination evolution (Figure 1).

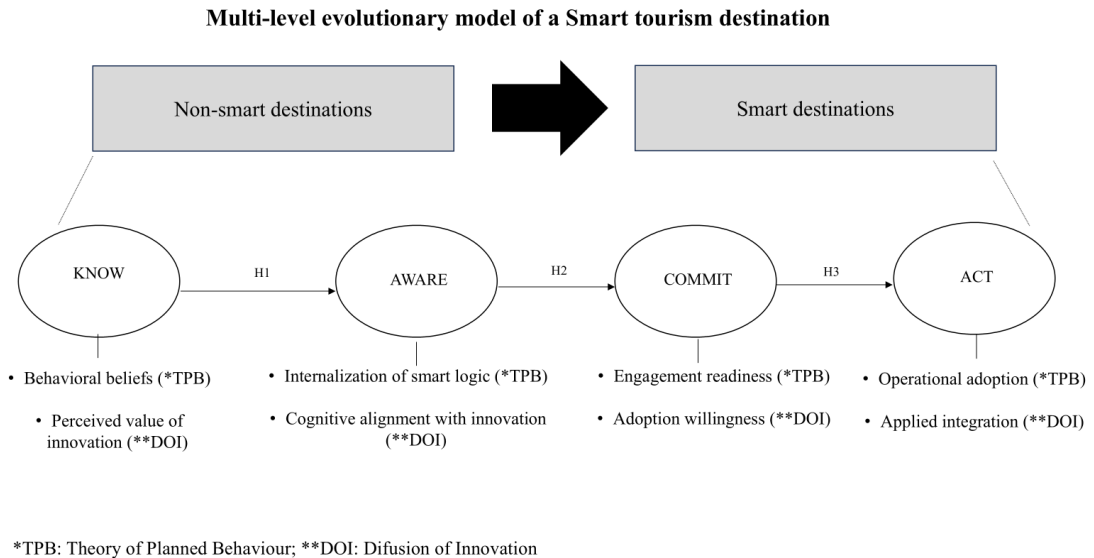


Figure 1. Testing the Multi-Level Evolutionary Model of a Smart Tourism Destination, Grounded in the Theory of Planned Behaviour and Diffusion of Innovation

2.2.1. The influence of knowledge on stakeholder awareness

Smart tourism has gained increasing relevance in recent years as technology and sustainability have become critical components of the tourism industry. Smart tourism encompasses a wide range of knowledge types, from understanding emerging technologies to evaluating their impact on the tourism sector and destinations, and numerous scholars have defined and characterized smart tourism (Alsharif *et al.*, 2024; Gursoy *et al.*, 2024; Liu *et al.*, 2023; Otowicz *et al.*, 2022; Panagopoulos *et al.*, 2025). Knowledge in this context involves not only understanding technologies but also their practical application in the tourism sector. This can include smart destination management systems that use real-time data for optimized planning and management, as well as mobile applications offering personalized information and recommendations (Balakrishnan *et al.*, 2023).

The benefits of smart tourism extend beyond technological efficiency. Smart tourism can enhance resource management, improve tourist experiences, and reduce the environmental and social impacts of tourism activities (Ma *et al.*, 2023). However, integrating this knowledge with the broader challenges it poses requires a proactive approach. Current debates in the literature have addressed issues such as data privacy and security (Femenia-Serra *et al.*, 2022; Saleem *et al.*, 2024), digital accessibility (Arbidane *et al.*, 2023), the digital divide among tourist groups, and the ethical, responsible use of technologies (Koo *et al.*, 2025).

The relationship between knowledge and awareness is critical in promoting sustainable tourism strategies. Awareness involves stakeholders' understanding and perception of smart tourism practices and their relevance. The more informed individuals are about available innovations and their potential benefits, the more likely they are to be aware of the importance of adopting smart tourism practices. As knowledge about innovation in tourism increases, so too does the awareness of the importance of collaboration among tourism stakeholders. This awareness is essential for fostering partnerships and driving the implementation of smart practices across various tourism sectors. Several platforms provide information and practical examples of smart tourism applications. These include specialized websites such as the European Capital & Green Pioneer of Smart Tourism, International Network of Sustainable Tourism Observatories (INSTO)-UNWTO, Smart Travel Lab, and Smart Tourism Solutions-European Commission. These sources offer articles, reports, case studies, and news about innovative practices implemented in businesses and destinations.

Researchers have also continued to analyse emerging smart tourism technologies such as the Internet of Things, cloud computing, artificial intelligence, big data, and augmented reality, among others, as powerful tools for improving both operational efficiency and customer satisfaction (Aliyah *et al.*, 2023; Ku *et al.*, 2024; Saleem *et al.*, 2024). As Gretzel (2021, p. 3) points out, "the smart tourism mindset should penetrate individual, organizational, and destination levels to install smart tourism ideas and values, elicit commitment to the process, and inform investments and activities without direct management." Knowledge dissemination thus plays a central role in building this mindset and encouraging stakeholders to move from passive awareness to active participation in smart tourism development. Based on this, we formulated Hypothesis 1:

H1: There is a positive relationship between knowledge about smart tourism (KNOW) and awareness of smart tourism practices (AWARE) among stakeholders.

2.2.2. The influence of awareness on stakeholder commitment to smart tourism practices

Awareness also involves a positive perception of the importance of adopting smart tourism practices to maintain destination competitiveness. This is reflected in the attitude of stakeholders who are open to adopting new technologies in their tourism businesses and destinations (Buitrago-Esquinas *et al.*, 2024), willing to participate in initiatives and projects that promote smart tourism, and ready to commit to the process. Educational and awareness-raising programmes are vital for informing and equipping businesses, destinations, and tourism professionals. These programmes range from university courses, postgraduate programmes, and short-term certifications to events. Participation in such events has been shown to increase stakeholders' understanding of the practical applications of smart tourism (Muniz *et al.*, 2021).

Stakeholders also recognize tangible benefits from committing to smart tourism practices. For instance, certain practices can improve the customer experience through mobile applications, virtual assistants, and augmented reality (Jeong & Shin, 2020). Other practices optimize operational processes, such as resource distribution, route planning, and reservation systems, which leads to increased efficiency and reduced costs for both businesses and destinations. Digital marketing strategies, including the use of social media, search engines, and online advertising, enhance brand visibility and contribute to increased bookings and sales (Halkiopoulos *et al.*, 2022). Smart tourism technologies provide valuable data on tourist behaviour, customer preferences, market trends, and service performance, which are critical in informed decision-making (Weng & Zhang, 2023). Smart tourism can also promote sustainability by encouraging efficient resource management, waste reduction, energy optimization, and the adoption of responsible practices (Aguirre *et al.*, 2022).

Successful case studies of smart tourism implementation provide a powerful tool to inspire and motivate other destinations to follow suit. In many cases, governments provide incentives and financial support to encourage businesses and destinations to adopt smart tourism initiatives through subsidies, funding programmes, and tax incentives. In Spain, for instance, the Recovery, Transformation, and Resilience Plan, linked to Next Generation EU funds, represents one of the most significant economic boosts in recent history. One of its strategies focuses on digital transformation, which is closely connected to smart tourism through initiatives like the Tourism Sustainability Plans for Destinations, Digitalization and Intelligence Programmes for destinations and tourism sectors, and Smart Tourism Systems (Sánchez-Bayón, 2023). Based on this, we formulated Hypothesis 2:

H2: There is a positive relationship between awareness of smart tourism practices (AWARE) and commitment to smart tourism (COMMIT) among stakeholders.

2.2.3. The effect of stakeholder commitment in driving smart tourism practices

The role of collaborative networks and platforms that enable the exchange of knowledge and experiences related to smart tourism is fundamental in translating commitment into action. Baggio *et al.* (2020) examined digital ecosystem networks in Italy and illustrated how these are reflected in the physical networks of destination stakeholders and their relationships, as well as in virtual networks. Governance is a critical element in this process, as various scholars have noted (Errichiello & Micera, 2021; Zvaigzne *et al.*, 2023), and significant literature exists, for example, on the members of the Spanish Network of Smart Destinations (Foronda-Robles *et al.*, 2023). This body of work emphasizes the coordinated public and private sector efforts to strengthen stakeholder commitment at a strategic level. Smart tourism destinations, however, move beyond mere commitment and actively participate in strategic planning and the implementation of solutions to improve both tourism management and the visitor experience. This involvement includes leading projects to introduce intelligent destination management systems, participating in sustainable development decision-making, and collaborating with local communities. Stakeholder engagement at this level ensures that smart tourism initiatives move from theoretical frameworks to practical applications, thus leading to sustainable practices and enhanced tourist experiences. The successful implementation of smart tourism practices often depends, however, on the alignment of governance structures with collaborative networks and financial support. Public–private partnerships, as well as backing from national and regional governments, play a key role in overcoming financial and logistical barriers that might otherwise impede progress. Without these critical enablers, stakeholder commitment may not translate easily into tangible actions (Calle-Lamelas *et al.*, 2023). Thus, the relationship between commitment and action is shaped by collaboration and supportive policies. Sustained efforts in stakeholder engagement, combined with the provision of necessary resources, are essential for ensuring that the commitment to smart tourism is realized through concrete actions. This led to the third hypothesis to be tested:

H3: There is a positive relationship between commitment to smart tourism (COMMIT) and action towards implementing smart tourism practices (ACT) among stakeholders.

3. Methodology

The methodology of this study was based on the prospective analysis of the performance of Andalusian tourism actors in relation to a medium- and long-term horizon within the framework of smart tourism development. This study employed PLS-SEM, a method particularly suitable for exploratory studies and for analysing complex relationships between latent constructs (Ringle *et al.*, 2009). PLS-SEM allows for robust hypothesis testing while handling non-normal data distributions and small-to-moderate sample sizes, thus making it an appropriate choice for evaluating the MLEM in the Andalusian tourism context (Hair *et al.*, 2011). To achieve the research objectives, 350 surveys were administered to public and private stakeholders in the tourism sector during the period September–December 2023, using the CATI

methodology. The validity of the model was assessed through convergent and discriminant validity tests, including composite reliability (CR), ρ_A (Dijkstra & Henseler, 2015), the average variance extracted (AVE), and variance inflation factor (VIF) to ensure measurement accuracy. Bootstrapping was used to test the statistical significance of path coefficients at the 5% significance level.

3.1. Study area

Over the past decade, Andalusia has consolidated its position as one of the principal tourist regions in Europe, not only in terms of visitor volume but also in the diversity and complexity of its tourism system. Between 2013 and 2019, the region experienced sustained growth and received over 30 million tourists annually, with figures reaching 32.5 million in 2019 (IECA, 2024). Following the disruption caused by the COVID-19 pandemic, Andalusia demonstrated a strong capacity for recovery and surpassed 36 million visitors in 2024, while generating approximately €30 billion in tourism-related revenue (Junta de Andalucía, 2024). This long-term trajectory reflects the consolidated maturity of the Andalusian tourism sector, which is supported by a broad offer that combines coastal tourism, cultural heritage, rural experiences, and increasingly diversified products linked to gastronomy and nature. The region is home to several UNESCO World Heritage Sites and includes internationally recognized destinations such as Seville, Granada, Córdoba, and Málaga, which function as urban tourism hubs with global visibility.

In parallel, Andalusia has become a relevant context for the implementation of public policies aimed at innovation, digitalization, and sustainability in tourism. The regional administration and local entities have launched various initiatives aligned with the smart destination model in recent years, as they seek to promote more efficient governance, data-driven decision-making, and inclusive stakeholder participation. These developments position Andalusia as a pertinent case for examining the evolutionary transition from conventional tourism management models to smart and sustainable destination frameworks.

3.2. Questionnaire design

The survey instrument consisted of 40 Likert-scale items, each rated on a scale from 1 to 5, designed to assess stakeholder engagement in the transition towards smart tourism (Appendix A). A cross-sectional psychometric approach was adopted to evaluate four core behavioural constructs: knowledge, awareness, commitment, and action. These dimensions were developed to reflect the sequential logic of the MLEM, thus enabling an in-depth analysis of how stakeholders perceive, internalize, and act upon smart tourism principles.

This conceptual structure reflects widely accepted analytical approaches in smart tourism research and practice; it builds upon frameworks successfully applied in global contexts (Fernández-Tabales *et al.*, 2017; Sánchez-Bayón, 2023). First, knowledge refers to the stakeholder's factual understanding of smart tourism principles, technologies, and strategies. It reflects cognitive familiarity but does not imply evaluation or emotional engagement. For example, within the *knowledge* construct, items such as "I know what a smart destination is" (KNOW-1) and "I understand the role of technology in developing smart tourism" (KNOW-4) measured respondents' familiarity with core concepts.

Second, awareness captures the stakeholder's perception of the importance and relevance of smart tourism practices for their own activities and the broader destination. It involves value attribution and recognition of the potential implications of smart initiatives. In this dimension, statements like "Sustainability is a critical factor that smart destinations must integrate into their development strategies" (AWARE-1) and "I recognize the potential of smart tourism to optimize resource management and sustainable practices" (AWARE-7) measured how respondents' perceptions of the importance of sustainability and technology in smart destinations.

Third, commitment represents the stakeholder's personal or organizational intention to support and engage in smart tourism practices. It moves beyond recognition towards a motivational readiness to allocate resources and effort. For the *commitment* dimension, items such as "I am committed to integrating smart tourism practices in my organization to enhance sustainability and visitor satisfaction" (COMMIT-1) and "I actively support the implementation of smart technologies to improve the accessibility and inclusivity of tourism services in our destination" (COMMIT-2) reflected the degree of dedication stakeholders expressed towards adopting smart tourism initiatives.

Finally, the *action* dimension denotes the actual implementation of smart tourism practices by stakeholders. It reflects tangible behaviours such as adopting technologies, participating in collaborative initiatives, or integrating smart principles into operational activities. This dimension was captured through items like "I actively participate in initiatives that promote the use of smart technologies in tourism development" (ACT-1) and "I apply data-driven decision-making to improve the management of tourism services in smart destinations" (ACT-6), which evaluated the tangible steps respondents have taken to implement smart tourism practices.

Prior to the full-scale data collection, we conducted a two-stage pre-validation process. First, the initial version of the survey was reviewed by four academic experts in tourism and smart destination governance and three professionals from local destination management organizations in Andalusia. The experts assessed item relevance, clarity, and alignment with the theoretical constructs. This stage ensured content validity and led to minor adjustments in item wording and order. Second, a pilot test was conducted with 20 respondents representing both public and private tourism stakeholders (10 from each). These participants completed the full version of the survey instrument and were subsequently asked to provide feedback on item clarity and survey flow. Based on their responses, two items in the commitment and action dimensions were refined to improve interpretability and consistency. This pre-validation process helped to ensure the content validity of the instrument prior to the full-scale data collection and model testing.

3.3. *Sampling and data collection*

A total of 350 surveys were distributed among public and private agents in the Andalusian tourism sector using a stratified sampling method to ensure balanced representation. A quarter of the sample (25%) represented the public sector, including municipalities, municipal associations, provincial councils, and public institutions managing cultural heritage and tourism resources. The remainder of the sample (75%) represented the private sector, including accommodation providers, tourism intermediaries, and businesses engaged in leisure, eco-tourism, and guided tours. This public-private ratio was adjusted to reflect the greater territorial distribution of private tourism entities compared to public institutions, thus ensuring that the dataset captured a comprehensive view of stakeholder participation in smart tourism initiatives.

The sampling method followed a stratified random sampling approach, while ensuring proportional representation of different stakeholder categories. To determine the representativeness of the 25%-75% public-private distribution, we compared it with official tourism sector data from Andalusia. This approach helped align the sample with the actual distribution of stakeholders in the region, thus increasing external validity. The sample was also geographically distributed across the eight provinces of Andalusia (Almería, Cádiz, Córdoba, Granada, Huelva, Jaén, Málaga, and Sevilla) to account for regional diversity in smart tourism adoption. The allocation of surveys across these provinces was based on the relative density of tourism businesses and governance bodies within each territory to ensure a balanced and representative dataset.

To achieve the target sample, a CATI methodology was employed that allowed for efficient data collection with a high response rate. Respondents were selected based on their direct involvement in tourism decision-making, thus ensuring that insights came from stakeholders with relevant expertise and experience in the smart tourism transition. To minimize non-response bias in the CATI, we applied the following strategies: (a) multiple call attempts were made at different times/days; (b) we tracked response patterns across different respondent categories and provinces, and no systematic bias was found; and (c) early versus late responder analysis showed no significant differences in responses across key constructs, thus supporting the absence of late-response bias.

To ensure sufficient statistical power in analysing the factors influencing stakeholder participation in smart tourism initiatives, the minimum required sample size was calculated with G*Power software, which yielded a value of 280 necessary responses for an alpha level of 0.01. Given that the study obtained 350 valid responses, the sample size was deemed adequate for detecting significant relationships within the proposed model. However, the larger sample of 350 ensures not only statistical robustness and reliability but also enabled a more detailed examination of smart tourism trends, which aligns with similar studies in the field (Calderón-Fajardo *et al.*, 2024; Munawar *et al.*, 2022).

3.4. Data analysis

To test the proposed model, we applied PLS-SEM using SmartPLS 4 software. This method was selected due to its suitability for exploratory research, its robustness with moderate sample sizes, and its capacity to handle complex models with multiple latent constructs and sequential dependencies (Sarstedt *et al.*, 2022). Unlike covariance-based SEM, which is primarily confirmatory, PLS-SEM is recommended for theory development and prediction-oriented models, particularly when the relationships among constructs have not been fully established (Hair *et al.*, 2019). The MLEM tested in this study is sequential and path dependent, as it sought to identify how knowledge, awareness, and commitment shape stakeholder action in the context of smart destination transitions. Given this structure and the behavioural nature of the constructs involved, PLS-SEM was deemed the most appropriate analytical framework.

PLS-SEM has been widely applied in recent tourism research with similar objectives (Calderón-Fajardo *et al.*, 2024; Kim *et al.*, 2024; Panagopoulos *et al.*, 2025; Yuksel *et al.*, 2024), which reinforces its relevance for modelling stakeholder behaviour, technology adoption, and innovation diffusion in smart tourism contexts. The analysis followed recommended best practices, including the assessment of indicator reliability, internal consistency (using CR and ρ_A), convergent validity (AVE), and discriminant validity (using heterotrait-monotrait [HTMT]). We also evaluated multicollinearity using VIF values. To test the significance of the structural relationships, a bootstrapping procedure with 5,000 subsamples was performed. Explained variance (R^2) and predictive relevance (Q^2) were reported to assess the model's explanatory power.

4. Results

4.1. Measurement model

Table 1 presents the reliability and convergent validity of the model. The internal consistency of the constructs was evaluated using the PLS approach. CR values exceed 0.80, while standardized loadings are above 0.70. Additionally, the AVE surpasses 0.50, thus confirming the presence of convergent validity (Hair *et al.*, 2019). Furthermore, the VIF values remain below 5, which indicates that multicollinearity is not a concern in the model (Hair *et al.*, 2011).

Table 1. *Item Loadings, Construct Reliability, and Convergent Validity*

| Variable | Items | Standard loadings | Cronbach's alpha | CR | AVE | VIF |
|----------------------------|-----------|-------------------|------------------|-------|-------|-------|
| Knowledge (KNOW) | KNOW-1 | 0.869 | 0.809 | 0.810 | 0.723 | 1.900 |
| | KNOW-2 | 0.820 | | | | |
| | KNOW-3 | 0.820 | | | | |
| | KNOW-4 | 0.862 | | | | |
| | KNOW-5 | 0.891 | | | | |
| | KNOW-6 | 0.869 | | | | |
| | KNOW-7 | 0.911 | | | | |
| | KNOW-8 | 0.942 | | | | |
| | KNOW-9 | 0.872 | | | | |
| | KNOW-10 | 0.985 | | | | |
| Awareness (AWARE) | AWARE-1 | 0.869 | 0.809 | 0.810 | 0.791 | 2.300 |
| | AWARE-2 | 0.820 | | | | |
| | AWARE-3 | 0.862 | | | | |
| | AWARE-4 | 0.891 | | | | |
| | AWARE-5 | 0.962 | | | | |
| | AWARE-6 | 0.869 | | | | |
| | AWARE-7 | 0.820 | | | | |
| | AWARE-8 | 0.862 | | | | |
| | AWARE-9 | 0.891 | | | | |
| | AWARE-10 | 0.972 | | | | |
| Commitment (COMMIT) | COMMIT-1 | 0.869 | 0.715 | 0.911 | 0.823 | 2.100 |
| | COMMIT-2 | 0.820 | | | | |
| | COMMIT-3 | 0.862 | | | | |
| | COMMIT-4 | 0.891 | | | | |
| | COMMIT-5 | 0.962 | | | | |
| | COMMIT-6 | 0.869 | | | | |
| | COMMIT-7 | 0.820 | | | | |
| | COMMIT-8 | 0.862 | | | | |
| | COMMIT-9 | 0.891 | | | | |
| | COMMIT-10 | 0.882 | | | | |
| Action (ACT) | ACT-1 | 0.869 | 0.638 | 0.715 | 0.761 | 1.900 |
| | ACT-2 | 0.820 | | | | |
| | ACT-3 | 0.862 | | | | |
| | ACT-4 | 0.891 | | | | |
| | ACT-5 | 0.962 | | | | |
| | ACT-6 | 0.869 | | | | |
| | ACT-7 | 0.820 | | | | |
| | ACT-8 | 0.862 | | | | |
| | ACT-9 | 0.891 | | | | |
| | ACT-10 | 0.962 | | | | |

Table 2 presents the results of the discriminant validity test, which was carried out by analysing the AVEs for each construct. The AVE values exceeded the squared correlations between the corresponding construct and the others, thus confirming their distinct nature and demonstrating that the constructs do not overlap. This confirmed the discriminant validity of the model. To further analyse the discriminant validity, the HTMT correlations were found not to exceed 1.00 (Henseler *et al.*, 2015) suggestions. The conclusion of this test is that all conceptual variables successfully passed the discriminant validity test as stated in Table 3.

Table 2. *Correlation Coefficients and the Square Roots of AVEs* (in italics on diagonal). Based on Fornell & Larcker (1981) discriminant validity test

| Variable | 1 | 2 | 3 | 4 |
|--------------------------------|-------|-------|-------|-------|
| <i>(1) Knowledge (KNOW)</i> | 0.851 | | | |
| <i>(2) Awareness (AWARE)</i> | 0.306 | 0.810 | | |
| <i>(3) Commitment (COMMIT)</i> | 0.698 | 0.415 | 0.793 | |
| <i>(4) Action (ACT)</i> | 0.330 | 0.325 | 0.346 | 0.821 |

Table 3. Heterotrait-Monotrait Correlations

| Variable | 1 | 2 | 3 | 4 |
|--------------------------------|-------|-------|-------|-------|
| <i>(1) Knowledge (KNOW)</i> | 0.386 | | | |
| <i>(2) Awareness (AWARE)</i> | 0.723 | 0.574 | | |
| <i>(3) Commitment (COMMIT)</i> | 0.400 | 0.450 | 0.483 | |
| <i>(4) Action (ACT)</i> | 0.614 | 0.529 | 0.678 | 0.649 |

4.2. Assessment of the structural model

The structural model was evaluated by analysing the predictive validity of the endogenous variables and the statistical significance of the path coefficients. More specifically, the coefficient of determination ($R^2 = 0.633$) and the Stone–Geisser blindfolding procedure ($Q^2 = 0.623$) were analysed (Ringle *et al.*, 2020). Because both values are greater than zero, it can be concluded that the endogenous variables in the tested model exhibit sufficient explanatory power and predictive relevance. We then examined the relationships between knowledge, awareness, commitment, and action within the context of smart tourism using SEM. Three hypotheses were tested (Appendix B, Table 4):

Table 4. Summary of Structural Model

| Hypothesis | Path | β Coefficient | Decision | R^2 (endogenous variable) |
|----------------|----------------|----------------------|-----------|-----------------------------|
| H ₁ | KNOW → AWARE | 0.490 ^{***} | Supported | 0.24 (Awareness) |
| H ₂ | AWARE → COMMIT | 0.336 ^{***} | Supported | 0.11 (Commitment) |
| H ₃ | COMMIT → ACT | 0.533 ^{***} | Supported | 0.28 (Action) |

^{***}significant at the 0.001 level

The structural model supports the hypothesized relationships and validates the sequential logic of the MLEM. In relation to H₁ (*Knowledge* → *Awareness*), the path coefficient ($\beta = 0.490$; $p < 0.001$) indicates a statistically significant and positive association between stakeholders' knowledge of smart tourism and their level of awareness. This finding reveals the foundational role of exposure to information in fostering perceptual engagement. The explanatory power for the *awareness* construct is reflected in an R^2 of 0.24, which suggests that knowledge alone accounts for approximately one-quarter of the variance observed in the levels of stakeholder awareness.

Regarding H₂ (*Awareness* → *Commitment*), the estimated path coefficient ($\beta = 0.336$; $p < 0.001$) also confirms a significant relationship. Although the magnitude is lower than that observed for H₁, the result points to a meaningful translation of awareness into a declared orientation towards action. The corresponding R^2 of 0.11 is modest but theoretically consistent, as commitment is typically influenced by a broader constellation of psychological, organizational, and contextual variables. The relationship specified in H₃ (*Commitment* → *Action*) exhibits the highest path coefficient among the tested hypotheses ($\beta = 0.533$; $p < 0.001$), thus confirming that declared commitment is a key driver of behavioural implementation. The model explains 28% of the variance in the *action* construct ($R^2 = 0.28$).

This figure is substantial, given the complexity and multicausality of behavioural outcomes in tourism governance contexts.

The confirmation of these hypotheses also reinforces the underlying assumption of the MLEM: that smart destination transitions unfold through sequential stages. Each phase reinforces the next, and final actions result not only from commitment, but also from earlier stages of knowledge and awareness. The model thus appears to capture how behavioural change is shaped by accumulated effects across stages, rather than by isolated drivers. It also highlights the need to align knowledge, perception, and intention before implementation can take place.

5. Discussion

Building on this empirical validation, the pilot study conducted in the Andalusian region confirms the practical relevance of the MLEM in a real-world policy and planning context. Rather than operating as a purely theoretical construct, the model captures a structured and progressive trajectory through which destinations move from conventional tourism paradigms to smart tourism governance. This transition unfolds through identifiable stages, each of which requires cognitive, normative, and operational shifts among stakeholders. Building on this structure, the MLEM organizes the evolution from traditional to smart destinations into three metaphorical levels (Figure 2): Illumination, Awakened Vision, and Smart Destination.

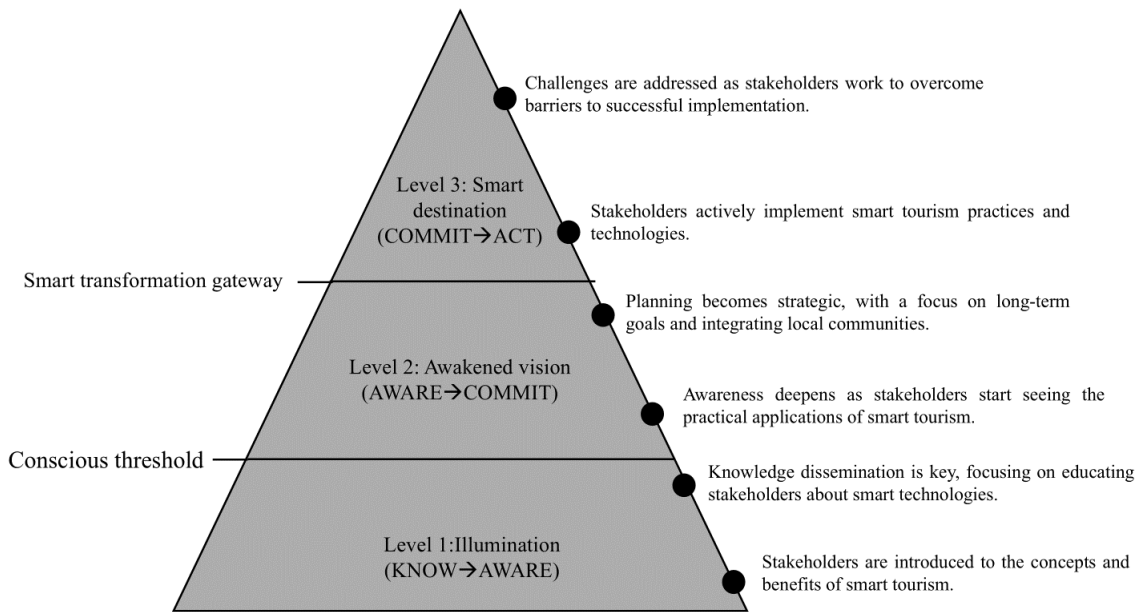


Figure 2. Multi-Level Evolutionary Model of a Smart Tourism Destination

Level 1, *Illumination*, represents the initial phase when knowledge about smart tourism is disseminated, which raises awareness among stakeholders about its benefits. This is followed by Level 2, *Awakened Vision*, which reflects the stage when awareness crystallizes into strategic commitment, as stakeholders begin to recognize the necessity of smart tourism for long-term development. Finally, Level 3, *Smart Destination*, marks the shift from commitment to action, when the practical implementation of smart tourism practices occurs, thus overcoming existing barriers and enabling the full integration of smart principles into destination management.

5.1. Level 1: Illumination (KNOW → AWARE)

Level 1, *Illumination*, represents the foundational stage of the evolutionary process when stakeholders are introduced to the concepts and potential benefits of smart tourism. This phase relies heavily on the dissemination of knowledge to stakeholders, which aligns with previous research emphasizing the importance of knowledge as a catalyst for change in the tourism industry (Bastidas-Manzano *et al.*, 2021; Liu *et al.*, 2023). Knowledge in this level involves not only introducing stakeholders to emerging technologies such as big data, Internet of Things, and artificial intelligence, but also contextualizing how these technologies can directly improve their specific operations (Azis *et al.*, 2020). The data from the Andalusian region showed that stakeholders with prior technological experience responded more readily to this knowledge, which is similar to the findings of Cimbaljević *et al.* (2023), who noted the varying levels of receptivity depending on stakeholders' background knowledge.

The emphasis in this level is thus on knowledge dissemination, which is often facilitated through educational programmes, workshops, and targeted communications that highlight the core components of smart tourism, such as technology integration, sustainability, and innovative governance models. At this stage, stakeholders remain largely passive, absorbing information without yet committing to strategic changes. The *conscious threshold* becomes a key boundary that must be crossed for stakeholders to move from simply receiving knowledge to actively recognizing the strategic importance of smart tourism (Gretzel, 2021). This transition is critical, as noted by Mehraliyev *et al.* (2020), who argue that without this cognitive shift, stakeholders are likely to remain passive, which limits the potential for smart tourism adoption. This study found that when stakeholders understood the potential of smart technologies to solve immediate challenges—such as improving resource efficiency or enhancing tourist satisfaction—their level of awareness increased significantly.

Finally, while knowledge dissemination plays a central role in this level, it is important to note that the mode of dissemination also matters. Stakeholders tended to respond more positively to interactive, personalized communication methods, such as workshops and collaborative sessions, rather than traditional one-way channels of information. This finding aligns with the recommendations of Otowicz *et al.* (2022) and Sustacha *et al.* (2023), who highlight the importance of experiential learning and engagement in driving stakeholder awareness. Addressing concerns such as data privacy and technological readiness early in this phase may also help reduce resistance, as previously noted by Femenia-Serra *et al.* (2022).

5.2. Level 2: Awakened vision (AWARE → COMMIT)

Level 2, *Awakened Vision*, involves stakeholders moving beyond passive awareness and beginning to engage actively with the concept of smart tourism. This engagement is driven by an increasing recognition of the strategic importance of adopting smart tourism practices to maintain competitiveness and enhance the quality of the tourist experience. As noted by Jeong and Shin (2020) and Muniz *et al.* (2021), the adoption of technologies such as mobile applications, augmented reality, and virtual assistants can significantly improve both operational efficiency and customer satisfaction. These innovations, combined with strategies like digital marketing and resource management optimization, provide a tangible value proposition that motivates stakeholders to commit to smart tourism.

The data from Andalusia indicate that stakeholders who reached this phase demonstrated a willingness to invest resources—both financial and organizational—into smart tourism initiatives. This aligns with previous studies (Jia *et al.*, 2022) highlighting how awareness of digital tools and data-driven decision-making processes drives a deeper commitment to smart tourism development. In particular, the ability to leverage tourist behaviour data and market trends was a key factor in pushing stakeholders towards

greater engagement with smart tourism practices (Weng & Zhang, 2023). One of the key challenges in this phase, however, is ensuring that stakeholders perceive the benefits of smart tourism as both immediate and long-term. While many stakeholders recognize the operational advantages of smart technologies, the broader impact on sustainability and destination resilience may not always be immediately apparent. As González-Mendes *et al.* (2024) argue, promoting sustainability through smart tourism requires a clear link between the use of technology and environmental and social benefits. In Andalusia, stakeholders who could see these connections more clearly were more likely to commit to larger-scale, long-term smart tourism projects. To facilitate this commitment, it is essential to offer continuous education and capacity-building opportunities. Events such as the Smart City Expo World Congress, TURITEC Málaga, and the World Tourism Forum Lucerne are critical platforms for stakeholders not only to learn about best practices but also to build networks that support collaborative implementation (Sánchez-Bayón, 2023).

Financial incentives and government support also play a crucial role in reducing perceived barriers to commitment. Stakeholders often hesitate to commit fully to smart tourism due to concerns over initial investment costs, technical expertise, and the regulatory environment. In Spain, programmes like the Plan de Recuperación, Transformación y Resiliencia provide critical financial support that allows destinations and businesses to overcome these initial hurdles. Our study shows that when these financial supports were coupled with clear evidence of operational and market benefits, stakeholder commitment significantly increased. This level thus marks the transition from awareness to active engagement. It is characterized by a growing willingness to invest in smart tourism initiatives as stakeholders begin to see the long-term strategic value. However, this commitment is contingent on the provision of continuous education, financial incentives, and the clear demonstration of both immediate and long-term benefits. Collaborative frameworks and government support are particularly important in sustaining stakeholder commitment, as they help to mitigate the risks and uncertainties associated with adopting new technologies.

5.3. Level 3: Smart destination (COMMIT → ACT)

The smart destination is the final and most critical stage in the MLEM. At this point, the strategic commitments made by stakeholders are translated into concrete, measurable actions aimed at integrating smart tourism practices within the destination. This stage represents the shift from theoretical frameworks and plans to their practical application, when stakeholders—ranging from public administrations to private enterprises and local communities—actively engage in initiatives designed to operationalize smart tourism. In this phase, the role of collaborative networks becomes essential. As Baggio *et al.* (2020) highlight, the formation of digital and physical ecosystems among stakeholders facilitates the exchange of best practices and fosters the collaborative implementation of smart technologies. In the case of the Andalusian region, these networks played a key role in driving the development of pilot projects and full-scale initiatives, such as those focusing on resource efficiency and enhanced visitor experiences. Similar findings are evident in studies emphasizing the importance of governance structures in the practical realization of smart tourism initiatives (Sedarati *et al.*, 2022). Governance thus emerges as a critical factor in this level. The effectiveness of smart tourism depends on the capacity of the public and private sectors to provide a supportive regulatory and policy framework, as well as financial incentives to enable the integration of smart technologies. In the Andalusian context, local and national authorities played a crucial role by offering both regulatory backing and financial support that allowed stakeholders to implement smart tourism solutions at scale. This finding is consistent with the broader literature, which points to the necessity of coordinated management structures in expanding smart tourism practices beyond isolated projects (Calle-Lamelas *et al.*, 2023).

Another defining characteristic of this phase is the integration of smart technologies into the daily operations of tourism businesses and destination management. The use of real-time data systems,

mobile applications for personalized tourist experiences, and big data analytics for decision-making processes enables destinations to optimize operations and improve sustainability and accessibility. Ivars-Baidal *et al.* (2024) stress, however, that smart tourism requires a comprehensive approach in which technology is integrated across all aspects of destination management, as this contributes to both operational efficiency and improved visitor experiences. Effective leadership is also a key driver of success in this phase. In both the public and private sector, leaders must not only set clear strategic goals but also coordinate efforts across multiple stakeholders to ensure that the benefits of smart tourism are realized equitably. Leadership plays an essential role in guiding the destination through this critical transition, fostering innovation, and aligning smart tourism initiatives with broader objectives of sustainability, competitiveness, and visitor satisfaction.

Despite the progress made during this phase, several challenges may arise. These can include logistical and financial constraints, as well as technical difficulties in scaling smart tourism initiatives. Overcoming these barriers requires strong collaboration among stakeholders, which can be facilitated through platforms for knowledge sharing and joint problem-solving (Foronda-Robles *et al.*, 2023). In the Andalusian region, public-private partnerships and community engagement were crucial in addressing these challenges and ensuring the successful implementation of smart tourism strategies. This level represents the culmination of the evolutionary process, as commitment is transformed into action through strategic collaborative networks and the implementation of smart technologies. While challenges remain, this phase provides a roadmap for destinations seeking to fully embrace smart tourism, while highlighting the importance of integrated approaches to overcome barriers and achieve sustainable, long-term success.

In this context, smart tourism has emerged as an expanding field generating substantial debate within the academic literature, with both supportive and critical perspectives. One of the most pressing challenges concerns the digital divide associated with smart tourism. The uneven distribution of information and communication technologies may exacerbate digital and social exclusion, which could limit the ability of destinations and tourism organizations to compete effectively in a globalized environment (Reverte & Luque, 2021). Furthermore, issues such as digital illiteracy and cognitive or sensory limitations intensify these disparities (Chen *et al.*, 2024b).

While much research has focused on the benefits and applications of digital transformation in tourism, comparatively less attention has been paid to its associated risks, particularly the emergence of structural dependency and data control dynamics. These factors may have long-term implications, including the potential for digital colonialism within tourism destinations (Abbasian & Kawa, 2019; Kumar & Kumar, 2022; Oakes, 2024). Conversely, techno-optimism, fuelled by the digital transformation of the tourism sector, is increasingly viewed as a catalyst for sustainable development (Dwyer, 2023; Vaz & Machado, 2022). Smart solutions are seen as critical instruments in this process; however, their full impact remains underexplored, which highlights the need for continued investigation into their long-term societal and economic implications (Rodrigues *et al.*, 2023).

6. Conclusion, Implications, Limitations, and Future Research

This study confirms the validity and practical utility of the Multi-Level Evolutionary Model (MLEM) for guiding the transformation of traditional tourism destinations into smart destinations. Applied to the Andalusian region as a pilot case, the MLEM provides an integrative framework that captures the dynamic, sequential progression through which destinations evolve—starting with knowledge dissemination and culminating in action-oriented smart tourism practices. This process is not linear but rather iterative and interdependent, reflecting the real-world complexity of institutional change, stakeholder interaction, and adaptive governance in the tourism sector.

6.1. Theoretical implications

This study contributes significantly to the expanding literature on smart tourism by presenting a structured MLEM that systematically explains the transformation from traditional to smart tourism destinations. The model enriches the theoretical discourse by mapping how the interconnected stages of knowledge, awareness, commitment, and action contribute to the conceptualization of smart tourism evolution. Unlike previous studies, which have primarily addressed individual aspects of smart tourism—such as technology adoption (Balakrishnan *et al.*, 2023), stakeholder engagement (Errichiello & Micera, 2021; Foronda-Robles *et al.*, 2023), or sustainability integration (González-Mendes *et al.*, 2024)—this model synthesizes these dimensions into a coherent framework that reflects a comprehensive progression.

The model goes beyond existing frameworks by demonstrating how knowledge dissemination triggers subsequent shifts in awareness and fosters proactive commitment to smart tourism practices. It also emphasizes the dynamic nature of stakeholder interaction and the importance of collective, informed decision-making throughout the transition process, which aligns with insights from previous studies (Ivars-Baidal *et al.*, 2024). As a theoretical foundation, the model can be adapted and tested across diverse settings, thus encouraging future research to explore its applicability in different geographic, cultural, and socio-economic contexts. Comparative studies examining the pathways that destinations may take through this model would refine the understanding of smart tourism development across varied regional and cultural landscapes (Zvaigzne *et al.*, 2023).

6.2. Practical implications

The findings provide clear, actionable insights for destination managers, policymakers, and industry stakeholders engaged in the transition to smart tourism. The MLEM identifies critical junctures at which interventions can be most effective, which allows for strategic, evidence-based decision-making. In the *Illumination* level, knowledge dissemination is central, thus emphasizing targeted educational campaigns and capacity-building initiatives that enhance stakeholders' understanding of smart technologies and their application in tourism. Managers are encouraged to deploy interactive, experiential learning platforms that make complex technologies more accessible to local stakeholders. As the process moves into the *Awakened Vision* level, the focus shifts to fostering deeper engagement, as stakeholders are not only informed but also motivated to commit resources towards smart tourism initiatives. Practical efforts here could involve facilitating public-private partnerships, incentivizing collaboration among key players, and implementing small-scale pilot projects to demonstrate the tangible benefits of smart tourism. In the final level, the emphasis should be placed on removing practical barriers to action, such as regulatory challenges, financial constraints, and stakeholder resistance. Destination managers must collaborate with policymakers to provide adequate funding mechanisms, supportive regulations, and technical guidance that can help stakeholders implement and scale smart tourism practices. Such strategic guidance would ensure that destinations do not stall in their evolution but instead move towards fully integrated smart tourism ecosystems.

6.3. Social implications

The social dimension of the MLEM underlines the fact that transitioning to a smart destination is not merely a technological upgrade but a social innovation process. The model foregrounds community engagement, inclusive governance, and shared vision-building as prerequisites for meaningful transformation.

In the early stages, equitable access to information and capacity-building tools ensures that vulnerable and digitally excluded groups are not left behind. As awareness and commitment increase, the role of local narratives, cultural identity, and participatory platforms becomes central. In the final phase, social implications revolve around the creation of long-term, inclusive governance mechanisms that institutionalize community voices and promote ongoing co-creation.

In doing so, the MLEM highlights how social cohesion, empowerment, and equity are essential to ensuring that smart tourism practices contribute to broader human development goals, not just economic efficiency.

6.4. Limitations and future research directions

Despite the contributions of this study, two main limitations should be acknowledged. First, the reliance on self-reported data introduces the possibility of response bias, as participants may overestimate or underestimate their engagement in smart tourism practices. The inclusion of objective performance indicators (e.g., digital infrastructure investments, actual technology adoption rates) in future research could complement survey-based findings. Second, while PLS-SEM is suitable for exploratory and theory-building research, it does not provide the same robustness in causal inference as traditional experimental or longitudinal designs. Future research could incorporate longitudinal data collection to analyse the evolution of stakeholder engagement in smart tourism over time.

Although this study adopted a structured and validated quantitative approach, future research could benefit from the inclusion of qualitative methods—such as focus groups or in-depth interviews—to explore the perceptions, motivations, and power dynamics that influence the transition to smart destinations in greater depth. Such methods would complement the theory-driven model tested here by offering richer contextual insights and capturing stakeholder narratives and discourses that may not emerge from structured questionnaires alone.

Another methodological limitation relates to the process for validating the measurement instrument. Although the constructs were theory-driven and underwent a two-stage pre-validation process (expert review and pilot testing), this study did not include separate exploratory or confirmatory factor analysis using an independent sample. This was due to the contextual focus and sample limitations of the study, which prioritized full model estimation with a representative group of stakeholders. Nevertheless, the constructs were assessed for reliability and validity within the PLS-SEM framework, including CR (ρA), AVE, and discriminant validity (HTMT), with all indicator loadings showing positive and significant values. To strengthen the generalizability and replicability of the model, future studies are encouraged to test the MLEM structure and its associated constructs in different geographical and institutional contexts using larger or independent samples. This would allow for further refinement of the scale and its applicability across diverse tourism governance settings.

Beyond these methodological considerations, several future research directions emerge. Studies should examine the MLEM framework in different types of destinations, such as urban versus rural areas or developed versus emerging markets. Also, this study focused on public and private sector actors as a whole, but future research could analyse these groups separately. For instance, public institutions might prioritize governance and regulatory frameworks, while private enterprises may focus on technological adoption and customer experience. Understanding these differences could help in tailoring smart tourism strategies to the needs and capacities of each group. Finally, evaluating the effectiveness of policies to promote smart tourism is also crucial for understanding their real-world impact. Future research could assess how different regulatory frameworks, incentive programmes, and public-private collaborations influence the success of smart tourism initiatives.

Future research should also further explore how human-centric factors mediate the transition towards smart destinations. While the MLEM emphasizes the sequential evolution from knowledge to action, the effective implementation of smart tourism practices may critically depend on digital literacy, technological acceptance, and community engagement. The availability of technology alone does not guarantee successful smart destination development; rather, its meaningful use requires stakeholder readiness, participatory governance, and social innovation processes. Extending the model to people-

centred frameworks could provide valuable insights into how socio-cultural and organizational factors enable or hinder the full realization of smart tourism transitions.

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Appendices

APPENDIX A

| Smart Tourism Constructs | Items |
|--------------------------|--|
| <i>Knowledge (KNOW)</i> | KNOW-1 I know what a smart destination is. |
| | KNOW-2 I am familiar with how smart destinations promote accessible and inclusive tourism for all visitors. |
| | KNOW-3 I understand the importance of smart tourism in promoting sustainability for balancing tourism growth and environmental protection |
| | KNOW-4 I understand the role of technology in developing smart tourism. |
| | KNOW-5 I know how innovation in tourism contributes to the transformation of traditional destinations into smart destinations. |
| | KNOW-6 I understand the governance structures that support the management and growth of smart destinations. |
| | KNOW-7 I am aware of how smart destinations use data analytics to enhance decision-making and improve the tourist experience. |
| | KNOW-8 I am familiar with the collaborative strategies employed by smart destinations to engage local communities and ensure their participation in tourism planning and governance. |
| | KNOW-9 I am familiar with the ethical concerns and data privacy issues related to the implementation of smart tourism technologies. |
| | KNOW-10 I understand how smart destinations can leverage big data to create personalized and secure tourism experiences while maintaining visitor privacy. |
| <i>Awareness (AWARE)</i> | AWARE-1 Sustainability is a critical factor that smart destinations must integrate into their development strategies. |
| | AWARE-2 In smart destinations, sustainability must address the needs of both tourists and local residents. |
| | AWARE-3 Accessibility should be a key element in smart destinations to ensure inclusivity for all visitors. |
| | AWARE-4 Smart tourism should be developed to actively promote universal physical accessibility and social inclusion. |
| | AWARE-5 Technology is crucial for enhancing operational efficiency and competitiveness in smart destinations. |
| | AWARE-6 Collaboration between public and private sectors is necessary to manage smart tourism initiatives and foster innovation effectively. |
| | AWARE-7 I recognize the potential of smart tourism for optimizing resource management and sustainable practices. |
| | AWARE-8 I recognize the importance of digital platforms in smart destinations for providing accessible and up-to-date information to all visitors. |

| | |
|----------------------------|--|
| | <p>AWARE-9 Smart technologies should be integrated in destinations to enhance the overall visitor experience, thus making tourism more efficient and personalized.</p> <p>AWARE-10 I recognize the importance of stakeholder engagement in developing inclusive and sustainable smart tourism practices.</p> |
| Commitment (COMMIT) | <p>COMMIT-1 I am committed to integrating smart tourism practices in my organization to enhance sustainability and visitor satisfaction.</p> <p>COMMIT-2 I actively support the implementation of smart technologies to improve the accessibility and inclusivity of tourism services in our destination.</p> <p>COMMIT-3 I am committed to collaborating with local stakeholders to drive the smart tourism agenda and foster public-private partnerships.</p> <p>COMMIT-4 I am willing to participate in initiatives that promote the integration of digital platforms for better governance and information sharing in our destination.</p> <p>COMMIT-5 I support the continuous development of tourism professionals through training programmes on smart destination management and the use of emerging technologies.</p> <p>COMMIT-6 I am dedicated to ensuring that the smart tourism strategies implemented in our destination meet the needs of both visitors and the local community.</p> <p>COMMIT-7 I prioritize smart governance frameworks that promote inclusive decision-making and the long-term sustainability of tourism practices in our destination.</p> <p>COMMIT-8 I am committed to fostering innovation within the tourism sector to ensure our destination remains competitive as a smart destination.</p> <p>COMMIT-9 I actively engage in projects aimed at improving the technological infrastructure that supports the development of smart tourism in our region.</p> <p>COMMIT-10 I am aware of the role that local communities play in shaping smart tourism initiatives and their involvement in destination governance.</p> |
| | <p>ACT-1 I actively participate in initiatives that promote the use of smart technologies in tourism development.</p> <p>ACT-2 I have implemented sustainable practices in my organization that align with the principles of smart tourism.</p> <p>ACT-3 I take part in projects aimed at improving digital accessibility in smart destinations.</p> <p>ACT-4 I collaborate with stakeholders to integrate innovation into tourism services and products.</p> <p>ACT-5 I contribute to the development and implementation of technology-driven solutions in the tourism sector.</p> <p>ACT-6 I apply data-driven decision-making to improve the management of tourism services in smart destinations.</p> <p>ACT-7 I lead or support projects focused on enhancing physical accessibility in tourist facilities within smart destinations.</p> <p>ACT-8 I actively promote and advocate for sustainability initiatives in tourism aligned with smart destination strategies.</p> <p>ACT-9 I have participated in the implementation of innovative tourism experiences that enhance the visitor experience through smart technologies.</p> <p>ACT-10 I collaborate with local governments and businesses to develop and support policies that foster smart tourism development.</p> |
| | Action (ACT) |

APPENDIX B

Hypothesis testing through bootstrapping analysis.

| Direct effects | | Original sample (O) | Sample mean (M) | Standard deviation (STDEV) | T statistics (O/STDEV) | Decision |
|----------------|-----------------|---------------------|-----------------|----------------------------|--------------------------|-----------|
| H ₁ | KNOW-> AWARE | 0.490 | 0.472 | 0.049 | 0.999 | Supported |
| H ₂ | AWARE -> COMMIT | 0.336 | 0.310 | 0.058 | 5.739 | Supported |
| H ₃ | COMMIT -> ACT | 0.533 | 0.520 | 0.059 | 0.568 | Supported |

***significant at the 0.001 level; **significant at 0.05; *significant at the 0.10 level

References

- Abbasian, M., & Kawa, A. (2019). Dark side of digital transformation in tourism. In *Asian conference on intelligent information and database systems* (pp. 510-518). Cham: Springer International Publishing. https://doi.org/10.1007/978-3-030-14802-7_44
- Absari, D. T., Djunaidy, A., & Susanto, T. D. (2024). Development of Evaluation Readiness Model for Smart Tourism Destination. In *2024 2nd International Conference on Software Engineering and Information Technology (ICoSEIT)* (pp. 311-317). IEEE. doi: <https://doi.org/10.1109/ICoSEIT60086.2024.10497483>
- Adnan, H. R., Hidayanto, A. N., Purwandari, B., & Nazief, B. A. A. (2020). Rocky roads towards smart tourism: A multi-dimensional challenges review. In *2020 Fifth International Conference on Informatics and Computing (ICIC)* (pp. 1-7). IEEE. doi: <https://doi.org/10.1109/ICIC50835.2020.9288514>
- Aguirre, A., Zayas, A., Gómez-Carmona, D., & Sánchez, J. A. L. (2022). Smart tourism destinations really make sustainable cities: Benidorm as a case study. *International Journal of Tourism Cities*, 9(1), 51-69. <https://doi.org/10.1108/IJTC-01-2022-0006>
- Ajzen, I. (1991). The theory of planned behavior. *Organizational Behavior and Human Decision Processes*, 50(2), 179-211. [https://doi.org/10.1016/0749-5978\(91\)90020-T](https://doi.org/10.1016/0749-5978(91)90020-T)
- Ajzen, I. (2020). The theory of planned behavior: Frequently asked questions. *Human behavior and emerging technologies*, 2(4), 314-324. <https://doi.org/10.1002/hbe2.195>
- Aliyah, L., Lukita, C., Pangilinan, G., Chakim, M., & Saputra, D. (2023). Examining the Impact of Artificial Intelligence and Internet of Things on Smart Tourism Destinations: A Comprehensive Study. *Aptisi Transactions on Technopreneurship*, 5, 135-145. <https://doi.org/10.34306/att.v5i2sp.332>
- Alsharif, A., Isa, S. M., & Alqudah, M. N. (2024). Smart Tourism, Hospitality, and Destination: A Systematic Review and Future Directions. *Journal of Tourism and Services*, 15(29), 72-110. <https://doi.org/10.29036/jots.v15i29.746>
- Arbidane, I., Puzule, A., Znotina, D., Narkuniene, R., & Daubariene, J. (2023). Accessibility and smart tourism: tourism for all and reducing inequalities: a tourism agenda 2030. *Worldwide Hospitality and Tourism Themes*, 15(5), 497-506. <https://doi.org/10.1108/WHATT-06-2023-0078>
- Azis, N., Amin, M., Chan, S., & Aprilia, C. (2020). How smart tourism technologies affect tourist destination loyalty. *Journal of hospitality and tourism technology*, 11(4), 603-625. <https://doi.org/10.1108/JHTT-01-2020-0005>
- Baggio, R., Micera, R., & Del Chiappa, G. (2020). Smart tourism destinations: a critical reflection. *Journal of Hospitality and Tourism Technology*, 11(3), 407-423. <https://doi.org/10.1108/JHTT-01-2019-001>
- Baiocco, S., Monda, A., Paniccia, P. M., & Botti, A. (2024). Smart tourism for smart city: An exploratory analysis of tourism digital start-ups: The case of Italy. In *ICT, the Business Sector and Smart Cities* (pp. 160-176). Routledge. <https://doi.org/10.1201/9781003450610-12>
- Balakrishnan, J., Dwivedi, Y. K., Malik, F. T., & Baabdullah, A. M. (2023). Role of smart tourism technology in heritage tourism development. *Journal of Sustainable Tourism*, 31(11), 2506-2525. <https://doi.org/10.1080/09669582.2021.1995398>

- Bastidas-Manzano, A. B., Sánchez-Fernández, J., & Casado-Aranda, L. A. (2021). The past, present, and future of smart tourism destinations: a bibliometric analysis. *Journal of Hospitality & Tourism Research*, 45(3), 529-552. <https://doi.org/10.1177/1096348020967062>
- Belhaj, N., & Azdimousa, H. (2023). Charting the Smart Tourism Landscape: A Comprehensive Framework for Revealing the Impact of Destination Smartness on Tourism Experience and Perceived Value. In *International Conference on Advanced Intelligent Systems for Sustainable Development* (pp. 249-261). Cham: Springer Nature Switzerland. https://doi.org/10.1007/978-3-031-54318-0_21
- Boom, S., Weijschede, J., Melissen, F., Koens, K., & Mayer, I. (2021). Identifying stakeholder perspectives and worldviews on sustainable urban tourism development using a Q-sort methodology. *Current Issues in Tourism*, 24(4), 520-535. <https://doi.org/10.1080/13683500.2020.1722076>
- Buhalis, D., & Sinarta, Y. (2019). Real-time co-creation and nowness service: lessons from tourism and hospitality. *Journal of Travel & Tourism Marketing*, 36(5), 563-582. <https://doi.org/10.1080/10548408.2019.1592059>
- Buitrago-Esquinas, E. M., Yñiguez-Ovando, R., Puig-Cabrera, M., Santos, M. C., & Santos, J. A. C. (2024). Artificial Intelligence and Sustainable Tourism Planning: A Hetero-Intelligence Methodology Proposal. *Tourism & Management Studies*, 20(SI), 45-59. <https://doi.org/10.18089/tms.2024SI04>
- Calderón-Fajardo, V., Puig-Cabrera, M., & Rodríguez-Rodríguez, I. (2024). Beyond the real world: Metaverse adoption patterns in tourism among Gen Z and Millennials. *Current Issues in Tourism*, 1-21. <https://doi.org/10.1080/13683500.2024.2330675>
- Calle-Lamelas, J. V., García-Hernández, M., & García-Muiña, F. E. (2023). What is a smart destination in practice? The interpretation of DMO managers from Spanish world heritage cities. *Tourism Planning & Development*, 1-23. <https://doi.org/10.1080/21568316.2023.2214123>
- Cavalheiro, M. B., Joia, L. A., & Cavalheiro, G. M. D. C. (2020). Towards a smart tourism destination development model: Promoting environmental, economic, socio-cultural and political values. *Tourism Planning & Development*, 17(3), 237-259. <https://doi.org/10.1080/21568316.2019.1597763>
- Chen, S. X., Zhang, Y., & Tse, S. W. T. (2024a). Untangling the smart tourism technostress enigma: assessing the effects of smart technology-related stressors on smart tourism avoidance behaviors in senior tourists. *Journal of Travel & Tourism Marketing*, 41(9), 1161-1176. <https://doi.org/10.1080/10548408.2024.2404839>
- Chen, Z., Chan, I. C. C., Mehraliyev, F., Law, R., & Choi, Y. (2024b). Typology of people-process-technology framework in refining smart tourism from the perspective of tourism academic experts. *Tourism Recreation Research*, 49 (1), 105-117. <https://doi.org/10.1080/02508281.2021.1969114>
- Cimbaljević, M., Demirović Bajrami, D., Kovačić, S., Pavluković, V., Stankov, U., & Vujičić, M. (2023). Employees' technology adoption in the context of smart tourism development: the role of technological acceptance and technological readiness. *European Journal of Innovation Management* 27(8), 2457-2482. <https://doi.org/10.1108/EJIM-09-2022-0516>
- Dwyer, L. (2023). Are smart tourism destinations developing sustainably?. *Smart Tourism*, 4 (2), 1-15 doi: <https://doi.org/10.54517/st.v4i2.2487>
- Erdmenger, E.C. (2023). The end of participatory destination governance as we thought to know it. *Tourism Geographies*, 25 (4), 1104-1126. <https://doi.org/10.1080/14616688.2022.2086904>
- Erdmenger, E. C. (2024). Nothing About Us without Us: Citizens' Role in Urban Tourism Policy-making. In *Tourism Policy-Making in the Context of Contested Wicked Problems: Politics, Paradigm Shifts and Transformation Processes* (pp. 199-217). Emerald Publishing Limited. <https://doi.org/10.1108/S1871-31732024000017B012>
- Errichiello, L., & Micera, R. (2021). A process-based perspective of smart tourism destination governance. *European Journal of Tourism Research*, 29, 2909-2909. <https://doi.org/10.54055/ejtr.v29i.2436>

- Femenia-Serra, F., Ioannou, A., & Tussyadiah, I. P. (2022). Is smart scary? A mixed-methods study on privacy in smart tourism. *Current Issues in Tourism*, 25(14), 2212-2238. <https://doi.org/10.1080/13683500.2021.1987399>
- Fernández-Díaz, E., Jambrino-Maldonado, C., Iglesias-Sánchez, P. P., & de las Heras-Pedrosa, C. (2023). Digital accessibility of smart cities-tourism for all and reducing inequalities: tourism agenda 2030. *Tourism Review*, 78(2), 361-380. <https://doi.org/10.1108/TR-02-2022-0091>
- Fernández-Tabales, A., Foronda-Robles, C., Galindo-Pérez-de-Azpillaga, L., & García-López, A. (2017). Developing a system of territorial governance indicators for tourism destinations. *Journal of Sustainable Tourism*, 25(9), 1275-1305. <https://doi.org/10.1080/09669582.2016.1260136>
- Foronda-Robles, C., Galindo-Pérez-de-Azpillaga, L., & Fernández-Tabales, A. (2023). Progress and stakes in sustainable tourism: indicators for smart coastal destinations. *Journal of Sustainable Tourism*, 31(7), 1518-1537. <https://doi.org/10.1080/09669582.2020.1864386>
- Ghaderi, Z., Beal, L., Hall, C. M., Zaman, M., Ahmad Rather, R., & Mat Som, A. P. (2024). Cybersecurity and smart tourist destinations resilience. *Tourism Recreation Research*, 1-17. <https://doi.org/10.1080/02508281.2024.2434791>
- Gómez, D., & Thiel-Ellul, D. (2024). Gobernanza en destinos turísticos: el caso de los destinos turísticos inteligentes (DTIs) en España. *Investigaciones Turísticas*, (27), 203-223. <https://doi.org/10.14198/INTURI.24674>
- González-Mendes, S., García-Muiña, F., & González-Sánchez, R. (2024). Blockchain revolution in the tourism industry: A semi-systematic literature review. *European Journal of Tourism Research*, 37, 3701-3701. <https://doi.org/10.54055/ejtr.v37i.2777>
- Gretzel, U. (2018). From smart destinations to smart tourism regions. *Investigaciones Regionales-Journal of Regional Research*, (42), 171-184.
- Gretzel, U. (2021). Conceptualizing the smart tourism mindset: Fostering utopian thinking in smart tourism development. *Journal of Smart Tourism*, 1(1), 3-8. <https://doi.org/10.52255/smarttourism.2021.1.1.2>
- Guarda, T., Haz, L., Augusto, M. F., & Vitor, J. A. (2018). Pervasive smart destinations. In *Trends and Advances in Information Systems and Technologies: Volume 3 6* (pp. 375-382). Springer International Publishing. https://doi.org/10.1007/978-3-319-77700-9_37
- Gursoy, D., Luongo, S., Della Corte, V., & Sepe, F. (2024). Smart tourism destinations: an overview of current research trends and a future research agenda. *Journal of Hospitality and Tourism Technology*, 15(3), 479-495. <https://doi.org/10.1108/JHTT-10-2023-0339>
- Hair Jr, J. F., M Hult, G. T., M Ringle, C., Sarstedt, M., Castillo Apraiz, J., Cepeda Carrión, G. A., & Roldán, J. L. (2019). *Manual de partial least squares structural equation modeling (pls-sem)*. OmniaScience.
- Hair Jr, J. F., Ringle, C. M., and Sarstedt, M. (2011). *PLS-SEM: Indeed, a Silver Bullet*. <http://dx.doi.org/10.2753/mtp1069-6679190202>
- Halkiopoulou, C., Antonopoulou, H., & Giotopoulos, K. (2022, September). Implementation of digital marketing techniques in smart tourism. In *International Conference of the International Association of Cultural and Digital Tourism* (pp. 381-398). Cham: Springer International Publishing. https://doi.org/10.1007/978-3-031-26829-8_24
- Henseler, J., Ringle, C. M., & Sarstedt, M. (2015). A new criterion for assessing discriminant validity in variance-based structural equation modeling. *Journal of the Academy of Marketing Science*, 43, 115-135. <https://doi.org/10.1007/s11747-014-0403-8>
- Instituto de Estadística y Cartografía de Andalucía (IECA). (2024). Tourism statistics Andalusia.
- Ivars-Baidal, J. A., Celdrán-Bernabeu, M. A., Mazón, J. N., & Perles-Ivars, Á. F. (2019). Smart destinations and the evolution of ICTs: a new scenario for destination management?. *Current Issues in Tourism*, 22(13), 1581-1600. <https://doi.org/10.1080/13683500.2017.1388771>
- Ivars-Baidal, J. A., Celdrán-Bernabeu, M. A., Femenia-Serra, F., Perles-Ribes, J. F., & Vera-Rebollo, J. F. (2023). Smart city and smart destination planning: Examining instruments and perceived impacts in Spain. *Cities*, 137, 104266. <https://doi.org/10.1016/j.cities.2023.104266>

- Ivars-Baidal, J. A., Casado-Díaz, A. B., Navarro-Ruiz, S., & Fuster-Uguet, M. (2024). Smart tourism city governance: exploring the impact on stakeholder networks. *International Journal of Contemporary Hospitality Management*, 36(2), 582-601. <https://doi.org/10.1108/IJCHM-03-2022-0322>
- Jasrotia, A. (2025). Smart Tourism Destinations: Branding the Smart Tourism Experience. In *Anthropology of Tourism* (pp. 77-88). Apple Academic Press. <https://doi.org/10.1201/9781003534334-5>
- Jeong, M., & Shin, H. H. (2020). Tourists' experiences with smart tourism technology at smart destinations and their behavior intentions. *Journal of Travel Research*, 59(8), 1464-1477. <https://doi.org/10.1177/0047287519883034>
- Jia, Q., Cui, Y., Liu, E., Young, J., Polly, Y., Sun, W., & Shen, H. (2022). Construction and design of a smart tourism model based on big data technologies. *Mobile Information Systems*, 2022, 1-7. <https://doi.org/10.1155/2022/1120541>
- Johnson, A. G. (2023). Why are smart destinations not all technology-oriented? Examining the development of smart tourism initiatives based on path dependence. *Current Issues in Tourism*, 26(8), 1282-1294. <https://doi.org/10.1080/13683500.2022.2053071>
- Junta de Andalucía (2024). Tourism data 2024. Consejería de Turismo, Cultura y Deporte.
- Kim, M. J., Hall, C. M., & Chung, N. (2024). The influence of AI and smart apps on tourist public transport use: applying mixed methods. *Information Technology & Tourism*, 26(1), 1-24. <https://doi.org/10.1007/s40558-023-00272-x>
- Kim, M. J., Lee, C. K., & Jung, T. (2020). Exploring consumer behavior in virtual reality tourism using an extended stimulus-organism-response model. *Journal of Travel Research*, 59(1), 69-89. <https://doi.org/10.1177/0047287518818>
- Koo, I., Zaman, U., Ha, H., & Nawaz, S. (2025). Assessing the interplay of trust dynamics, personalization, ethical AI practices, and tourist behavior in the adoption of AI-driven smart tourism technologies. *Journal of Open Innovation: Technology, Market, and Complexity*, 11(1), 100455. <https://doi.org/10.1016/j.joitmc.2024.100455>
- Ku, E. C. (2024). Opportunity or destiny: how do market knowledge resources and absorptive capacities lead to competitive advantage for travel agencies?. *Journal of Travel & Tourism Marketing*, 41(5), 673-688. <https://doi.org/10.1080/10548408.2024.2323948>
- Kumar, S., & Kumar, V. (2022). Potential risk and dark side of digital transformation colonialism in tourism sector: A conceptual framework. In *The proceedings of international conference* (248-259).
- Liu, J., Hall, C. M., Zhu, C., & Ting Pong Cheng, V. (2023). Redefining the concept of smart tourism in tourism and hospitality. *Anatolia*, 1-13. <https://doi.org/10.1080/13032917.2023.2282712>
- Lu, C. W., Huang, J. C., Chen, C., Shu, M. H., Hsu, C. W., & Bapu, B. T. (2021). An energy-efficient smart city for sustainable green tourism industry. *Sustainable Energy Technologies and Assessments*, 47, 101494. <https://doi.org/10.1016/j.seta.2021.101494>
- Ma, L., Liu, C., & Zhan, Y. (2023). How smart city construction affects destination tourism efficiency. *Tourism Economics*, 30 (6), 1600-1623. <https://doi.org/10.1177/13548166231221849>
- Mandić, A., Séraphin, H., & Vuković, M. (2024). Engaging stakeholders in cultural tourism Living Labs: A pathway to innovation, sustainability, and resilience. *Technology in Society*, 79, 102742. <https://doi.org/10.1016/j.techsoc.2024.102742>
- Mehraliyev, F., Chan, I. C. C., Choi, Y., Koseoglu, M. A., & Law, R. (2020). A state-of-the-art review of smart tourism research. *Journal of Travel & Tourism Marketing*, 37(1), 78-91. <https://doi.org/10.1080/10548408.2020.1712309>
- Micera, R., Errichiello, L., & Baggio, R. (2025). Implementing smart tourism destination governance: the case of Naples. In *Handbook on Tourism Governance* (pp. 130-148). Edward Elgar Publishing. <https://doi.org/10.4337/9781800374287.00019>
- Munawar, S., Yousaf, H. Q., Ahmed, M., & Rehman, S. (2022). Effects of green human resource management on green innovation through green human capital, environmental knowledge, and

- managerial environmental concern. *Journal of Hospitality and Tourism Management*, 52, 141-150. <https://doi.org/10.1016/j.jhtm.2022.06.009>
- Muniz, E. C. L., Dandolini, G. A., Biz, A. A., & Ribeiro, A. C. (2021). Customer knowledge management and smart tourism destinations: a framework for the smart management of the tourist experience-SMARTUR. *Journal of Knowledge Management*, 25(5), 1336-1361. <https://doi.org/10.1108/JKM-07-2020-0529>
- Oakes, T. (2024). Toward a critical geopolitics of smart tourism. *Tourism Geographies*, 26(5), 862-873. <https://doi.org/10.1080/14616688.2024.2360633>
- Otowicz, M. H., Macedo, M., & Biz, A. A. (2022). Dimensions of smart tourism and its levels: An integrative literature review. *Journal of Smart Tourism*, 2(1), 5-19. <https://doi.org/10.52255/smarttourism.2022.2.1.2>
- Panagopoulos, A., Matika, V., Nikas, I. A., & Paraschi, E. P. (2025). A comprehensive structural framework for smart stadiums as essential components of smart tourism destinations. *Worldwide Hospitality and Tourism Themes*, 17(1), 106-119. Vol. 17 No. 1, pp. 106-119. <https://doi.org/10.1108/WHATT-12-2024-0302>
- Reverte, F. G., & Luque, P. D. (2021). Digital divide in e-Tourism. In *Handbook of e-Tourism* (pp. 1-21). Cham: Springer International Publishing. https://doi.org/10.1007/978-3-030-05324-6_109-1
- Ringle, C. M., Sarstedt, M., Mitchell, R., & Gudergan, S. P. (2020). Partial least squares structural equation modeling in HRM research. *The International Journal of Human Resource Management*, 31(12), 1617-1643. <https://doi.org/10.1080/09585192.2017.1416655>
- Ringle, C. M., Wende, S., & Will, A. (2009). Finite mixture partial least squares analysis: Methodology and numerical examples. In *Handbook of partial least squares: Concepts, methods and applications* (pp. 195-218). Berlin, Heidelberg: Springer Berlin Heidelberg. http://dx.doi.org/10.1007/978-3-540-32827-8_9
- Rodrigues, V., Eusébio, C., & Breda, Z. (2023). Enhancing sustainable development through tourism digitalisation: a systematic literature review. *Information Technology & Tourism*, 25(1), 13-45. <https://doi.org/10.1007/s40558-022-00241-w>
- Rogers, E. M., Singhal, A., & Quinlan, M. M. (2014). Diffusion of innovations. In *An integrated approach to communication theory and research* (pp. 432-448). Routledge. <https://doi.org/10.4324/9780203887011-36>
- Saleem, M., Shah, M. J., Wajid, M., Akhter, M., & Malik, J. A. (2024). A Comprehensive Study of AI and IoT's Impact on Smart Tourism Destinations. *Journal of Computing & Biomedical Informatics*. <https://jcibi.org/index.php/Main/article/view/424>
- Samancioglu, E., Kumlu, S., & Ozkul, E. (2024). Smart tourism destinations and sustainability: evidence from the tourism industry. *Worldwide Hospitality and Tourism Themes*, 16(6), 680-693. <https://doi.org/10.1108/WHATT-07-2024-0167>
- Sánchez-Bayón, A. (2023). Digital transition and readjustment on EU tourism industry. *Studies in Business and Economics*, 18(1), 275-297. <https://doi.org/10.2478/sbe-2023-0015>
- Sedarati, P., Serra, F., & Jere Jakulin, T. (2022). Systems approach to model smart tourism ecosystems. *International Journal for Quality Research*, 16(1), 285-306. DOI: 10.24874/IJQR16.01-20
- Shafiee, S., Ghatari, A. R., Hasanzadeh, A., & Jahanyan, S. (2022). Developing a model for smart tourism destinations: an interpretive structural modelling approach. *Information Technology & Tourism*, 24(4), 511-546. <https://doi.org/10.1007/s40558-022-00236-7>
- Sharma, S., Dogra, J., & Khan, S. (2024). Destination resilience and transformations in the tourism sector: new tendencies in destination development and management. *Tourism & Management Studies*, 20(4), 17-26. <https://doi.org/10.18089/tms.20240402>
- Sorokina, E., Wang, Y., Fyall, A., Lugosi, P., Torres, E., & Jung, T. (2022). Constructing a smart destination framework: A destination marketing organization perspective. *Journal of Destination Marketing & Management*, 23, 100688. <https://doi.org/10.1016/j.jdmm.2021.100688>

- Sustacha, I., Banos-Pino, J. F., & Del Valle, E. (2023). The role of technology in enhancing the tourism experience in smart destinations: A meta-analysis. *Journal of Destination Marketing & Management*, 30, 100817. <https://doi.org/10.1016/j.jdmm.2023.100817>
- Vaz, M. J., & Machado, H. (2022). Tourism and Big Data in a post-COVID-19 world: The utopian and dystopian rhetoric. In *International Conference on Tourism Research* 15 (1), 546-552.
- Weng, G., & Zhang, J. (2023). Application analysis of smart tourism management model under the background of Big Data and IOT. *Journal of Information Processing Systems*, 19(3), 347-354. <https://doi.org/10.3745/JIPS.03.0186>
- Yuksel, F., Kement, U., Dogan, S., Erkol Bayram, G., Bayar, S. B., & Cobanoglu, C. (2024). Effect of smart tourism technology experience (STTE) on tourist satisfaction and tourist happiness in Bordeaux: the mediation role of self-gratification. *International Journal of Tourism Cities* (ahead of print). <https://doi.org/10.1108/IJTC-06-2024-0119>
- Zvaigzne, A., Mietule, I., Kotane, I., Vonoga, A., & Meiste, R. (2023). Smart tourism: the role and synergies of stakeholders. *Worldwide Hospitality and Tourism Themes*, 15(5), 476-485. <https://doi.org/10.1108/WHATT-06-2023-0079>