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## Smart tourism services: Emerging trends and research agenda

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### Abstract

**Aim/purpose** – This paper systematically reviews the development of smart tourism services (STS) as an emerging research stream, highlighting a shift from technology-driven approaches toward experience-centered and value-oriented service systems.

**Design/methodology/approach** – A two-phase hybrid methodology was applied, combining bibliometric analysis (2013 – January 2025) with systematic content analysis of 310 studies to examine the theoretical, methodological, and managerial foundations of STS research.

**Findings** – The results indicate an evolution from fragmented, technology-centric discourse toward integrated, user-oriented smart tourism service ecosystems. Four major research streams are identified, emphasizing value co-creation, experiential design, platform governance, and stakeholder coordination.

**Research implications/limitations** – This study provides researchers and policymakers with a structured basis of the STS domain, enabling them to better align technological innovation with tourist expectations, satisfaction, and behavioral outcomes in smart tourism ecosystems.

**Originality/value/contribution** – Distinct from infrastructure-focused reviews, this study offers a theory-informed synthesis of STS from the tourist perspective. Crucially, its contributions extend beyond the tourism domain, enriching broader academic discussions in service management, platform governance, and stakeholder coordination. By developing a comprehensive conceptual framework, this study demonstrates how digital service innovation directly informs managerial decision-making and fosters collaborative experiential value creation within complex digital eco-systems.

**Keywords:** Smart tourism services, perceived smart tourism services, tourists' behavior intention, bibliometric analysis, systematic content analysis.

**JEL Classification:** L83, O00, Z31, Z32.

## 1. Introduction

In the context of pervasive digital transformation and the Fourth Industrial Revolution, the tourism industry has experienced a profound shift in service delivery and consumption, driven by the integration of advanced digital technologies (Van Riel et al., 2019; Xiao & Smith, 2006). This transformation has reshaped tourists' roles from passive recipients of information to active participants in service co-creation throughout the travel journey (Jeong & Shin, 2019; Wang et al., 2016). Through digital platforms, mobile applications, and real-time data systems, smart tourism services (STS) now support personalized interactions, operational coordination, and adaptive service design (Chuang, 2023; Pai et al., 2025). These developments have important implications for service efficiency, strategic positioning, and destination competitiveness.

While STS is increasingly recognized as a critical research domain (Chuang, 2023), the existing literature largely adopts a supply-side, technology-centric perspective. Prior studies predominantly focus on the technological capabilities and infrastructure across various service components, such as smart attractions (Paiva Neto et al., 2020), transportation (Bogicevic et al., 2017), accommodation (Sam & Jasim, 2025; Seo & Shulga, 2024), dining (Cheng et al., 2025; Okumus et al., 2018), shopping (Bruwer et al., 2022; Dennis et al., 2017), and payments (Flavián et al., 2020). However, these investigations frequently overlook nuanced variations in technological adoption and its implications across diverse geographical and developmental contexts, thereby limiting a comprehensive understanding of global STS implementation (Bhuiyan et al., 2022). This supply-side emphasis often leads to a fragmented view that overlooks the crucial interplay between technology and the tourist experience.

Conversely, from a demand-side perspective, tourists are increasingly leveraging smart technologies throughout their travel processes, which significantly enhances convenience, personalization, and real-time service responsiveness (Chuang,

2023; Tavitiyaman et al., 2021). Despite these apparent benefits, research critically exploring tourists' perceptions and experiential outcomes of STS remains underdeveloped. Existing studies tend to focus on individual service attributes, such as accessibility, personalization, interactivity, or security, and their impact on satisfaction and memorable experiences (Jeong & Shin, 2019; Torabi et al., 2022). However, these findings remain largely fragmented, failing to integrate these dimensions into a comprehensive framework that captures tourists' holistic perceptions of STS. Consequently, understanding how integrated STS collectively influences crucial behavioral outcomes, including satisfaction, loyalty, and revisit intentions, remains limited (Bhuiyan et al., 2022; Serra et al., 2022).

Despite growing interest in STS, several gaps remain. First, existing studies lack a consistent service system perspective, leading to fragmented conceptualizations across service domains (Bhuiyan et al., 2022; Serra et al., 2022). Second, tourists' experiential and co-creative roles remain under-theorized, particularly in relation to value generation and platform-mediated interactions (Jeong & Shin, 2019; Neuhofer et al., 2015). Third, interpretive practices linking service attributes, managerial practices, and behavioral outcomes remain limited. Finally, comprehensive reviews tracing the evolution of STS research and its managerial implications remain scarce.

To address these critical gaps and contribute to the scholarly understanding of digital service innovation in tourism, this study undertakes a comprehensive systematic review. Employing a two-phase hybrid methodology, combining bibliometric analysis with systematic content analysis of studies published between 2013 and January 2025, this review aims to answer the following revised research questions:

RQ1: How have the principal smart service components and their interconnections evolved within the conceptualization of STS over time?

RQ2: What are the key perceived attributes of STS from the tourist perspective, and how do these attributes influence their experiential journey and subsequent behavioral intentions?

This research advances management theory by applying service-dominant logic (SDL) and digital business model concepts to tourism services. It synthesizes fragmented literature across technological, experiential, and managerial domains to develop a comprehensive framework for smart tourism systems (STS) as integrated, co-created, tourist-centered ecosystems. Examining STS from supply-side (strategy, resources) and demand-side (experience, behavior) perspectives, the study bridges tourism and research on digital innovation and service ecosystems. It clarifies the evolution of STS, highlights demand-side attributes, and provides actionable recommendations to advance theoretical and practical developments in digital tourism innovation, thereby positioning STS strategically within service management and digital economics.

## 2. Literature review

### 2.1. Smart tourism

Smart tourism represents an evolving paradigm that integrates digital technologies into tourism service systems to enhance coordination, decision making, and value creation (Vasavada & Padhiyar, 2016). Initially conceptualized as a technological enhancement of tourism infrastructure and services, smart tourism leverages technologies such as the internet of things, big data analytics, artificial intelligence, and cloud computing to create interconnected and intelligent environments (Xiang et al., 2021). This integration aims to improve operational efficiency, enhance stakeholder decision-making, and deliver more personalized experiences for tourists.

A fundamental aspect of smart tourism is its reliance on an ecosystem perspective, drawn from foundational management theories such as Moore's ecosystem concept (Bhuiyan et al., 2022). Through this lens, smart tourism emphasizes value creation that emerges from continuous, dynamic interactions among a diverse set of stakeholders. These stakeholders include tourists, service providers (e.g., hotels, attractions, transport operators), destination management organizations, technology platform developers, and local communities. This collaborative framework fosters a highly interactive and adaptive environment in which digital platforms facilitate seamless communication and resource exchange, ultimately enhancing the overall tourism experience and operational efficiency across destinations (Bhuiyan et al., 2022). This shift highlights the managerial importance of governance mechanisms, data-sharing arrangements, and inter-organizational coordination in sustaining smart tourism systems.

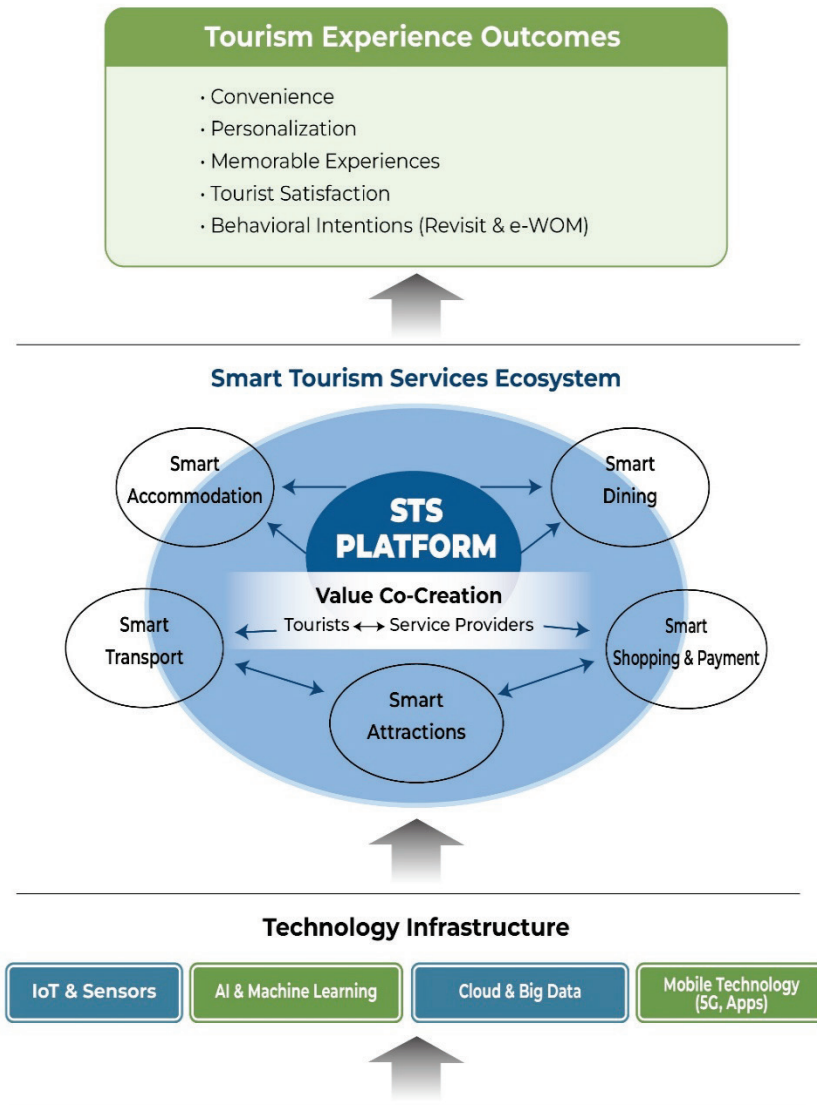
Over time, literature has moved beyond isolated technological applications toward holistic and demand-oriented approaches that emphasize experiential quality, strategic alignment, and destination competitiveness (Gretzel et al., 2015a; 2015b). This evolution reflects a growing recognition within tourism management and economics that technological capabilities alone are insufficient; their strategic deployment must be aligned with tourist needs, destination sustainability, and effective governance for optimal economic and social outcomes (Bhuiyan et al., 2022). Despite this conceptual progress, integrated service-level frameworks remain limited, particularly from a tourist-centered perspective.

### 2.2. Smart tourism services

STS represent a paradigm shift from traditional service delivery to a technology-mediated ecosystem characterized by real-time interaction and personalization (Chuang, 2023; Xiang et al., 2021). Rather than being viewed as isolated digital

tools, STS are conceptualized as integrated platforms that facilitate value co-creation among diverse stakeholders (Chuang, 2023; Vargo & Lusch, 2004). To provide a comprehensive understanding of this phenomenon, this study proposes a multi-layered conceptual framework comprising technological infrastructure, service components, and experiential outcomes (Figure 1).

**Figure 1.** Conceptual framework of the smart tourism service ecosystem



Source: Authors' own elaboration based on: Buhalis & Amaranggana (2014); Chuang (2023); Pai et al. (2025); Torabi et al. (2022); Vargo & Lusch (2004); Xiang et al. (2021).

At the foundational layer, STS relies on an advanced digital infrastructure that serves as the technological backbone for data-driven environments. This layer integrates internet of things, artificial intelligence, machine learning, cloud computing, and big data analytics (Pai et al., 2025; Xiang et al., 2021). These technologies enable the seamless collection and analysis of massive datasets, allowing for intelligent decision-making and the delivery of context-aware services (Chuang, 2023). As noted by Xiang et al. (2021), the design of smart tourism places is fundamentally rooted in pervasive connectivity, which transforms physical spaces into “smart” environments capable of responding to real-time tourist needs.

Building on this technological base, the service interaction layer comprises integrated service components, including smart accommodation, smart dining, smart transportation, and smart shopping and payment systems (Buhalis & Amaranggana, 2014; Pai et al., 2025). According to the SDL, these components do not merely provide functional utility but also act as “resource integrators” that facilitate continuous interaction between service providers and tourists (Vargo & Lusch, 2004). In this ecosystem, smart platforms enable a dynamic exchange of information, where tourists are no longer passive consumers but active participants in co-creating their own service experiences (Chuang, 2023; Serra et al., 2022). This integration enhances service-delivery efficiency while reducing information asymmetry across the destination (Buhalis & Amaranggana, 2014).

The final layer of the framework focuses on experiential and behavioral outcomes. The synergy between infrastructure and service components generates high-order experiential benefits, such as enhanced convenience, extreme personalization, and memorable tourism experiences (Jeong & Shin, 2019; Torabi et al., 2022). From a management perspective, these outcomes are critical as they directly influence psychological states, leading to increased tourist satisfaction and positive behavioral intentions, including revisit intention and electronic word-of-mouth (e-WOM) (Serra et al., 2022; Torabi et al., 2022). Consequently, STS should be managed not as technical features but as strategic assets that shape the overall competitiveness of smart destinations (Buhalis & Amaranggana, 2014; Jeong & Shin, 2019).

### **2.3. Perceived smart tourism services: The tourist’s experiential perspective**

Perceived value in STS refers to tourists’ subjective assessment of the utility of technology-integrated services, based on a comparison of the benefits received with the costs or effort involved (Zeithaml, 1988). This evaluation is influenced

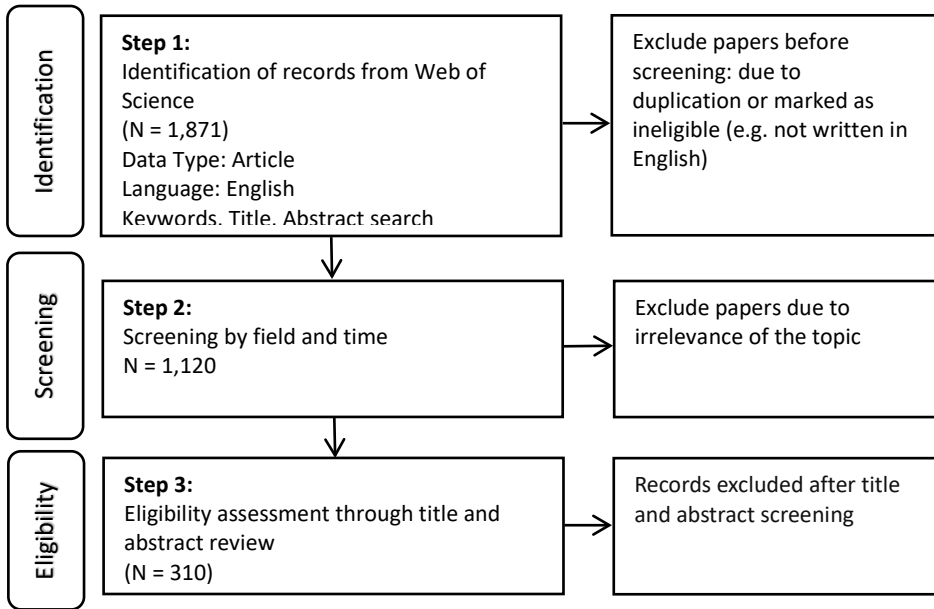
by perceived usefulness, ease of use, interactivity, personalization, and accessibility (Davis, 1989; Parasuraman et al., 1985). In the context of smart tourism, technologies and mobile applications enhance perceived value by enabling real-time decisions and seamless experiences throughout the travel journey (Chuang, 2023; Wang et al., 2016). Moreover, under the SDL, tourists actively co-create value by interacting with service providers and contributing to personalized experiences (Gretzel et al., 2015b; Vargo & Lusch, 2004).

### **3. Research methodology**

#### **3.1. Phase 1: Bibliometric analysis – data collection and selection**

Data collection for the bibliometric analysis was conducted using the Web of Science Core Collection database, specifically the Science Citation Index Expanded. Web of Science was used as the source database for identifying peer-reviewed publications relevant to tourism, hospitality, management, and technology. The search, screening, and reporting procedures were structured in accordance with the PRISMA 2020 framework to enhance transparency and reproducibility (Page et al., 2021).

To retrieve relevant literature, a structured Boolean search string was developed and applied to the topic of publications (including titles, abstracts, and author keywords). The search was refined to include only “Article” as the data type and “English” as the language. The specific search string used in the database was: (“Smart tourism service” OR “Smart hotel” OR “Smart accommodation\*” OR “Smart lodging\*” OR “Smart transportation\*” OR “smart mobility\*” OR “smart catering\*” OR “smart restaurant\*” OR “Smart diet\*” OR “Smart dining\*” OR “Smart purchase\*” OR “Smart shopping\*” OR “Smart attraction\*” OR “Smart sightseeing” OR “smart payment”)\*\*\*. This detailed search strategy was fully aligned with the criteria shown in Figure 2 to ensure transparency and reproducibility of the data collection process.

**Figure 2.** PRISMA diagram

Source: Author's own elaboration.

The study timeframe spans from 2013 to January 2025. The starting year, 2013, was chosen because it marked a significant turning point, corresponding to the rise of the Fourth Industrial Revolution and the early adoption of integrated information systems, real-time data processing, and advanced analytics in tourism. Since then, research on smart tourism has surged, peaking in 2024, reflecting its consolidation as a distinct research domain. The end date, January 2025, reflects the most current available data at the time of data collection, while acknowledging that some late 2025 publications may not yet have been indexed.

The data screening process, illustrated by the PRISMA diagram in Figure 2, involved a systematic three-stage approach:

- Step 1: Identification. The initial search in WoS, using the defined search string, data type, and language criteria applied to the topic fields, yielded 1,871 research articles.
- Step 2: Screening by field and time. These 1,871 articles underwent preliminary screening for relevance to specific academic fields and for publication within the predefined timeframe (2013-1/2025). Articles were retained if they belonged to fields such as “Transportation Science Technology,” “Transportation,” “Telecommunications,” “Green Sustainable Science Technology,” “Hospitality Leisure Sport Tourism,” “Urban Studies,” “Business or Manage-

ment,” “Social Issues,” “Social Sciences Mathematical Methods,” or “Food.” This step reduced the number of articles to 1,120.

- Step 3: Eligibility assessment. The remaining 1,120 articles underwent a rigorous eligibility assessment through systematic review of titles and abstracts. Articles were excluded if they were not directly focused on STS or on perceived STS from a tourist perspective, did not present empirical findings or conceptual developments relevant to the study’s research questions, or were duplicates or inappropriate document types. This detailed screening process ensured that only publications directly pertinent to the study’s scope were retained. This step resulted in the final selection of 310 articles deemed suitable for full-text content analysis. The clearly defined inclusion and exclusion criteria ensure methodological transparency and rigor.

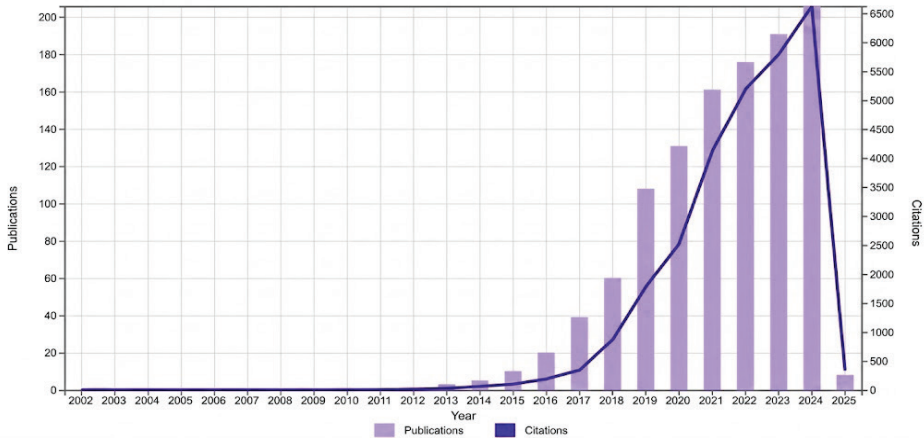
### **3.2. Phase 2: Systematic content analysis – thematic development**

Following the bibliometric analysis, 310 articles on the smart tourism service ecosystem were selected for systematic content analysis in Phase 2 (Seuring & Gold, 2012). The study established a theory-based classification scheme that integrates inductive and inferential categories to ensure the validity and analytical depth of the literature review (Seuring & Gold, 2012).

The development of this classification scheme involved a systematic, iterative process for extracting and organizing key information from the selected articles. Initially, an inductive approach was used, allowing primary themes and categories to emerge directly from the data through repeated, careful reading of abstracts and full texts. This initial coding process identified common concepts, phenomena, and relationships across the literature.

Subsequently, an inferential approach was employed to refine, consolidate, and theoretically anchor the emergent categories based on established frameworks in service management, tourism studies, and technology adoption research. In particular, concepts derived from SDL (Vargo & Lusch, 2004) and Technology Acceptance Model (TAM) (Davis, 1989) often guided the grouping and interpretation of categories related to value co-creation, user perception, and technology adoption. This dual approach ensured that the classification scheme was both empirically grounded and theoretically informed, thereby enhancing its validity and comprehensiveness.

Web of Science was ultimately selected as the primary identification database after preliminary consideration of Scopus, because it provided consistent coverage of peer-reviewed publications relevant to tourism, hospitality, management, and technology.

**Figure 3.** Number of publications and citations from 2013 to 2025

Note: The formal review period covers publications from 2013 to January 2025. Earlier years are displayed only for contextual purposes to illustrate the limited volume of STS-related publications before the beginning of the review period.

Source: Authors' own work.

## 4. Results

This section presents the key findings derived from the two-phase hybrid methodology. First, descriptive bibliometric results provide an overview of the publication trends, geographical distribution, and thematic evolution within STS research. Second, a critical analysis of the theoretical frameworks in the extant literature is presented, identifying prominent theories and highlighting gaps in their theoretical grounding. These findings collectively lay the groundwork for understanding the current state and future directions of STS research, directly informing our answers to the research questions.

### 4.1. Descriptive results from bibliometric analysis

The bibliometric analysis of 310 articles, published between 2013 and January 2025, reveals significant trends in the academic development of STS.

**Publication trends and growth:** As illustrated in Figure 3, the number of publications and citations in STS research has grown substantially, particularly after 2013. Publications before 2013 were notably scarce, indicating that this field was in its nascent stage. The year 2013 emerged as a critical turning point,

aligning with the accelerated rise of the Fourth Industrial Revolution (which marked an early exploration of smart tourism research on how integrating IT, including hardware, software, and networks, could deliver real-time information and enhanced analytics in tourism). Since then, research on smart tourism has surged, peaking in 2024, and its implications for technology integration in tourism have been examined. This period marked the beginning of a rapid increase in academic interest and research output. It is important to acknowledge that, due to the timing of our analysis, the full scope of 2025 publications may not be fully captured; however, the observed sustained growth unequivocally underscores the growing recognition and scholarly interest in STS.

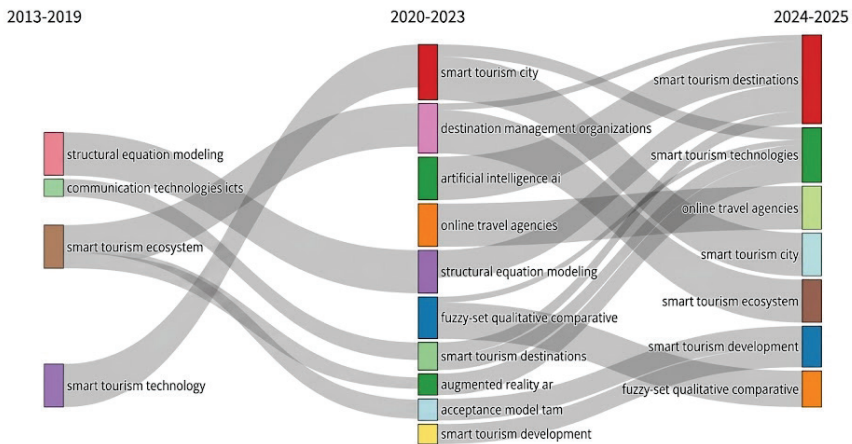
**Geographical concentration of research output:** Research on STS exhibits its geographic concentration, with developed nations predominantly shaping the publication landscape. China leads the way with 61 publications, followed by the United States (41), England (32), Spain (30), South Korea (25), and Taiwan (15). This distribution suggests that while interest in smart tourism spans the globe, research output is heavily concentrated in countries with established research capabilities and a keen interest in leveraging technology to advance tourism. This focus may reflect their advanced ICT infrastructure and capacity to promote smart tourism initiatives and offer high-quality services.

**Thematic evolution:** The Sankey diagram analysis of prominent research trends in smart tourism across three periods (2013-2019, 2020-2023, 2024-2025) in Figure 4 shows a clear shift from studies on communication technologies (ICTs), and smart tourism technology centered on structural equation modeling in the early phase to topics like smart tourism cities, destination management organizations, and artificial intelligence (AI) in the subsequent phase. The middle period (2020-2023) witnessed substantial diversification of research interests, incorporating emerging topics such as smart tourism cities, destination management organizations, artificial intelligence, online travel agencies, and new methodological approaches, such as fuzzy-set qualitative comparative analysis. This expansion reflected the evolution and increasing integration of smart and advanced technologies in tourism. In the most recent period (2024-2025), studies have focused on smart tourism destinations, smart tourism technologies, online travel agencies, and the continued exploration of smart tourism ecosystems and development, with specific methodological refinements.

**Thematic mapping and conceptual clusters:** Figure 5, a scatter plot mapping key research topics in smart tourism, visually delineates distinct conceptual clusters. These clusters broadly encompass: consumer behavior and loyalty variables, destination infrastructure components, experience factors, and technology adoption elements. Significantly, core bridging concepts such as “satisfaction,”

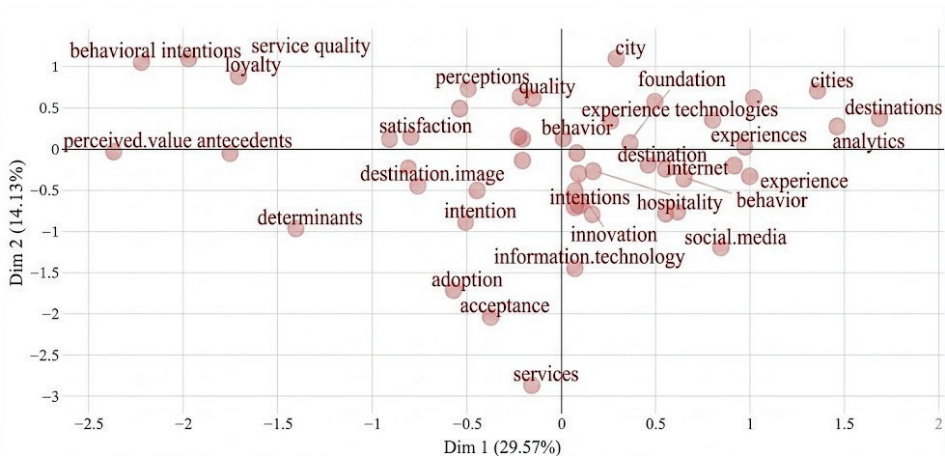
“perceptions,” “destination image,” “information technology,” and “experience technologies” occupy central positions within this map. Their centrality suggests a foundational and integrative role across diverse research streams. This visualized map effectively highlights the intricate relationships and interdependencies between consumer behavior, destination attributes, technological implementation, and desired experiential outcomes within the STS domain.

**Figure 4.** Thematic evolution of publications from 2013 to 2025



Source: Authors’ own elaboration.

**Figure 5.** Thematic mapping of publications from 2013 to 2025



Source: Authors’ own elaboration.

## **4.2. Theories applied in extant research**

Research on STS draws upon various theoretical frameworks to understand the complex interplay between technology, destination services, and tourist behavior. Prominent theories in early studies include the TAM (Davis, 1989); the diffusion of innovation theory (DOI) (Rogers, 2003); the stimulus – organism – response (SOR) theory (Mehrabian & Russell, 1974), the experience economy model (Pine & Gilmore, 1998) and the theory of mind (ToM) (Premack & Woodruff, 1978). However, many of these theories are borrowed from the broader online service literature, suggesting a need for more context-specific theoretical frameworks for STS research. Although ST shares similarities with online services, unique aspects of the STS, such as dynamic interactions among multiple stakeholders and the importance of place-based experiences, may not be fully captured by existing models. In essence, the theoretical grounding of STS research remains somewhat limited. Notably, there is a lack of studies focused on the development of STS scales, particularly in emerging countries, where tourism technology adoption is still in the early stages. The design and implementation of STSs in destinations undergoing digital transformation in these regions represent a critical area for future research.

In TAM, the theory is often applied to explain tourists' adoption of specific technologies (e.g., mobile apps, smart devices) by examining perceived usefulness and ease of use. Its prevalence in early studies may stem from its simplicity and ability to predict adoption behavior in relatively straightforward contexts (Chung et al., 2015; Wang et al., 2023). However, researchers increasingly employ SDL to study STS (Bhuiyan et al., 2022; Buhalis et al., 2023a; Polese et al., 2018; Rather et al., 2022; Saha et al., 2020). SDL offers a valuable perspective on how value is co-created between businesses, customers, and other stakeholders (Vargo & Lusch, 2004). In the context of smart tourism, SDL highlights the complex interactions between tourists and service providers, shedding light on how value is created and exchanged within STS. It emphasizes the importance of relationships and interactions in service provision, providing a strong foundation for understanding platform dynamics. Integrating SDL into STS research enables the conceptualization of smart tourism service platforms as ecosystems that actively promote value co-creation. Therefore, STS development should prioritize investments in information and communication technologies and infrastructure, and address tourists' needs from their perspective, fostering continuous innovation in service delivery.

## 5. Discussion

### 5.1. The evolution and integration of smart tourism service platforms and components

Our bibliometric analysis, particularly thematic evolution and thematic mapping from Section 4.1, reveals a significant progression in the conceptualization of STS platforms and their components, directly addressing RQ1. Early research predominantly viewed STS platforms as isolated technological tools (Chuang, 2023), often applications or websites, primarily designed to provide real-time information and decision support for tourists (Tavitiyaman et al., 2021; Tsang & Au, 2023; Yoo et al., 2017). These technology-centered approaches facilitated trip planning and booking but offered limited integration across service domains (Tavitiyaman et al., 2021; Tsang & Au, 2023; Yoo et al., 2017).

However, recent research increasingly frames STS platforms as integrated ecosystems in which accommodation, transportation, dining, shopping, and payment services operate synergistically. This evolution is evident in the increasing focus on the interconnections between various STS, such as AI-driven smart accommodation (Buhalis et al., 2023b; Kabadayi et al., 2019; Khan & Khan, 2024; Leung, 2019; Zheng et al., 2023), IoT-enabled smart dining experiences (Cheng et al., 2025; Shi & Lee, 2021; Wong et al., 2022), augmented reality applications in smart purchase (Bruwer et al., 2022; Dennis et al., 2017), automated smart services at cultural attractions (Dong & Jiang, 2024; Niu, 2023), and blockchain-based smart payment infrastructures.

This shift is reflected in growing attention to AI-enabled accommodation, IoT-based dining services, AR-supported shopping, automated attraction services, and blockchain-based payment systems. Rather than functioning independently, these components are now embedded within interconnected service architectures (Chuang, 2023).

From a managerial perspective, this evolution reflects a transition from functional digitalization to strategic platform governance and service orchestration. Accordingly, STS platforms are no longer evaluated solely by technological capability but by their capacity to coordinate stakeholders and deliver coherent service experiences across the travel journey (Xiang et al., 2021).

## **5.2. Research streams on different types of smart tourism services**

Research on smart transportation services in the tourism industry reveals critical trends in integrating technology into travel behavior and holistic tourism experiences. Central to these developments are smart transportation mobile applications that enhance the tourist experience through personalized recommendations tailored to user preferences. These platforms leverage advanced data analytics and machine learning to process real-time behavioral data, enabling dynamic adjustments to route suggestions and activity planning. By fostering informed decision-making and facilitating social sharing among users, such applications create networked travel communities that amplify destination attractiveness through user-generated content (Park et al., 2023; Silva Souza & Bacelar de Vasconcelos Marques, 2022). The adoption of smart transportation solutions is increasingly recognized as a catalyst for sustainable tourism (Chung et al., 2024; Hussain et al., 2023). Research shows that cities that adopt smart transportation practices have seen an increase in tourist arrivals thanks to meeting the needs of both residents and visitors (Chang et al., 2024; Marchesani & Masciarelli, 2023; Zhan & Ning, 2021). Finally, effective management is critical for the successful implementation of smart tourism, requiring active stakeholder collaboration to develop ecosystems that balance local needs and sustainability. The smart transportation framework provides real-time, location-specific details, efficient public transit, navigation services, and parking solutions. Travelers can easily access road maps, safe travel directions, parking areas, traffic information, and fuel consumption data (Siuhi & Mwakalonge, 2016), all through a smart transportation system integrated into the city (González-Reverté, 2019).

Research on smart accommodation services reveals critical trends shaping the hospitality industry's technological evolution and consumer adoption patterns. First, the proliferation of unmanned hotels underscores a paradigm shift in service delivery, where AI-driven interfaces and blockchain-enabled transaction systems enhance operational efficiency while reducing human error (Çalli et al., 2023; Cheong & Law, 2023; Kim & Han, 2020; Kim et al., 2020; Leung, 2019). However, this automation creates a dual impact: while tech-savvy travelers appreciate 24/7 accessibility and personalized room configurations via mobile apps, studies note that guests and hotel managers hold differing views on the role of robots in replacing human staff, which affects guest satisfaction and loyalty (Gupta et al., 2022; Kim et al., 2022; Nam et al., 2021; Qin et al., 2023). Second, adopting technology in the hospitality industry hinges on a trifecta of consumer variables, including age, gender, and technological readiness. Research shows that the expected benefits of using smart services can shape cus-

tomers' behavior, thereby driving future return intent (Tavitiyaman et al., 2024; Yang et al., 2021). Finally, sustainability is also an important factor in smart hotel design. Sustainability has transitioned from a peripheral concern to a core design imperative in smart hotels. Hotel managers are focusing on green and sustainability criteria to meet travelers' increasing demands for environmental sustainability (Kim et al., 2020; Kusumawardhani et al., 2024). Smart accommodation services enable hotels to build a well-established smart ecosystem, leveraging digital tools and networks to improve and optimize hotel operations. This system helps meet tourists' needs, improves hotel operations, introduces new services, and enables better sharing and use of hotel and community resources (Stankov & Filimonau, 2019). Smart tourism technologies help create an interactive environment between hotel employees and guests by supporting social media reviews, communication, transactions, and room-service management (Buhalis & Leung, 2018; Stankov & Filimonau, 2019; Xiang et al., 2021). This integration of smart technologies transforms hotels into interactive environments where guests can engage through social media reviews, communications, and transactions, optimizing room service control and creating new business opportunities by leveraging smart services to increase revenue for lodging establishments (Buhalis & Leung, 2018).

Research on smart dining services highlights notable trends related to technology adoption and service quality enhancement. Firstly, the development of smart restaurants creates novel culinary experiences for customers by integrating automation and internet connectivity. Smart devices, such as automated diet tables and intelligent serving trays, help monitor eating habits, thereby improving the overall dining experience for patrons (Leung & Loo, 2022; Wong et al., 2022). This technological integration not only streamlined service delivery but also enabled real-time feedback mechanisms, allowing restaurants to tailor their offerings more effectively to customer preferences. Secondly, measuring service quality in smart restaurants has become more critical. Studies have shown that customers tend to appreciate restaurants that can provide fast, efficient service facilitated by technology, which, in turn, enhances customer loyalty and satisfaction (Shi & Lee, 2021; Wong et al., 2022; 2024). Lastly, the trend of using mobile applications to track dietary habits and identify food ingredients is on the rise (Cheng et al., 2025; Wong et al., 2024).

Research on smart services at tourist attractions highlights trends in technology adoption aimed at enhancing visitor experiences. First, smart tourism technologies (STT) are used to enhance destination image and increase tourist satisfaction (Tavitiyaman et al., 2023; Yang et al., 2022; Zhu et al., 2024). Smart travel apps enable travelers to access real-time information about attractions,

helping them plan their trips more effectively (Tavitiyaman et al., 2021). Technology solutions such as virtual reality (VR) and augmented reality (AR) are becoming increasingly popular, providing rich interactive experiences for tourists. These technologies enhance personalized experiences and contribute to the preservation and promotion of cultural heritage (Tussyadiah et al., 2016; Zhu et al., 2024).

Research on smart purchase services reflects several prominent retail and e-commerce trends. Consumers can place orders immediately and easily on mobile devices; their key concerns are product selection and payment methods (Flavián et al., 2020). Travelers have access to one-to-many information exchange platforms that influence their purchasing decisions (Xiang et al., 2021). In other words, smart tourism technologies enable intensive interactions between tourists and social networks, enabling massive information searches that affect and change tourists' shopping behavior.

Research on smart payment services showcases several prominent trends, particularly the development of blockchain technology and digital payment solutions. Blockchain is emerging as a core technology in the financial sector, enhancing transaction transparency and security. Smart contracts automate payment processes, thereby reducing fraud risk and optimizing operating costs (Flavián et al., 2020; Wu et al., 2022). Second, the trend toward contactless payments is growing rapidly. This technology helps reduce transaction time and enhances consumer experience. Virtual cards and smartphone payment methods are also becoming increasingly popular, facilitating fast, secure transactions (Flavián et al., 2020). Furthermore, the development of mobile payment apps and digital wallets is opening up many new consumer opportunities. These applications simplify payment processes and offer additional features such as expense management and transaction tracking, allowing users to monitor their financial activities more effectively (Lim et al., 2024).

### **5.3. The role of stakeholders in co-creating smart tourism service experiences**

The shift toward a more holistic, user-oriented understanding of STS is further illuminated by the emerging emphasis on value co-creation and the collaborative roles of diverse stakeholders, directly contributing to RQ2. As highlighted in Section 4.2 on applied theories, the increasing adoption of SDL (Bhuiyan et al., 2022) reflects a recognition that value in STS is not solely delivered by providers but collaboratively generated through interactions among tourists, service providers, governments, and private enterprises (Hidayah et al., 2022).

Tourists are no longer passive recipients but active co-creators, shaping their experiences through interaction with smart technologies and personalized services. This aligns with the principles of SDL (Vargo & Lusch, 2004), in which value emerges from continuous, dynamic interactions among resources and actors. The integration of ICT, AI, and mobile systems by tourism providers (Wang et al., 2022), coupled with public-sector support for infrastructure and policy, and private-sector innovation, forms a complex web of interactions that fosters tech-enhanced tourism experiences (Melis et al., 2015). Effective co-creation relies on collaborative networks and public-private partnerships, emphasizing shared strategic goals for sustainable STS development (Ramkissoon et al., 2025). However, this discussion also raises challenges, including data privacy, technology adoption, and sustainability, that require coordinated efforts to balance value delivery with responsibility (Serra et al., 2022). This underscores the critical role of multi-stakeholder collaboration in addressing both the opportunities and the inherent complexities of designing and managing integrated STS to enhance tourist experiences.

#### **5.4. Tourist perceptions of smart technologies and experiential outcomes**

This research stream, central to RQ2, explores how tourists subjectively evaluate smart technologies integrated into services and how these perceptions influence their experiential journey and behavioral intentions. As discussed in Section 4.2, the frequent reliance on theories such as the TAM (Chung et al., 2015; Davis, 1989; Wang et al., 2023) and the Diffusion of Innovations theory (Rogers, 2003) provides initial insights into technology adoption. Empirical evidence indicates that accessibility, personalization, and responsiveness enhance satisfaction and revisit intentions (Jeong & Shin, 2019). Tourists also associate smart technologies with authenticity and co-created experiences, particularly when cultural context and individual involvement are considered (Garanti, 2023).

However, our analysis in Section 4.2 also revealed a critical gap: many theories applied to STS are borrowed from broader online service and information systems literature, which may not fully capture the unique characteristics of the STS domain. This generic theoretical grounding limits a holistic understanding of how integrated STS collectively influences tourist outcomes. While convenience, personalization, and real-time responsiveness are recognized benefits, concerns regarding privacy and security remain significant barriers to full acceptance (Gong & Schroeder, 2022). These findings suggest that technological

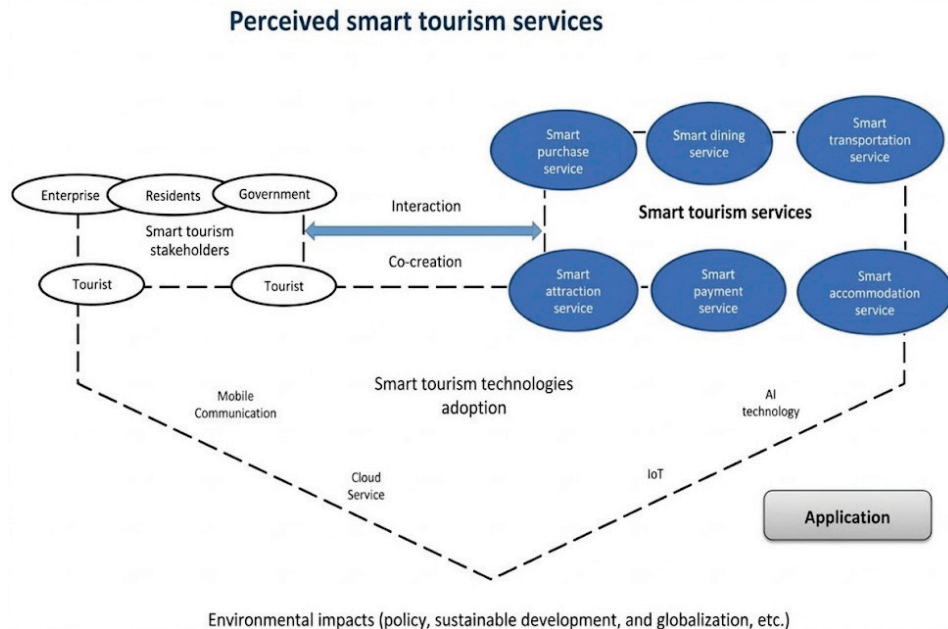
innovation must be aligned with institutional credibility and user confidence. Moreover, the absence of validated STS-specific measurement scales restricts comparative research and theory development, particularly in emerging economies.

## 6. Conclusions

### 6.1. Theoretical contributions

This study advances management and tourism research in three ways. First, it provides a conceptual framework (Figure 6) that illustrates the interconnections among stakeholders, technologies, and service touchpoints within digital service ecosystems. Second, it clarifies how STS research applies SDL by demonstrating value co-creation through technology-mediated interactions. Third, it positions STS within the broader literature on digital business models, highlighting how integrated service platforms generate competitive advantage through network effects, data-driven personalization, and customer retention.

**Figure 6.** Conceptual framework of perceived smart tourism services



Source: Authors' own elaboration.

To visualize these gaps in STS research, our study provides a conceptual framework for STS, drawing on existing research and emphasizing technology-empowered smart services and sustainability, which has become increasingly important in tourism research (Wang et al., 2016).

Our perceived STS illustrates the complex interconnections among key stakeholders, services, and enabling technologies as a smart tourism ecosystem comprises multiple platforms (apps or websites) that provide smart services that enhance the travel experience and interactions with stakeholders and facilitate value co-creation (Gretzel et al., 2015b). Importantly, there is an increasing emphasis on the co-creation of tourist value and behavior, particularly in relation to economic sustainability, socio-cultural impacts, and environmental considerations (Bhuiyan et al., 2022). When tourists use smart technologies and services, their positive emotional responses enhance overall satisfaction, thereby influencing their intention to engage in positive behaviors (Femenia-Serra & Neuhofer, 2018). Therefore, behavioral intentions within STS are closely linked to sustainable value co-creation, in which satisfied tourists intend to revisit destinations and co-create value for them, thereby enhancing competitiveness and overall sustainability in the tourism industry.

## **6.2. Practical implications**

The conceptual framework of STS developed in this study offers significant practical implications for tourism stakeholders, highlighting the transition from technology adoption to the holistic orchestration of service ecosystems. For tourism managers, three strategic priorities are identified. First, the pursuit of integration strategies through unified digital platforms is essential. By integrating transportation, accommodation, and local attractions, managers can effectively mitigate service fragmentation and ensure a seamless journey for tourists (Buhalis & Amaranggana, 2014; Pai et al., 2025). This requires a shift in focus from mere platform ownership to active platform governance, establishing data-sharing incentives and interoperability protocols that foster effective stakeholder coordination. Second, investment in a robust customer data infrastructure is paramount. Instead of funding isolated front-end technologies, strategic managerial decisions regarding STS investments must prioritize foundational data systems that directly enhance service integration and destination competitiveness through real-time resource allocation and demand forecasting. Data-enabled destination management systems empower providers to capture granular behavioral information, enabling real-time experience customization, efficient congestion con-

trol, and accurate demand forecasting (Buhalis & Amaranggana, 2014; Pai et al., 2025). Third, managers must maintain a strategic balance between technological automation and human touchpoints. While AI and IoT enhance operational efficiency, human involvement remains indispensable for complex problem-solving and fostering emotional engagement during the service encounter (Chuang, 2023; Jeong & Shin, 2019). For policymakers, the findings underscore the need to establish regulatory frameworks that enhance secure data sharing while maintaining ethical standards for algorithmic personalization. Destination Management Organizations should take a lead role in promoting public–private partnerships to establish interoperability standards and ensure inclusive digital access across all demographic segments (Chuang, 2023; Pai et al., 2025). Policy initiatives must ensure technological innovations to enhance the complete tourist journey, aligning behavioral intentions with perceived value rather than increasing user complexity (Torabi et al., 2022). Furthermore, governments must strengthen the foundational elements of the smart tourism ecosystem while safeguarding tourist privacy through rigorous data protection policies (Chuang, 2023; Buhalis & Amaranggana, 2014).

### **6.3. Limitations and future research**

This study is subject to three primary limitations. First, the search was restricted to English-language publications indexed in the Web of Science database, which may have excluded significant research published in other languages or specialized regional databases. Second, the keyword-based bibliometric approach is contingent on authors' specific terminological choices, potentially overlooking conceptually related studies that use alternative nomenclature. Third, despite the use of structured coding procedures, systematic content analysis inherently involves interpretive judgment during the synthesis and thematic categorization process. Future research should prioritize three strategic trajectories. First, scholars should develop and empirically validate integrated models that link specific STS attributes to high-order behavioral outcomes, such as destination loyalty and value co-creation, across diverse cultural and demographic contexts (Chuang, 2023; Torabi et al., 2022). Second, longitudinal studies are required to track the evolution of tourist technological readiness and shifting preferences in response to emerging AI innovations (Chuang, 2023; Pai et al., 2025). Third, further investigation into the emotional and experiential dimensions of technology-mediated tourism – including destination attachment and memorable experience formation – is essential (Jeong & Shin, 2019; Torabi et al., 2022). Finally,

addressing the potential negative consequences of smart tourism, such as information overload, privacy concerns, and technological dependency, will support a more balanced and responsible development of the global STS ecosystem (Buhalis & Amaranggana, 2014; Chuang, 2023).

This systematic review goes beyond a simple summary of prior publications to establish a clear, structured understanding of the STS domain. The synthesized findings establish that STS has successfully transitioned from a technology-driven infrastructure into an experience-centered ecosystem. Within this ecosystem, principal service components such as transportation, accommodation, dining, attractions, shopping, and payment are no longer isolated but increasingly interconnected through shared digital platforms. Furthermore, this study reveals that tourists' behavioral intentions are driven not by the technology itself, but by four critical perceived attributes – accessibility, personalization, interactivity, and security – which directly shape their experiential journey and value co-creation. Moving beyond a mere aggregation of existing literature, this study provides a robust conceptual and interpretative framework that captures the complex dynamics of digital service ecosystems. This framework serves as a valuable strategic tool not only for guiding future academic research but also for assisting managers, destination decision-makers, and policy-makers in orchestrating seamless service integration and making ROI-driven investment choices.

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## **Conflict of interest**

The authors declare that there is no conflict of interest.

## **Authors contributions**

**Anh Diep Tram Huynh** – 50% (research concept and design, collection and/or assembly of data, data analysis and interpretation, writing the article, critical revision of the article, final approval of the article).

**Yen Hai Do** – 30% (critical revision of the article, final approval of the article).

**Vong Le-Cong-Ky** – 20% (writing the article, critical revision of the article).

## Ethics statement

This study is a systematic review of secondary data from published academic literature. It does not involve human participants or animal subjects; therefore, formal ethical approval was not required.

## Data availability statement

No primary data were collected. The bibliometric dataset and coding materials used in this review are available from the corresponding author upon reasonable request.

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