SMART TOURISM DESTINATIONS: A BIBLIOMETRIC REVIEW OF RESEARCH (2000–2025)

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Abstract - This study provides a comprehensive review of the literature on Smart Tourism Destination (STD) based on the Scopus database, aiming to clarify their formation, development, and current research trends. Using bibliometric analysis, the authors collected 554 peer-reviewed articles published between 2000 and 2025. The results indicate that research on STDs became distinct from 2011 and has grown rapidly since 2014, with 554 publications, 21,634 citations, 1,480 authors across 73 countries, and 198 publication sources. Europe and Asia dominate the field (78.08%), with Spain and China leading in publication output. Major research themes focus on the integration of technology in tourism development, its linkage with policy and sustainability, and the emerging exploration of tourist behavior and experience. The findings provide a foundation for identifying potential future research directions on STDs.

Key words - Smart destination; smart tourism; bibliometric analysis

1. Introduction

In the context of global digital transformation, the concept of STDs has emerged as a prominent research frontier within tourism and destination management. STDs are characterized by the integration of Information and Communication Technologies (ICT), Big Data, and digital platforms to enhance visitor experiences, optimize destination management, and foster sustainable development [1, 2, 3]. Over the past two decades, the volume of STD research has increased exponentially, reflecting the pivotal role of technology in reshaping the modern tourism ecosystem. However, despite significant progress, the field still faces notable limitations. Primarily, previous studies have largely adopted a "technology-centric" approach, focusing on digital infrastructure and smart applications while overlooking the complex interplay between technology and governance, social, and environmental factors [2]. This has resulted in a lack of an integrated theoretical framework capable of comprehensively explaining the nature of STDs as complex ecosystems. While recent studies have begun to emphasize value co-creation and stakeholder engagement, non-technical elements - such as leadership and destination governance - remain insufficiently clarified within a unified model [2, 4]. While topics such as technology and tourist behavior are widely researched, critical dimensions - including Smart Destination Management Organizations (Smart DMOs), local community participation, electronic Word-of-Mouth (e-WOM), and the nexus between ecotourism and technology - have yet to be systematically synthesized [3, 5, 6].

Previous literature reviews often suffer from three primary limitations: (1) an overemphasis on technical aspects at the expense of the socio-ecological ecosystem; (2) small data scales (frequently involving fewer than 300 articles), leading to generalizations that lack robustness; and (3) a lack of updated insights regarding post-pandemic shifts.

The objective of this study is to conduct a bibliometric analysis to map the STD knowledge base for the 2000–2025 period. The research focuses on addressing questions concerning shifts in governance models, international collaboration networks, and emerging thematic clusters. This study contributes to the existing body of literature, exemplified by recent works were expanding the analytical scope to 554 articles and applying a PRISMA protocol to enhance methodological transparency. Consequently, this approach aims to provide a detailed synthesis of the field's evolution to date.

Driven by these gaps, this study provides a comprehensive and systematic overview of the STD field from 2000 to 2025. By utilizing the Scopus database with a dataset of 554 articles and combining the PRISMA framework with bibliometric analysis, this research not only identifies the latest trends but also restructures the field’s knowledge base toward a multidimensional integration. In doing so, this study elucidates the transition from a "technology-centric" perspective to a hybrid model that synthesizes technology, governance, and sustainability.

The contributions of this research are both academic and practical. Theoretically, it systematizes and expands the theoretical framework of STDs based on innovation ecosystems, socio-technical systems, and sustainable development, providing a more holistic lens for analyzing smart destinations. Practically, the findings offer a scientific foundation for policymakers and destination managers to formulate digital transformation strategies, enhance visitor experiences, and promote sustainability in the post-pandemic era. This article specifically addresses the following research questions:

RQ1: What are the knowledge structures and evolutionary trends of the STD field between 2000 and 2025?

RQ2: What is the geographical distribution and academic contribution of STD research globally?

RQ3: How have the theoretical foundations and primary research clusters within the STD field been formed and developed?

RQ4: What research gaps currently exist, and what are the potential directions for future research?

2. Theoretical Concepts

2.1. Smart Tourism

Smart tourism is regarded as the next stage in the evolution of traditional tourism and e-tourism, grounded in the extensive application of ICT across the entire tourism value chain [1]. The rapid development of social media, mobile devices, and big data has accelerated comprehensive digitalization, transforming smart tourism into a connected ecosystem in which physical infrastructure, governance, and tourist experiences are digitally integrated [2, 3].

The smart tourism model comprises three core components: smart destinations, smart experiences, and smart businesses [4]. Smart destinations integrate ICT into infrastructure to enhance accessibility, sustainability, and the quality of experiences for both tourists and residents. Smart experiences are personalized and responsive in real time through context-aware technologies. Smart businesses operate within flexible digital ecosystems, fostering deep collaboration among stakeholders, including public authorities, private enterprises, and tourists. These three components are supported by technological layers that collect, connect, and process data with the aim of optimizing efficiency, sustainability, and tourism experience quality.

Smart tourism is not merely a technological phenomenon but also a socio-economic transformation that restructures value creation and tourist experiences through ICT integration across the entire travel journey - before, during, and after the trip [3, 4]. Building upon the foundations of e-tourism, the widespread adoption of mobile devices and digital platforms after 2010 has driven the transition toward smart tourism, in which destinations, businesses, and tourists co-create value [5]. As a central concept, smart tourism provides both theoretical and practical foundations for STDs, where technology is applied to optimize management efficiency, enhance tourist experiences, and improve residents' quality of life [6].

2.2. Smart Tourism Destinations

The rapid advancement of technology in the context of the Fourth Industrial Revolution has fostered the emergence of the STD model, which demonstrates superior characteristics compared to traditional destinations, particularly in enhancing tourist experiences and strengthening competitiveness. International studies have expanded the theoretical foundations of STD, identifying its structures, functions, and values from multiple perspectives.

Smart destinations were conceptualized as smart cities characterized by strong technological development and application [7]. A STD emerges where ICT applications enrich tourist experiences and enhance destination competitiveness.

STD was developed based on the smart city concept and consists of four fundamental structures activated and supported by robust ICT applications and infrastructure: leadership, innovative entrepreneurship, social capital, and human capital (considered the most critical structure) [8].

The rapid growth of urbanization and population has positioned the smart city concept as a central theme in planning and academic research. Within this context, tourism has also been examined from a smart city perspective [9]. STD is understood as a tourism system that integrates ICT with innovative management to enhance tourist experiences, resource efficiency, and residents' quality of life [10]. The development of smart urban applications provides a foundation for STD [11], as destinations leverage advanced technologies and infrastructure to enhance competitiveness through innovative services [12].

Overall, STD has shifted from a technology-centered approach to an integrated model combining technology, governance, social development, and environmental sustainability, thereby opening new research directions in management innovation, value co-creation, and sustainability impact assessment.

2.3. Components of a STD

A STD is a complex system requiring harmonious interaction between technology and human factors. Currently, there are two primary approaches to STDs: one originates from the Smart City perspective, providing the foundation for technological infrastructure and urban governance; the other stems from the Smart Tourism Ecosystem, emphasizing value co-creation and the visitor experience [3, 4]. Despite their differing focal points, both approaches aim for the common goal of leveraging technology to generate value for all stakeholders, including local authorities, businesses, residents, and tourists [8].

2.3.1. The Smart City Framework Approach

This perspective views an STD as a specialized application of the Smart City concept [3]. In this context, an STD utilizes ICT and urban infrastructure to address the challenges of urbanization. Technology serves as the "hardware" designed to optimize service accessibility, manage resources efficiently, and enhance the quality of life for both local citizens and visitors [7].

2.3.2. The Smart Tourism Ecosystem Approach

Under this approach, an STD is the nucleus where data from physical infrastructure, social connections, and governance are transformed into value-added experiences [3]. Within this ecosystem, a continuous process of Value Co-creation takes place, enabling DMOs and businesses to make decisions based on real-time data, thereby enhancing overall competitiveness [8].

2.3.3. Technological Foundations and Operational Attributes

Regardless of the perspective, the core intersection of STD concepts lies in the pervasive application of technology across all stages of the tourism journey. An STD is an environment where digital tools and techniques are employed to facilitate shared value creation between supply and demand, delivering tangible benefits to both tourists and management organizations [2]. Eight key technological elements constitute a smart tourism experience from the tourist's perspective [13]:

- Information Systems: Providing multi-dimensional and accurate data.

- Smart Management: Optimizing destination operations.

- Smart Sightseeing: Implementing on-site assistive technologies (such as QR codes and digital signage).

- E-commerce: Digital transformation in transactions and payments.

- Safety & Security: Ensuring data privacy and physical safety for visitors.

- Transportation: Integrating Smart Mobility systems.

- Smart Forecasting: Utilizing Big Data to predict demand and tourist density.

- Virtual Attractions: Utilizing VR/AR to expand the spatial and temporal dimensions of the experience.

Subsequent studies [14 - 16] have reaffirmed that these eight attributes form the essential foundation for establishing a comprehensive smart tourism experience. The presence of these components not only facilitates the personalization of the tourist journey but also serves as a critical research area helping administrators optimize practical efficiency at the destination.

3. Research Methodology

This study aims to systematically analyze and comprehensively evaluate scientific publications on STDs indexed in the Scopus database. Through bibliometric analysis, the study examines the current status, development trends, academic collaboration networks, and prominent research themes within the STD field. Based on these findings, research gaps are identified, and future research directions are proposed. The specific objectives are as follows:

- To determine the scale, development trends, and growth rate of STD-related research over time.

- To analyze the geographical and national distribution of STD research publications.

- To identify major research themes and focal topics related to STD across different periods.

- To provide conclusions and propose future research directions in the field of STDs.

The study adopts the PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) framework [17] to ensure a transparent and consistent data selection process. PRISMA is a validated methodological standard widely applied across disciplines, including education [18] and tourism and hospitality [19].

Data were collected from the Scopus database using the search string: “Smart OR Intelligent OR Tech-enabled AND Tourism OR Travel AND Destination OR Ecosystem.” The selection of Scopus is theoretically and practically justified due to its high reliability, broad coverage, and standardized citation system, which meet the requirements of bibliometric analysis. Previous studies have also utilized or recommended Scopus for similar analyses, confirming its comprehensiveness and comparability when combined with analytical tools such as VOSviewer and Biblioshiny [20, 21].

Bibliometric analysis ensures objectivity in evaluating scientific literature within the research domain. The Process (PRISMA Framework) illustrating the steps undertaken in the bibliometric analysis of STDs is presented as follows:

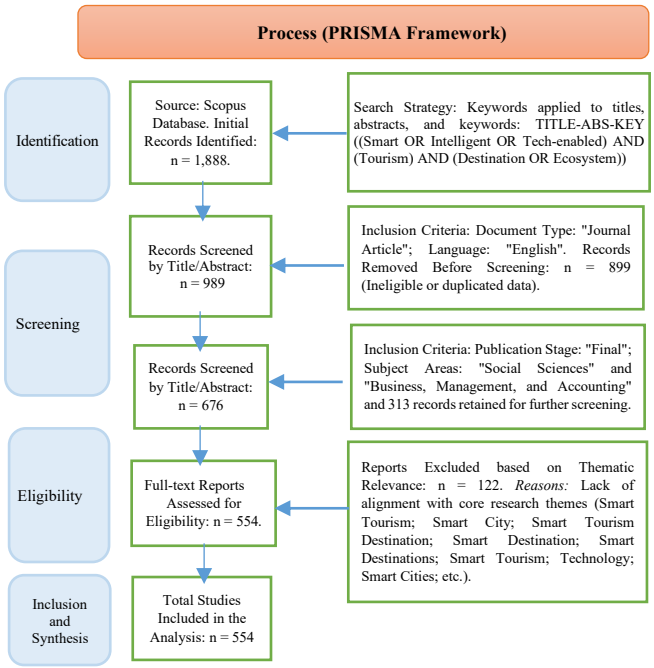

Figure 1. *PRISMA Flow Diagram for Systematic Literature Review (Source: The author’s research process, 2025)*

In this study, the search keyword string was designed not only to ensure close alignment with the research topic but also to enhance comprehensiveness. The search strategy was constructed to comprehensively capture the domain of STDs. The terms “Smart,” “Intelligent,” and “Tech-enabled” reflect the technological and digital transformation nature of STD, while “Tourism” and “Travel” broaden the scope to the general tourism domain. The combination of “Destination” and “Ecosystem” enables the retrieval of studies focusing on both destination-level and ecosystem-level perspectives of smart tourism, a prominent trend in the digitalization of tourism.

Relevance Determination: The relevance of the selected studies was rigorously assessed using a "Content Intersection Rule." Theoretically, a study was deemed eligible for final analysis only if it occupied the mandatory intersection between two core knowledge domains: (A) Smart Technological Solutions and (B) Tourism Management or Experience Contexts.

Specifically, for Domain A (Smart Technological Domain), the manuscript must directly address at least one of the foundational technological pillars, including immersive technologies (VR/AR/MR), artificial intelligence systems (AI, Machine Learning, virtual assistants), Internet of Things infrastructure (IoT, 5G, sensor systems, Big Data), or digital platforms such as Blockchain and cloud computing. For Domain B (Tourism Management & Experience Domain), the research must

explicitly clarify the application of these technologies within practical tourism scenarios. These include DMO functions, such as visitor flow coordination and digital heritage preservation; operational optimization in the hospitality and restaurant sectors; or the analysis of tourist psychology through metrics of satisfaction, behavioral intentions, and psychological flow states during technological mediation.

To ensure precision and prevent "thematic drift," a stringent Verification Standard was established: studies focusing purely on technical aspects, such as algorithmic optimization (lacking a tourism context), or those investigating traditional tourism psychology (lacking smart technology integration) were systematically excluded. This rigorous screening process ensures that the final dataset is holistically centered on the smart tourism ecosystem, thereby enhancing the reliability and scholarly value of the subsequent bibliometric analyses.

The search query was constructed using a three-tier Boolean structure targeting the Title, Abstract, and Keywords (TITLE-ABS-KEY) to ensure a high degree of recall and precision. The finalized Scopus search string is presented below: TITLE-ABS-KEY (("Smart" OR "Intelligent" OR "Tech-enabled") AND ("Tourism" OR "Travel") AND ("Destination" OR "Ecosystem"))

The selection of terms was driven by the need to capture the multi-dimensional nature of the field:

+ Tech-enabled: Included to capture modern studies that may not use the label "Smart" but focus on the functional application of emerging technologies (e.g., IoT, AI) in tourism contexts.

+ Travel: While "Tourism" is the primary academic term, "Travel" is frequently used in industry-oriented research and cross-disciplinary studies (e.g., transportation and logistics) that are essential to the smart destination infrastructure.

+ Ecosystem: This term reflects the theoretical shift from seeing a destination as a static geographical point to a dynamic, socio-technical network. It ensures the retrieval of studies focusing on stakeholder collaboration, value co-creation, and platform-based governance.

The study followed the PRISMA process comprising four stages, summarized as follows:

- Identification: A comprehensive search was performed on the Scopus database in July 2025. To ensure a robust retrieval, the following Boolean syntax was applied: TITLE-ABS-KEY (("Smart" OR "Intelligent" OR "Tech-enabled") AND "Tourism" AND ("Destination" OR "Ecosystem")). The initial search yielded 1,888 documents.

- Screening: The screening phase was conducted in two systematic steps to refine the quality and focus of the dataset:

+ Step 1: Records were filtered by document type (Journal Articles), language (English). During this process, 899 records were removed (including 2026 early-access articles, non-English papers, and duplicate entries). This resulted in 989 records retained for further screening.

+ Step 2: The dataset was further limited to the publication stage (Final) and subject areas of "Social Sciences" and "Business, Management, and Accounting". After this step, 676 records were retained for title and abstract screening. This resulted in 313 records retained for further screening.

- Eligibility: During the eligibility phase, an independent assessment and cross-comparison of results were conducted. 122 reports were excluded: Lack of alignment with core research themes (Smart Tourism; Smart City; STD; Smart Destination; Smart Destinations; Smart Tourism; Technology; Smart Cities; etc.).

All 554 articles met the established inclusion criteria, with no further exclusions necessitated during this stage.

- Inclusion and Synthesis: The final dataset of 554 articles was exported in BibTeX format (scopus.bib). Data processing was performed using RStudio (v.4.4.2) with the Bibliometrix (Biblioshiny) package. This finalized count of 554 is applied consistently throughout the bibliometric analysis, including collaboration networks and keyword co-occurrence mapping.

3.1. Keyword Standardization and Merging

In bibliometric databases such as Scopus or Web of Science (WoS), a single concept often appears in multiple formats. Failure to standardize these terms would dilute the link strength between nodes in the network.

- Plural/Singular and Lexical Variants: Terms such as "Smart Destination" and "Smart Destinations," or " Smart city" and và "Smart cities" were merged to maintain conceptual consistency.

- Maintaining conceptual independence: The terms "Smart City", "Smart Destination" and "Smart Ecosystem" were treated as distinct nodes in the network analysis to preserve the granularity of the data and reflect their different analytical scales.

- Abbreviation Harmonization: Technical abbreviations were converted to their full forms, such as "STD" to "STD", "Smart" to " Intelligent" to "Tech-enabled".

- Synonym Consolidation: Within the scope of this study, equivalent concepts like "Smart Tourism" and "Intelligent Tourism" were unified using a thesaurus file to ensure a cohesive analysis of the knowledge domain.

- Stop-word Removal: Generic terms providing negligible analytical value (e.g., "Research," "Case study," "Article") and primary search strings were excluded. This refinement allows for the emergence of more nuanced sub-themes and niche research areas.

3.2. Selection of Keyword Occurrence Threshold

The selection of a frequency threshold is a strategic decision governed by the data volume and the specific analytical objectives of the study. Given a dataset of 554 articles, where the raw keyword count extends into the thousands, a robust filtering mechanism is essential to ensure network clarity:

- Rationale: Setting an excessively low threshold (n=1 or n=2) results in a fragmented and unintelligible network saturated with noise. Furthermore, maintaining a low threshold (e.g., $n < 5$) often generates a "hairball" effect - a visualization too dense to interpret effectively.

- Proposed Threshold (n ≥ 10): For a dataset of this scale, a minimum occurrence of 10 was established to filter idiosyncratic keywords as a strategic filter.

- Justification: This approach prioritizes academic traction, ensuring that the visualized clusters represent established research streams rather than idiosyncratic terms or emerging concepts that have yet to reach a critical mass of citations. By filtering out these outliers, the analysis focuses on the core knowledge domain and its most influential thematic structures.

3.3. Methodology Workflow

Data Pre-processing and Refinement: To ensure the integrity and clarity of the bibliometric mapping, a rigorous two-stage refinement process was conducted. First, keyword standardization was performed using a customized thesaurus file to harmonize plural/singular forms and merge synonymous technical terms (e.g., "Tech-enabled tourism" and "Smart tourism"). Second, to enhance network interpretability, a minimum occurrence threshold of 10 (n ≥ 10) was established. Out of 1.850 raw keywords, 120 met this criterion. This filtering process effectively reduced network density to a manageable level, facilitating a more precise identification of core thematic clusters and their evolutionary trajectories within the smart tourism ecosystem.

4. Research Results

4.1. Volume and Growth Trends of STD Research

Figure 2 presents the number and growth trends of research publications on STDs during the period 2000–2025. The findings indicate that STD research only became clearly identifiable around 2011, with a significant increase in publication output beginning in 2014, followed by a steady upward trend continuing to the present.

The number of studies on STDs increased significantly after 2014, reflecting the growing academic awareness and practical demand for digital transformation in tourism. Core technologies of the Fourth Industrial Revolution (IoT, AI, big data, and cloud computing) have shaped the smart tourism environment, stimulating research on the role of technology in enhancing tourist experiences and destination competitiveness. At the same time, the impact of COVID-19 and changes in tourist behavior in the digital era have further expanded the research landscape, reinforcing the importance of STD development in the coming years.

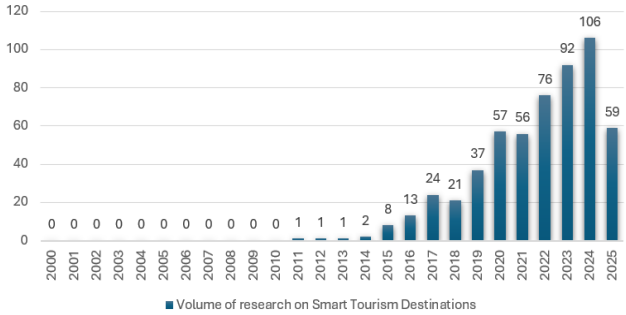

Figure 2. *Growth of Smart Tourism Destination Research*

(Source: The author's research process, 2025)

4.2. Geographical Distribution of STD Research

According to data extracted from Biblioshiny, during the period 2000–2025, a total of 1,480 authors from 73 countries contributed to research on STDs, demonstrating global scholarly interest. Specifically, 30 countries are from Europe, 27 from Asia, 11 from the Americas, 5 from Africa, and 2 from Oceania.

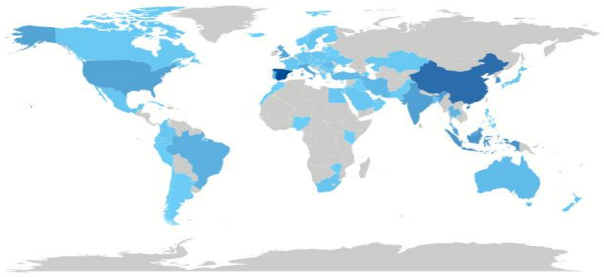

Figure 3. *Geographical Distribution of STD research*

(Source: Author's analysis using Biblioshiny, 2025)

The geographical distribution of STD research (Figure 3) shows that Europe and Asia dominate with 57 out of 73 countries (78.08%), confirming their central role in this research field, while the Americas, Africa, and Oceania demonstrate comparatively limited contributions.

Table 1 presents the top 10 countries with the highest number of STD publications during 2000–2025. Spain ranks first due to three main factors: (1) its leading position in the global tourism industry, (2) a clear national strategy for STD development, and (3) advanced technological infrastructure and standardized systems. A notable example is the STDs Network coordinated by SEGITTUR, structured around five pillars (Governance, Innovation, Technology, Sustainability, and Accessibility), comprising 97 requirements and 261 evaluation indicators, thereby providing a strong practical foundation for academic research. China ranks second with 124 publications, reflecting the integration of national "smart city" and "smart tourism" strategies, a large domestic tourism market, and strong technological capabilities. The extensive deployment of ICT, IoT, and big data has generated rich empirical data while fostering research adapted to China's specific governance and domestic tourism context. Following the COVID-19 pandemic, the demand for tourism recovery and digital transformation further accelerated STD research in China.

Table 1. *Top Countries by Number of STD Publications*

Rank	Country	Number of Publications
1	Spain	168
2	China	124
3	South Korea	75
4	Indonesia	73
5	India	57
6	Malaysia	55
7	United States	53
8	United Kingdom	50
9	Italy	47
10	Portugal	37

(Source: The author's research process, 2025)

4.3. Most Cited STD Studies

A statistical synthesis from the Scopus database indicates that a total of 1,480 authors contributed at least one publication related to STDs during the period 2000–2025. Among them, five research groups stand out as having the highest total citation counts in the field (Table 2).

Table 2. *Ranking of the Top Five Most Highly Cited STD Studies*

Rank	Article title	Author(s)	DOI	Total Citations
1	Smart tourism: foundations and developments	[3]	10.1007/s12525-015-0196-8	1400
2	Technology in tourism-from information communication technologies to eTourism and smart tourism towards ambient intelligence tourism: a perspective article	[5]	10.1108/TR-06-2019-0258	731
3	Technological disruptions in services: lessons from tourism and hospitality	[22]	10.1108/JOSM-12-2018-0398	725
4	The digital revolution in the travel and tourism industry	[23]	10.1007/s40558-019-00160-3	513
5	Smart tourism destinations: ecosystems for tourism destination competitiveness	[8]	10.1108/IJTC-12-2015-0032	480

(Source: Author's statistical synthesis, 2025)

The study has received the highest number of citations, although it was not the earliest work on this topic [3]. The study addressed a major theoretical gap, as the field had previously been approached primarily from a technological perspective and lacked a clear conceptual framework. It established an academic foundation by systematically defining smart tourism and proposing three core components: smart destinations, smart business ecosystems, and smart tourist experiences. Emerging in the context of the digital revolution and the rapid development of smart cities, this study became a key reference for both scholars and policymakers. Beyond identifying opportunities, it also addressed potential risks such as data privacy concerns, technological dependency, and socio-economic impacts, thereby opening multiple new research directions. Due to its strong theoretical foundation, it is widely regarded as the most influential work in the field of smart tourism.

4.4. Most Prominent Research Themes in STDs

A keyword co-occurrence analysis was conducted on 1,958 keywords extracted from 554 articles published by 1,480 authors during the period 2000–2025. Only keywords appearing at least 10 times were retained, resulting in 55 qualified keywords. The most frequently occurring keywords were: "tourist destination" (147); "smart tourism" (140); "tourism" (85); "tourism development" (63); "smart city" (58); "STD" (49); "tourism management" (48); "smart destination" (47); "sustainability" (45); and "tourist behavior" (42) (see Figure 4).

The keyword co-occurrence network indicates that "tourist destination" occupies a central position in the research landscape. The analysis reveals two main research streams related to smart tourism destinations:

(1) Red Cluster: Smart Tourism and Sustainable Development. This cluster focuses on themes such as smart cities, artificial intelligence, sustainability, and destination governance.

(2) Blue Cluster: Smart Tourism Experience, Tourist Behavior, and Smart Tourism Management. This cluster centers on issues such as tourist behavior, satisfaction, revisit intention, and the utilization of big data, social media, and mobile technologies.

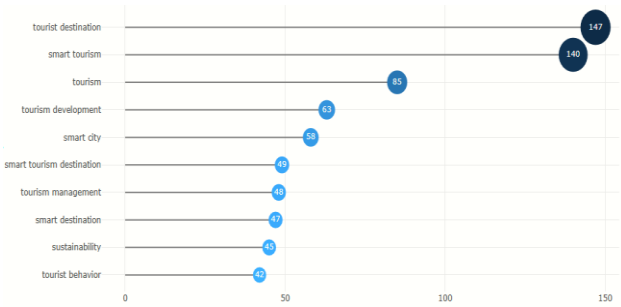

Figure 4. *Most Frequent Keywords in STD research*
(Source: Author's analysis using Biblioshiny, 2025)

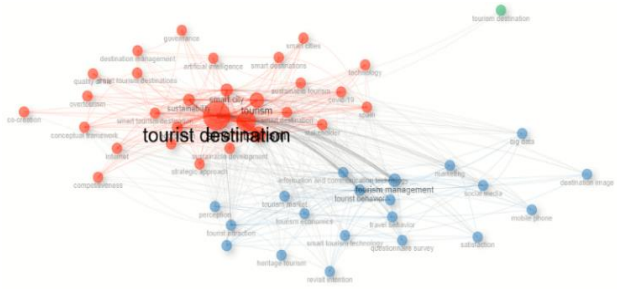

Figure 5. *Network Visualization of Keyword Co-occurrence in STD research (2000–2025)*
(Source: Author's analysis using Biblioshiny, 2025)

Figure 6 illustrates the keyword cloud representing the frequency and prominence of concepts in STD research. Central keywords such as "tourist destination," "smart tourism," and "tourism development" indicate that the research focus primarily revolves around destinations, tourism development, and the application of smart technologies. Terms including "smart city," "tourism management," "sustainability," and "tourist behavior" reflect scholarly attention to governance, sustainable development, and tourist behavior. Meanwhile, keywords such as "social media," "technology adoption," "innovation," and "ICT" highlight the critical role of digital technologies and innovation.

Figure 6. *Wordcloud of STDs*
(Source: Author's analysis using Biblioshiny, 2025)

Overall, STD research can be categorized into four major thematic groups: destination studies, technology, tourist behavior, and sustainable governance.

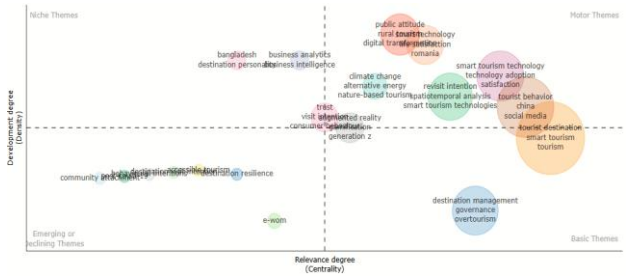

Figure 7. *Thematic Map of Research Directions in STDs (Source: Author's analysis using Biblioshiny, 2025)*

The thematic map illustrates the relationships and developmental status of research themes in STDs. The vertical axis represents the degree of internal development (density), while the horizontal axis reflects centrality within the research field. Based on these two dimensions, themes are classified into four categories: motor themes, basic themes, niche themes, and emerging or declining themes.

The results indicate that themes such as smart destinations, smart tourism technologies, tourist behavior, satisfaction, and social media fall within the motor themes quadrant, demonstrating both high centrality and strong internal development.

Basic themes include destination management and governance, which hold significant academic importance but remain underexplored.

Niche themes, such as business analytics, rural tourism, and digital transformation, reflect specialized and focused research directions.

Emerging or declining themes, including accessible tourism, community engagement, and e-WOM, indicate either growing potential or decreasing scholarly attention.

In summary, the thematic map confirms that technology and tourist behavior constitute the core of STD research, while also highlighting opportunities for further exploration in destination management, social impacts, and sustainable development.

4.5. Comparison with Related Studies

All three studies aim to explore the structural configuration of STDs, yet they differ significantly in terms of research approach, data scope, and analytical tools.

First, regarding the keyword search strategy, the present study employs an expanded and interdisciplinary query ("Smart OR Intelligent OR Tech-enabled AND Tourism OR Travel AND Destination OR Ecosystem"), reflecting a more comprehensive approach focused primarily on direct keyword phrases.

Second, concerning data coverage, this study analyzes the period 2000–2025 using the Scopus database, thereby capturing the full developmental trajectory of the field. In contrast, related Studies were relied on the WoS database.

Third, in terms of search criteria, this study limits retrieval to title, abstract, and keywords to ensure high relevance, whereas the other two studies used the "All Fields" option, which increases coverage but may introduce less relevant records.

Fourth, regarding dataset size, this study obtained 554 articles, enabling a more comprehensive trend analysis, while acknowledging structural differences between Scopus and WoS databases.

Fifth, with respect to methodology, this study employs Bibliometrix/Biblioshiny (R Studio), offering advanced functionalities for citation, co-citation, and keyword co-occurrence analysis. By contrast, the other studies utilized CiteSpace.

Table 3. *Comparison with Related Studies*

Comparison Criteria	Author's Study	Ercan [22]	Yan [23]
Topic	STD	STD	STD
Search Keywords	Smart OR Intelligent OR Tech-enabled AND Tourism AND Destination OR Ecosystem	"smart destination", "smart destinations", "STD", "STDs", "smart tourism city", "smart tourism cities"	("STD*") OR ("smart destination*")
Search Period	2000–2025	1975–2021	2013–2025
Database	Scopus	WoS	WoS
Search Scope	Article title, abstract, keywords	All fields	All fields
Initial Results	661 documents	147 documents	312 documents
Data Type	Journal articles	Journal articles	Journal articles
Language	English	English	English
Research Fields	Social Sciences; Business, Management & Accounting; Psychology	SSCI-indexed journals in Hospitality, Leisure, Sport & Tourism	SSCI-indexed journals across all subject categories
Final Sample	554 documents	147 documents	232 documents
Analytical Tools	Biblioshiny	CiteSpace	CiteSpace
Summary of Research Findings	- Identifies two primary research streams in STDs: (1) Smart tourism and sustainable development; (2) Tourist experience, behavior, and smart tourism management. - Future research directions are proposed in three areas: (1) integration of technology with sustainable development; (2) refinement of smart destination governance models; (3) expansion into socio-technological themes such as e-WOM and community engagement.	- STD research focuses on digital technologies (IoT, Big Data, AI), destination governance, tourist experience, sustainability, and multi-stakeholder collaboration. - Citation network analysis reveals expansion into emerging areas such as sustainable tourism, innovation, and smart tourism experiences. ..	- The study demonstrates a shift in STD research from a technology-oriented perspective toward themes emphasizing tourist experience, collaborative governance, and sustainable development. - It provides a comprehensive overview of STD evolution, emphasizing technological efficiency, sustainability, and strategic governance, thereby offering guidance for both academic research and practical destination management.

(Source: Compiled by the author, 2025)

Finally, in terms of findings and scholarly contributions, this study clearly identifies a thematic shift in the STD field from a technology-centered perspective toward tourist experience, destination governance, and sustainable development. Moreover, it proposes an integrated knowledge framework and outlines future research directions, thereby contributing to shaping the academic trajectory of the field. Overall, the present study demonstrates a higher level of conceptual generalization and strategic orientation, moving beyond merely describing existing knowledge structures to proposing future pathways for both research and practical applications in the context of tourism digital transformation.

5. Conclusion and Future Research Directions

5.1. Conclusion

Research on STDs is grounded in multidisciplinary theoretical foundations, reflecting the systemic and interactive relationships among technology, people, organizations, and the environment [1-3]. At the core of STD lies innovation ecosystem theory, which views stakeholders (governments, businesses, communities, and tourists) as co-creators of value within a digital ecosystem [8].

Smart city theory provides the foundational framework, emphasizing the role of ICT, big data, sensors, and artificial intelligence in governance and experience optimization [11]. Information systems theory and ICT integration perspectives explain the application of IoT, Big Data, Cloud Computing, VR/AR, and AI in real-time decision-making and service personalization [5]. From a sustainable development standpoint, STD seeks to balance economic, social, and environmental dimensions, optimize resource use, and enhance quality of life [8]. Furthermore, socio-technical systems theory highlights that the harmonious interaction between technological infrastructure and human factors is a decisive condition for STD success [20].

The bibliometric analysis of 554 publications indexed in the Scopus database reflects not only a burgeoning volume of scholarly output but also critical shifts in the governance structure of STDs. By establishing a keyword occurrence threshold of ($n \geq 10$), this study has synthesized a knowledge network centered on the intersection of technological infrastructure and sustainable social values. From a theoretical perspective, the findings confirm that the STD concept has transcended its origins as a purely technical construct, evolving into a complex ecosystem where "value co-creation" serves as the central operational mechanism. This evolution necessitates that future theoretical frameworks move away from technology-centric approaches toward integrated governance models that synchronously align digital infrastructure with human capital.

Regarding practical application and policymaking, emerging thematic clusters indicate that DMOs must undergo a paradigm shift from "digital marketers" to "digital ecosystem orchestrators." Specifically, the analysis reveals a disconnect between Big Data analytics and the localized decision-making capacity of resident communities. Consequently, policymakers should prioritize digital literacy programs for local inhabitants to ensure technological inclusivity. Within the realm of destination management, the deployment of IoT and AI must extend beyond enhancing tourist experiences; these technologies should be integrated into real-time environmental carrying capacity monitoring systems to directly support green growth objectives and post-pandemic resilience.

Although the field of STD research has made significant strides over the past two decades, the systematization of knowledge still reveals certain limitations. This study is conducted to bridge the following five (05) research gaps:

First, the lack of an integrated and multidimensional theoretical framework: Most prior studies have adopted a technology-centric approach, resulting in a fragmented theoretical landscape. Currently, the field lacks an integrated model capable of synchronously connecting technological infrastructure with strategic governance, social development, and environmental sustainability. In particular, the mechanisms of "value co-creation" and the influence of non-technical factors, such as leadership capacity, have not been clearly positioned within a unified STD ecosystem.

Second, limitations in sample size and data representativeness: A review of previous bibliometric analyses shows that they often rely on limited datasets, making it difficult to generalize the overall field. For instance, some studies [24, 25] utilized only 147 and 232 documents, respectively. Furthermore, an exclusive reliance on the WoS database in earlier research may lead to bias or the omission of key publications. This study addresses these issues by expanding the data scope to 554 articles from Scopus, ensuring broader coverage and higher reliability.

Third, a lack of updated insights regarding post-pandemic developments through 2025: Existing systematic reviews typically limit their scope to 2021 or earlier, failing to capture the watershed shift in the tourism industry following the COVID-19 pandemic. By extending the analytical period to 2025, this research provides the most current perspective on emerging trends, particularly the profound digital transformation and shifts in tourist behavior within the "new normal" context.

Fourth, fragmentation among specialized research themes: While technology and tourist behavior remain central themes, operational aspects - such as Smart DMOs, local community engagement, e-WOM, and the intersection of ecotourism and technology - remain relegated to niche categories. This study aims to restructure these thematic clusters to establish a concrete roadmap for sustainable development strategies.

Fifth, the lack of transparency and standardization in methodology: Within the STD field, the application of standardized protocols like the PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-

Analyses) framework for literature screening remains uncommon. This raises concerns regarding the transparency and reproducibility of review studies. This paper establishes a rigorous process by combining PRISMA with the Biblioshiny tool to create a robust methodological standard.

By synthesizing existing knowledge to bridge these identified gaps, this study provides a strategic foundation for both practical application and future inquiry, delineating three pivotal research trajectories to enable the development of more sustainable and resilient STD models:

+ Human-Centric Smart Governance: Further investigation is required into the role of digital leadership and the psychological determinants of technology acceptance among local communities as catalysts for the success of STD initiatives.

+ Data Ethics and Privacy in Tourism: Future studies should explore the equilibrium between AI-driven experience personalization and the protection of tourist privacy, particularly in an era of increasingly stringent data protection regulations.

+ Green Digital Transformation: There is a critical need for quantitative models to assess the direct impact of smart solutions - such as intelligent energy management and green mobility - on the mitigation of carbon footprints within key tourism destinations.

5.2. Research Contributions

This study provides significant contributions across three dimensions: methodology, theory, and strategic orientation. The specific contributions are as follows:

5.2.1. Methodological Contributions

This research is among the first in the STD field to rigorously apply the PRISMA framework, ensuring a data selection process that is transparent, consistent, and reproducible. Furthermore, the employment of an expanded, interdisciplinary keyword string - incorporating terms such as "Tech-enabled" and "Ecosystem" - facilitates a more comprehensive topical coverage compared to previous review studies.

5.3. Theoretical Contributions

- Paradigm Shift Identification: The study clearly identifies a shift in the STD domain from a "technology-centric" approach toward an integrated model that synthesizes technology, governance, tourist experience, and sustainable development.

- Systematization of Multidisciplinary Foundations: It systematizes the interdisciplinary theoretical underpinnings of STD, including innovation ecosystem theory, smart city frameworks, information systems, and socio-technical systems.

- Structural Clarification: By analyzing two primary evolutionary paths – originating from Smart Cities and Smart Tourism, the research clarifies the core structures and components that define a STD.

5.3.1. Overview Value and Data Currency

This study provides a comprehensive and contemporary synthesis of the literature, incorporating records from the Scopus database through July 2025. With a robust dataset of 554 articles, this research offers higher generalizability and a superior longitudinal view of the field's evolution compared to previous studies [22, 23].

5.4. Research Limitations and Future Research Directions

While STDs are fundamentally built upon robust technological foundations, this study intentionally prioritizes social, managerial, and behavioral perspectives. Purely engineering-centric subjects, such as hardware optimization, sensor protocol development, or low-level network architecture, were excluded from the primary analysis. This decision was made to ensure the findings remain actionable for tourism practitioners and policy-makers, focusing on how technology mediates the human and organizational elements of the ecosystem. Consequently, readers should exercise caution when generalizing these results to the technical engineering domain of smart infrastructure, as the study's scope is centered on the socio-technical and managerial evolution of the field.

(1) The study considers only English-language journal articles, potentially overlooking publications in other languages. Future research should expand linguistic coverage to enhance comprehensiveness.

(2) The dataset is limited to the Scopus database; incorporating additional sources such as WoS would help reduce potential bias. Furthermore, interpretation based on the authors' analytical judgments may influence the objectivity of the findings.

The analysis of keyword co-occurrence and thematic mapping reveals that core themes, namely smart tourism, tourism destinations, and tourism development, are intrinsically linked to the conceptual framework of STDs. Within this integrated ecosystem, smart tourism provides the technological and data-driven foundation, the destination serves as the operational landscape, and tourism development steers the trajectory toward sustainable growth. This convergence not only facilitates the functional mechanisms of STDs to optimize governance and visitor experiences but also identifies critical pathways for future research. Specifically, subsequent studies should prioritize the integration of digital transformation and innovation, while addressing existing research gaps in governance frameworks and policy mechanisms within smart operational models.

In addition, emerging topics such as community engagement and electronic word-of-mouth (e-WOM) open new avenues for socio-technological inquiry, enabling a deeper understanding of technology's role in shaping tourist behavior and expectations. Integrating ecotourism, sustainability, and climate change considerations into smart tourism research also represents a promising direction, contributing to the development of empirical models and sustainable tourism strategies in the digital era.

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