

Article

Urban Dimensions and Indicators for Smart Tourist Destinations from a State of the Art

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Abstract

Smart Tourism Destinations (DTIs) represent innovative places established on the basis of an infrastructure of advanced technology, whose objective is to promote accessible, sustainable development for tourist regions to enrich tourist's experiences and inhabitants' quality of life. Therefore, the main objective of this research is to verify whether the phenomenon indicators of existing smart tourist destinations fit within all dimensions of a smart tourist destination. For data collection, the bibliographic survey method was used in renowned databases. Data analysis comprises two approaches, bibliometric and content analysis, applied sequentially. The results of the bibliometric analysis identify three main pillars in the current perspectives on DTIs: Management and Tourism Experience, Technology, and Sustainability, in addition, it revealed a duality between approaches from the Far East and Western Europe. The content analysis culminates in the proposition of two theoretical-conceptual models for the dimensions and indicators of DTIs, encompassing elements: Information and Communication Technologies (TICs), Governance, Innovation, Accessibility, Performance, Mobility and Infrastructure, as well as Segmented Sustainability in its economic, social, and environmental dimensions. However, the analysis highlights the lack of consensus among studies, especially DTI indicators. The results of the research highlight the insufficiency of these indicators for a comprehensive assessment, notably in the environmental dimension of sustainability.



Academic Editors: Frank Witlox and
Diego Gabriel Rossit

Received: 22 August 2025

Revised: 27 October 2025

Accepted: 3 November 2025

Published: 11 November 2025

Citation: García, T.S.; Tricárico, L.T. Urban Dimensions and Indicators for Smart Tourist Destinations from a State of the Art. *Urban Sci.* **2025**, *9*, 471. <https://doi.org/10.3390/urbansci9110471>

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Keywords: smart tourism destinations; dimensions; indicators; sustainable urban; sustainable development

1. Introduction

1.1. Contextualization

The concept of smart tourist destinations is inspired by the notion of smart cities [1] defined as innovative tourist destinations built on an advanced technology infrastructure that promotes the affordable, sustainable development of tourist areas to provide enhanced tourist experiences and quality of life for residents. Smart tourism is an evolutionary and logical development of traditional tourism and e-tourism (technology-based tourism), where the foundation for technology-driven innovation has been established [2].

Technology is understood as a fundamental pillar for the implementation of a DTI [3]. The conceptualization of DTIs prior to the COVID-19 pandemic was mainly guided by technological and intelligence attributes linked to tourist destinations: use of Big Data and digital platforms [4] and shamelessly with the use of generative AI and IoT [5], despite attributes of environmental, social and economic sustainability. Studies on DTIs between

2015 and 2023 demonstrated the need for studies focused on a holistic need for DTIs by encompassing concepts of technology, innovation, sustainability, and accessibility [6].

Smart tourism unites issues related to the environment, society, and economy with the development and application of Information and Communication Technologies (TICs), which makes it a relevant theme for sustainable development [2]. Within the TIC sphere, DTIs are concerned with integrating data to provide tourists with more exclusive experiences within destinations. Sustainable smart tourism can pave the way to further study tourism deeply in terms of social, economic, environmental, and cultural issues through a scientific approach [2].

Boes et al. (2016) [1] developed a framework for classifying intelligence in cities and tourist destinations. For this, the researchers establish the 4 dimensions of intelligence, namely: (a) human capital—developing collaborations with the participation of stakeholders, with the crossing of knowledge; (b) leadership—destinations must have an institution that mediates and executes ideas, initiatives, and incorporates stakeholders to facilitate the coordination of ideas and projects; (c) entrepreneurship and innovation—to stimulate innovation in the field of service by implementing the use of ICTs; (d) social capital—improving the quality of public services through the collaboration of residents, through platforms that encourage social capital.

Boes et al. (2016) [1] created a framework for developing Smart Tourist Destinations. This framework has three axes: people, technology, and leadership. Under these axes, the different parts of Smart Tourist Destinations are defined: innovation, mobility, governance, economy, life, environment, and people.

Ivars-Baidal et al. (2021) [7], together with the Instituto Valenciano de Tecnologías Turísticas (INVAT.TUR), adapted the existing indicators in the literature on the management of tourist destinations and smart cities, to indicators of smart tourist destinations, where 9 dimensions were defined (governance, sustainability, innovation, accessibility, connectivity, intelligence, information system, online marketing, and indicators), subdivided into 72 indicators.

In Spain, a pioneer country for DTI studies, there are two models for the development and evaluation of DTI: the INVAT.TUR model and the SEGITTUR (Sociedad Mercantil Estatal para la Gestión de la Innovación y las Tecnologías Turísticas) model. Currently, these models serve as a basis for the development and evaluation of smart tourist destinations in different countries.

1.2. Research Problem

The topic of Smart Tourist Destinations has aroused growing interest in tourism, resulting in an increasing number of scientific papers dedicated to this subject. Many well-respected studies on smart tourism [8–11] revealed significant gaps in the definition and understanding of concepts related to smart tourism destinations [12], still lacking clarity and consensus [13].

It is common to find indicators in smart tourism studies that measure a destination's competitiveness; however, many of these studies have gaps in relation to the complexity and multidimensionality of sustainability in destinations [7].

For a more comprehensive approach, smart destinations must consider a complete set of indicators that assess their performance in different dimensions, including connectivity, use of Big Data, technology adoption, and their relationship with destination sustainability and accessibility [2,7,14].

The bibliometric study included in this research was unable to effectively determine the contemporary relationship between climate services and DTIs. Climate services and their technological supports have contributed to smart decisions in tourist destinations [15–17].

1.3. Research Question

Considering the research problem, two questions were raised:

- (a) What are the main indicators and dimensions available in the literature that rate Smart Tourist Destinations?
- (b) Are the existing indicators sufficient to rate a Smart Tourist Destination, considering all the dimensions of a DTI?

1.4. Research Hypothesis

Research questions led to the following hypothesis: the existing Smart Tourism Destination indicators are not effectively engaging to measure and rate a Smart Destination holistically, especially regarding the environmental dimension of sustainability. The lack of a holistic conceptualization for DTIs is demonstrated by the manifestation of DTI attributes that are largely guided by technologies, not interconnected with sustainability attributes [4].

1.5. Objective

The goal of this research was to verify whether the existing smart tourist destination indicators fit within all the dimensions of phenomenon of a smart tourist destination and to evaluate their effectiveness compared to the dimensions of DTIs.

1.6. Justification of the Study for the Field of Tourism

The DTI subject is essential for transforming the tourism sector, as it uses data continuously and accurately to make decisions, prioritize actions and anticipate challenges; in addition, these destinations promote inclusive governance, ensuring accessibility and boosting sustainable tourism management [18].

As for the Sustainable Development Goals (SDGs), the study, in the socio-environmental sphere, stands out in Goal 2, which seeks to end hunger and promote sustainable agriculture; Goal 3, which aims to ensure healthy living and well-being for all; Goal 10, which seeks to reduce inequalities within and between countries; and Goal 12, which seeks to ensure sustainable production and consumption patterns. In addition, the Innovation and Technology dimension, combined with the management of natural resources in the DTIs, is connected to Goal 6, which seeks the sustainable management of water and sanitation, and Goal 7, which ensures access to sustainable energy. The research also analyzes the lack of indicators that address the environmental dimension of sustainability in DTIs, which relates to Goal 13 to combat climate change, Goal 14 to conserve oceans and marine resources, and Goal 15 to protect terrestrial ecosystems. Finally, Goals 8, 9, and 11 are directly related to the topic of the research, as they aim to promote sustainable economic growth, build resilient infrastructure, and make cities sustainable, respectively. These goals are essential to boosting the sustainable development of tourist destinations through technological innovations and considering economic, social, and environmental aspects.

Ivars-Baidal et al. (2021) [7] emphasize the importance of rating sustainability indicators for tourist destinations. The authors understand that sustainable tourism is a continuous process, not a perfect state. It is the role of indicators to measure this evolution in destinations.

For Shafiee et al. (2019) [13], a systematic review of the literature on Smart Tourist Destinations becomes fundamental to examining existing studies, assessing current knowledge about smart tourist destinations, and guiding future research in this field.

Even after the effects of the COVID-19 pandemic on tourism, there are still DTI studies that focus on technological attributes [19]; therefore, studies focused on a holistic vision that integrates technologies and sustainability are necessary.

2. Materials and Methods

2.1. Research Characterization

The research approach is considered predominantly qualitative. However, quantitative methods were adopted for data treatment. For Creswell (2021) [20], qualitative research involves collecting, analyzing, interpreting, and describing the data found and is based on inductive methods. Even so, quantitative methods were used to enrich how the data is treated and facilitate the analysis instruments. According to Sampieri (2013) [21], mixed research uses the strengths of both types, combining them and trying to minimize the possible weaknesses of both approaches.

2.2. Procedures for Data Collection

Firstly, the bibliographic research focused on identifying and analyzing the main concepts related to Smart Tourist Destinations (DTIs), with the specific purpose of examining the works that explore the dimensions and indicators associated with this subject. This first collection helped to create the theoretical framework and the reference for selecting the static corpus for content analysis.

A literature review on the subject was conducted using the Web of Science and Scopus databases. Academic and scientific research has demonstrated the efficiency of the Scopus and Web of Science databases combined with each other [22].

The term “smart tourism destination” was used to search for relevant articles. The searches were conducted in English to access as many publications as possible. It was also decided not to limit the search to a specific time period; this was performed to gain a comprehensive understanding of the evolution of the theme over time. Next, only the most relevant literature review articles were selected. The number of citations that an article had was the main way to determine its relevance (articles with over 30 citations were selected). As a result, 8 articles were selected and submitted for individual analysis. Although the literature used may seem limited, it is worth noting that it derives from the research process, which aims to restrict the content to be analyzed [23,24]. The period analyzed was restricted to 2020 to 2023 because it is a post-COVID-19 pandemic period, with significant impacts on the tourism sector [25,26].

We used Microsoft Excel version 2309 (Build 16827.20130) software to categorize the references of each article and find out which references were used most. This procedure showed the publications with the most relevant theories, as they are the main sources cited in all articles.

The second phase of the bibliographic research was carried out through a systematic review aimed at the research objectives and was the theoretical basis for both the bibliometric analysis and the content analysis. To understand the most common words used in publications about Smart Tourist Destinations (DTIs), a search was carried out on the Web of Science platform. In this sense, the term “Smart Tourism Destination” was used as a search criterion, and no restrictions were applied to the date, source, or field of knowledge. This search turned up a total of 842 publications.

In a later step, these papers were transferred to the VosViewer version 1.6.18 software to create a keyword correlation map (Figure 1). Using the method of bibliometric analysis of the correlation of keywords between the various articles, the software considers all the keywords present in all the articles. The software was able to identify a total of 3189 distinct keywords; given the number of keywords, it was decided to restrict the final map to the 30 most frequent occurrences between the words, which resulted in a set of 35 keywords selected to compose the correlation map. After the analysis of the words presented in the keyword correlation map, two other terms emerged that, although they may seem obvious, had not been considered until now to help guide the bibliographic research. These

terms are “Smart Tourism” and “Smart Destination”, and they are used separately. This finding highlights the relevance of the methodological approach adopted, demonstrating its effectiveness in revealing pertinent terms that might have gone unnoticed in a less comprehensive study.

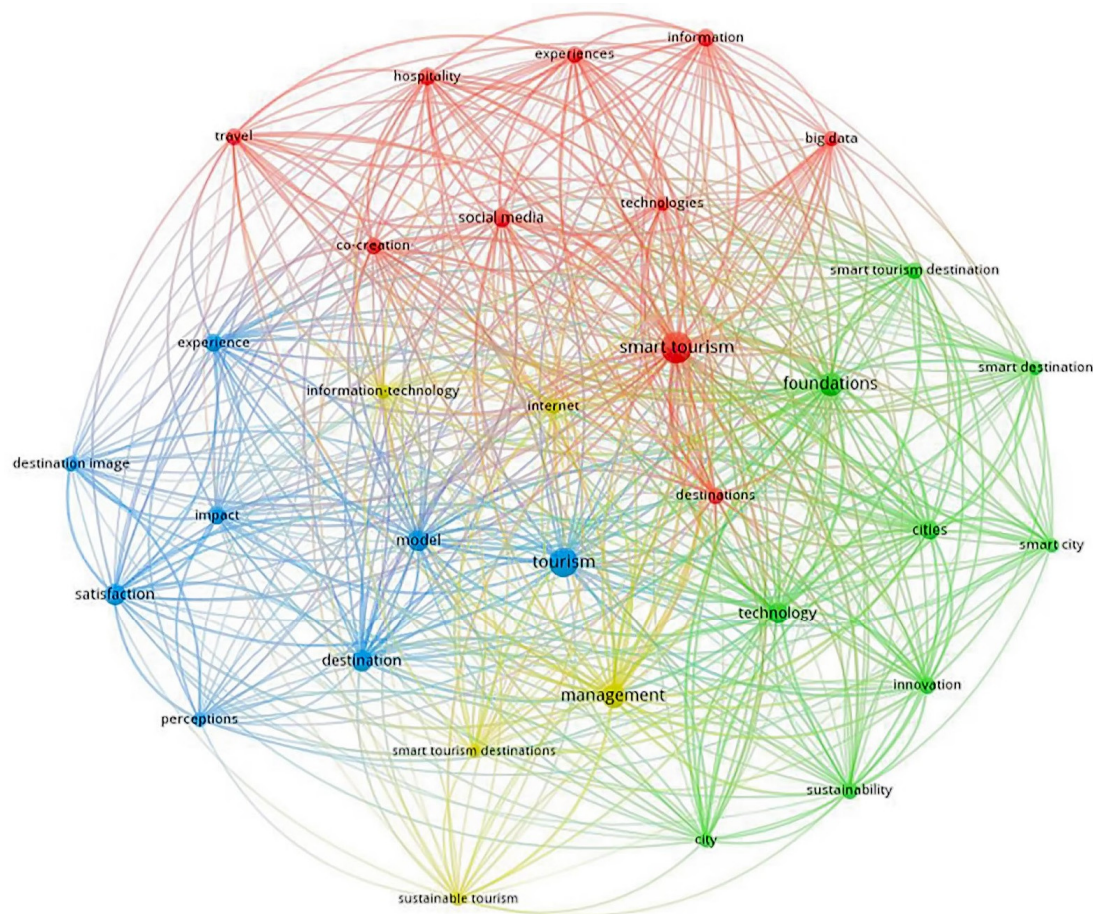


Figure 1. Keywords testing. Source: Authors from VosViewer version 1.6.18.

After determining the three terms selected as keywords—“Smart Tourism Destination,” “Smart Tourism,” and “Smart Destination”—the search strategies were formulated. It was established that Boolean logic would be applied, employing the “or” operator to link the three key terms in database searches. This “or” link in database searches retrieves references that employ any of the indicated terms, i.e., references that contain “Smart Tourism Destination” OR “Smart Tourism” OR “Smart Destination”. The choice to use English as the main language was based on the international nature of the databases and the universality of this language, which provides a range and relevance in terms of available publications. A seven-year period was established comprising the interval between 2017 and 2023. The search in the databases was limited to scientific articles published in academic journals. Three different platforms and databases were used in this research: Web of Science, Scopus, and EBSCOhost. These databases were chosen due to their international recognition and the scope of publications in renowned journals in applied social sciences, specifically in tourism and urbanism.

The 1462 articles were transferred to the EndNote version 20 software. There, the duplicate articles were removed. This was performed manually and mechanically by the software. Then, the articles were manually deleted if they had titles in languages other than English. They were also manually deleted if they did not have all the basic information needed for the analysis including title, journal, year of publication, keywords, authors,

and country of the first author. These scanning steps reduced the number to 788 articles. The next phase consisted of filtering the 788 articles; this step tries to make sure that the information is as precise as possible to achieve the goal of the research, which is the “Identification of indicators and dimensions of Smart Tourist Destinations”. The articles were filtered using EndNote version 20 software, resulting in 477 articles which were then transferred to Microsoft Excel version 2309 (Build 16827.20130) software, where the following information was listed: authors, years, titles, journals, and abstracts.

This compilation served as the basis for applying the multi-criteria method, which assessed the relevance of the articles based on the information previously compiled. In addition, the number of citations of each article in Google Scholar (adjusted for the year of publication) and its relationship with the research objectives were taken into account. The attribution of a research alignment score measured the degree of relevance of the publication in relation to the established objectives: strong adherence, medium adherence, weak adherence, and no adherence. Thus, 55 articles were considered without significant adherence, while 224 articles had weak adherence; 279 were removed from the final set of analysis. On the other hand, 189 articles were evaluated with a medium level of adherence. Articles that met medium adherence standards were reviewed again to decide if they should be kept or left out of the final analysis portfolio; this method offered an impartial and objective view of the research, avoiding subjective bias [23]. After all these procedures, the bibliographical analysis followed.

2.3. Data Analysis

For this purpose, the qualitative content analysis approach proposed by Bardin (2011) [24] was chosen, which adheres to some fundamental rules, such as being homogeneous, exhaustive, exclusive, objective, and adequate or pertinent. The content analysis unfolded in three distinct phases: pre-analysis, exploration of the material through coding and categorization, and results treatment. In the pre-analysis phases, exploration of the material through coding and categorization, the final corpus was formed, consisting of a sample of 20 documents.

Two key terms from the research objective were used as categories for analysis [24]: “DIMENSIONS” and “INDICATORS”. The coding process began with a direct search within each article after the definition of the categories of analysis, using the terms “indicator” and “dimension,” considering both the plural and singular forms of these terms. As this process continued, we also found other similar words for the ones we already had. For example, “dimension” had words like “pillar” and “axes” as synonyms, and “indicator” had words like “tools” and “variables” as synonyms. However, these additional terms were incorporated into the analysis only if they showed cohesion with the dimensions and indicators of Smart Tourist Destinations.

In the results treatment stage, the units of analysis were grouped and categorized, which created thematic categories. These categories simplify the raw data, organizing them into classes that combine elements with similar characteristics. The definition of these categories was based on both semantic (thematic categories) and lexical criteria (grouping of words with related meanings, including synonyms and terms with a close meaning) [24].

Finally, these groupings of categories resulted in naming the groups of units. Each name was chosen to define the set of registration codes/units, taking into account the aspects that would be analyzed in each category. These categories of analysis were organized to allow the identification of the general theme, revealing the dimensions and indicators of Smart Tourist Destinations present in the literature.

3. Results

According to Bardin (2011) [24], the approach that was used could result in the construction of two structures for analysis based on a conceptual-theoretical model. The first structure focused on the articles, aiming to extract the dimensions identified in the literature, which provide clues to the units of record and context, according to Bardin (2011) [24]. These dimensions were defined considering both the frequency and the correlations in which they appeared between the articles. With the dimensions identified, the second structure followed the same data collection approach but aimed at correlating the previously delimited dimensions with the indicators in the literature.

3.1. Dimensions

The dimensions identified in the literature were Information and Communication Technologies (TICs), Governance, Innovation, Accessibility, Performance, Mobility and Infrastructure, and Sustainability, which was divided into three dimensions: Economic Sustainability, Social Sustainability, and Environmental Sustainability. Table 1 comprises the units of record and context [24] in their dimensions found in the literature.

Table 1. DTI Dimensions.

Unit of Record (Found)	Authors (Cite as Dimension)	Context Unit
Information and Communication Technologies (TICs) (Connectivity/Information System)	GOMEZ-OLIVA, A. et al. (2019) [27]; ALLAWI, A. H. (2022) [28]; SANTOS-JÚNIOR, A. et al. (2020) [29]; MENDES FILHO, L. et al. (2022) [30]; SANTOS-JÚNIOR, A. et al. (2017) [31]; GONZÁLEZ-REVERTÉ, F. (2019) [32]; KHAN, M. S. et al. (2017) [33]; IVARS-BAIDAL, J. A. et al. (2021) [7]; IVARS-BAIDAL, J. A. et al. (2023) [34]; BOES, K.; BUHALIS, D.; INVERSINI, A. (2015) [1]; BORGES-TIAGO, T.; VERÍSSIMO, J.; TIAGO, F. (2022) [35]; FEMENIA-SERRA, F.; IVARS-BAIDAL, J. A. (2021) [36]; CORNEJO ORTEGA, J. L.; MALCOLM, C. D. (2020) [37]	The development of the Smart Tourist Destination is interconnected, co-created and value-oriented through the implementation of technological applications and TIC infrastructures such as Cloud Computing and Internet of Things (BOES, Kim; BUHALIS, Dimitrios; INVERSINI, Alessandro, 2015) [1]. Information and Communication Technologies (TICs) are the fundamental components of smart tourism destinations, improving user experiences, efficiency, and process automation for sustainability. Although it is not the only feature, the TIC platform is essential for successfully realizing the concept of smart cities. (KHAN, M. Sajid et al. 2017) [33]. In addition to urban strategies, TICs also enhance daily life and communication, fostering conservation and development. (GOMEZ-OLIVA, Andrea et al. 2019) [27].
Governance	GOMEZ-OLIVA, A. et al. (2019) [27]; ALLAWI, A. H. (2022) [28]; SANTOS-JÚNIOR, A. et al. (2020) [29]; GONZÁLEZ-REVERTÉ, F. (2019) [32]; KHAN, M. S. et al. (2017) [33]; BUHALIS, D.; AMARANGGANA, A. (2014) [38]; IVARS-BAIDAL, J. A. et al. (2021) [7]; IVARS-BAIDAL, J. A. et al. (2023) [34]; GRETZEL, U. et al. (2015) [2]; BOES, K.; BUHALIS, D.; INVERSINI, A. (2015) [1]; FEMENIA-SERRA, F.; IVARS-BAIDAL, J. A. (2021) [36]; MADEIRA, C.; RODRIGUES, P.; GOMEZ-SUAREZ, M. (2025) [39]; CORNEJO ORTEGA, J. L.; MALCOLM, C.D. (2020) [37]	Governance subsystems encompass tourism services such as travel procedures, visas, and special requirements, encompassing extraordinary government permits when required. (KHAN, M. Sajid et al. 2017) [33]. Smart governance refers to transparency in governance systems, modernizing urban administration with open data and public engagement (BUHALIS, Dimitrios; AMARANGGANA, Aditya. 2014) [38]. Governance implies the participation and collaboration of multiple actors (public, private, residents, and tourists) in smart tourist destinations' decision-making, planning and policies, supported by advanced technologies and political leadership (SANTOS-JÚNIOR, Adalberto et al. 2020) [29].

Table 1. *Cont.*

Unit of Record (Found)	Authors (Cite as Dimension)	Context Unit
Innovation	ROMÃO, J.; NIJKAMP, P. (2019) [40]; GOMEZ-OLIVA, A. et al. (2019) [27]; ALLAWI, A. H. (2022) [28]; SANTOS-JÚNIOR, A. et al. (2020) [29]; MENDES FILHO, L. et al. (2022) [30]; SANTOS-JÚNIOR, A. et al. (2017) [31]; IVARS-BAIDAL, J. A. et al. (2021) [7]; IVARS-BAIDAL, J. A. et al. (2023) [34]; BOES, K.; BUHALIS, D.; INVERSINI, A. (2015) [1]; FEMENIA-SERRA, F; IVARS-BAIDAL, J. A. (2021) [36]; MADEIRA, C.; RODRIGUES, P.; GOMEZ-SUAREZ, M. (2023) [39]	Innovation is the implementation of new ventures related to tourism and other activities with the support of TICs (SANTOS-JÚNIOR, Adalberto et al. 2020) [29]. The Innovation dimension in Smart Tourist Destinations involves the adoption of technologies such as QR code and RFID, as well as projects to improve services and municipal innovations. To become a DTI, innovative objectives are crucial, boosting a tourism ecosystem and favoring the consolidation of the destination through advanced management (MENDES FILHO, Luiz et al. 2022) [30]. The innovation dimension promotes initiatives that aim to encourage innovation in tourism and entrepreneurship. On the negative side, the degree of compliance with standardized innovation management systems is low in companies and public administrations. Innovation is primarily fostered by public administrations in DTI territories (IVARS-BAIDAL, Josep A. et al. 2021) [7].
Accessibility	GOMEZ-OLIVA, A. et al. (2019) [27]; ALLAWI, A. H. (2022) [28]; SANTOS-JÚNIOR, A. et al. (2020) [29]; MENDES FILHO, L. et al. (2022) [30]; SANTOS-JÚNIOR, A. et al. (2017) [31]; IVARS-BAIDAL, J. A. et al. (2021) [7]; IVARS-BAIDAL, J.A. et al. (2023) [34]	A DTI aims to include people in society with the support of smart technologies and accessibility (SANTOS-JÚNIOR, Adalberto et al. 2020) [29]. Accessibility means making tourism so that anyone can enjoy it. It makes it so that everyone can use the same things, like the environment, services, goods, technologies, and products in the safest, most comfortable, and most independent way possible (MENDES FILHO, Luiz et al. 2022) [30]. Regarding accessibility, further efforts are needed to ensure that all tourist attractions, information, and infrastructure are accessible to all visitors, regardless of their age, condition, or potential disability (IVARS-BAIDAL, Josep A. et al. 2021) [7].
Performance	GOMEZ-OLIVA, A. et al. (2019) [27]; IVARS-BAIDAL, J. A. et al. (2021) [7]; IVARS-BAIDAL, J. A. et al. (2023) [34]; BORGES et al. (2022); ROMÃO, J.; NIJKAMP, P. (2019) [40]	Smart destinations need a complete set of metrics encompassing performance in the various areas they are expected to engage. This includes connectivity, analysis of large volumes of data, adoption of technology, and its integration with sustainability concerns and accessibility of destinations (IVARS-BAIDAL, CELDR'AN-BERNABEU, Maz'on, & PERLES-IVARS, 2023) [34]. Technologies such as the Internet of Things, Big Data, and mobile devices will allow destinations to better understand the tourist behavior in this data intelligence environment, reducing uncertainties about consumption habits. DTI should focus on enhancing the tourist experience through technologies such as augmented and virtual reality (MENDES FILHO, Luiz et al. 2022) [30].

Table 1. *Cont.*

Unit of Record (Found)	Authors (Cite as Dimension)	Context Unit
Mobility/urban infrastructure	KHAN, M. S. et al. (2017); BUHALIS, D.; AMARANGGANA, A. (2014) [38]; BOES, K.; BUHALIS, D.; INVERSINI, A. (2015) [1]; MADEIRA, C.; RODRIGUES, P.; GOMEZ-SUAREZ, M. (2023) [39]; CORNEJO ORTEGA, J. L.; MALCOLM, C.D. (2020) [37]	The Mobility dimension involves services including air, land, and water transportation modes. Intelligent roads, bridges, and tunnels, Intelligent Transportation Systems (ITSs), and intelligent traffic and parking management are integrated with tourism to provide tourists with seamless integration of travel-related services (KHAN, M. Sajid et al. 2017) [33]. Smart Mobility refers to accessibility in and out of the city and the availability of modern transportation systems (BUHALIS, Dimitrios; AMARANGGANA, Aditya. 2014) [38]. Smart accessibility and mobility mainly refer to transportation that facilitates local interconnections of the destination for tourists and potential tourists (ALLAWI, Ahmed Hussein. 2022) [28]. The mobility dimension is about the modernization of public transport, improving traffic through real-time information and other technologies, and creating alternative means of transport (SANTOS-JÚNIOR, Adalberto et al. 2020) [29].
Sustainability	GOMEZ-OLIVA, A. et al. (2019) [27]; SANTOS-JÚNIOR, A. et al. (2020) [29]; ALLAWI, A. H. (2022) [28]; ROMÃO, J.; NIJKAMP, P. (2019) [40]; MENDES FILHO, L. et al. (2022) [30]; SANTOS-JÚNIOR, A. et al. (2017) [31]; GONZÁLEZ-REVERTÉ, F. (2019) [32]; IVARS-BAIDAL, J. A. et al. (2021) [7]; IVARS-BAIDAL, J. A. et al. (2023) [34]; FEMENIA-SERRA, F.; IVARS-BAIDAL, J. A. et al. (2023) [41]; AGUIRRE, A. et al. (2022) [42]; CORNEJO ORTEGA, J. L.; MALCOLM, C.D. (2020) [37]	The ideal smart tourism should be based on sustainability, circular economy, quality of life, and social value. The sustainability axis has the most significant number of publications on the theme of DTI (MADEIRA, Clara; RODRIGUES, Paula; GOMEZ-SUAREZ, Monica. 2023) [39]. Destination sustainability indicators adopt the approach of balancing economic, social, and environmental sustainability (IVARS-BAIDAL, Josep A. et al. 2021) [7].
Economic Sustainability	ROMÃO, J.; NIJKAMP, P. (2019) [40]; ALLAWI, A. H. (2022) [28]; SANTOS-JÚNIOR, A. et al. (2020) [29]; AGUIRRE, A. et al. (2022) [42]; KHAN, M. S. et al. (2017) [33]; BUHALIS, D.; AMARANGGANA, A. (2014) [38]; BOES, K. et al. (2015) [1]; BORGES-TIAGO, T.; VERÍSSIMO, J.; TIAGO, F. (2022) [35]; MADEIRA, C.; RODRIGUES, P.; GOMEZ-SUAREZ, M. (2023) [39]	The economic dimension includes local strengthening, jobs, standard of living, investments, and new businesses. This can increase tax revenues but also lead to higher costs of living and prices, as well as real estate speculation. The necessary balance between advantages and challenges (SANTOS-JÚNIOR, Adalberto et al. 2020) [29]. Economic dimension: where smart and innovative economic conditions and tools are provided to fuel entrepreneurship and competitiveness (KHAN, M. Sajid et al. 2017) [33]. Economic growth is directly connected to Information and Communication Technologies. Since the rise in computers, there has always been a constant recognition of the importance of technology in driving economic advancements (BOES, Kim; BUHALIS, Dimitrios; INVERSINI, Alessandro 2015).

Table 1. Cont.

Unit of Record (Found)	Authors (Cite as Dimension)	Context Unit
Social Sustainability	ROMÃO, J.; NIJKAMP, P. (2019) [40]; GOMEZ-OLIVA, A. et al. (2019) [27]; SANTOS-JÚNIOR, A. et al. (2020) [29]; AGUIRRE, A. et al. (2022) [42]; KHAN, M. S. et al. (2017) [33]; BUHALIS, D.; AMARANGGANA, A. (2014) [38]; GRETZEL, U. et al. (2015) [2]; BOES, K.; BUHALIS, D.; INVERSINI, A. (2015) [1]; MADEIRA, C.; RODRIGUES, P.; GOMEZ-SUAREZ, M. (2023) [39]	Smart Tourism Destination initiatives (DTIs) contribute to the enhancement of local sustainability. It is critical that they not only improve visitor experiences to achieve this goal but also develop them through continuous dialog with locally staked parties, including local actors and residents. This approach ensures that the benefits arising from the tourism sector can be optimally distributed in local society (CORNEJO ORTEGA, José Luis; MALCOLM, Christopher D. 2020) [37]. The “People” dimension emphasizes a culture of learning, engagement, and innovation, with examples such as advanced education and intelligent security. This joins educational, innovation, and safety subsectors, all connected to local culture, providing tourists with access to cultural and social solutions. The “Life” dimension seeks to improve the quality of life through education, health, and culture, with a focus on smart buildings, eHealth, and advanced medical facilities. It connects the sustainable and smart tourism system to the quality of life, although many aspects mainly benefit local residents. The integration of health services with tourist buildings and facilities is the main link with tourism in this dimension (KHAN, M. Sajid et al. 2017) [33]. “Smart People” refers to the level of skills and knowledge of the city’s human capital. On the other hand, “Smart Living” covers the quality of life, including a healthy environment, social cohesion, tourist attractiveness, and the availability of cultural and educational services (BUHALIS, Dimitrios; AMARANGGANA, Aditya. 2014) [38].
Environmental Sustainability	AGUIRRE, A. et al. (2022) [42]; KHAN, M. S. et al. (2017) [33]; BUHALIS, D.; AMARANGGANA, A. (2014) [38]; BOES, K.; BUHALIS, D.; INVERSINI, A. (2015) [1]; MADEIRA, C.; RODRIGUES, P.; GOMEZ-SUAREZ, M. (2023) [39]	In the “Environment” dimension, the focus is on intelligent asset management to reduce pollution and waste of resources. Examples include the integration of smart grids and buildings, advanced irrigation and water treatment systems, as well as intelligent rainwater and waste management. This dimension, together with its functionalities, integrates intelligent systems for the management of networks, buildings, water, sewage, and waste in the context of sustainable tourism. This creates an essential connection between tourism and sustainable practices at a macro level (KHAN, M. Sajid et al. 2017) [33]. Intelligent Environment is related to energy optimization that leads to sustainable management of available resources (BUHALIS, Dimitrios; AMARANGGANA, Aditya. 2014) [38].

Source: Authors.

3.1.1. Information and Communication Technologies (TICs)

The Information and Communication Technology (TIC) dimension emerges as one of the most recurrent among the analyzed studies, making explicit its importance in the development of Smart Tourist Destinations (DTIs) [33]. The development of the Smart Tourist Destination is interconnected, co-created, and value-oriented through the implementation of technological applications and TIC infrastructures such as Cloud Computing and the Internet of Things [1].

Gomez-Oliva et al. (2019) [27] point out in their study that TICs drive sustainable development by obtaining and analyzing the data made available by these TICs. This dimension also plays an important role in residents' quality of life and in tourists' experience with easier and more comprehensive communication, consequently fostering the development of destinations.

In the study conducted by Ivars-Baidal et al. (2021) [7], which identified dimensions and indicators of Smart Tourist Destinations (DTIs), although Information and Communication Technologies (TICs) are not explicitly treated as an independent dimension, the authors introduced indicators related to TICs in practically all dimensions.

The SEGITTUR model, cited in the article by Mendes Filho et al. (2022) [30], which makes up the technology dimension for the development of smart tourist destinations, was also used to help define the dimensions.

3.1.2. Governance

Khan et al. (2017) [33] state that governance subsystems encompass travel and tourism-related services, including political decision-making processes within destinations.

The term "smart governance", proposed by Cohen (2014) [43] for the development of a Smart City and consecutively by Buhalis et al. (2014) [38] for the development of Smart Tourist Destinations, is a recurring term among publications for this dimension.

Buhalis and Amaranggana (2014) [38] emphasize that smart governance also encourages open data and public participation, creating an environment conducive to collaboration and involvement of the various stakeholders.

Governance in DTIs is characterized by the participation and collaboration of multiple actors, including the public and private sectors, residents, and tourists [27].

3.1.3. Innovation

Innovation in DTIs often relies on Information and Communication Technologies (TICs), as evidenced by Santos-Júnior et al. (2020) [29] when emphasizing the implementation of new TIC-supported ventures. In addition, the innovation dimension in DTIs has a strong connection with the creative economy. Mendes Filho et al. (2022) [30] indicate that the search for innovation includes the adoption of new technologies, such as QR code, RFID, and NFC, which not only improve the visitor experience but can also be drivers of innovative economic activities.

Innovation in DTIs can contribute to the creation of unique products and services that add value to the tourist experience and foster local economic development [28].

The innovation dimension must also consider intangible cultural heritage, implementing solutions that encourage resident and tourist participation and investment in this dimension [27]. In addition, Romão and Nijkamp (2019) [40] point out that innovation should encourage sustainable development based on its three pillars.

3.1.4. Accessibility

As noted by Santos-Júnior et al. (2020) [29], accessibility is a cornerstone for achieving inclusion in society, using smart technologies to ensure that everyone can fully participate in tourism activities.

According to Mendes Filho et al. (2022) [30], accessibility transcends mere physical access to tourist sites and services. It involves creating environments, products, and experiences that are equally accessible to all, promoting equal opportunities.

As highlighted by Ivars-Baidal et al. (2021) [7], the development of an DTI should incorporate significant efforts to make tourist attractions, information, and infrastructure accessible to everyone.

3.1.5. Performance

Regarding the performance of DTIs, Ivars-Baidal et al. (2021) [7] highlight the need for comprehensive metrics that encompass various aspects of the functioning of destinations, including connectivity, data analytics, technology adoption, and sustainability and accessibility considerations. The performance dimension gains relevance by allowing destinations to monitor and evaluate the impact of their initiatives and policies in real-time, adjusting their strategies as needed.

As Mendes Filho et al. (2022) [30] mention, the application of Information and Communication Technologies (TICs) in the performance dimension is a crucial element. TICs allow data collection, analysis, and interpretation in real time, offering valuable information on tourists' behavior and the effectiveness of destination interventions. In addition, using technologies such as the Internet of Things, Big Data, augmented reality, and virtual reality enhances the tourist experience and the services offered in DTIs.

3.1.6. Mobility and Urban Infrastructure

"Smart mobility" provides a more fluid and convenient travel experience for visitors and residents of the destination [1,38,44]. Therefore, it is worth noting the direct relationship between this dimension and accessibility; in this sense, the relationship between smart mobility and accessibility is highlighted by Allawi (2022) [28], who emphasizes the importance of transportation to facilitate local connections to the destination, making it attractive to both tourists and potential visitors.

As indicated by Khan et al. (2017) [33], the Mobility dimension involves a wide range of transportation services, covering air, land, and water modalities. In addition, it includes elements of infrastructure such as roads, bridges, tunnels, intelligent transport systems (ITS), and intelligent traffic and parking management.

The definition of Smart Mobility by Buhalis and Amaranggana (2014) [38] underscores the importance of accessibility within and outside the city and the availability of modern transportation systems. In addition, the modernization of public transport, the use of technologies to improve traffic in real-time, and the creation of transport alternatives are essential aspects of the Mobility and Urban Infrastructure dimension, where they are directly connected with the TIC dimension, as mentioned by Santos-Júnior et al. (2020) [29].

3.1.7. Sustainability

The concept of an optimal smart tourism is based on sustainability, a circular economy, quality of life, and social value [39].

The approach to sustainability in smart tourism destinations [12] encompasses three fundamental pillars: economic, social, and environmental. The literature highlights the importance of balancing these dimensions to build a successful DTI [7].

3.1.8. Economic Sustainability

This dimension recognizes that implementing smart and innovative strategies in the economic sphere can boost entrepreneurship and increase the destination's competitiveness [33]. The direct connection between economic growth and Information and Communication Technologies highlights the crucial role of technology in promoting economic advances over time [1].

In the context of DTIs, the economic dimension gains even more relevance since it seeks to promote economic growth in line with the principles of innovation and technology [38].

Economic development in DTIs must be conducted in a conscious and responsible manner, considering not only quantitative growth but also the quality of life of local communities, the conservation of natural resources, and encouraging innovative entrepreneurship [40].

3.1.9. Social Sustainability

In this dimension, the importance of continuous and collaborative dialogue with local stakeholders, including local actors and residents, is highlighted to ensure that the benefits generated by tourism are equitably distributed and optimized [37].

It is observed that the social sustainability dimension was broadly defined to include the "Smart Living" and "Smart People" dimensions, as proposed by Buhalis and Amaranggana (2014) [38]. These dimensions advocate the development of a vibrant and engaged community with a high quality of life and access to cultural and educational services. Therefore, the social sustainability dimension encompasses material well-being, social cohesion, health, education, and culture, all essential elements for a smart and sustainable tourist destination.

The "People" dimension emphasizes promoting a culture of learning, engagement, and innovation. This includes creating environments conducive to advanced education and security and establishing a link between the educational sphere, innovation, and security with local culture. The emphasis in this dimension is also on empowering the city's human capital, recognizing that residents' skills and knowledge play a crucial role in the social sustainability of the destination [38].

The "Life" dimension aims to improve the quality of life of residents, involving areas such as education, health, and culture. This dimension is connected to initiatives promoting advanced health services, smart buildings, and other facilities that benefit residents and tourists. The integration of health services with tourism infrastructure demonstrates the importance of considering residents' quality of life as a vital component to the success of a DTI [33].

3.1.10. Environmental Sustainability

The approach in this dimension includes integrating smart technologies into areas such as smart grids and buildings, advanced irrigation and water treatment systems, and smart rainwater and waste management; these initiatives aim to achieve greater efficiency in resource use and contribute to the environmental sustainability of the tourist destination [33].

The "Smart Environment" dimension is intrinsically linked to energy optimization and the sustainable management of available resources. It encompasses the implementation of technological solutions that aim to reduce energy consumption and minimize environmental impact, providing a healthier and more sustainable environment for residents and visitors [38].

3.2. Indicators for Dimensions

Indicators play a key role in providing a tangible measure to assess the progress and success of initiatives to transform a destination into a smart destination. They serve as measurement tools that allow managers to monitor and evaluate the effectiveness of the strategies implemented, aiding in informed decision-making to achieve the goals and

objectives of smart tourism. As a result of the record and context units [24], the following indicators are found in the literature for each dimension:

3.2.1. Information and Communication Technology (TIC) Indicators

Use of IoT (Internet of Things) Devices and Sensors:

Use of IoT (Internet of Things) Devices [27,32]

Sensors and Smartphones [28]

Implementation of sensors in tourist signage [7]

Digital Apps and Platforms:

Use of mobile apps [33]

Development of a Web-App as an interactive tool [27]

Tourist apps with city information [30,33]

Websites with tourist information about the city [30]

Social media profiles with tourist information about the city [30]

The existence of an official destination mobile app [7]

Wi-Fi and Connectivity:

Wi-Fi is available throughout the city [7,30,33]

Wi-Fi network quality [7]

Availability of information on connectivity and public Wi-Fi networks [7]

The proportion of tourism companies offering free Wi-Fi to tourists [7]

Fast connection by the internet operator in the city [30]

Social Media Presence and Marketing:

Adaptation of the DMOs (Destination Management Organizations) website to any device [7]

The active presence of the DMO on social networks to provide information [7]

Virtual and Interactive Assistance:

Existence of digitalized promotional material [7]

Existence of 24/7 information points [7]

Implementation of virtual assistance [7]

Quality, Privacy, and Standards Certifications:

Privacy and information security [33]

Destination certified by “q quality” (standard on quality of services, including information) [7]

Use of Big Data and Data Analytics:

Information management [33]

Use of Big Data [28]

Implementation of sensors for data collection at the destination [7]

IoT devices and sensors allow managers to collect real-time data, making more informed decisions about the infrastructure, tourist flow, and services needed. Apps, digital platforms, and social networks provide tourists with easy access to information, interactive guides, and personalized recommendations, increasing their satisfaction and enriching their experiences.

Connectivity, represented by the availability of Wi-Fi, is essential for instant communication with tourists and continuous access to information. Adapting websites and services to mobile devices and having an active presence on social media promotes a more fluid interaction between tourists and local authorities.

Data analysis, such as using Big Data, contributes to understanding tourists’ preferences and enables the personalization of offers and services. In addition, quality certification and information privacy strengthen tourists’ confidence in the information provided and in the destination management.

3.2.2. Governance Indicators

Stakeholder Engagement and Community Participation:

Motivation of residents to participate in content creation and interaction with the solution [27]

The interest of tourism entrepreneurs, tourism agents, and local managers in smartphone-oriented solutions [27]

Community participation in the decision-making process of the destination [29]

Trust in local government in decision-making on tourism [29]

Citizen participation in solving the city's problems through digital platforms [29]

Cooperation between stakeholders [32]

Transparency and Smart Governance:

Fighting fake news [31]

Transparency in governance systems; modernization of the city administration; Open Data; public involvement [38]

Coordination Strategies and Mechanisms:

Existence of policies aimed at tourism [29]

Implementation of a strategic tourism plan [7]

Coordination mechanism between local government departments for the development of smart tourism destination projects [7]

Implementation of a smart destination project [7]

Existence of a smart destination coordinator [7]

The existence of an annual operation plan for a smart destination [7]

Mechanism to facilitate public-private partnership [7]

Development of e-government/open government strategies [2,7]

Communication and Awareness:

Development of social awareness campaigns on the impacts of tourism on citizens and application of ROI (Return on Investment) analysis in tourism initiatives [7].

The governance dimension plays an essential role in the development of smart tourism destinations [12]. The indicators associated with this dimension encompass the decisions made, the stakeholders, and the policies implemented in the tourism context.

Fighting fake news is an indicator that highlights the need to provide reliable and accurate information to tourists to ensure informed decisions and build trust. Policies aimed at tourism are an indicator that highlights the local government's commitment to guiding tourism development strategically, establishing clear guidelines and promoting sustainable growth. Community participation in the destination's decision-making process is key to ensuring that local voices are heard, creating a more in-depth approach to tourism planning. In addition, the increased transparency of the local government on tourism actions strengthens ties with the community and visitors, while trust in the local government in decision-making on tourism is a sign of a healthy environment for the development of the sector.

3.2.3. Innovation Indicators

Investment in Research and Development:

Regional Investment in Research and Development [40]

Innovative Technologies and Tools:

Implementation of a Smart Point of Interaction (Smart POI) solution [27]

Use of new technologies such as QR code, RFID, and NFC by companies in the tourism sector [30]

Innovation and Co-creation Ecosystem:

Technology-Mediated Co-creation Ecosystem [28]

Citizen participation in solving the city's problems through digital platforms [29]

Collaborative Economy [29]

Innovation Management and Partnerships:

Creation of local smart departments [32]

Implementation of innovation management systems in companies and public agencies [7,34]

Promotion of Innovation:

Last-minute promotions for the sale of tourism products and services [30]

Different tourist services compared to other destinations [30]

Change-oriented mindset [28]

The deployment of Smart POI solutions and the creation of a technology-mediated co-creation ecosystem represents an approach to enhance the interaction between tourists and the destination's cultural resources. This enriches the visitor's experience and promotes the preservation and prominence of the destination's cultural heritage. In addition, the creation of smart routes to cultural Points of Interest and the focus on the participation of residents demonstrate a strategy to involve the community in promoting and sharing the region's cultural richness.

3.2.4. Accessibility Indicators

Adapted and Accessible Streets and Public Transport:

Accessibility of public transportation for tourists with disabilities [7,30]

Accessibility of streets for tourists with physical, hearing, or visual disabilities [30]

Adapted Information and Services:

Content Accessibility with the Web Accessibility Initiative (WAI) [7]

Existence of information services adapted to people with disabilities [7]

Accessible tourist attractions [30]

Inclusion of Accessible Resources and Businesses:

Existence of a dynamic inventory of tourism resources [7]

Accessible businesses and services for tourists [7]

Street accessibility for tourists with physical, hearing, or visual disabilities, adapted public transport, and accessible tourist attractions are crucial indicators of a destination's ability to offer inclusive experiences. The presence of adapted information services and the existence of devices or facilities for tourists with disabilities are factors that promote the autonomy and independence of visitors with special needs.

3.2.5. Performance Indicators

Economic Indicators:

Labor Productivity [40]

Regional Gross Value Added of Tourism Activities [40]

Level of unemployment in the service sector [7]

Accommodation Indicators:

Overnight stays in hotels [42]

Average number of hotels [42]

RevPAR Hotels (means revenue per available room) [42]

Evolution of the occupancy rate of tourist accommodation [42]

Tourist Satisfaction and Expense Indicators:

Level of tourist satisfaction with tourist demand [7]

Evolution of tourist expenditure in the destination [7]

Seasonality level of tourism demand [7]

Performance indicators related to labor productivity and regional gross value added from tourism activities provide a comprehensive view of tourism's contribution to the local

economy. Labor productivity is a key performance indicator of operational efficiency and the utilization of human resources in the tourism sector. The regional gross value added reflects the generation of direct and indirect wealth from tourism activities, influencing the region's economic competitiveness.

The performance indicators of hotel occupancy, overnight stay in different types of accommodation, and the RevPAR (Revenue Per Available Room) analysis are crucial performance indicators of tourist demand, and the success of the accommodation offer. These performance indicators offer insight into how accommodation resources are used and how attractive the destination is to tourists.

Tourist satisfaction and the evolution of tourist spending measure the direct impact of tourist experiences on the quality of visits and average visitor spending. These performance indicators allow one to assess whether marketing strategies and development efforts are aligned with tourists' expectations and whether they are generating added value for the destination.

3.2.6. Mobility and Urban Infrastructure Indicators

Basic Infrastructure Indicators:

Health infrastructure [33]

Running water [33]

Sanitation [33]

Electricity [33]

Constructions [33]

Accessibility and Transportation Indicators:

Accessibility in and out of the city [38]

Availability of modern transport systems [38]

Highway infrastructure [33]

The indicators that refer to basic infrastructure and mobility, such as health, running water, sanitation, electricity, highway infrastructure, ports, airports, and buildings, reveal the degree of development and preparation of the city to receive both residents and tourists. Solid infrastructure is crucial to ensure a positive visitor experience and the well-being of residents. In addition, a well-maintained and efficient infrastructure contributes to a positive image of the destination and tourists' overall satisfaction.

3.2.7. Sustainability Indicators

Urban Planning and Infrastructure Indicators:

Sustainable urban planning [30]

Garbage collectors around the city [30]

Conservation of public buildings [30]

Implementation of urban regulations adjusted to sustainability principles [7]

Public promotion of sustainable mobility [7]

Development of awareness campaigns aimed at tourists on sustainability [7]

Legal provisions and environmental or quality certifications [7]

Use of ethical codes in tourism (regulation of the activity, governance, impacts) [7].

Preservation of natural areas [31]

Urban planning is a key element in the destination's overall sustainability. Indicators such as the planning of green areas, the conservation of public buildings, and the promotion of sustainable mobility demonstrate the destination's commitment to creating a pleasant urban environment for residents and tourists.

The promotion of innovation and the adoption of sustainable practices are important aspects of the Overall Sustainability dimension. Indicators such as implementing sustainable urban regulations, developing sustainability awareness campaigns, and using

ethical codes in tourism highlight the destination's commitment to adopting responsible approaches in all spheres of the tourism sector. In addition, including sustainability criteria in certifications and awards encourages the adoption of positive practices by tourism companies and services.

3.2.8. Economic Sustainability Indicators

Economic Impact Indicators:

Tourism's share of regional employment and gross value added [40]

Employees in the hotel activity [28,29]

Number of salaries paid [28]

Average tourist income [29]

Quality of products/services [29]

Job creation in the sector [29]

Capital investment, jobs, economies, import/export, trade, domestic finance, innovation, and economic knowledge [33]

Economic Innovation Indicators:

Implementation of economic strategies based on digital technology [38]

Qualifications

Companies awarded with environmental certifications (standards) [38]

Tourism's share of regional employment and gross value added are key indicators that demonstrate the sector's direct economic contribution. The number of employees in the hotel activity and the number of salaries indicated the sector's labor intensity and ability to generate direct jobs. These indicators reflect tourism's ability to create job opportunities, especially in areas that rely heavily on the hospitality industry.

Indicators such as the number of jobs in the sector, the average tourist income, and the quality of tourism products/services provide information on the breadth and quality of tourism-related economic activities. Capital investment, jobs, economies, import/export, trade, domestic finance, innovation, and economic knowledge reveal how tourism influences finances and the local market, as well as the destination's ability to innovate and adapt to economic changes.

3.2.9. Social Sustainability Indicators

Social Impact Indicators:

The educational level of the workforce in the region [40]

Highlighting intangible cultural heritage through digital tools [27]

Creating smart routes to offer cultural Points of Interest (POIs) [27]

Focus on the residents' participation, involving them with the proposed cultural content [27]

Social Inclusion, Culture and Entertainment, and Gentrification [29]

Level of qualification of the city's human capital. [38]

Indicators of Quality of Life and Community Participation:

Quality of life is measured in terms of a healthy environment [38]

Availability of cultural and educational services [38]

Cost of living [29]

Health [29]

Security [29]

Highlighting intangible cultural heritage through digital tools, creating smart routes to cultural points of interest, and focusing on the participation of residents in promoting cultural content demonstrate the appreciation of cultural authenticity and local heritage. These indicators encourage interaction and collaboration between visitors and the community, allowing tourists to experience enriching and genuine experiences.

The analysis of these indicators also underscores the importance of addressing quality of life issues such as the cost of living, health, safety, social inclusion, culture, and entertainment. Quality of life is measured in terms of a healthy environment, social cohesion, and availability of cultural and educational services are key indicators for assessing the positive impact of tourism on society.

3.2.10. Environmental Sustainability Indicators

Waste Management Indicators:

Water Waste [42]

Solid Waste [42]

Electronic Waste [42]

Waste collection and treatment [42]

Environmental Quality Indicators:

Water quality [7,33]

Wastewater purification and reuse [7]

Efficiency in water supply [7]

Soil quality and noise. [33]

Level of CO₂ emission [33]

Air quality [33]

Energy Optimization and Sustainable Management Indicators:

Energy optimization [7,38]

Sustainable management of available resources [38]

Preservation of natural areas [31]

Creating climate change adaptation programs [7]

Area of green spaces by actual population [7]

Proper waste management, including water, solids, and electronics, indicates the ability to reduce space pollution. Attention to water and soil quality, as well as monitoring CO₂ emissions and air quality, are indicators that assess the destination's environmental health. Energy optimization and sustainable management of available resources reduces the consumption of non-renewable resources and promotes more efficient practices.

The analysis of these indicators underscores the need to develop strategies and policies that directly address tourism's environmental challenges. Implementing sustainable practices, such as reducing the use of single-use plastics, promoting recycling, using renewable energy sources, and preserving natural areas can significantly contribute to environmental conservation.

4. Discussion

Although many scholars have emphasized that TICs do not necessarily define the 'smart' orientation of cities, some authors emphasize the TIC dimension as the main common feature among most conceptual frameworks and as essential for the successful implementation of the smart concept.

Santos-Júnior et al. (2020) [29] point out that the governance dimension plays a central role in the decision-making, planning, and policy-making process of smart tourist destinations.

It is important to note that despite innovation being a widely discussed dimension in studies, there is a lack of consensus on what constitutes an innovative tool in DTIs. Different perspectives and approaches can lead to varied interpretations of innovation, which can result in a diversity of strategies and initiatives adopted by individual destinations.

Although accessibility is not widely cited in the sample articles, it plays an extremely relevant role in developing a smart tourist destination. The study conducted by Mendes Filho et al. (2022) [30] addresses the dimensions that affect tourists, considering a sample without or with disabilities. The results reveal that, today, tourists may not consider this

dimension to be very important. Accessibility not only meets an ethical imperative of inclusivity but also contributes to the improvement of tourism experience as a whole.

The performance dimension has emerged more clearly in recent publications. As indicated by Ivars-Baidal et al. (2021) [7], its importance is crucial for the effective development of DTIs. Performance measurement allows destinations to assess their strategies' impact, identify improvement areas, and optimize their resources. It is through careful analysis of data provided by TICs that DTIs can dynamically adapt to each destination's specific characteristics and peculiarities, contributing to its continuous evolution and offering high-quality tourist experiences.

The mobility dimension not only aims to provide effective transportation solutions, but also to ensure that tourists can easily travel within and to the country. The urban mobility and infrastructure dimension is intrinsically linked to the Smart City dimension, as it involves planning and creating an urban environment that is functional, efficient, and adapted to the needs of the local population and tourists. In addition, this dimension is strongly related to the spatial and physical measures that make the destination accessible, interconnected, and enjoyable for all visitors.

However, there is a need for interrelationships between DTIs (which offer opportunities to tourists) and smart cities based on urban development for both tourists and citizens [45]. In other words, it is necessary to overcome the primacy of accessibility in smart city and DTI studies. Thus, as an example: technological innovation is directly related to the development of smart cities, tourists who used technologies for tourist visits evaluated the image of the city (as a tourist destination) more positively [46].

Of the studies addressing the topic of DTIs, the largest number of publications focus on the sustainability dimension, underscoring its significance in planning and managing these destinations. Although these publications often mention sustainability in general terms, their analyses rarely delve into the details and nuances of each pillar.

The economic dimension of sustainability in DTIs also presents a key challenge: finding a balance between the advantages of economic growth and the associated challenges. Economic strengthening can generate increased tax revenues, boost job creation, and attract investments. However, it is important to consider the potential adverse impacts, such as the rising cost of living, higher prices, and risks of real estate speculation, as well as environmental impacts [29]. The studies contain recurring definitions of the economic dimension, but none effectively align the economic and environmental dimensions.

In the social sustainability dimension, there is a lack of studies demonstrating techniques for involving visitors and tourists in the participatory construction of smart tourist destinations.

Although the term "environment" is widely covered in articles on Smart Tourist Destinations, such as those by Aguirre et al. (2023) [42], Allawi (2022) [28], and Madeira et al. (2023) [39], it is notable that many studies do not delve into the specific issues of the environmental dimension, such as green spaces, air quality, water management, sewage treatment, noise control, soil conservation, and the relationship of rural communities or non-urban destinations with this dimension of the DTIs. This suggests that, despite the relevance of the environment to the sustainability of destinations, some studies may focus more on the implementation of smart technologies for the overall management of resources and assets without going into specific details about the environmental characteristics of different types of destinations.

It is essential to recognize that the effective implementation of TIC indicators requires significant investments in technological infrastructure, staff training, and collaboration between the public and private sectors. The security of tourist information is also a critical aspect to consider.

Citizens' participation in solving the city's problems through digital platforms reflects robust civic engagement, contributing to a more participatory and adaptive tourism man-

agement. Transparency in governance systems, the modernization of city administration, the adoption of “open data” practices, and public engagement highlight the importance of a responsible, data-driven approach to tourism decision-making. However, there is a lack of studies and practices that directly involve tourists in solutions to the social demands facing tourist destinations.

Studies have shown that digital governance contributes to popular participation in the decisions of a DTI [47]. The technological condition of digital governance was not a constant in the research’s bibliometric survey. In this sense, it is important to emphasize the need for studies on digital governance for DTIs, as the Chinese experience has demonstrated the effectiveness of government service websites in advancing digital governance for tourism; these government service websites have even demonstrated greater efficiency than administrative management [48].

Promoting initiatives that encourage entrepreneurship and innovation in tourism, as well as the collaborative economy and the formation of new companies in the sector, fosters the growth of the creative local economy. Implementing innovative projects to improve tourism products and services, linked to the adoption of emerging technologies such as QR codes, RFID, and NFC, indicates the destination’s willingness to embrace digital transformation to create unique and memorable experiences for tourists.

The analysis of accessibility indicators highlights the importance of considering technology as a powerful tool for increasing accessibility. Utilizing technologies such as QR codes, RFID, and NFC to provide relevant and tailored information to visitors with disabilities contributes to a more enriching and convenient experience.

The analysis of indicators can also reveal seasonal patterns, allowing the destination to adapt to changing demands throughout the year. Additionally, looking at employment and unemployment levels in the tourism-related services can provide discussions on economic stability and the sector’s ability to generate sustainable jobs.

Accessibility is a critical factor to the success of a DTI. Accessibility in and out of the city, the availability of modern transportation systems, and the accessibility of public transportation for people with disabilities (PCDs) are indicators of a destination’s commitment to providing inclusive and efficient transportation options.

Analysis of its indicators suggests that the sustainability dimension is essential for achieving harmony between tourism and the environment, as well as for preserving the cultural authenticity and quality of life of residents. Implementing sustainable strategies contributes to the destination’s long-term attractiveness and reinforces its position as a responsible, environmentally conscious, and community-conscious place.

A destination’s implementation of economic strategies based on digital technology indicates its ability to adopt innovative approaches to economic growth. These technologies can boost operational efficiency, enhance tourist experience, and attract investment.

Social sustainability indicators highlight the importance of raising awareness and implementing educational strategies for residents and tourists. Involving the local population in tourism management and encouraging appreciation of cultural traditions helps preserve local identity and strengthen the sense of belonging.

Environmental sustainability indicators highlight the importance of balancing tourism growth with environmental protection. DTIs should be designed to protect and conserve natural resources while minimizing negative impacts on the local ecosystem. Doing so will contribute to the destination’s long-term sustainability.

Although the bibliometric studies of the research did not emphasize variability and climate change within the Environmental Sustainability dimension, the role of climate services in the planning and management of a DTI is necessary [49,50].

In order to demonstrate the frequency of occurrence of the selected dimensions within the analyzed articles, as well as the geographical scope of application of each study, Table 2 was developed. This systematization allows for the visualization of which dimensions of Smart Tourist Destinations (DTIs) have received greater attention in the literature, while also highlighting whether the research focuses on urban, municipal, or regional scales. Therefore, the analysis enables an understanding of the emphasis given to certain conceptual axes over others, indicating the main trends and existing gaps in approaches to DTIs.

The literature review shows that the Sustainability dimension is the most recurrent among the analyzed studies on Smart Tourist Destinations (DTIs), with nineteen citations, indicating a strong emphasis on sustainable practices associated with the development of smart urban destinations. However, despite this high incidence, there are evident gaps in the treatment of environmental sustainability, which is often addressed superficially or diluted among other sustainability axes, mainly the economic one. Next, the Governance dimension appears with fourteen occurrences, followed by Information and Communication Technologies (ICTs) with thirteen records. As expected, both are widely explored as they constitute the core conceptual pillars of DTIs, strongly grounded in the Smart Cities model. The Innovation dimension, with eleven citations, demonstrates a growing interest in the relationship between innovation and territorial competitiveness, while Accessibility and Performance appear less frequently, seven and five mentions, respectively, as they are more recent dimensions in the literature on the subject. Mobility/Urban Infrastructure, also with five records, remains a dimension of less emphasis in the analyzed studies.

Another relevant point is that none of the identified works directly address issues related to climate change, which reinforces the existence of important gaps at the intersection of tourism, sustainability, and smart environmental management. Regarding geographical scope, it is observed that most studies focus on the urban scale, applied to specific cities such as Benidorm, Dubai, Ceutí, Marbella, and Natal. The analysis shows that these studies are mostly limited to the municipal territory, while only a few authors, such as Romão and Nijkamp (2019) [40], Allawi (2022) [28], and Mendes Filho et al. (2022) [30], expand the focus to regional contexts. This urban predominance reveals a still restricted understanding of DTIs as a territorial and systemic phenomenon, reinforcing the need to broaden analyses toward regional and intermunicipal scales, where integration and governance dynamics become more complex.

Table 2. Frequency of DTI Dimensions.

Dimension	Frequency in the Reviewed Literature	Author(s)	Geographical Scope
Information and Communication Technologies (ICTs)	13	GOMEZ-OLIVA, A. et al. (2019) [27]	City—applied in Ceutí/Spain
		ALLAWI, A. H. (2022) [28]	Regional/Provincial—applied in Karbala/Iraq
		SANTOS-JÚNIOR, A. et al. (2020) [29]	City—analysis of residents' quality of life in STDs
		MENDES FILHO, L. et al. (2022) [30]	Cities—applied in Natal, Rio de Janeiro, and São Paulo/Brazil
		SANTOS-JÚNIOR, A. et al. (2017) [31]	City—applied in Marbella, Málaga/Spain
		GONZÁLEZ-REVERTÉ, F. (2019) [32]	City—analysis of Spanish STD plans
		KHAN, M. S. et al. (2017) [33]	City—applied in Dubai
		IVARS-BAIDAL, J. A. et al. (2021) [7]	City—evaluation of INVAT.TUR STD indicators
		IVARS-BAIDAL, J. A. et al. (2023) [34]	City—based on Smart Cities
		BOES, K.; BUHALIS, D.; INVERSINI, A. (2015) [1]	City—based on Smart Cities
		BORGES-TIAGO, T.; VERÍSSIMO, J.; TIAGO, F. (2022) [35]	Bibliometric review
		FEMENIA-SERRA, F.; IVARS-BAIDAL, J. A. (2021) [36]	City—applied in Benidorm/Spain
		CORNEJO ORTEGA, J. L.; MALCOLM, C. D. (2020) [37]	City—applied in Puerto Vallarta/Mexico

Table 2. Cont.

Dimension	Frequency in the Reviewed Literature	Author(s)	Geographical Scope
Governance	14	GOMEZ-OLIVA, A. et al. (2019) [27]	City—applied in Ceutí/Spain
		ALLAWI, A. H. (2022) [28]	Regional/Provincial—applied in Karbala/Iraq
		SANTOS-JÚNIOR, A. et al. (2020) [29]	City—analysis of residents' quality of life in STDs
		GONZÁLEZ-REVERTÉ, F. (2019) [32]	City—analysis of Spanish STD plans
		KHAN, M. S. et al. (2017) [33]	City—applied in Dubai
		BUHALIS, D.;	
		AMARANGGANA, A. (2014) [38]	City—based on Smart Cities
		IVARS-BAIDAL, J. A. et al. (2021) [7]	City—evaluation of INVAT.TUR STD indicators
		IVARS-BAIDAL, J. A. et al. (2023) [34]	City—based on Smart Cities
		GRETZEL, U. et al. (2015) [2]	City—based on Smart Cities
Innovation	11	BOES, K.; BUHALIS, D.;	
		INVERSINI, A. (2015) [1]	City—based on Smart Cities
		FEMENIA-SERRA, F.;	
		IVARS-BAIDAL, J. A. (2021) [36]	City—applied in Benidorm/Spain
		MADEIRA, C.; RODRIGUES, P.;	
		GOMEZ-SUAREZ, M. (2023) [39]	City—bibliometric review
		CORNEJO ORTEGA, J. L.;	
		MALCOLM, C. D. (2020) [37]	City—applied in Puerto Vallarta/Mexico
		ROMÃO, J.; NIJKAMP, P. (2019) [40]	Regional—analysis of European regions
		GOMEZ-OLIVA, A. et al. (2019) [27]	City—applied in Ceutí/Spain
Accessibility	7	ALLAWI, A. H. (2022) [28]	Regional/Provincial—applied in Karbala/Iraq
		SANTOS-JÚNIOR, A. et al. (2020) [29]	City—analysis of residents' quality of life in STDs
		MENDES FILHO, L. et al. (2022) [30]	Cities—applied in Natal, Rio de Janeiro, and São Paulo/Brazil
		SANTOS-JÚNIOR, A. et al. (2017) [31]	City—applied in Marbella, Málaga/Spain
		IVARS-BAIDAL, J. A. et al. (2021) [7]	City—evaluation of INVAT.TUR STD indicators
		IVARS-BAIDAL, J. A. et al. (2023) [34]	City—based on Smart Cities
		BOES, K.; BUHALIS, D.;	
		INVERSINI, A. (2015) [1]	City—based on Smart Cities
		FEMENIA-SERRA, F.;	
		IVARS-BAIDAL, J. A. (2021) [36]	City—applied in Benidorm/Spain
Performance	5	MADEIRA, C.; RODRIGUES, P.;	
		GOMEZ-SUAREZ, M. (2023) [39]	City—bibliometric review
		GOMEZ-OLIVA, A. et al. (2019) [27]	City—applied in Ceutí/Spain
		ALLAWI, A. H. (2022) [28]	Regional/Provincial—applied in Karbala/Iraq
		SANTOS-JÚNIOR, A. et al. (2020) [29]	City—analysis of residents' quality of life in STDs
		MENDES FILHO, L. et al. (2022) [30]	Cities—applied in Natal, Rio de Janeiro, and São Paulo/Brazil
		SANTOS-JÚNIOR, A. et al. (2017)	City—applied in Marbella, Málaga/Spain
		IVARS-BAIDAL, J. A. et al. (2021) [7]	City—evaluation of INVAT.TUR STD indicators
		IVARS-BAIDAL, J. A. et al. (2023) [34]	City—based on Smart Cities
		GOMEZ-OLIVA, A. et al. (2019) [27]	City—applied in Ceutí/Spain
Mobility/Urban Infrastructure	5	IVARS-BAIDAL, J. A. et al. (2021) [7]	City—evaluation of INVAT.TUR STD indicators
		IVARS-BAIDAL, J. A. et al. (2023) [34]	City—based on Smart Cities
		BORGES-TIAGO, T.; VERÍSSIMO, J.;	
		TIAGO, F. (2022) [35]	Bibliometric review
		ROMÃO, J.; NIJKAMP, P. (2019) [40]	Regional—analysis of European regions
		KHAN, M. S. et al. (2017) [33]	City—applied in Dubai
		BUHALIS, D.;	
		AMARANGGANA, A. (2014) [38]	City—based on Smart Cities
		BOES, K.; BUHALIS, D.;	
		INVERSINI, A. (2015) [1]	City—based on Smart Cities
Mobility/Urban Infrastructure	5	MADEIRA, C.; RODRIGUES, P.;	
		GOMEZ-SUAREZ, M. (2023) [39]	City—bibliometric review
		CORNEJO ORTEGA, J. L.;	
		MALCOLM, C. D. (2020) [37]	City—applied in Puerto Vallarta/Mexico

Table 2. Cont.

Dimension	Frequency in the Reviewed Literature	Author(s)	Geographical Scope
Sustainability	19	GOMEZ-OLIVA, A. et al. (2019) [27]	City—applied in Ceutí/Spain
		SANTOS-JÚNIOR, A. et al. (2020) [29]	City—analysis of residents' quality of life in STDs
		ALLAWI, A. H. (2022) [28]	Regional/Provincial—applied in Karbala/Iraq
		ROMÃO, J.; NIJKAMP, P. (2019) [40]	Regional—analysis of European regions
		MENDES FILHO, L. et al. (2022) [30]	Cities—applied in Natal, Rio de Janeiro, and São Paulo/Brazil
		AGUIRRE, A. et al. (2022) [42]	City—applied in Benidorm/Spain
		SANTOS-JÚNIOR, A. et al. (2017) [31]	City—applied in Marbella, Málaga/Spain
		GONZÁLEZ-REVERTÉ, F. (2019) [32]	City—analysis of Spanish STD plans
		IVARS-BAIDAL, J. A. et al. (2021) [7]	City—evaluation of INVAT.TUR STD indicators
		IVARS-BAIDAL, J. A. et al. (2023) [34]	City—based on Smart Cities
		FEMENIA-SERRA, F.; IVARS-BAIDAL, J. A. (2023) [41]	City—applied in Benidorm/Spain
		CORNEJO ORTEGA, J. L.; MALCOLM, C. D. (2020) [37]	City—applied in Benidorm/Spain
		KHAN, M. S. et al. (2017) [33]	City—applied in Dubai
		BUHALIS, D.; AMARANGGANA, A. (2014) [38]	City—based on Smart Cities
		BORGES-TIAGO, T.; VERÍSSIMO, J.; TIAGO, F. (2022) [35]	Bibliometric review
		MADEIRA, C.; RODRIGUES, P.; GOMEZ-SUAREZ, M. (2023) [39]	City—bibliometric review
		GRETZEL, U. et al. (2015) [2]	City—based on Smart Cities
		BOES, K.; BUHALIS, D.; INVERSINI, A. (2015) [1]	City—based on Smart Cities

Source: Authors.

5. Conclusions

The bibliometric analysis revealed two specific approaches to DTIs in the literature. An approach focused on technological development was observed in the Far East, particularly in China. On the other hand, Europe, particularly Spain, adopted a more sustainable development approach that emphasizes the tourist experience. The analysis of the countries where the research was published corroborated this duality, reinforcing the trend of different, geographically distinct approaches in the literature on DTIs.

In summary, the bibliometric analysis provided an overview of Smart Tourist Destinations and the predominant approaches related to DTIs. It highlighted the three aforementioned pillars and emphasized the duality between technological development and sustainability/tourist experience. This duality is represented by locations in the Far East and Europe.

However, it is important to contextualize the limitations of bibliometric research: limited literature selection, often resulting from deficient selection, filtering, and data analysis processes; lack of frameworks for evaluating bibliometric research [51]; citation limitations, particularly in the social sciences, in some databases, notably the Web of Science [51] and limitations when using a small number of databases [52,53]. To overcome the limitations in bibliometric analyses, content analysis can be used, for example [54].

Scientific progress in bibliometric research can include mapping geographic occurrences of research objects, analyzing historical data that can confirm the growth of scientific interest in certain topics, identifying key authors working on specific topics, disseminating and collaborating internationally for research, and constantly adapting to emerging trends [55].

The analysis revealed a notable and specific lack of consensus among the studies regarding the dimensions and, especially, the indicators of smart tourist destinations. The most prominent DTI implementation models are the Spanish ones (SEGITTUR and INVAT.TUR). Due to advances in these models, an increased number of publications ad-

addressing these indicators have emerged. A significant gap was identified regarding the indicators and dimensions of smart tourist destinations. There is a scarcity of publications that comprehensively address both the dimensions and indicators of smart tourist destinations, and there is an absence of consensus among existing publications.

A content analysis of the studies revealed disparities in the theoretical foundation of the Smart Tourist Destination (DTI) dimensions and indicators. While some dimensions and indicators have solid definitions, others have gaps. For example, the Innovation dimension lacks a clear consensus on what constitutes innovative tools in DTIs. Different interpretations of innovation lead to varied strategies and initiatives adopted by different destinations. In turn, the Accessibility dimension is underrepresented in publications despite its relevance to the development of smart tourist destinations; the scarcity of specific indicators hinders the evaluation and improvement of this dimension. Although the Performance dimension is recent, it has demonstrated efficacy, as evidenced by studies such as that of Ivars-Baidal et al. (2021) [7]. These studies have enriched the development of DTIs with new indicators. The Sustainability dimension is widely cited in the sample articles, but it is such a complex topic that deep investigation and interconnection between the economy, society, and the environment still present challenges. While the economic and social dimensions demonstrate connections in publications, the environmental dimension often remains isolated, suggesting the need for a more integrated approach.

For the Environmental Sustainability dimension, climate services must be considered for the planning and management of a DTI; research in this regard is needed, since the bibliometrics of this study did not effectively indicate this need.

Publications aimed at non-urban tourist destinations, such as rural environments, predominantly focus on Information and Communication Technologies (TICs) or neglect the dimensions and indicators of DTI, overlooking the environmental elements that should be fundamental to these places, especially with regard to environmental conservation. These considerations were evident during the selection phase of articles for the analytical corpus, where most of the excluded rural tourism studies addressed the TIC dimension.

The evidence supports the initial hypothesis that there is a lack of indicators focused on the environmental dimension of sustainability in DTIs. It also emphasizes the urgent need for an inclusive approach in evaluating Smart Tourist Destinations, particularly in rural or non-urban contexts. This study emphasizes the importance of a balanced approach that aligns with environmental principles in smart tourist destinations. Sustainability and DTIs should not be approached separately.

The study's practical applications can be applied to DTI assessments and in reviewing and creating DTI evaluation models.

Based on these findings, future research must focus on developing specific environmental indicators for Smart Tourist Destinations (DTIs) and exploring how these metrics can be applied in non-urban contexts, such as rural areas. The absence of environmental sustainability indicators in DTIs and the emphasis on Information and Communication Technology in non-urban destinations highlight the need for a more comprehensive, integrated approach to achieve a more complete and balanced smart tourism development.

Author Contributions: Conceptualization, T.S.G. and L.T.T.; methodology, T.S.G.; software, T.S.G.; validation, T.S.G. and L.T.T.; formal analysis, T.S.G. and L.T.T.; investigation, T.S.G.; resources, T.S.G.; data curation, T.S.G.; writing—original draft preparation, T.S.G.; writing—review and editing, L.T.T.; visualization, L.T.T.; supervision, L.T.T.; project administration, L.T.T.; funding acquisition, L.T.T. All authors have read and agreed to the published version of the manuscript.

Funding: This research was funded by FAPESC (Fundação de Apoio à Pesquisa do Estado de Santa Catarina) (Brazil), Proposal 54/2022, grant number 2023TR000658.

Data Availability Statement: <https://www.univali.br/pos/stricto-sensu/ppgth/Paginas/default.aspx#teses-dissertacoes> (accessed on 12 April 2025); https://sucupira-legado.capes.gov.br/sucupira/public/consultas/coleta/trabalhoConclusao/viewTrabalhoConclusao.jsf?popup=true&id_trabalho=14751956 (accessed on 12 April 2025).

Conflicts of Interest: The authors declare no conflicts of interest.

Abbreviations

The following abbreviations are used in this manuscript:

DTI	Smart Tourist Destination
TIC	Information and Communication Technology
SEGITTUR	Sociedad Mercantil Estatal para la Gestión de la Innovación y las Tecnologías Turísticas
INVAT.TUR	Instituto Valenciano de Tecnologías Turísticas
SDG	Sustainable Development Goal
IoT	Internet of Things
DMO	Destination Management Organizations
ROI	Return on Investment
WAI	Web Accessibility Initiative
RevPAR	Revenue Per Available Room
QR code	Quick Response Code
RFID	Radio-Frequency Identification
NFC	Near Field Communication
PCDs	People with Disabilities

References

1. Boes, K.; Buhalis, D.; Inversini, A. Smart tourism destinations: Ecosystems for tourism destination competitiveness. *Int. J. Tour. Cities* **2016**, *2*, 108–124. [\[CrossRef\]](#)
2. Gretzel, U.; Sigala, M.; Xiang, Z.; Koo, C. Smart tourism: Foundations and developments. *Electron. Mark.* **2015**, *25*, 179–188. [\[CrossRef\]](#)
3. SEGITTUR; Andrades, L. The Technology Pillar of the Spanish Smart Tourism Destination (DTI) Model. In *The Spanish Model for Smart Tourism Destination Management: A Methodological Approach*; Springer International Publishing: Cham, Switzerland, 2024; pp. 149–176. Available online: https://link.springer.com/chapter/10.1007/978-3-031-60709-7_6 (accessed on 25 October 2025).
4. Kusumawardhani, Y.; Hilmiana, H.; Widiyanto, S.; Azis, Y. Smart tourism practice in the scope of sustainable tourism in emerging markets: A systematic literature review. *Cogent Soc. Sci.* **2024**, *10*, 2384193. [\[CrossRef\]](#)
5. Suanpang, P.; Pothipassa, P. Integrating generative AI and IoT for sustainable smart tourism destinations. *Sustainability* **2024**, *16*, 7435. [\[CrossRef\]](#)
6. Liu, J.; Hall, C.M.; Zhu, C.; Ting Pong Cheng, V. Redefining the concept of smart tourism in tourism and hospitality. *Anatolia* **2024**, *35*, 566–578. [\[CrossRef\]](#)
7. Ivars-Baidal, J.; Celdrán-Bernabéu, M.A.; Femenia-Serra, F. Guía de Implantación de Destinos Turísticos Inteligentes de la Comunitat Valenciana. 2021. Available online: https://invattur.es/uploads/entorno_37/ficheros/62690c9e305de2073297352.pdf (accessed on 18 September 2022).
8. Xiang, Z.; Fesenmaier, D.R. Big data analytics, tourism design and smart tourism. In *Analytics in Smart Tourism Design: Concepts and Methods*; Springer: Cham, Switzerland, 2017; pp. 299–307. [\[CrossRef\]](#)
9. Xiang, Z.; Stienmetz, J.; Fesenmaier, D.R. Smart Tourism Design: Launching the annals of tourism research curated collection on designing tourism places. *Ann. Tour. Res.* **2021**, *86*, 103154. [\[CrossRef\]](#)
10. Zhu, W.; Zhang, L.; Li, N. Challenges, function changing of government and enterprises in Chinese smart tourism. *Inf. Commun. Technol. Tour.* **2014**, *10*, 553–564.
11. Wang, X.; Li, X.R.; Zhen, F.; Zhang, J. How smart is your tourist attraction?: Measuring tourist preferences of smart tourism attractions via a FCEM-AHP and IPA approach. *Tour. Manag.* **2016**, *54*, 309–320. [\[CrossRef\]](#)
12. Panagopoulos, A.; Matika, V.; Nikas, I.A.; Paraschi, E.P. A comprehensive structural framework for smart stadiums as essential components of smart tourism destinations. *Worldw. Hosp. Tour. Themes* **2025**, *17*, 106–119. [\[CrossRef\]](#)
13. Shafiee, S.; Ghatari, A.R.; Hasanzadeh, A.; Jahanyan, S. Developing a model for sustainable smart tourism destinations: A systematic review. *Tour. Manag. Perspect.* **2019**, *31*, 287–300. [\[CrossRef\]](#)

14. Gretzel, U.; Werthner, H.; Koo, C.; Lamsfus, C. Conceptual foundations for understanding smart tourism ecosystems. *Comput. Hum. Behav.* **2015**, *50*, 558–563. [\[CrossRef\]](#)
15. Scott, D.J.; Lemieux, C.J.; Malone, L. Climate services to support sustainable tourism and adaptation to climate change. *Clim. Res.* **2011**, *47*, 111–122. [\[CrossRef\]](#)
16. Font-Barnet, A.; Ciurana, A.B.; Pozo, J.X.O.; Russo, A.; Coscarelli, R.; Antronico, L.; De Pascale, F.; Saladié, Ò.; Anton-Clavé, S.; Aguilar, E. Climate services for tourism: An applied methodology for user engagement and co-creation in European destinations. *Clim. Serv.* **2021**, *23*, 100249. [\[CrossRef\]](#)
17. Damm, A.; Köberl, J.; Stegmaier, P.; Alonso, E.J.; Harjanne, A. The market for climate services in the tourism sector—An analysis of Austrian stakeholders' perceptions. *Clim. Serv.* **2020**, *17*, 100094. [\[CrossRef\]](#)
18. OMT-ORGANIZAÇÃO MUNDIAL DO TURISMO. Digital Transformation. 2018. Available online: <https://www.unwto.org/es/digital-transformation> (accessed on 23 April 2022).
19. Alsharif, A.; Isa, S.M.; Alqudah, M.N. Smart tourism, hospitality, and destination: A systematic review and future directions. *J. Tour. Serv.* **2024**, *15*, 72–110. [\[CrossRef\]](#)
20. Creswell, J.W.; Creswell, J.D. *Projeto de Pesquisa: Métodos Qualitativo, Quantitativo e Misto*; Penso Editora: Porto Alegre, Brasil, 2021.
21. Sampieri, R.H.; Collado, C.F.; Lucio, M.P.B. *Metodologia de Pesquisa*; Penso Editora: Porto Alegre, Brasil, 2013.
22. Diez-Junguitu, D.; Peña-Cerezo, M.A. Bibliomerge: A Python-Based Automated Tool to Merge WoS and Scopus Bibliographic Data, Compatible with Biblioshiny, Bibexcel, Vosviewer, Scimat and Scientopy. 2025. Available online: https://papers.ssrn.com/sol3/papers.cfm?abstract_id=5327967 (accessed on 25 October 2025).
23. Zupic, I.; Čater, T. Bibliometric methods in management and organization. *Organ. Res. Methods* **2015**, *18*, 429–472. [\[CrossRef\]](#)
24. Bardin, L. *Análisis de Contenido*; Ediciones Akal: Madrid, Spain, 2011; Volume 89.
25. Zhou, B.; Wang, S.; Wu, W. Tourism industry shrinkage and the economic loss of China in the COVID pandemic years. *Curr. Issues Tour.* **2025**, *28*, 304–320. [\[CrossRef\]](#)
26. Madeira, C.; Rodrigues, P.; Gomez-Suarez, M. A bibliometric and content analysis of sustainability and smart tourism. *Urban Sci.* **2023**, *7*, 33. [\[CrossRef\]](#)
27. Gomez-Oliva, A.; Alvarado-Urbe, J.; Parra-Meroño, M.C.; Jara, A.J. Transforming communication channels to the co-creation and diffusion of intangible heritage in smart tourism destination: Creation and testing in Ceutí (Spain). *Sustainability* **2019**, *11*, 3848. [\[CrossRef\]](#)
28. Allawi, A.H. Towards Smart Trends for Tourism Development and its Role in the Place Sustainability-Karbala Region, a Case Study. *Int. J. Sustain. Dev. Plan.* **2022**, *17*, 931–939. [\[CrossRef\]](#)
29. Santos-Júnior, A.; Almeida-García, F.; Morgado, P.; Mendes-Filho, L. Residents' quality of life in smart tourism destinations: A theoretical approach. *Sustainability* **2020**, *12*, 8445. [\[CrossRef\]](#)
30. Mendes Filho, L.; Mayer, V.F.; Correa, C.H.W. Dimensões que influenciam a percepção dos turistas sobre Destinos Turísticos Inteligentes. *Rev. Bras. Pesqui. Em Tur.* **2022**, *16*, e-2332. [\[CrossRef\]](#)
31. Santos-Júnior, A.; Mendes-Filho, L.; Almeida-García, F.; Manuel-Simões, J. Smart Tourism Destinations: Un estudio basado en la visión de los stakeholders. *Rev. Tur. Em Análise* **2017**, *28*, 358–379. [\[CrossRef\]](#)
32. González-Reverté, F. Building sustainable smart destinations: An approach based on the development of Spanish smart tourism plans. *Sustainability* **2019**, *11*, 6874. [\[CrossRef\]](#)
33. Khan, M.S.; Woo, M.; Nam, K.; Chathoth, P.K. Smart city and smart tourism: A case of Dubai. *Sustainability* **2017**, *9*, 2279. [\[CrossRef\]](#)
34. Ivars-Baidal, J.A.; Vera-Rebollo, J.F.; Perles-Ribes, J.; Femenia-Serra, F.; Celdrán-Bernabeu, M.A. Sustainable tourism indicators: What's new within the smart city/destination approach? *J. Sustain. Tour.* **2023**, *31*, 1556–1582. [\[CrossRef\]](#)
35. Borges-Tiago, T.; Veríssimo, J.M.; Tiago, F. Smart tourism: A scientometric review (2008–2020). *Eur. J. Tour. Res.* **2022**, *30*, 3006. [\[CrossRef\]](#)
36. Femenia-Serra, F.; Ivars-Baidal, J.A. Do smart tourism destinations really work? The case of Benidorm. *Asia Pac. J. Tour. Res.* **2021**, *26*, 365–384. [\[CrossRef\]](#)
37. Cornejo Ortega, J.L.; Malcolm, C.D. Touristic stakeholders' perceptions about the smart tourism destination concept in Puerto Vallarta, Jalisco, Mexico. *Sustainability* **2020**, *12*, 1741. [\[CrossRef\]](#)
38. Buhalis, D.; Amaranggana, A. Smart tourism destinations enhancing tourism experience through personalisation of services. In *Proceedings of the Information and Communication Technologies in Tourism 2015*, Lugano, Switzerland, 3–6 February 2015; Springer International Publishing: Cham, Switzerland, 2013; pp. 377–389. [\[CrossRef\]](#)
39. Madeira, A.; Rodrigues, R.; Lopes, S.; Palrão, T. Exploring positive and negative emotions through motivational factors: Before, during, and after the pandemic crisis with a sustainability perspective. *Sustainability* **2023**, *17*, 2246. [\[CrossRef\]](#)
40. Romão, J.; Nijkamp, P. Impacts of innovation, productivity and specialization on tourism competitiveness—a spatial econometric analysis on European regions. *Curr. Issues Tour.* **2019**, *22*, 1150–1169. [\[CrossRef\]](#)

41. Ivars-Baidal, J.A.; Celdrán-Bernabeu, M.A.; Femenia-Serra, F.; Perles-Ribes, J.F.; Vera-Rebollo, J.F. Smart city and smart destination planning: Examining instruments and perceived impacts in Spain. *Cities* **2023**, *137*, 104266. [CrossRef]
42. Aguirre, A.; Zayas, A.; Gómez-Carmona, D.; Sánchez, J.A.L. Smart tourism destinations really make sustainable cities: Benidorm as a case study. *Int. J. Tour. Cities* **2022**, *9*, 51–69. [CrossRef]
43. Cohen, B. Smart City Index Master Indicators Survey. 2014. Available online: <https://www.smartcitiescouncil.com/> (accessed on 15 July 2022).
44. Buonincontri, P.; Micera, R. The experience co-creation in smart tourism destinations: A multiple case analysis of European destinations. *Inf. Technol. Tour.* **2016**, *16*, 285–315. [CrossRef]
45. Matyusupov, B.; Khodjaniyazov, E.; Masharipova, M.; Gurbanov, F. The concepts of smart cities, smart tourism destination and smart tourism cities and their interrelationship. *BIO Web Conf.* **2024**, *82*, 06015. [CrossRef]
46. Chang, K.Y.; Chen, C.D.; Ku, E.C. Enhancing smart tourism and smart city development: Evidence from Taoyuan smart aviation city in Taiwan. *Int. J. Tour. Cities* **2024**, *10*, 146–165. [CrossRef]
47. Aguilera-Vega, P.M.; Domínguez, D.P.; Escobar, S.D. Smart Tourism Development Based on Governance and Technology. The Role of Creativity and Governance: Building Strength After Challenges, 43. Available online: https://www.researchgate.net/profile/Tania-Gonzalez-Alvarado-2/publication/392101221_The_role_of_creativity_and_governance_building_strength_after_challenges/links/6834bd7a6b5a287c3045ab3d/The-role-of-creativity-and-governance-building-strength-after-challenges.pdf#page=49 (accessed on 12 November 2023).
48. Wang, H.R.; Fang, Y.; Shao, J.P.; Li, C. Digital Governance Driving Tourism Development: The Mediating Role of Tourism Resources and the Moderating Effect of Provincial Economic Comprehensive Competitiveness. *Sustainability* **2025**, *17*, 3831. [CrossRef]
49. Grillakis, M.G.; Koutroulis, A.G.; Tsanis, I.K. The 2 C global warming effect on summer European tourism through different indices. *Int. J. Biometeorol.* **2016**, *60*, 1205–1215. [CrossRef]
50. Damm, A.; Greuell, W.; Landgren, O.; Prettenhaler, F. Impacts of+ 2 C global warming on winter tourism demand in Europe. *Clim. Serv.* **2017**, *7*, 31–46. [CrossRef]
51. Hoang, A.D. Evaluating bibliometrics reviews: A practical guide for peer review and critical reading. *Eval. Rev.* **2025**, *49*, 1074–1102. [CrossRef]
52. Chansanam, W.; Lai, C. KKKU-BiblioMerge: A novel tool for multi-database integration in bibliometric analysis. *Iberoam. J. Sci. Meas. Commun.* **2025**, *5*, 4. [CrossRef]
53. Hodge, D.R. Assessing scholarly impact: Conducting bibliometric analyses. In *Handbook of Research Methods in Social Work*; Edward Elgar Publishing: Cheltenham, UK, 2025; pp. 76–83.
54. Matorevhu, A. Bibliometrics: Application opportunities and limitations. In *Bibliometrics-An Essential Methodological Tool for Research Projects*; IntechOpen: London, UK, 2024; Available online: https://books.google.com.br/books?hl=pt-BR&lr=&id=G9U3EQAAQBAJ&oi=fnd&pg=PA3&dq=limits+of+bibliometrics&ots=bKyPnsZbrK&sig=6a_mh8aOkMV0z3gCUScfayJB09E#v=onepage&q=limits%20of%20bibliometrics&f=false (accessed on 19 October 2025).
55. Amiruddin, M.Z.B.; Samsudin, A.; Suhandi, A.; Coştu, B.; Prahani, B.K. Scientific mapping and trend of conceptual change: A bibliometric analysis. *Soc. Sci. Humanit. Open* **2025**, *11*, 101208. [CrossRef]

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