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Research Paper

Smart destination applications in Türkiye and global examples: A comparative analysis

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Abstract

This study aims to conduct a comparative analysis of smart city/destination applications in Türkiye and around the world and to identify areas where smart destination management can be further developed in Türkiye. The research was designed using a multiple-case study approach within the framework of qualitative research. Document review was utilized as the data collection technique, and secondary sources such as academic studies, institutional reports, municipal websites, strategy documents, project descriptions, and digital destination applications were evaluated. The study's sample was determined using purposive sampling; a total of ten cities were included in the analysis: Benidorm, Singapore, Helsinki, Amsterdam, and Valencia from around the world, and Konya, Istanbul, Izmir, Antalya, and Mugla from Türkiye. The global cities were treated as the global reference group, while the Turkish cities were treated as the local analysis group. The data were analyzed using a thematic analysis method that combined deductive and inductive approaches. As a result of the analysis, nine main themes were identified: smart governance and institutional capacity; smart transportation and mobility; digital services and local resident/visitor experience; data-driven management 8-and digital infrastructure; smart tourism and cultural heritage management; environmental sustainability and resource management; accessibility, inclusivity, and visitor convenience; innovation ecosystem and experimental applications; and security, risk, and resilience management. The findings indicate that cities in Türkiye have advanced examples, particularly in transportation integration, mobile municipal services, digital payment systems, geographic information system (GIS)-based mapping, and tourist information applications. In contrast, it was determined that in cities around the world, data-driven decision support systems, digital twin applications, environmental sensor infrastructures, capacity management, living lab applications, institutional certification, and inclusive accessibility solutions have developed in a more comprehensive and measurable manner. In conclusion, the study highlights that smart destination applications in Türkiye should not remain limited to the level of digital service delivery but must be transformed into data-driven, sustainable, inclusive, measurable, and integrated destination management systems.

Keywords: Smart City, Smart Destination, Smart Tourism, Document Analysis, World, Türkiye.

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Ethics & Conflict of Interest

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1. Introduction

Driven by rapid advancements in information and communication technologies, the tourism sector has undergone a significant transformation in recent years. The widespread adoption of internet technologies, the integration of mobile devices into daily life, and the development of technologies such as big data, artificial intelligence, the Internet of Things, and cloud computing have significantly altered the ways in which tourists plan their trips, experience destinations, and evaluate their travel experiences afterward. This transformation has paved the way for tourism activities to adopt a technology-driven structure and has led to the emergence of the smart tourism approach. Smart tourism refers not only to the integration of technology into tourism processes but also to the enhancement of the tourist experience, the more efficient use of resources, the improvement of service processes, and the enhancement of destinations' competitiveness through data-driven systems (Buhalis & Amaranggana, 2014). The destination-level counterpart of this approach is explained by the concept of a smart destination.

Smart destinations are holistic systems in which information and communication technologies are integrated into tourism services; they generate data, analyze this data, and utilize the resulting outputs in destination management processes. In this regard, smart destinations go beyond being mere digital platforms that provide information to tourists; they are structures that generate value in multidimensional areas such as visitor experience, local quality of life, sustainable resource use, accessibility, safety, and governance. The fundamental philosophy of a smart destination is to integrate technological infrastructure with sustainable development goals, thereby simultaneously enhancing both the quality of life for the local population and the quality of the visitor experience (Lopez de Avila, 2015). For this reason, the competitive strength of destinations today is no longer dependent solely on their natural, cultural, and historical attractions. In addition, data management, digital infrastructure, user experience, sustainability, and institutional capacity levels have also become critical factors.

The European Smart Tourism Capital initiative, led by the European Commission, plays a significant role in raising the profile of the smart destination approach on an international scale. This initiative evaluates cities' smart tourism performance based on four key criteria: accessibility, sustainability, digitalization, and cultural heritage and creativity. These criteria demonstrate that cities must be evaluated not only in terms of technological infrastructure but also in terms of inclusivity, environmental sensitivity, the preservation of cultural values, and innovative experience design. In this context, the smart destination approach is viewed not merely as a technology-focused application area, but as a comprehensive transformation model that requires destinations to be managed in a sustainable, accessible, data-driven, and participatory manner.

Türkiye possesses significant potential for smart destination transformation due to its strategic position in global tourism, rich cultural heritage, natural attractions, and strong destination diversity. In recent years, Türkiye has developed various strategy documents, municipal projects, mobile applications, digital promotion platforms, smart transportation systems, and initiatives aimed at the digitization of cultural heritage related to smart city and smart destination applications. In particular, cities that stand out in terms of tourism, such as Konya, Istanbul, Izmir, Antalya, and Muğla, feature notable smart transportation systems, mobile municipal services, digital payment systems, geographic information systems, tourist information platforms, and cultural heritage applications. These applications demonstrate that the smart city approach in Türkiye forms a crucial infrastructure for local service delivery and visitor experience.

However, it is observed that a significant portion of smart city and smart destination applications in Türkiye have developed on a project-by-project basis and face certain limitations in the process of transforming into integrated, data-driven, and measurable destination management systems. In particular, it is important to evaluate Turkish cities in comparison with global examples in advanced application areas such as data-driven decision support systems, capacity management, digital twin applications, environmental sensor infrastructure, institutional certification, autonomous accessibility solutions, and open innovation ecosystems. While there are various studies in the literature regarding smart city applications in Türkiye, it can be said that there are limited studies that address these applications from a smart destination perspective, in comparison with global best practices, and within a thematic comparative framework.

Based on this, the central research question of this study is to identify the areas where Turkish cities excel in smart destination applications and the areas where they require further development compared to global examples. This study aims to conduct a comparative analysis of smart destination applications in the cities of Benidorm, Singapore, Helsinki, Amsterdam, and Valencia from around the world, and Konya, Istanbul, Izmir, Antalya, and Muğla from Türkiye. The study adopted a multiple-case design within the framework of a qualitative research approach; data were collected through document analysis and evaluated using a thematic analysis approach.

The comparative analysis conducted within this framework aims to compare the current implementation capacity of cities in Türkiye with that of global benchmark cities and to develop actionable recommendations for destination managers and policymakers. In other words, this study highlights the current state of smart destination transformation in Türkiye and provides a scientific assessment of areas for improvement in light of global practices.

2. Conceptual Framework

The Concept of Smart Cities and Its Dimensions

On a global scale, population growth, the acceleration of urbanization, increasing pressure on natural resources, and rising expectations regarding quality of life in cities are confronting city administrations with increasingly complex economic, social, and environmental challenges. These challenges are heightening the need for new urban management models (data-driven, participatory, sustainable, and technology-supported) that go beyond traditional approaches to governance. Today, the efficient use of resources, the improvement of service delivery, the enhancement of quality of life, and the achievement of sustainable development goals necessitate that cities be managed not only through physical infrastructure investments but also through holistic management approaches supported by information and communication technologies.

One of the key concepts emerging in this transformation process is "smartness." Smartness does not merely refer to the use of digital technologies; it also denotes the ability to collect and process data, transform it into meaningful information, and generate effective solutions to existing problems based on this information (Vargas-Sánchez, 2018; Vargas-Sánchez et al., 2019). The smart city approach, which has evolved in line with this understanding, stands out as a management model aimed at developing faster, more effective, and sustainable solutions to the challenges cities face (Çoban & Eren, 2018). In this model, information and communication technologies are regarded as one of the fundamental tools that not only facilitate the transition of services to a digital environment but also support decision-making processes, make resource utilization more efficient, and enhance the effectiveness of urban life (Batty et al., 2012).

According to Nam and Pardo (2011), smart cities are urban structures that integrate information and data into physical infrastructure to simplify daily life, make transportation and mobility more efficient, increase productivity, conserve resources, contribute to improving air and water quality, quickly identify and resolve problems, and enable inter-organizational collaboration and data sharing. This definition demonstrates that smart cities are not merely structures that provide digital services, but are also systems that learn, adapt, and utilize data in decision-making processes. Similarly, Bakıcı et al. (2013) define smart cities as cities that utilize information and communication technologies to improve the quality of life for local residents and support sustainable development. Therefore, from this perspective, technology serves as a strategic tool to enhance quality of life and achieve sustainable development goals, rather than being an end in itself.

One of the most widely accepted classifications in the smart city literature is the six-dimensional model developed by Giffinger et al. (2007). According to this model, smart cities are urban structures that demonstrate high performance across six fundamental dimensions (smart economy, smart people, smart governance, smart mobility, smart environment, and smart living) and are capable of managing these dimensions in a coordinated manner. These dimensions demonstrate that smart cities must be evaluated not only based on technological capacity but also on their performance across various areas such as social capital, environmental sensitivity, transportation infrastructure, economic competitiveness, quality of life, and participatory governance.

This approach, developed by Giffinger et al. (2007), was later expanded by Cohen (2012) into the "smart city wheel" model and has become an important reference framework in smart city studies. Because the smart city wheel allows for a multidimensional and comparative assessment of cities' performance, it is frequently used in smart city and smart destination research. In the literature, some researchers have treated these components as fundamental dimensions not only of smart cities but also of smart destinations (Buhalis & Amaranggana, 2014; Duran & Uygur, 2019; Yayla & Aydın, 2021). This indicates that the concepts of smart cities and smart destinations should not be evaluated as independent structures, and that both concepts are shaped around a shared technological infrastructure, governance approach, and sustainability goals.

Within this framework, the smart city approach should be viewed not as a narrow model in which technology is used solely as an infrastructure-focused tool, but rather as a holistic transformation process shaped around urban management, service delivery, sustainability, participation, and quality of life. However, a significant conceptual distinction emerges at this point. While smart cities primarily focus on improving the quality of life for local

residents and the effectiveness of urban services, smart destinations, in addition to these goals, also prioritize the visitor experience, tourism mobility, destination competitiveness, and the sustainable management of tourism resources.

The Concept and Characteristics of Smart Destinations

The concept of a smart destination emerged as a reflection of the smart city approach in the field of tourism (Buhalis & Amaranggana, 2014). The increasing digitalization of tourism, and the way technology shapes tourists' pre-trip, during-trip, and post-trip behaviors, has heightened the importance of data-driven and user-centered approaches in destination management. In this context, smart destinations are regarded as a specific application area that integrates the technological and managerial infrastructure of smart cities with the tourism experience.

The ultimate goal of smart destinations is not merely to provide tourists with more digital services. These destinations are complex tourism ecosystems aimed at creating value among local residents, tourists, businesses, public institutions, technology providers, and other stakeholders. Caragliu et al. (2011), Buhalis and Amaranggana (2014), and Boes et al. (2016) emphasize that smart destinations aim to improve both the quality of life for local residents and the quality of experience for visitors. In this regard, smart destinations should not only enhance competitiveness in tourism but also support goals such as sustainability, accessibility, and stakeholder participation.

Gretzel et al. (2015) define smart destinations as tourism systems that utilize information and communication technologies in the process of creating, managing, and delivering smart tourism experiences, and are characterized by intensive information sharing and co-creation of value. This definition highlights that smart destinations are not merely places with technological infrastructure, but rather systems characterized by intensive information flow, stakeholder interaction, and the collaborative creation of the tourist experience. According to Buhalis and Amaranggana (2014), smart destinations are those that adopt the modern technological infrastructure of smart cities, promote sustainable development, and positively impact the quality of life and experience not only for local residents but also for tourists.

However, a key point to note here is that a smart destination is not limited to digital guides, mobile apps, QR code-based information systems, or online promotional platforms. While such applications serve as visible tools of a smart destination, the concept's true strength stems from its broader scope, which encompasses data-driven management, capacity control, visitor flow tracking, sustainable resource use, accessibility, crisis management, stakeholder collaboration, and experience design. Therefore, approaching the concept of a smart destination solely at the level of technological infrastructure or digital applications undermines its managerial and strategic dimensions.

Technological infrastructure plays a significant role in the operation of smart destinations. However, the fundamental function of technology in smart destinations is not merely to transfer services to a digital environment, but to support decision-making processes by transforming the data generated at the destination into meaningful information (Gretzel et al., 2015). According to Agboola and Findikgil (2023), the primary purpose of technology in a smart environment is to collect and organize large amounts of data and make this data accessible to the city and its users. In this context, data has become one of the most critical resources for smart destinations. Data such as tourist mobility, visitor density, transportation preferences, spending behaviors, environmental indicators, satisfaction levels, and digital interactions enable more effective and forward-looking decisions in destination management.

Smart tourism technologies encompass the digital systems with which tourists interact, starting from the pre-trip decision-making phase through their trip and beyond. Nezai et al. (2021) define smart technological applications as systems that facilitate tourists' decision-making, movement, experience, and evaluation processes. These systems include various tools such as mobile apps, digital maps, personalized recommendation systems, augmented reality applications, online ticketing, contactless payment, smart transportation solutions, sensor-based tracking systems, and social media data analytics.

Guo et al. (2014) note that smart tourism is based on four core information technologies: artificial intelligence, the Internet of Things, cloud computing, and mobile communication technologies. Artificial intelligence is used to analyze tourist behavior, provide personalized recommendations, and automate service processes. The Internet of Things enables data collection through sensors in the physical environment and the real-time transmission of this data to management systems. Cloud computing facilitates the storage, processing, and sharing of big data

among various stakeholders. Mobile technologies, meanwhile, enable tourists to remain in constant interaction with the destination, making the travel experience more accessible and flexible.

However, the success of technology use in smart destinations does not depend solely on the existence of technological infrastructure. Boes et al. (2016) note that a successful smart destination model is only possible if destination managers, businesses, public institutions, and other stakeholders adopt smart technologies and are able to work in an integrated manner with these technologies. In this context, smart destinations require not only technical capacity but also institutional capacity, a governance framework, stakeholder collaboration, and strategic planning. In other words, simply possessing technological tools is not sufficient to become a smart destination. What is decisive is the extent to which these tools are transformed into meaningful, sustainable, and measurable outcomes in destination management.

In smart destinations, the tourist experience is also being reshaped alongside advancing technology. While gathering information about the destination, route planning, and booking procedures prior to travel take place largely through digital platforms, during the trip, mobile apps, digital guides, location-based services, and contactless payment systems facilitate the visitors' experience. After the trip, visitors' social media posts, online reviews, and ratings serve as a significant data source for destinations. Thus, the visitor moves beyond being a passive user who merely receives services to become an active stakeholder who generates data, makes their experience visible, and contributes to the formation of the destination's image.

Sustainability is recognized as one of the core components of the smart destination approach. Increased visitor density in tourism destinations creates various impacts on natural resource use, waste generation, transportation pressures, the preservation of cultural heritage sites, and the quality of life of local communities. Therefore, smart destinations should aim not only to enhance the visitor experience but also to manage the environmental, social, and economic impacts of tourism activities. Applications such as sensor-based environmental monitoring, smart water and energy management, carbon footprint tracking, crowd management, and capacity control are gaining importance in this context.

Accessibility is also one of the fundamental components of smart destinations. Smart destinations must ensure that different user groups have equal access to information, services, transportation systems, and tourist experiences. In this context, multilingual digital guides, accessible mobile apps, wayfinding systems for people with disabilities, assistive technologies for the elderly, and secure payment systems strengthen the inclusive nature of smart destinations. Therefore, accessibility should not be limited to physical space arrangements alone but must also be addressed in terms of digital access, access to information, and access to experiences.

Effective management of smart destinations requires a governance structure that facilitates the participation of various stakeholders in joint decision-making processes. Governance, a key component of smart destinations, is based on multi-stakeholder collaboration among public institutions and organizations, local governments, tourism businesses, academic institutions, civil society organizations, local residents, and visitors. For this reason, the smart destination approach embraces a participatory, data-driven, and stakeholder-focused management philosophy rather than a centralized and one-way service delivery model. Open data platforms, living labs, innovation centers, and pilot projects, along with partnerships developed among the public sector, the private sector, and academia, are considered key tools for strengthening governance capacity in smart destinations.

In this regard, the European Capital of Smart Tourism initiative provides an important conceptual framework for evaluating smart destinations. Under this initiative, cities are evaluated based on accessibility, sustainability, digitalization, cultural heritage, and creativity. These criteria demonstrate that smart destinations must be considered not only in terms of their level of technological advancement but also in terms of environmental sensitivity, inclusivity, the preservation of cultural values, and the design of creative experiences. Therefore, a smart destination is not merely a technology-centered concept but rather a holistic approach that enables sustainable, accessible, and experience-focused destination management through the use of technology.

In this context, the comparative analysis of smart destination applications is not merely about determining which technological applications are present in which city. What is more important is understanding what function these applications serve, which user groups they serve, how they contribute to destination management, and what value they generate in areas such as sustainability, accessibility, data management, and experience design. In this context, smart destination research should focus on analyzing the functions and managerial implications of these applications rather than merely their names.

In this study, the comparative examination of examples from Türkiye and around the world is significant for highlighting the varying levels of development of smart destination applications. In many cities across Türkiye,

important applications are being developed, such as mobile apps, digital payment systems, smart transportation solutions, geographic information systems, the digitization of cultural heritage, and online municipal services. However, global examples show that the smart destination approach is supported more by elements such as data-driven decision support systems, digital twin applications, real-time capacity management, environmental sensor networks, and open innovation platforms. Therefore, the fundamental difference in the development of smart destinations lies not only in the presence of technological applications but also in whether these applications have evolved into an integrated management system. From Türkiye's perspective, it is crucial to develop existing digital services and smart city infrastructures not merely as tools that provide user convenience, but also as systems that generate data, support decision-making, monitor sustainability performance, and manage the visitor experience. For this reason, examining smart applications in successful global destinations and utilizing these applications to determine the direction of development for destinations in Türkiye constitutes an important research topic in terms of destination competitiveness. To this end, this study evaluates selected cities in Türkiye and around the world comparatively in line with this conceptual framework.

3. Method

This research was designed within the framework of a qualitative research approach to comparatively examine smart city applications in Türkiye and around the world, identify themes for smart destinations, and present recommendations that could be developed for smart destinations and Türkiye. The study focused on understanding the current state of smart city and smart destination applications, classifying their application areas, and interpreting the similarities and differences among cities. Accordingly, the study was conducted using a descriptive and comparative qualitative research design. Therefore, rather than simply listing and describing smart city applications one by one, the research aimed to reveal the thematic areas in which these applications are concentrated, the functions they perform, and the aspects where Turkish examples are open to improvement when compared with global examples.

Document review was utilized as the data collection technique in this study. This method offers a suitable approach, particularly for analyzing existing applications, strategy documents, municipal projects, digital platforms, and examples found in the literature. Accordingly, the study examined secondary data related to smart city applications, including academic studies, institutional reports, municipal websites, project descriptions, smart city strategy documents, and digital destination applications.

The primary unit of analysis in the study is the smart city and smart destination applications developed in cities. Therefore, each city was first evaluated based on the applications it possesses, and then compared with examples from Türkiye and around the world. This approach has made it possible to conduct both descriptive analysis at the application level and develop thematic comparisons at a higher level.

The population of this study consists of cities in Türkiye and around the world that are developing smart city or smart destination initiatives. However, because smart city initiatives are quite widespread globally, it is not possible to cover the entire population. For this reason, purposive sampling was used in the study. Three main criteria were considered in selecting the cities for the sample: First, the cities must have visible and documented smart city or smart destination initiatives. Second, the cities must possess various smart city components, such as transportation, digital services, data management, sustainability, cultural heritage, tourism, environmental monitoring, and innovation. Third, there must be sufficient diversity in smart city/destination initiatives to enable a comparison between examples from Türkiye and global examples. Accordingly, the study's sample consists of the Turkish cities of Konya, Istanbul, Muğla, Antalya, and Izmir, and the global cities of Benidorm, Singapore, Helsinki, Amsterdam, and Valencia. Consequently, this sample enables the study to compare existing smart city applications in Türkiye with global examples and to develop actionable recommendations for Türkiye.

The research data was obtained from secondary sources. In this context, academic publications on smart city and smart destination applications, institutional information published by municipalities, reports, project descriptions, digital application presentations, and relevant web resources were examined. During the data collection process, particular emphasis was placed on the functions of the applications. In this context, consideration was given not only to the names of the applications but also to the problems they aim to solve, the services they offer, the technologies they use, and their contributions to destination management. This approach ensured that the applications were analyzed in a multidimensional rather than a one-dimensional manner. As a result of the data collection process, the applications identified from examples in Türkiye and around the world were organized into a systematic dataset, laying an analytical foundation for the subsequent coding and theme-building process.

Thematic analysis was utilized to analyze the data in this study. The thematic analysis process was conducted using both inductive and deductive approaches. First, the core components frequently used in the smart city literature were examined using a deductive approach. In this context, conceptual areas such as smart governance, smart transportation, digital infrastructure, sustainability, accessibility, quality of life, innovation, and security served as guiding principles in the creation of initial codes. Subsequently, the applications included in the dataset were examined in detail, and new codes emerging directly from the data were created using an inductive approach.

The coding process was carried out in several stages. In the first stage, all applications in the dataset were reviewed, and the core function of each application was identified. In the second stage, applications with similar functions were grouped under common codes. In the third stage, the codes created were re-evaluated for semantic coherence and consolidated under higher-level themes.

As a result of this process, nine main themes were identified: Smart Governance and Institutional Capacity, Smart Transportation and Mobility, Digital Services and Local Resident/Visitor Experience, Data-Driven Management and Digital Infrastructure, Smart Tourism and Cultural Heritage Management, Environmental Sustainability and Resource Management, Accessibility, Inclusivity, and Visitor Convenience; Innovation Ecosystem and Experimental Applications; and Security, Risk, and Resilience Management. Sub-themes were then established under each main theme, and the applications in the cities were linked to these sub-themes. During the theme-creation process, care was taken to ensure that each theme was meaningful in its own right and distinct from the other themes. This made it easier to identify which smart city component each application most strongly corresponded to. The cities examined in the study, the data sources, the analyzed applications, and the main themes to which they were linked as a result of the coding process are shown in Table 1.

Information regarding the practices evaluated in the study was verified through the official municipal websites of the relevant cities, national and local strategy documents, project platforms, open data portals, and institutional reports. In the Turkish examples, the identification of initiatives relied primarily on the Ministry of Environment, Urbanization, and Climate Change's Smart Cities Portal and the official websites of the relevant metropolitan municipalities; for the global examples, the official smart city platforms, municipal websites, and institutional documents of the relevant cities were utilized.

In this study, descriptive analysis and thematic analysis were used to analyze the data obtained from the documents. Descriptive analysis is an analytical approach used in qualitative research to organize, summarize, and interpret the data obtained in accordance with the research questions, conceptual framework, or predefined themes (Yıldırım & Şimşek, 2018). In this type of analysis, rather than presenting the data in its raw form, the researcher classifies it under specific themes, presents the findings in a systematic and understandable manner, and interprets them in line with the research objective (Miles et al., 2014). During the descriptive analysis phase, smart city applications featured in examples from Türkiye and around the world were organized by city, the key characteristics of each application were explained, and the areas in which the applications were concentrated were identified. Thematic analysis, on the other hand, is a qualitative analysis method used to discover, interpret, and report relevant patterns of meaning within a dataset. Thematic analysis is an approach aimed at identifying, examining, and interpreting patterns of meaning within a dataset (Braun & Clarke, 2022). The reflective thematic analysis approach (Braun & Clarke, 2006) was adopted for the analysis of the data. Reflective thematic analysis is an approach in which the researcher actively engages in the research process while being aware of their own position, values, and assumptions (Braun & Clarke, 2022). This approach is considered appropriate for the study's purpose because it enables the creation of meaningful themes from the data by explicitly acknowledging the researcher's interpretive role. During the thematic analysis phase, the applications were classified according to the identified main and sub-themes. Each application was evaluated in terms of its function, technology use, target user group, and managerial contribution. Thus, it was revealed not only in which city the applications were located but also which smart city dimension they contributed to. In the analysis process, examples from Türkiye and the rest of the world were evaluated separately, followed by a comparative interpretation between the two groups.

Table 1: Cities, data sources, applications analyzed, and main themes identified through the document review

City	Key documents reviewed	Source Type	Examples of Applications Analyzed	Related main themes
Benidorm	Benidorm City Council Official Website, Benidorm UNE 178501 Documents, Smart Destination Benidorm CORE Project Documents	Municipal website, international standard documents, project documents	Benidorm BeCiti, Benidorm CORE Platform Benidorm UNE 178501 Smart Tourism Destination Certificate, Benidorm Smart Water Management, Benidorm Beach Crowd Monitoring System	Smart Governance and Institutional Capacity, Environmental Sustainability and Resource Management, Innovation Ecosystem and Experimental Applications, Data-Driven Management and Digital Infrastructure
Singapore	Smart Nation Singapore Official Portal, GovTech Singapore, Smart Nation and Digital Government Office (SNDGO), Virtual Singapore Project Documents	Official public portals, national strategy documents, project documents	Smart Nation Singapore, GoBusiness, myENV, Virtual Singapore, Environmental Monitoring and Early Warning System	Smart Governance and Institutional Capacity, Data-Driven Management and Digital Infrastructure, Environmental Sustainability and Resource Management, Security, Risk, and Resilience Management
Helsinki	City of Helsinki Official Website, MyHelsinki Official Portal, Helsinki DataLokki Open Data Platform	City website, open data platform, project documents	Helsinki DataLokki, 3D Helsinki, Virtual Helsinki, Helsinki Helpers, WeChat Mini Helsinki, Helsinki City Map	Digital Services and Local Resident/Visitor Experience, Data-Driven Management and Digital Infrastructure, Smart Tourism and Cultural Heritage Management, Accessibility, Inclusivity, and Visitor Convenience
Amsterdam	Amsterdam Smart City Platform, Amsterdam City Government Official Website, Amsterdam IoT, Living Lab Project Documents	City website, project platform, project documents	Amsterdam Smart City, Amsterdam IoT Living Lab, Amsterdam smart energy systems	Smart Governance and Institutional Capacity, Data-Driven Management and Digital Infrastructure, Innovation Ecosystem and Experimental Applications, Environmental Sustainability and Resource Management
Valencia	Valencia City Government Official Website, VLCi Platform, Valencia Smart City Official Promotional Materials	Municipal website, project platform, project documents	Valencia VLCi, AppValència, NFC-based applications, Valencia environmental sensors (air quality monitoring and noise monitoring)	Digital Services and Local Resident/Visitor Experience, Environmental Sustainability and Resource Management, Accessibility, Inclusivity, and Visitor Convenience, Security, Risk, and Resilience Management
Konya	Ministry of Environment, Urbanization, and Climate Change of the Republic of Türkiye Smart Cities Portal, Konya Metropolitan Municipality Official Website	Official public portal, municipal website	Organizational structure of the Konya Smart City Management Directorate, Konya Smart Traffic Management System, Konya Smart Intersections, Konya Mobile Elkart, Konya Mobile Parking Finder, Konya Mobile Mesnevi, solar energy systems	Smart Governance and Institutional Capacity, Smart Transportation and Mobility, Digital Services and Local Residents/Visitor Experience, Smart Tourism and Cultural Heritage Management, Environmental Sustainability and Resource Management
Istanbul	Ministry of Environment, Urbanization, and Climate Change of the Republic of Türkiye Smart Cities Portal, Istanbul Metropolitan Municipality Official Website, Istanbul Smart City Roadmap, ISBAK (Istanbul Smart City Technologies) Official Documents	Official public portal, municipal website, strategy documents	Istanbul Living Laboratories Project, Istanbul EDS and Traffic Information Systems, Istanbul Smart Parking System Digital Istanbul, Istanbulkart, Visit Istanbul	Smart Governance and Institutional Capacity, Smart Transportation and Mobility, Digital Services and Local Resident/Visitor Experience, Smart Tourism and Cultural Heritage Management, Accessibility, Inclusivity, and Visitor Convenience, Innovation Ecosystem and Experimental Applications, Security, Risk, and Resilience Management
Izmir	Ministry of Environment, Urbanization, and Climate Change of the Republic of Türkiye Smart Cities Portal, Izmir Metropolitan Municipality Official Website, Izmir Open Data Portal	Official public portal, municipal website, open data platform	IZUM (Izmir Transportation Center), Izmir BISIM, Open Data Portal, IzmirNet, Visit Izmir, Izmir Time Machine, Virtual Museum	Smart Transportation and Mobility, Data-Driven Management and Digital Infrastructure, Smart Tourism and Cultural Heritage Management, Accessibility, Inclusivity, and Visitor Convenience
Antalya	Ministry of Environment, Urbanization, and Climate Change of the Republic of Türkiye Smart Cities Portal, Antalya Metropolitan Municipality Official Website	Official public portal, municipal website	myAntalya, Antalyakart, Kaleiçi QR Cultural Map, smart lighting, Antalya ICF Airport Mobile	Smart Transportation and Mobility, Digital Services and Local Resident/Visitor Experience, Smart Tourism and Cultural Heritage Management, Environmental Sustainability and Resource Management, Accessibility, Inclusivity, and Visitor Convenience
Muğla	Ministry of Environment, Urbanization, and Climate Change of the Republic of Türkiye Smart Cities Portal, Muğla Metropolitan Municipality Official Website	Official public portal, municipal website	MuğlaKart, MuğlaApp, Muğla GIS, Muğla TAMBİS, Muğla Tourism Maps, Muğla wastewater quality control system, earthquake analysis system	Smart Transportation and Mobility, Digital Services and Local Resident/Visitor Experience, Data-Driven Management and Digital Infrastructure, Smart Tourism and Cultural Heritage Management, Environmental Sustainability and Resource Management, Accessibility, Inclusivity, and Visitor Convenience, Security, Risk, and Resilience Management

Source: *Prepared by the authors based on the official websites of the relevant municipalities, national and international strategy documents, project platforms, open data portals, and institutional reports.*

In qualitative research, validity and reliability are linked to the transparent, systematic, and traceable conduct of the research process. In this study, to enhance validity, various types of documents were utilized, and the applications were evaluated not solely based on a single source but by considering both the literature and institutional information together. In this way, data diversity was sought. During the coding process, the development of themes was carried out in stages: first, preliminary codes were created; then, similar codes were grouped under subthemes; and finally, the main themes were identified. Throughout this process, care was taken to ensure that the themes were aligned with the research objectives and adequately represented the practices in the dataset. Additionally, the traceability of the analysis process was enhanced by clearly indicating under which themes the practices were evaluated. To support reliability, the core function of each application was taken into account during the coding process, and efforts were made to ensure consistency in the placement of applications under themes. For applications related to more than one theme, the application's primary function was taken as the basis. However, the relationship of the relevant application to other themes is noted in the discussion section. This approach has contributed both to maintaining coding consistency and to explaining the multidimensional structure of smart city applications.

This study has some limitations. First, the study is based on secondary data. Therefore, no primary data was collected regarding how the applications in the cities were experienced by users, local officials, tourism stakeholders, or the local population. Second, the cities selected for the study were determined using purposive sampling. Consequently, the findings cannot be generalized to all cities in Türkiye or worldwide. However, the study enables a comparative assessment of Turkish and global applications based on the selected examples and facilitates the development of recommendations for Türkiye. The third limitation is that smart city applications constitute a dynamic and constantly evolving field. New projects may be developed in cities, existing applications may be updated, or some applications may be phased out. Therefore, this study reflects the current situation as of the period when the examined data was collected.

4. Findings

In this section of the study, the findings regarding smart destination/smart city applications in Türkiye and globally, obtained through a document review, have been organized according to the main and sub-themes identified and are evaluated in detail below.

Smart Governance and Institutional Capacity

Under the theme of "Smart Governance and Institutional Capacity," four subthemes have been identified: Strategic Roadmap and Vision, Institutional Structure, Stakeholder Collaboration, and Standardization and Certification. These are presented in Table 2.

Table 2: Smart Governance and Institutional Capacity / Subthemes and Descriptions

Subtheme	Applications / Cities	Description
Strategic Roadmap and Vision	Istanbul Smart City Roadmap, Singapore Smart Nation, Amsterdam Smart City, Valencia VLCi	These initiatives demonstrate that smart city transformation is driven not only by individual projects but also by long-term strategic plans. Istanbul's 2029 goal, Singapore's Smart Nation approach, and Amsterdam's smart city strategy, which has been systematically implemented since 2008, can be evaluated within this framework.
Institutional Structure	Konya Smart City Management Directorate, ISBAK, Benidorm BeCiti, Singapore SNDGO, and GovTech	The sustainable implementation of smart city and smart destination initiatives requires coordination by an institutional framework. While the establishment of a dedicated directorate in Konya serves as a model of institutionalization for Türkiye, Benidorm and Singapore feature more advanced governance structures focused on technology and innovation.
Stakeholder Collaboration	Istanbul Living Labs, Amsterdam IoT Living Lab, Benidorm BeCiti	These initiatives represent collaboration models that bring together municipalities, academia, the private sector, entrepreneurs, and local residents. In the Amsterdam and Benidorm examples in particular, the smart city is structured not only as a municipal service but also as an innovation ecosystem.
Standardization and Certification	Benidorm UNE 178501 Smart Tourism Destination Certification	Among global examples, Benidorm stands out for linking smart destination management to certification and standards. In the Turkish examples, however, it is evident that a smart destination management system of a similar level, one based on measurable, certified, and institutional standards, is not yet sufficiently established.

Source: *Compiled by the authors.*

Upon examining the table, the examples from Istanbul and Konya in Türkiye are particularly noteworthy in terms of institutional capacity under this theme. However, when compared to global examples, it can be said that applications in Türkiye remain largely at the level of digitizing municipal services, whereas in examples such as Singapore, Amsterdam, Valencia, and Benidorm, the smart city approach has achieved a more holistic structure through strategic governance, data management, innovation, and certification.

Smart Transportation and Mobility

Under the theme of Smart Transportation and Mobility, four subthemes have emerged: Traffic Management, Public Transportation Integration, Smart Parking Management, and Bicycling and Low-Carbon Transportation. These are presented in Table 3.

Table 3: Smart Transportation and Mobility / Subthemes and Descriptions

Subtheme	Apps / Cities	Description
Traffic Management	Konya Smart Traffic Management System, Konya Smart Intersections, Istanbul EDS and Traffic Information Systems, Izmir IZUM (Izmir Transportation Center)	These systems are designed to monitor traffic flow, reduce congestion, provide real-time information to drivers, and optimize travel times.
Public Transportation Integration	Konya Elkart, Istanbulkart, MuğlaKart, Antalyakart, AppValència transportation information	Card-based and mobile payment systems make public transportation more accessible and faster. This field is quite advanced in Türkiye.
Smart parking management	Konya Mobile Parking Finder, Istanbul smart parking system, Antalya parking information, Valencia transportation integration	These systems are designed to reduce the time spent searching for parking spaces when driving within the city. These applications have the potential to reduce traffic congestion and user stress.
Bicycles and Low-Carbon Transportation	Konya Bike Rental, Izmir BISIM, Izmir dynamic charging electric buses, Amsterdam bicycle infrastructure,	These applications link smart mobility with environmental sustainability. The examples from Izmir and Amsterdam, in particular, stand out in terms of low-carbon transportation.

Source: *Compiled by the authors.*

As seen in the table, smart transportation is one of the most visible and widespread smart city application areas in Türkiye. In the examples of Konya, Istanbul, Izmir, Antalya, and Muğla, transportation cards, mobile apps, traffic monitoring systems, and parking information stand out. This indicates that smart city applications in Türkiye are largely focused on providing solutions to transportation and urban mobility issues. In contrast, global examples show that transportation is not limited to traffic management alone. For instance, bicycle-focused sustainable transportation in Amsterdam, autonomous systems and integrated smart transportation solutions in Singapore, and mobility infrastructure supported by environmental sensors in Valencia represent a more advanced level.

Digital Services and Local Resident/Visitor Experience

As a result of the analyses conducted, four subthemes were identified regarding digital services and local resident/visitor experience applications: Mobile city apps, E-municipality online services, Free internet and connectivity infrastructure, and Contactless payment and digital transaction convenience. These are presented in Table 4.

Table 4: Digital Services and Local Resident/Visitor Experience: Subthemes and Descriptions

Subtheme	Applications / Cities	Description
Mobile city apps	Konya Mobil, MuğlaApp, myAntalya, AppValència, City of Helsinki	These apps provide city services, transportation information, weather, events, tourist attractions, and municipal services all on a single platform.
E-Municipality and Online Services	Konya Mobil Belediyem, MuğlaApp e-municipality access, AppValència municipal services	They enable local residents to access municipal services without having to visit a physical location. This increases service efficiency and user satisfaction.
Free Internet and Connectivity Infrastructure	Konya Free Wi-Fi, Istanbul Metropolitan Municipality (İBB) Wi-Fi	Digital access is one of the fundamental requirements of smart cities. Public Wi-Fi services facilitate access to information for both local residents and tourists.
Contactless payment and ease of digital transactions	Elkart, Istanbulkart, MuğlaKart, Antalyakart, Klook, and NFC-based Valencia apps	These apps streamline and simplify the user experience in transportation, shopping, ticketing, and tourist services.

Source: *Compiled by the authors.*

An examination of the table reveals that digital services in Türkiye are primarily concentrated around mobile municipal services, transit cards, online payments, and city information systems. In this regard, the Turkish examples are strong in terms of providing services focused on the local community. However, global examples show that digital services do not remain merely at the level of providing information and performing transactions; rather, they have evolved into platforms that track user behavior, offer data-driven recommendations, and are integrated with decision-making processes. Helsinki's DataLokki, Valencia's VLCi, and Singapore's Smart Nation offer advanced models for Türkiye in this regard.

Data-Driven Management and Digital Infrastructure

Under the theme of Data-Driven Management and Digital Infrastructure, four subthemes have emerged: Open Data and Data Portals, Geographic Information Systems, Dashboards and Decision Support Systems, and Digital Twins and 3D Modeling. Descriptions of these subthemes are provided in Table 5.

Table 5: Data-Driven Management and Digital Infrastructure / Subthemes and Descriptions

Subtheme	Applications / Cities	Description
Open Data and Data Portals	Izmir Open Data Portal, Helsinki DataLokki	These systems facilitate the sharing and analysis of data in areas such as transportation, the environment, the economy, tourism, health, and governance.
Geographic Information Systems	Muğla GIS, Muğla TAMBİS, Muğla Tourism Maps GIS, İzmirNet	GIS-based systems support tourism, cultural heritage, infrastructure, transportation, and environmental management through spatial data.
Dashboards and Decision Support Systems	Valencia VLCi, Helsinki DataLokki, Benidorm CORE	These systems aggregate data from various sources into a single hub, helping managers make real-time decisions.
Digital Twin and 3D Modeling	Virtual Singapore, 3D Helsinki, Virtual Helsinki, Izmir Time Machine	Digital twin applications create virtual models of cities, offering new possibilities for planning, disaster management, tourism experiences, and sustainability.

Source: *Compiled by the authors.*

As seen in the table, data-driven management is one of the most notable differences between examples from Türkiye and the rest of the world. Although there are notable examples in Türkiye, such as the Izmir Open Data Portal, Muğla GIS, and Izmir Time Machine, the extent to which these systems are integrated into decision support, forecasting, scenario generation, and performance monitoring processes appears limited. In global examples, however, systems such as Helsinki DataLokki, Valencia VLCi, Benidorm CORE, and Virtual Singapore base smart city management directly on data analytics.

Smart Tourism and Cultural Heritage Management

As a result of the analyses conducted, four subthemes related to the "Smart Tourism and Cultural Heritage Management" theme were identified: Digital Destination Promotion, Digital Guided Tours and Multilingual Information, Digitization of Cultural Heritage, and Virtual and Augmented Experiences. Descriptions of these subthemes are provided in Table 6.

Table 6: Smart Tourism and Cultural Heritage Management / Subthemes and Descriptions

Subtheme	Applications / Cities	Description
Digital Destination Promotion	Visit Istanbul, Visit Izmir, VisitSingapore, myAntalya, Antalya ICF Airport Mobile	These apps promote the destinations' tourist attractions, events, transportation information, and cultural values in a digital environment.
Digital guidance and multilingual information	Konya Mobile Mesnevi, Antalya Kaleiçi QR Cultural Map, Helsinki Helpers, WeChat Mini Helsinki, AppValència	These are multilingual digital guidance systems that facilitate individual travel for both domestic and international tourists.
Digitization of cultural heritage	Digital Istanbul, Muğla TAMBİS, Visit İzmir, İzmir Virtual Museum, İzmir Time Machine	These initiatives make cultural heritage elements visible through digital inventories, virtual museums, 3D modeling, and mapping systems.
Virtual and Augmented Experiences	Virtual Helsinki, 3D Helsinki, Izmir Time Machine, Helsinki Virtual City Tour	These applications enhance the destination experience with digital technologies, either before or during a visit.

Source: *Compiled by the authors.*

This theme is one of the most important areas of the study in terms of the "smart destination" dimension. Table 6 shows examples from Istanbul, Izmir, Antalya, Konya, and Muğla in Türkiye, where cultural heritage and tourist attractions are promoted through digital platforms. In particular, Digital Istanbul, Izmir Time Machine, TAMBİS, and the Kaleiçi QR cultural map are significant applications in terms of the digitization of cultural heritage. However, in global examples, the tourist experience is not limited to the mere presentation of information. Virtual reality and digital twin applications in Helsinki, Virtual Singapore in Singapore, beach crowd monitoring in Benidorm, and the NFC-based tourism information system in Valencia make the destination experience more interactive and data-driven.

Environmental Sustainability and Resource Management

As a result of the analyses conducted, four sub-themes were identified under the Environmental Sustainability and Resource Management theme: Energy Efficiency, Waste Management, Water Management, and Air and Noise Monitoring. Descriptions of these sub-themes are provided in Table 7.

Table 7: Environmental Sustainability and Resource Management / Subthemes and Descriptions

Subtheme	Applications / Cities	Description
Energy Efficiency	Konya: solar-powered lighting; Antalya: smart lighting; Benidorm: LED lighting; Amsterdam: smart energy systems	These applications help save energy and contribute to reducing the carbon footprint.
Waste management	Bodrum Smart Waste Collection Management System, Istanbul Household Waste Service Plan, Electricity Generation at Konya Solid Waste Facilities	Smart waste systems support environmental sustainability through solutions such as sensors, RFID, vehicle tracking, and energy generation.
Water Management	Benidorm Smart Water Management, Muğla wastewater quality control system	Monitoring water consumption, graywater reuse, and wastewater control are critical practices for sustainable destination management.
Air and Noise Monitoring	Valencia air quality sensors, Valencia noise sensors, Singapore myENV	Real-time monitoring of environmental quality is important for quality of life and sustainable tourism management.

Source: *Compiled by the authors.*

As seen in the table, among environmental sustainability practices in Türkiye, Antalya's smart lighting, Bodrum's smart waste management, and Konya's solar-powered lighting and electricity generation from solid waste stand out. However, in global examples, environmental sustainability is addressed in a more systematic, measurable, and sensor-based manner. In Benidorm, reducing water consumption, saving energy through LED lighting, and implementing environmental management standards such as ISO 14001; in Valencia, air and noise sensors; and in Singapore, environmental warning systems represent more advanced applications in this regard.

Accessibility, Inclusivity, and Visitor Convenience

Accessibility, Inclusivity, and Visitor Convenience is the seventh theme of the study's findings. The analysis identified four subthemes related to this theme: multilingual access, ease of individual travel, barrier-free and inclusive services, and secure payment and transaction convenience. Explanations regarding these subthemes are provided in Table 8.

Table 8: Accessibility, Inclusivity, and Visitor Convenience

Subtheme	Applications / Cities	Description
Multilingual Access	Konya Mobile Mesnevi, Antalya ICF Airport Mobile, Antalya Kaleiçi QR Cultural Map, Helsinki Helpers, WeChat Mini Helsinki	Multilingual apps make it easier for tourists to access information and enhance their destination experience.
Convenience for Individual Travelers	Visit İzmir, Visit Istanbul, Konya Mobile Discover, Antalya QR Culture Map, Helsinki City Map	These apps allow tourists to navigate the city without needing a guide.
Accessible and inclusive services	Singapore's autonomous walking projects for the elderly, autonomous wheelchair initiatives	The example of Singapore demonstrates that smart city technologies can serve not only tourists but also the elderly and individuals with limited mobility.
Secure payments and ease of transactions	MuğlaKart, İstanbulkart, Elkart, Klook, AppValència	Digital payment systems make it easier for both locals and tourists to access services.

Source: *Compiled by the authors.*

As seen in the table, accessibility in Türkiye is primarily advancing through multilingual information, mobile apps, QR codes, and the ease of digital payments. This is a significant advantage that enhances the visitor experience, particularly in tourist cities. However, global examples offer a broader perspective in terms of inclusivity. In Singapore, the development of autonomous systems for the elderly, people with disabilities, and those with limited mobility is strengthening the social inclusion aspect of smart cities.

Innovation Ecosystem and Experimental Applications

The eighth theme of the study is the Innovation Ecosystem and Experimental Applications. Based on the analyses, four subthemes were identified for this theme: Living Labs, Innovation Centers, Academy-Private Sector-Municipality Collaborations, and Pilot Programs and Field Tests. Explanations regarding these subthemes are provided in Table 9.

Table 9: Innovation Ecosystem and Experimental Applications / Subthemes and Descriptions

Subtheme	Applications / Cities	Explanation
Living Labs	Istanbul Living Labs, Amsterdam IoT Living Lab	The city itself is used as a testing ground for new technologies.
Innovation Centers	Benidorm BeCiti, Amsterdam Smart City Platform	These centers are building ecosystems to develop technology, sustainability, and data-driven solutions in tourism.
Academia-Private Sector-Municipal Partnerships	Amsterdam Smart City, Benidorm BeCiti, Istanbul Metropolitan Municipality-ISBAK collaboration	This demonstrates the importance of multi-stakeholder structures in the development of smart city applications.
Pilot projects and field tests	Benidorm beach occupancy monitoring, Valencia environmental sensors, Amsterdam IoT projects	New technologies are first tested in specific areas and can then be scaled up.

Source: *Compiled by the authors.*

An examination of the table reveals that global examples are more advanced than Türkiye's in terms of the innovation ecosystem. The smart city/destination approach in Amsterdam and Benidorm is a system supported not only by the digitization of municipal services but also by entrepreneurship, field tests, pilot projects, and open innovation. In Türkiye, structures such as the Living Labs in Istanbul and ISBAK hold significant potential in this area.

Security, Risk, and Resilience Management

Based on the analyses conducted, the final theme of the study emerged as Security, Risk, and Resilience Management. Four subthemes were identified under this theme: Emergency Management, Cybersecurity, Crowd and Capacity Management, and Environmental Risk Monitoring. Explanations regarding these subthemes are provided in Table 10.

Table 10: Security, Risk, and Resilience Management / Subthemes and Descriptions

Subtheme	Applications / Cities	Description
Emergency Management	Istanbul urban security and emergency management platform, Singapore's myENV, Muğla earthquake analysis monitoring	Smart cities are developing early warning and rapid response capabilities against disasters, crises, and environmental risks.
Cybersecurity	Istanbul Smart Cybersecurity Platform	The digitization of smart city infrastructure also increases cybersecurity risks. For this reason, security infrastructure is becoming one of the fundamental components of smart cities.
Crowd and Capacity Management	Benidorm Beach Occupancy Monitoring System, Istanbul Traffic Density Systems	Monitoring crowd levels in tourist areas is important for visitor experience, safety, and environmental sustainability.
Environmental Risk Monitoring	Singapore: Flash flood, heavy rain, and air quality alerts; Valencia: Air and noise sensors	Real-time monitoring of environmental risks improves both quality of life and destination resilience.

Source: *Compiled by the authors.*

In Türkiye, security and risk management are primarily addressed through traffic, emergency, and cybersecurity platforms. The earthquake analysis tracking system within Muğla CBS and Istanbul's emergency management platform are key examples in this field. In global examples, however, risk management is evaluated within a broader framework. Singapore's environmental warning systems, Valencia's air and noise sensors, and Benidorm's beach capacity monitoring system demonstrate that smart destinations are not merely service providers but also systems that anticipate and manage risks.

A Comparison of Smart City/Smart Destination Applications in Türkiye and Around the World

Smart city and smart destination applications require the restructuring of cities and destinations not only in terms of technological infrastructure but also in areas such as governance, sustainability, accessibility, visitor experience, and local quality of life. Therefore, in this study, the cities selected as examples from Türkiye and around the world were compared based on the themes outlined above, and the findings are presented in Table 11.

An examination of the table reveals that smart city/destination applications in Türkiye are concentrated particularly in the areas of transportation, mobile municipal services, digital payments, GIS-based mapping, cultural heritage promotion, and the digitization of municipal services. It can be said that this situation demonstrates that the smart city approach in Türkiye is primarily focused on facilitating services for local residents and visitors, streamlining transportation processes, and improving tourist information.

In global examples, however, smart city/destination applications are developing more through data-driven management, digital twins, certification, environmental sensors, capacity management, open innovation, and experimental applications. Examples of such applications include Benidorm's status as a certified smart tourism destination, Helsinki's DataLokki platform, Valencia's VLCi data infrastructure, Singapore's "Virtual Singapore" digital twin, and Amsterdam's "Living Lab" approach.

5. Discussion, Conclusions, and Recommendations

This study aims to identify areas for development in smart destination management in Türkiye by conducting a comparative analysis of smart city/destination applications in Türkiye and around the world. In the research, Benidorm, Singapore, Helsinki, Amsterdam, and Valencia were considered as the global reference group, while Konya, Istanbul, Izmir, Antalya, and Muğla were treated as the local analysis group. Data obtained through document analysis were analyzed using a thematic analysis process. In this regard, the study examined smart city/destination applications not only at the level of application names or technological tools but also in terms of their function, managerial contribution, value offered to users, and relationship with destination management.

Table 11: Comparison of Smart City/Smart Destination Applications

Theme	Türkiye	World	Assessment
Smart governance and institutional capacity	Istanbul Smart City Roadmap, Konya Smart City Management Directorate, ISBAK, Istanbul Living Labs	Singapore Smart Nation, Amsterdam Smart City, Valencia VLCi, Benidorm BeCiti, Benidorm UNE 178501 certification	Examples of institutional structure and strategic planning in Türkiye are particularly evident in Istanbul and Konya. However, global examples feature a governance structure that is more holistic, standards-based, measurable, and supported by an innovation ecosystem. Benidorm's status as a certified smart tourism destination stands out in this regard.
Smart Transportation and Mobility	Konya Smart Traffic Management System, Konya Smart Intersections, Istanbul EDS, Istanbul traffic information systems, Izmir IZUM, Elkart, Istanbulkart, MuğlaKart, Antalyakart, Izmir BISIM	Amsterdam's bicycle infrastructure, Singapore's integrated smart transportation solutions, Valencia's transportation integration, Benidorm's sustainable mobility approach	Transportation is one of the areas where smart city applications are strongest in Türkiye. Traffic management, transit cards, mobile payments, and parking information have become widespread. In global examples, however, transportation applications are integrated at a more advanced level with environmental sensors, carbon reduction, autonomous systems, and sustainable mobility policies.
Digital Services and Local Resident/Visitor Experience	Konya Mobil, MuğlaApp, myAntalya, İBB Wi-Fi, Konya Free Wi-Fi, Elkart, İstanbulkart, MuğlaKart, Antalyakart	AppValència, City of Helsinki, Klook, NFC-based Valencia apps, Smart Nation digital public services	In Türkiye, digital services are primarily focused on mobile municipal services, transportation information, payment convenience, and access to basic city services. In global examples, however, digital services are evolving into systems that track user behavior, are linked to data-driven decision-making processes, and are geared toward providing personalized service delivery.
Data-Driven Management and Digital Infrastructure	Izmir Open Data Portal, Muğla GIS, TAMBIS, Muğla Tourism Maps GIS, IzmirNet, Izmir Time Machine	Helsinki DataLokki, Valencia VLCi, Benidorm CORE, Virtual Singapore, 3D Helsinki, Virtual Helsinki	There are significant examples in Türkiye regarding GIS, open data, and the digitization of cultural heritage. However, in global examples, data infrastructures are more strongly linked to decision support, forecasting, dashboards, digital twins, and real-time management processes. This theme highlights the most pronounced gap in development between Turkish and global examples.
Smart Tourism and Cultural Heritage Management	Visit Istanbul, Visit Izmir, myAntalya, ICF Airport Mobile, Mobil Mesnevi, Antalya Kaleiçi QR Cultural Map, Digital Istanbul, TAMBIS, Izmir Virtual Museum, Izmir Time Machine	VisitSingapore, Helsinki Helpers, WeChat Mini Helsinki, AppValència, Virtual Helsinki, 3D Helsinki, Valencia NFC-based tourism information system	In Türkiye, smart tourism applications primarily focus on destination promotion, cultural heritage information, digital guidance, and QR code-based information delivery. In global examples, however, the tourist experience is supported by virtual reality, digital twins, data-driven visitor management, and interactive tourism information systems.
Environmental sustainability and resource management	Konya solar-powered lighting, electricity generation at Konya's solid- waste facilities, Antalya smart lighting, Bodrum Smart Waste Collection Management System, Muğla wastewater quality control system	Benidorm smart water management, Benidorm LED lighting, Amsterdam smart energy systems, Valencia air quality sensors, Valencia noise sensors, Singapore myENV	In Türkiye, environmental sustainability is primarily associated with energy efficiency, waste management, and certain infrastructure solutions. In global examples, however, environmental sustainability has a more measurable and integrated structure through the real-time monitoring of water, energy, air quality, noise, carbon reduction, and environmental risks.
Accessibility, Inclusivity, and Visitor Convenience	Mobil Mesnevi, Antalya ICF Airport Mobile, Kaleiçi QR Cultural Map, Visit İzmir, Visit İstanbul, Konya Mobil Keşfet, MuğlaKart, İstanbulkart, Elkart	Helsinki Helpers, WeChat Mini Helsinki, Helsinki City Map, Singapore's autonomous walking projects for seniors, autonomous wheelchair initiatives, Klook, AppValència	In Türkiye, accessibility is primarily advancing through multilingual information, mobile apps, digital payments, and individual travel convenience. In global examples, however, accessibility is addressed in a more inclusive manner; technological solutions are being developed for seniors, people with disabilities, and diverse visitor profiles.
Innovation ecosystem and experimental applications	Istanbul Living Labs, Istanbul Metropolitan Municipality-ISBAK collaboration	Amsterdam IoT Living Lab, Amsterdam Smart City platform, Benidorm BeCiti, Valencia environmental sensors, Benidorm beach occupancy monitoring	In terms of the innovation ecosystem, Istanbul stands out in Türkiye. However, in global examples, open innovation, living labs, field tests, pilot projects, entrepreneurship, and collaborations between academia, the private sector, and municipalities are carried out in a more systematic manner. Amsterdam and Benidorm are strong examples in this regard.
Security, Risk, and Resilience Management	Istanbul urban security and emergency management platform, Istanbul smart cybersecurity platform, Muğla earthquake analysis tracking, Istanbul traffic congestion systems	Singapore's myENV, Valencia's air and noise sensors, Benidorm's beach occupancy monitoring system	In Türkiye, risk management is primarily addressed within the frameworks of traffic, emergency response, earthquake analysis, and cybersecurity. In global examples, however, broader-scope, real-time resilience systems, such as environmental risk monitoring, crowd management, beach capacity monitoring, air quality monitoring, and flash flood alerts, are prominent.

Source: *Compiled by the authors.*

The findings of the study indicate that cities in Türkiye have established a significant digital infrastructure in terms of smart destination transformation; however, this infrastructure still requires further development to evolve into the data-driven, measurable, integrated, and predictive management systems observed in global benchmark cities. This finding highlights that the concept of a smart destination cannot be explained solely by the presence of technological tools; rather, it is more important to consider how technology is integrated into destination management and which decision-making processes it is incorporated into. Therefore, while the quantitative increase in smart destination applications in Türkiye is important, these applications must be linked to strategic

governance, data integration, sustainability management, visitor flow control, inclusive accessibility, and performance measurement.

Regarding the study's first theme, smart governance and institutional capacity, the examples of Istanbul and Konya in Türkiye are particularly noteworthy. The Istanbul Smart City Roadmap, ISBAK, and the "living lab" initiatives in Istanbul, along with the institutional framework for smart city management in Konya, demonstrate that a certain level of administrative awareness has been established in this field in Türkiye. However, global examples such as Singapore's Smart Nation, Amsterdam's Smart City, Valencia's VLCi, and Benidorm's BeCiti show that the smart city approach is not limited to the digitization of municipal services but is supported by elements such as a long-term strategic vision, institutional ownership, data management, open innovation, and certification. This situation indicates that, from Türkiye's perspective, one of the most significant gaps in smart destination management is the transition from the "application development" level to the "institutional governance model" level.

The theme of smart transportation and mobility is one of the areas where Turkish cities are relatively strong. In Konya, Istanbul, Izmir, Antalya, and Muğla, smart traffic systems, transit cards, mobile payment systems, parking information apps, and bicycle systems are widely used. This finding indicates that smart city applications in Türkiye have largely developed with the aim of addressing issues related to intra-city mobility, ease of transportation, and access to services. However, when compared to global benchmark cities, it is evident that transportation is addressed not only at the level of traffic management or payment convenience but also in conjunction with carbon reduction, environmental data integration, autonomous mobility, tourist density management, and sustainable mobility policies. Therefore, the next phase for transportation applications in Türkiye must involve integrating transportation data with destination management, environmental sustainability, and visitor capacity management.

The theme of digital services and the local resident/visitor experience highlights significant developments in Turkish cities in the areas of mobile municipal services, digital payments, ease of online transactions, and the provision of tourist information. Apps such as Konya Mobil, MuğlaApp, myAntalya, İstanbulkart, MuğlaKart, and Antalyakart enable local residents and visitors to access services more easily. These apps are important in terms of user convenience and service efficiency. However, the findings indicate that digital services in Türkiye are largely limited to the functions of providing information, facilitating transactions, and improving access. In global examples, however, digital platforms are evolving into systems that track user behavior, offer personalized recommendations, measure service performance, and provide data for decision-making processes. This highlights the need to transform digital services in Türkiye from "passive information-providing" platforms into "active data-generating and management-supporting" systems.

One of the most notable gaps in the research emerges in the area of data-driven management and digital infrastructure. In Türkiye, there are applications such as the Izmir Open Data Portal, Muğla GIS, TAMBİS, IzmirNet, and Izmir Time Machine. These applications offer an important starting point in terms of open data, geographic information systems, the digitization of cultural heritage, and the use of spatial data. However, the extent to which these systems are integrated with decision support, forecasting, scenario generation, dashboard usage, and real-time performance monitoring processes appears limited. In contrast, examples such as Helsinki DataLokki, Valencia VLCi, Benidorm CORE, and Virtual Singapore demonstrate that data is not merely a stored or shared element, but a strategic resource at the center of urban and tourism decision-making processes. Therefore, to strengthen smart destination management in Türkiye, it is crucial not only to collect data but also to actively use it in decision-making processes.

The theme of smart tourism and cultural heritage management is one area where Türkiye possesses significant potential, yet this potential has not yet been fully translated into advanced visitor experiences. In the case studies of Istanbul, Izmir, Antalya, Konya, and Muğla, there are various applications related to destination promotion, digital guidance, QR code-supported information, virtual museum applications, and the digitization of cultural heritage. These applications contribute to making cultural heritage more visible, enabling visitors to access the information they need more easily, and strengthening the destination's image. However, when global examples are examined, it becomes evident that cultural heritage management is not limited solely to promotion and information sharing but is supported by virtual reality, augmented reality, digital twin technologies, visitor flow management, carrying capacity management, and interactive experience design. For this reason, it is important to develop smart tourism applications for cultural heritage in Türkiye that go beyond an approach focused solely on promotion to also encompass experience management and sustainable destination management.

In the area of environmental sustainability and resource management, Türkiye has implemented important initiatives such as energy efficiency, smart lighting, waste management, wastewater quality control, and solid

waste-to-energy production. These initiatives demonstrate a growing environmental awareness and a pursuit of resource efficiency at the municipal level. However, in global examples, environmental sustainability is addressed in a more measurable manner, based on sensor-based and real-time monitoring systems. Examples of this include smart water management and environmental standards in Benidorm, air and noise sensors in Valencia, and environmental warning systems in Singapore. This discrepancy indicates that sustainability practices in Türkiye remain largely confined to the infrastructure and service levels, while there is a need for systems that comprehensively monitor indicators such as environmental performance, tourism intensity, carbon emissions, air quality, and noise.

The theme of accessibility, inclusivity, and visitor convenience is evolving in Türkiye, particularly through multilingual information, digital payment systems, mobile apps, and solutions that support the individual travel experience. These applications enable visitors to move more independently within the destination, access information more easily, and make more effective use of the services offered. However, examples from around the world demonstrate that the concept of accessibility is not limited to multilingual information or the ease of digital transactions. Technological solutions specifically designed for the elderly, individuals with special needs, visitors with limited mobility, families with children, and various other user profiles also constitute an important part of this approach. In particular, autonomous applications developed in Singapore for the elderly and individuals with limited mobility offer compelling examples of how technology can support accessibility. In this context, it would be beneficial to develop the inclusivity dimension of smart destination applications in Türkiye more comprehensively, taking into account the expectations and needs of different visitor groups.

In terms of the innovation ecosystem and experimental applications, structures such as living labs in Istanbul and ISBAK offer significant potential in Türkiye. However, in global examples, innovation processes are supported more systematically through living labs, field tests, pilot projects, collaborations between academia, the private sector, and municipalities, and entrepreneurship ecosystems. Examples such as the Amsterdam IoT Living Lab, the Amsterdam Smart City platform, and Benidorm BeCiti demonstrate that the transformation into a smart destination is not a process carried out solely by public institutions; rather, it is an innovation space where different stakeholders collaborate to develop solutions. This finding indicates that smart destination policies in Türkiye need to be supported by a more open, experimental, collaborative, and scalable innovation model.

The theme of security, risk, and resilience management highlights that smart destinations are not merely service-providing structures but should be evaluated as systems capable of identifying potential risks in advance and developing appropriate solutions. In Türkiye, urban security, emergency response, and cybersecurity platforms developed in Istanbul, along with earthquake analysis applications in Muğla, are among the leading examples in this field. In contrast, global examples show that security is not limited solely to disasters or cyber threats. It is addressed within a broader framework that includes the continuous monitoring of environmental risks, early warning systems for flash floods and heavy rainfall, air quality monitoring, noise sensors, beach capacity monitoring, and crowd management. Particularly in destinations with high visitor volumes, addressing risk and resilience management, disaster management, climate-related risks, crowd control, environmental quality, cybersecurity, and visitor safety, rather than treating them as separate, independent initiatives, within a unified management system will provide a more sustainable approach.

Overall, the study's findings indicate that the smart destination transformation in Türkiye has made a strong start in certain areas, but that this transformation has not yet fully evolved into a holistic management model. The practices highlighted in the Turkish examples are primarily concentrated in the areas of service facilitation, transportation integration, mobile municipal services, digital payments, GIS-based mapping, and the digital promotion of cultural heritage. In contrast, global examples of the smart destination approach feature a more advanced structure incorporating data analytics, digital twins, environmental sensors, certification, capacity management, open innovation, and inclusive accessibility solutions. This finding suggests that the next phase of development for smart destinations in Türkiye should involve a transition from "digital service delivery" to "data-driven destination management."

The study involves a systematic examination of visible and documented practices in cities through document analysis of municipal reports, strategy documents, project descriptions, digital application presentations, and academic sources. However, the study's reliance on secondary data constitutes a limitation in that it does not directly measure user experiences, local residents' perceptions, the views of tourism stakeholders, or the actual performance of the applications. Therefore, the findings present an assessment based on existing and documented applications in the selected cities; research based on primary data is needed to draw deeper conclusions regarding the effectiveness of these applications in the field.

6. Conclusions

This study has highlighted the strengths and areas for improvement in smart destination management in Türkiye through a comparative analysis of smart city and smart destination applications using examples from Türkiye and around the world. The research concluded that cities in Türkiye possess significant infrastructure, particularly in areas such as transportation integration, mobile municipal services, digital payment systems, GIS-based mapping, digital destination promotion, and the digitization of cultural heritage. This indicates that the smart city approach in Türkiye has reached a certain level of maturity in terms of local service delivery and visitor convenience.

In contrast, it was observed that smart destination applications in global reference cities are structured through more advanced and integrated systems. In these examples, technology is positioned not merely as a tool that serves the user, but as a strategic element that supports decision-making, monitoring, forecasting, performance measurement, and sustainability processes in destination management.

The most important finding of the study is that smart destination applications in Türkiye should no longer be approached solely at the level of developing new mobile apps, providing digital information, or offering payment convenience. Türkiye's existing digital infrastructure must be transformed into integrated smart destination management systems that generate data, provide decision support, monitor environmental and social impacts, manage visitor density, offer inclusive accessibility, and support stakeholder collaboration. This transformation is not merely a matter of technological investment but also involves institutional capacity, data governance, sustainability policy, stakeholder participation, and performance measurement.

The study contributes to the academic discussion by examining the relationship between the concepts of smart cities and smart destinations through a comparative case analysis. It also highlights the fundamental differences between examples from Türkiye and the rest of the world by classifying smart destination applications under nine themes. From an implementation perspective, the study provides a roadmap for destination managers, local governments, and policymakers regarding the areas where the smart destination transformation in Türkiye needs to be strengthened.

In conclusion, the fundamental requirement for the smart destination transformation in Türkiye is the transformation of existing digital applications into integrated, measurable, sustainable, inclusive, and data-driven management systems. Once this transformation is achieved, Türkiye's tourism destinations will evolve from being merely cities that offer digital services into smart destinations that manage the visitor experience, enhance the quality of life for local residents, monitor resource usage, anticipate risks, and boost global competitiveness.

Recommendations

The recommendations developed based on the research findings are aimed at ensuring that the smart destination transformation in Türkiye takes on a more holistic, data-driven, and sustainable structure.

First, smart city and smart destination projects in Türkiye should be supported not only at the application development level but also through measurable goals, performance indicators, and governance models based on stakeholder participation. In this context, a smart destination roadmap should be prepared for each city, taking local conditions and priorities into account; these roadmaps should set concrete goals in areas such as data management, sustainability, accessibility, visitor experience, capacity management, cultural heritage, and security. Additionally, regular monitoring and reporting systems should be established to evaluate the success of smart destination applications.

Second, mobile apps, transit cards, digital payment systems, GIS-based maps, and tourist information platforms in Türkiye should be viewed not as disconnected service tools but as integrated data sources. Data obtained from these applications should be collected on central data platforms and analyzed through dashboards that can be used in destination management. This will enable more effective monitoring of visitor density, transportation usage, tourist attraction preferences, environmental pressures, and service demands.

Third, transportation and mobility applications must be integrated with environmental sustainability and tourism capacity management. Although smart transportation systems in Türkiye have reached a significant level of development, these systems must be linked to issues such as reducing carbon emissions, monitoring visitor mobility, conducting congestion analyses, supporting bicycle and pedestrian transportation, promoting low-carbon transportation options, and planning public transportation more effectively. Especially in high-visitor destinations such as Istanbul, Antalya, Muğla, and Izmir, transportation data should be incorporated into tourism planning processes.

Fourth, digital applications focused on cultural heritage and tourism should not be used solely as promotional and informational tools. In Türkiye, applications such as Digital Istanbul, Izmir Time Machine, TAMBIS, Visit Izmir, myAntalya, and QR-code-based cultural maps provide an important infrastructure. However, these applications must be more strongly linked to visitor flow, capacity management, experience design, multilingual guidance, augmented reality, virtual experiences, and the preservation of cultural heritage. In this way, the digitization of cultural heritage will not only enhance visibility but also contribute to the sustainable management of heritage sites.

Fifth, environmental sustainability practices should not be limited to energy and waste management but should be expanded to include indicators such as air quality, noise, water consumption, carbon emissions, visitor density, and environmental carrying capacity. Sensor-based environmental monitoring systems should be established in high-traffic tourism destinations, and the data obtained from these systems should be integrated into decision-support mechanisms for both municipal and destination management. In particular, beach density, water consumption, and waste production should be regularly monitored in coastal destinations, while visitor pressure and site capacity should be monitored in cultural heritage destinations.

Sixth, the dimensions of accessibility and inclusivity must be addressed with a broader approach. While multilingual information provision, digital payment convenience, and mobile applications represent important steps in Türkiye, smart destinations must offer more inclusive services for the elderly, people with disabilities, families with children, foreign tourists, and individuals with limited mobility. In this context, accessible route planners, voice-guided navigation systems, mobile interfaces designed for users with disabilities, smart directional signage, and inclusive tourism experience designs should be developed.

Seventh, smart destination initiatives in Türkiye should be supported by open innovation ecosystems established among universities, technology companies, tourism businesses, local communities, civil society organizations, and local governments. Examples such as the living labs in Istanbul and ISBAK offer significant potential in this regard. However, these structures must be replicated in different cities, pilot projects must be tested in the field, and successful applications must be scaled up. The smart destination transformation should not be viewed as the sole responsibility of public institutions but should be designed as a multi-stakeholder collaboration process.

Eighth, standardization and certification mechanisms for smart destination management should be developed in Türkiye. As seen in the example of Benidorm, linking smart tourism destination management to specific standards, measurable performance indicators, and regular audit processes could serve as a guiding model for Türkiye. In this context, a national "smart destination performance model" specific to tourism destinations in Türkiye could be developed. In this model, indicators such as digitalization, data management, sustainability, accessibility, cultural heritage, security, visitor experience, and governance can be evaluated collectively.

Ninth, security, risk, and resilience management must be addressed in an integrated manner. Particularly in high-traffic tourism destinations, crowd management, disaster resilience, environmental risk monitoring, air quality, sudden rainfall and flood alerts, cybersecurity, and visitor safety should be evaluated within the same system. Security and disaster-focused systems currently in place in cities such as Istanbul and Muğla in Türkiye can be transformed into more comprehensive smart resilience systems by integrating them with tourism density and environmental risk management.

Tenth, it is recommended that future research utilize primary data collection methods in addition to document analysis. Since this study is based on secondary data, the user experience of these applications in cities, local residents' perceptions, their impact on tourism businesses, and how they are evaluated by destination managers have not been directly measured. Therefore, future research could include interviews with local officials, tourism businesses, technology providers, tourists, and local residents. Additionally, the on-the-ground impacts of smart destination applications could be examined in greater detail using various data collection methods such as surveys, focus groups, observation, user experience analysis, and digital data analytics.

Finally, the success of the smart destination transformation in Türkiye does not depend solely on strengthening the technological infrastructure. For this transformation to be successful, data governance, institutional capacity, stakeholder participation, sustainability policies, inclusive design, performance measurement, and a culture of continuous improvement must be developed in tandem. For this reason, smart destination policies in Türkiye should be designed not merely with the mindset of "using more technology" but with the goal of "creating better-managed, more sustainable, more accessible, and more experience-focused destinations."

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