

Designing STT Platform Based on Perceived Value on Smart Tourism

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ABSTRACT

Our article investigated how to create a design for smart tourism applications that focused on the values felt by tourists, specifically on the valuable experiences encountered by tourists during destinations such as accessibility, amenities, available packages, activities, and additional services, in order to assess the successful management of a tourist destination. Whereas the methodology applied in this research is Design Science Research (DSR), which is used to overcome a problem by designing a tool to address the issue, the major challenge that is frequently experienced by visitors in tourism studies is the convenience and completeness of information about tourist destinations.

The theoretical contribution of the research might provide to the capacity in the study of tourist behavior, which is associated primarily with tourist satisfaction with a specific tourist destination based on previous experience and information. Whereas practically, the research will assist tourism managers in developing architectural designs of service tools to help tourist destination management in making decisions based on the requirements and preferences of tourists during their visit.

Based on our findings, we recommend that tourist destinations should create dynamic platforms that mediate STT in order to respond to tourist demands. Tourists will appreciate their vacation more because the travel service experience is improved. Thus, providing information more accessible, constructing integrated information systems, and creating a technologically friendly environment would increase tourist participation and actually contribute to the overall travel experience.

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1. Introduction

With the exponential development of technology, there has been a significant increase in internet and smartphone use worldwide [1][2]. Today, technology is a necessity that has penetrated almost all aspects of life, from civil infrastructure to educational services [3]. Sensors and the Internet of Things (IoTs) give a variety of information and tracking various emergency events and community regular activities [4][5][6][7].

Smart technology has recently become popular in the tourism industry [8]. As a result of the development of smart cities, where smart technologies such as artificial intelligence, cloud computing, IoT, and cellular communications have been integrated with tourist destinations, the use of these technologies has enriched the experience of tourists in Seoul, South Korea, that had launched a mobile application, Deoksugung in My Hands, to provide relevant and interesting information about nearby cities and attractions to tourists [9].

Similarly, many tourism destinations have adopted the concept of “smart tourism” as more destinations become “smarter” through integrated technology platforms where tourism stakeholders may directly share and exchange tourism activity information with others [2]. Tour operators strive to enhance the tourist experience and raise the competitiveness of tourist destinations by integrating advanced information and communication technology (i.e., smart technology) in smart tourism destinations.

When evaluating satisfaction and tourism sustainability, it is independent from the involvement and participation of the community in the development and sustainability of tourism in a tourist destination [10]. Even delivering value to customers (perceived value) in the hospitality and tourism business sector may be a source of competitive advantage for a tourist destination [11][12]. The tourism sector has recently realized that measuring perceived value is critical in making a decision based on customer requirements and preferences for a tourist destination [13]. According to [14][15][16][17], the sustainability of the hospitality and tourist sector may be assessed by the extent to which companies can generate better customer value, and this must be done sustainably and efficiently. Furthermore, tourism enterprises must improve the quality of their product portfolio and ensure that their customers' requirements and expectations are achieved [18].

With the recent development of smart technology, the tourism sector may be able to optimize the customer's perceived value in determining their decision based on their requirements and perceptions of the tourism supply of goods [2][19]. Similarly, [20] utilized a structural equation model to investigate how smart tourism satisfaction and service satisfaction impact the overall satisfaction of smart tourism cities. The survey findings from Seoul, Busan, and Jeju in South Korea indicated a minor variation in the relationship among destination service and satisfaction across the three cities using a multigroup analysis based on tourist destination characteristics. Intelligent tourism technology attributes Intelligent tourism technology is highly essential to enhance tourism competitiveness and optimize tourist satisfaction, therefore providing practical consequences for tourism promotion.

People's trends happen rapidly in this digitalization era due to simple access to information. Tourism, as one of the industries that is quickly expanding, is, of course, continuously changing in response to current trends. The tourism sector needs adjust immediately to the changing environment and intense competition[16] [21]. Smart tourism is the best way to survive in the rigors of technological and information evolution, where physical dimensions and tourist management enter the next level (digitalization) in order to create a new generation that is more advanced in accordance with the times [21].

Smart tourism, as a new ecosystem, may promote and facilitate the development of new innovations, particularly those related to the use of technology and the development of smart tourism experiences. The concept of smart tourism came as a result of studies into the interaction between technology and the tourism industry [21]. Smart Tourism can represent the current scenario in which the evolution of the tourism sector has been influenced by the rapid development of technology and information [19]. It also creates, integrates, and links micro-enterprises from local communities and nomads throughout the world to the global market [22].

The development of technology and information innovation has resulted in the smart concept in the tourism sector [8][21]. Smart tourism is the application of all existing potentials and resources to enhance experience in the tourism sector. Smart Tourism, as a solution, allows for the establishment of a wide range of businesses in dispersed areas, potentially resulting in the creation of a large number of employment [23]. Smart tourism is a direct outgrowth of the concept of e-tourism [9][24]. Convergence of tourism information, services, and IT technologies that assist travelers in enlarging the cognitive boundaries of their travel plans with visualized details about destinations and other quality enhancements [24][25][26]. The objective of smart tourism is to focus on meeting the needs of tourists by integrating ICT development with culture and innovation in order to promote, improve the quality of tourism services, better tourism management, and extend the industry's scale [9][22][26].

Tabel 1. Definitions of smart city and smart tourism.

Definition	Sources
Smart City	
a city to be smart when investments in human and social capital and traditional (transport) and modern (ICT) communication infrastructure fuel sustainable economic growth and a high quality of life, with a wise management of natural resources, through participatory governance (p.70)	[27]
A city well performing in a forward-looking way in economy, people, governance, mobility, environment, and living, built on the smart combination of endowments and activities of self-decisive independent and aware citizens (p.13)	[28]
The smart city represents the future challenge, a city model where the technology is in service to the person and to his economic and social life quality improvement (p. 332)	[29]
Smart Tourism	
smart tourism is the ubiquitous tour information service received by tourists during a touring process (p. 297)	[26]
Smart tourism is defined as tourism supported by integrated efforts at a destination to collect and aggregate/harness data derived from physical infrastructure, social connections, government/organisational sources and human bodies/minds in combination with the use of advanced technologies to transform that data into on-site experiences and business value-propositions with a clear focus on efficiency, sustainability and experience enrichment (p.181)	[24]

The issue of Smart Tourism has not been completely and specifically defined in previous studies, and there have not been many references that discuss this in depth up to this point. However, in general, the concept of Smart Tourism may be found in table 1.

Meanwhile, according to [24][26], this tourist trend is known as smart tourism. Because of smartphones, the term "smart" became popular, and it has since been applied in a variety of sectors, which may be classified into devices and environments. Smartphones, smart cars, and all smart tags are typical devices. In this context, the term "smart" relates to the meanings of smart, integrated, digital, massive, wireless, and so on. Smart towns, smart houses, smart buildings, and smart cities are prime examples of the concepts of space. In this context, "smart" refers to things such intelligent, eco-friendly, sustainable, integrated, accessible, and so on. Cities and tourism, in particular, are a convergence of factors that shows the strength variety of research approaches. Many academics, however, provide definitions of smart cities and smart tourism, including table 1 displaying different definitions of smart tourism. Various tourist-related services or industries are integrated with ICT to assist tourism, and the implementation of a smart environment in tourism destinations has resulted in the creation of smart tourism [26].

Previously, we discussed the importance of perceived value in tourism sustainability [10], while also providing a competitive advantage for a tourist destination [11][12], where the industry's evolution over several decades has recognized the need of measuring perceived value in making a decision based on consumer requirements and preferences [13]. According to research [14], perceived values are a good predictor of whether visitors would have repurchased intentions or feel satisfied with the perceived quality. Perceived value is a subjective concept that varies between customers, cultures, and times [32].

Perceived value is a contemporary research that is gaining momentum amongst marketers. This interest derives from the fact that the tourism experience given by today's management companies is critical to the creation of value for their different target publics. In an environment characterized by global competitiveness and tourists who are more demanding for good tourism, the production and transfer of value to tourists has become a first-order competitive advantage [33].

To establish excellent values in the tourism industry, technology that supports it is important. Several tourist destinations, both domestic and international, have created the idea of smart tourism and have been successful in attracting a large number of tourists. A gaming tourism destination is also available in smart tourism. Many gaming tourism destinations are striving to strengthen their image in order to expand their tourism industry. When visitors visit game tourism destinations, they might have both game and non-game memorable tourism experiences (MTEs) [32][33].

The objective of this research is to construct an architectural design of smart tourism technology that focuses on the values felt by customers (in this case, the valuable experiences experienced by tourists during their tour), which include accessibility, amenities, available packages, activities, and services. additional services, particularly to measure the performance of managing a tourist destination

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2. Method

This research adopted Construction Science Research (DSR) as a research methodology for solving complex issues through the design and evaluation of number of alternatives artifacts [34][35][36]. According to [35], the DSR process includes the following steps: issue identification, establishing solution objectives, design and development, demonstration and assessment, and communication.

Each cycle's substance and purpose include several phases, including the problem identification phase and specific motivation; the goal definition phase of the solution to solve the problem by determining the figures and functions for each proposed design artifact; and the implementation phase of the solution. ; a demonstration and evaluation phase to assess the extent to which the functionality of the produced design artifacts provides a solution; and a communication phase to communicate the concerns and designed artifacts to relevant academics and audiences.

The objective of this step is for researchers to contribute to practice (i.e., disseminate problem solutions) and design theory (i.e., add instantiation of design models and theories) while also receiving comments and suggestions for further improvement of artifacts [35]. Essentially, the DSR approach may be used to design the proposed smart tourism project, which has three types of components: smart locations, experiences, and business [24]. The smart city supports tourism by providing mobility, resource allocation, and availability, as well as a sustainable quality of life for its people [27]. It also facilitates tourism by providing an integrated smart environment, increasing the visitor experiences (smart experience). The concept "Smart Business" refers to a complex business ecosystem of dynamically integrated stakeholders, as well as the exchange and co-creation of tourism resources.

Figure 1 illustrates these three components in terms of three other layers of data-related factors: an intelligent information layer that represents data collection; an exchange layer that facilitates

interconnectivity; and processing layers related to data analysis, visualization, integration, and intelligent use [37], operations to enhance efficiency, minimize expenses, and optimize service quality in order to improve profit sustainability and visitor satisfaction. [16] identified hotels establishing essential ICT applications for effective strategic operations, based on divisions for reservation, room management, accounting, and telecommunications using the previously specified requirements. Tourists in smart tourism not only consume data from their visitor experience, but they also allow data production and analytics. There are various methods for identifying potential data for smart tourism. Smart mobility, smart governance, smart economics, smart people, smart living, and smart environment are the six major components of smart city tourism [25]. There are another six – tourist attraction, accessibility, amenities, available packages, activities, and extra services – which are characteristics that produce revenues and advantages for places by providing valuable experiences to tourists. There are another six – tourist attraction, accessibility, amenities, available packages, activities, and additional services – which are characteristics that produce revenues and benefits for destinations by providing valuable experiences to tourists. Figure 2 also highlighted the essential components of smart tourism, including transportation, accommodation, gastronomy, attractions, and support services. The smart tourism experience is constructed on a tangible smart business ecosystem at the destination that functions through data sharing among stakeholders. The improved model represents a more comprehensive and customized intelligent travel experience, and it excludes a few of the previously described possible data elements, such as 'availability packages,' while adding others, such as 'gastronomy.'

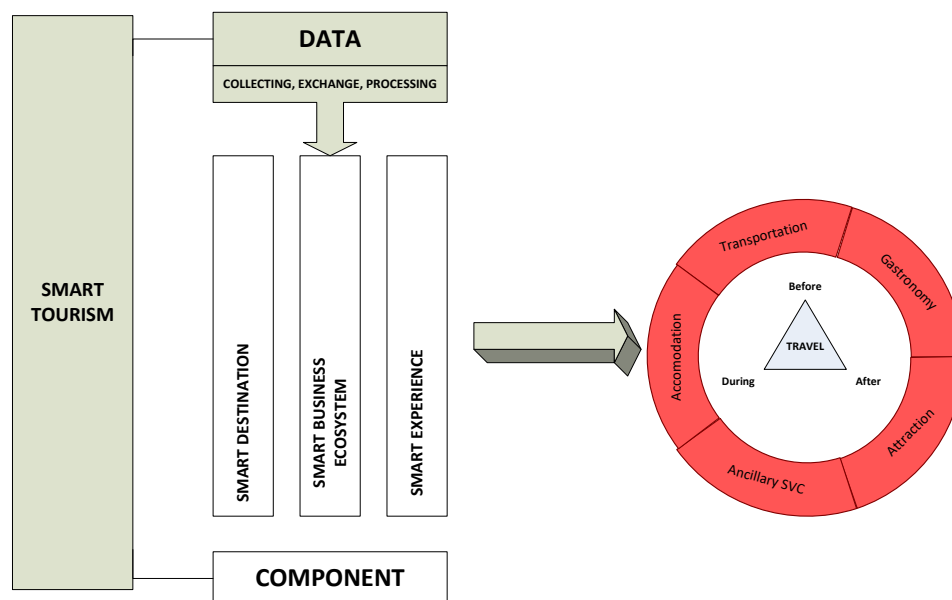


Fig. 1. Model Digital-Based Smart Tourism

Sources: [24] [37]

Smart systems use technological innovations to process data in real time in attempt to create goods and services that benefit everyone involved [38]. Intelligence is the structure that binds together frameworks and partners that are adaptable, interconnected, and aid and provide information to enterprises in creating value to everyone. Intelligent systems in tourism are constructed through open progress, supported by human and social capital interests, and supported by participatory administration, thereby going to increase the aggregate intensity of tourism industry goals to improve social, economic, and environmental welfare for all partners and generate value for tourists [39][40].

In general, the term "smart" has become another popular expression to characterize the technological, financial, and societal advancements driven on by information technology innovation. Based on sensors, big data analytics, and open data, improved approaches to connectivity or data

availability and transmission (e.g., NFC, IoT, and RFID), as well as the ability to drive and reason [41].

According to [22], smart tourism is defined as a travel and tourism industry that is supported by coordinated efforts in tourist destinations to collect and combine/more information gained from physical frameworks, authority/organizational sources, social associations, and the human body/mind in combination with the use of advanced technology. Furthermore, [42] define innovation through Technology adoption, which has shifted the traditional tourist perspective from conventional to electronic tourism (e-tourism). Smart tourism, rather than e-tourism, might be provided by using smartphone-based services. Various technologies, such as Internet of Things (IoT), Radio Frequency Identification (RFID), Quick Response (QR) codes, and Near Field Communication (NFC), have been used to facilitate the use of technology in tourism [43].

3. Results and Discussion

Smart tourism is described as the most recent stage of tourism development that is affected by the advancement of technology and information [21]. Smart tourism is defined as any application of ICT to collect information about tourism activities [9][24]. Smart tourism effectively organizes and provides tourism experiences and services (by technology) provided by stakeholders who are members of the smart tourism ecosystem such as producers, distributors, tourists themselves, government agents, travel agencies, and operators applying ICT. Smart tourism, based on [2][25], is the use of hardware and software platforms for smart city information and services that are properly managed to lead to a visualized integrated tourism industry.

The Key Elements of the Smart Tourism Concept

The key element that attracts and impacts the behavior and interests of tourists so that they become concerned about trying Smart Tourism is experience. The following are the major components of Smart Tourism [23]; IoT, Mobile communication, Cloud computing, and Artificial intelligence [44]. However, experts believed that smart tourism takes the following forms including data centrality, real-time development, context-awareness, co-creation, and cross-cutting issues [45].

The development of the concept of smart tourism cannot be separated from technology, therefore much study has been conducted on it. According to [9], the parameters for the smart tourism technology variable include four dimensions, as indicated on figure 2.

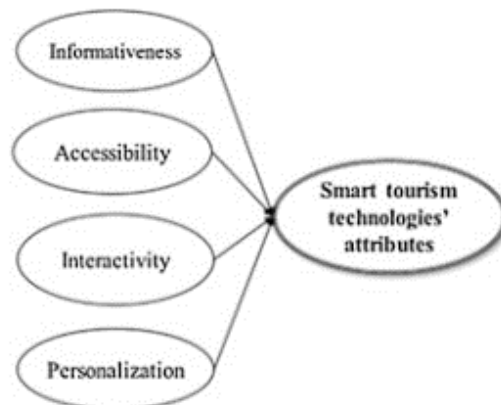


Fig. 2.Dimensions of Smart Tourism Technology

Sources:[9]

According to [9], the dimensions of smart tourism technology are: a) Informativeness, which is focused in how the information provided by smart tourism technology may be useful, dependable, or of value to users when traveling, b) Accessibility, which refers to how easy users of smart tourism

technology feel they have during their journey, c) Interactivity, which refers to the interactions that occur or are perceived by users of smart tourist technology while in use, and and d) personalization, which refers to how visitors are given the ability to customize the look of this smart tourist technology based on their preferences.

Application of the Smart Tourism Concept

The development of smart tourism has increased the demand for infrastructure, public awareness, and other services. This is a great opportunity to promote a company's pariwisata sales and marketing efforts, as well as to provide information and services relevant to the company's pariwisata growth strategy [25] [26]. As a consequence, technologies were created to assist with this smart tourism activity.

Smart Tourism Destination Tools enable tourists to explore or discover destinations using their mobile phones. Smart Tourism Destination Tools technology allows users to navigate their route without the use of maps or travel guidebooks [46]. Smart tourist destination tools may be classified into three types [45], namely:

1. Application

Apps are classified into three (three) categories based on their availability online and offline, namely "Native Apps," "Mobile Web Apps," and "Hybrid Apps." Native apps: active on the physical device and accessible through an on-screen icon Native Apps can provide travelers with references, which is particularly beneficial in terms of keeping roaming costs low and being able to access information without internet access. Web apps are webpages that seem and feel like real programs in many respects. Hybrid applications are made up of some online apps and some native apps. These applications, like native apps, are featured in app stores and may take advantage of device features.

2. Augmented Reality (AR)

Augmented reality is a combination of real and virtual items in a real environment, running interactively in real time, and there is integration between objects in three dimensions, specifically virtual objects integrated in the actual world [44][47][48]. One type of application that is widely used is one that is based on the need for a portable camera, such as a smartphone's built-in camera (delivering information in the form of images). According to [23], AR allows tourism destinations to provide unique experiences for travelers, particularly when coupled with cultural tourism activities [32][33]. It may also be improved in the future for co-creation of experiences by actively inviting tourists to be a part of this [49].

3. Near Field Communication (NFC) (NFC)

NFC is a wireless radio communication system that delivers data stored on it to electronic devices over a short distance [50]. According to [51], NFC may be utilized at tourist destinations such as museums (tourists can scan information on historical paintings/statues/artefacts with their phones, which brings up, for example, a translation in the original language or anything that becomes a new experience). NFC may also be utilized in hotels, for example, to make it easier to enter the room because scanning doors with NFC is as simple as a tap, to open hotel security doors, and to obtain information about local attractions. Other examples of smart tourism tools in use in the business are as follows:

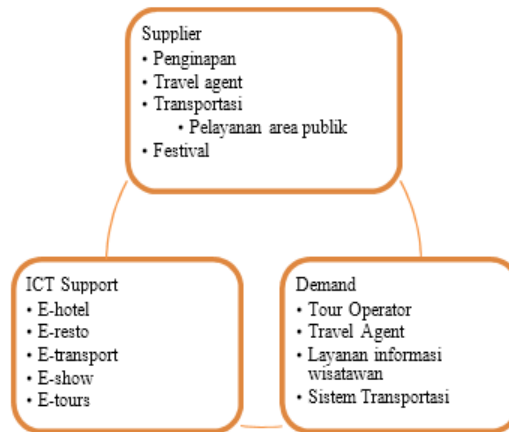


Fig. 3.Figure 3: Implementation of Smart Tourism

Sources: [45]

Indicators for the Smart Tourism Concept's Implementation

According to [45], there are various indicators in the application of the smart tourism concept, such as enhancing the convenience of both domestic and foreign tourists. , the applicability of customized visitor demand, the influence of common sharing, the effective and intense use of diverse tourism and cultural resources, and the role of and enhanced community support.

This study also contributes to the theoretical and practical tourism literature in a variety of ways. In terms of the theoretical implications of interpreting the experience and perceived convenience applying the characteristics of smart tourism technology obtained by evaluating the destination's value [9][26]. Furthermore, the incorporation of IT-based experiences is an important contribution to the tourist literature. In terms of practical applications, the study's findings indicate that this study can assist diverse parties in gaining quick access to information. Based on these findings, it can be concluded that tourist sites should create a dynamic platform that mediates STT in order to respond to visitor demands as soon as possible (2) [8]. According to [2][19], if the travel service experience is enhanced, tourists will appreciate and respond to their travels more positively, which implies it may send a positive signal to the values that tourists have about tourist destinations.

Tourism-Smart Architecture

The system architecture is made up of many system components that work to support the system's operation. When developing mobile apps, the clustering component technique is extremely prevalent. Application designers typically consider organizing components into areas of interest and focusing on the interactions between the various components and how they work together [36][52].

The architecture and design are represented in Figure 2, where the Smart-Tourism application is a code snippet designed to be installed on a tourist's phone. It includes essential travel features such as reading QR/NFC tags, selecting language preferences, identifying location, mapping nearby places to visit, and delivering traveler feedback. Location and tagging services are included in localization. Location services are linked to the Global Positioning System (GPS), which provides the user with their current and nearby location. Wi-Fi/Mobile data connectivity is also available to facilitate Internet access. Tagging service is a QR-code or NFC tag that is put at a certain location and contains a link address to access the information needed, either by watching streaming videos or by receiving textual information about the desired location [53]. The Processing Center Service is in responsible of answering customer queries, supplying required information in a specific format (such as streaming video or textual information), and allowing travelers to provide feedback on their experience.

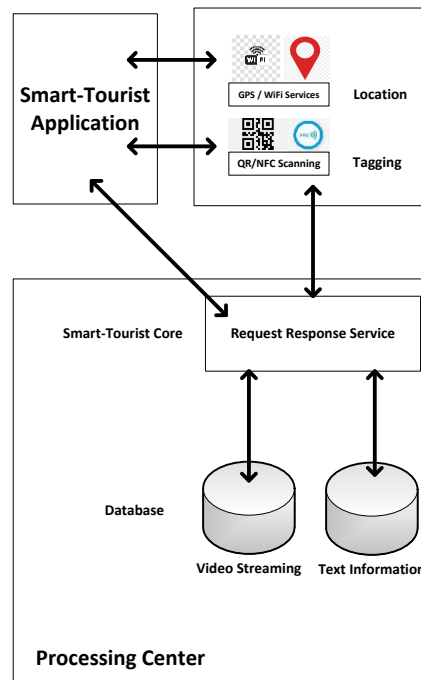


Fig. 4. Tourism-Smart Architecture

Sources: [26][33][32] [37][53]

Smart-Tourism Workflow

The initialization procedures are completed to prepare the Smart-Tourism application for operations; it turns on any existing internet connection (i.e. Wi-Fi or cellular data) as well as a QR code reader, GPS service, and Smart-Tourism apps. The procedures are highly dependent on Telecommunication Network Services, where Bandwidth and Distortion are measured in a certain time unit and required to transfer files of a specific size under certain network issues [54][55].

The next stage is to register, with the goal of encouraging tourists to submit their basic information into the Smart-Tourism database at this phase. In this circumstance, the registration process provides a communication channel between tourists and travel agencies in order to enhance the tourist experience by providing additional customer service in the future based on customer records and feedback [42]. The services available to registered visitors are not restricted; they may demand complete Smart-Tourism system services such as listening to audio, watching videos, reading textual data, and submitting comments. If a user is not registered, the system will prompt them to do so [2]

The Smart-Tourism program will have three categories of users: visitor users, registered users, and admin users, with user functions and services including of: 1) Guest Users, who are only authorized to access a restricted number of Smart-Tourism services, therefore encouraging visitors of all perspectives to register, exchange experiences, and give feedback on their tours in order to develop Smart-Tourism services based on traveler feedback. 2) Registered Users who can access the entire Smart-Tourism system and provide feedback. 3) Administrator users who can operate the system, add, edit, and remove Smart-Tourism data, create reports, calculate statistics, and maintain the system. Administrators can, in short, monitor system performance and manage system access. Smart-Tourism may also assist administrators with various types of analytics, such as the number of videos played, the peak time of video playback, the most frequently used videos, and so on. 4) Reset credentials, where registered tourists may update their basic personal information and reset their passwords.

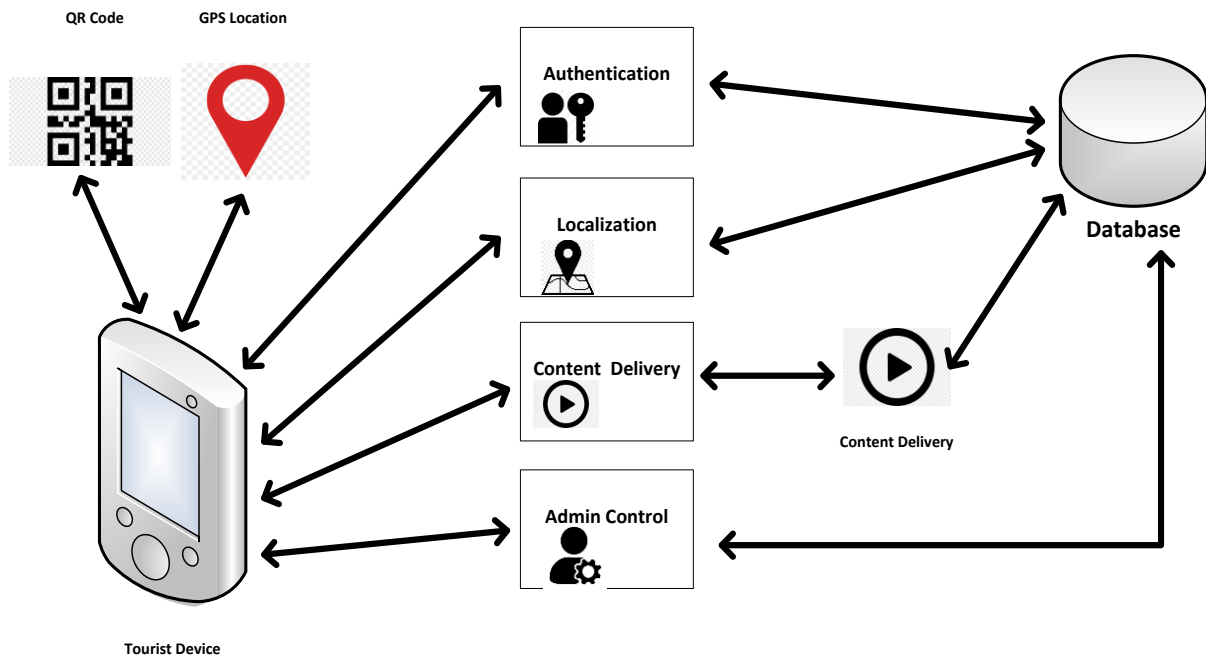


Fig. 5. Service Architecture

Sources [26] [53]

4. Conclusion

The use of technology in tourism activities changes the customer experience and results in a tourist destination business model. The Smart Tourism concept, when applied, allows tourists to communicate and interact more effectively, and it relates to the development of a smart tourism industry. The intelligent tourism activity may also support and promote city development. By adapting the concept of smart tourism to the requirements of travelers before, during, and after their trips, the industry or field will gain a competitive advantage in the eyes of tourists. Furthermore, the application of the smart tourism concept can result in a better tourist experience, improved population welfare, increased the effectiveness of business destination competitiveness, and overall competitive sustainability. The technological advancement (in the form of applications) makes it easier and more convenient for tourists because they feel free to choose and organize what they want, and it benefits the industry (both destinations, hotels, restaurants/culinary, and other fields) because it can reduce promotional costs and speed up the transaction process. It is advantageous and interesting for all participants.

The research also contributes to the practical and theoretical tourism literature. In terms of practical implications, this research will assist tourism managers in developing architectural designs for service tools that will support tourist destination managers in making decisions based on the requirements and preferences of tourists during their travels. In terms of theoretical implications, we broaden our understanding of perceived satisfaction by establishing two distinct ways to determine tourist pleasure in the research model: travel services obtained through the use of intelligent tourism technology attributes and travel experiences obtained via the assessment of destination values. Moreover, the integration of IT-based experiences and destination value experiences contributes to the tourism literatures.

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