

# Smart Tourism Management Framework

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This entry firstly suggests a workable definition for the Smart Tourism Management Framework. Secondly, it presents the key elements of this ST management framework at destination level. It is completed by outlining the current state of academic research in this field and suggesting directions for future research endeavours.

Smart tourism

Management framework

Smart tourists

Smart technologies

Smart businesses

Academic research

## 1. Introduction

Technology has been developing at an unprecedented pace, which fundamentally changes and will continue to change our way of life. In recent years we have witnessed the convergence between the physical and digital worlds supported by sensors that collect data arising from mutual interactions between tourists and destinations. Smart tourism (ST) is one of the exciting technology applications that are shaping the current and future landscape [1][2]. The advancement of information and communication technologies (ICTs) in general, and cloud computing technologies in particular, motivates tourism destinations and suppliers to leverage smart technologies to optimize their decision-making in business planning and enhance the tourism experience. ST refers to the burgeoning phenomenon of the application of ICTs for developing innovative tools and approaches to improve tourism [3].

The concept of ST was inspired by IBM's 'Smarter Planet' and 'Smarter City' and has emerged as a result of the rise of ICTs and the need for sustainability [2]. Smart technologies trigger innovation and leads to higher competitiveness, while ensuring sustainable development. Destinations and businesses from around the globe are collaborating to provide smart experiences to tourists [1][4]. For instance, in 2019 European Union has launched a brand-new initiative 'European Capital of Smart Tourism'. This initiative rewards European cities and gives them the opportunity to share their exemplary practices as smart tourism destinations (STDs). For the purpose of this initiative, a STD is defined as a destination facilitating access to tourism and hospitality products, services, spaces and experiences through ICT-based tools. Furthermore, a STD is a healthy social and cultural environment, which can be found through a focus on the city's social and human capital [5].

Scholars suggest that ST is an ecosystem, formed by a smart business network, smart destinations and a smart technologies infrastructure. This ecosystem creates benefits for the whole system and for each individual. The principles of ST lie at enhancing tourism experiences, improve the efficiency of resource management, maximize destination competitiveness with an emphasis on sustainable aspects [6][7][8]. Gretzel et al. [8] suggest the following

comprehensive and robust definition of ST: "a tourism supported by integrated efforts at a destination to collect and aggregate/harness data derived from physical infrastructure, social connections, government/organizational 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).

From technological perspective, Gretzel et al. [9] argue that ST refers to the competitive advantage resulting from "using a range of smart technologies, such as sensors, beacons, mobile phone apps, radio-frequency identification (RFID), near-field communication (NFC), smart meters, the Internet-of-Things (IoT), cloud computing, relational databases, etc., that together form a smart digital ecosystem that fosters data-driven innovations and supports new business models." (p.173). Femenia-Serra et al. [10] have the opinion that "ST and STDs are new frameworks within which to understand the impact the latest ICTs have on the relationship between businesses, destinations and tourists" (p. 109). Literature also suggests that the appropriate adoption and adequate uses of management methods and tools significantly contribute to achieving sustainable management of tourism resources, which constitutes one of the main aims of smartness [4][8][11].

Based on the above brief discussion on ST, this article suggests the following workable definition for the Smart Tourism Management Framework : "It is a comprehensive and holistic set of approaches, methods and tools from the discipline of management that destinations and other stakeholders should adopt and implement to attain the aims and objectives of smart tourism paradigm at both macro and micro levels". The following sections presents the key elements of this ST management framework at destination level.

## 2. Main Actors/Elements of a Smart Tourism Destination

The ST management framework has rapidly become a leading stream of literature [2][3][7]. Academic research is lately interested in the field and explores the related dimensions, issues and aspects. According to Gretzel et al. [7][8] any destination can be a STD if it consists of the two pillars: Soft smartness (that includes collaborations, innovation, and leadership), and Hard smartness (that refers to all the technological infrastructure). However, the availability of any of the two pillars does not make a destination smart. It depends on the availability of hard smartness which enables improvement of human capital and smart decisions based on the application of technology and infrastructure. Hence, ST requires the following attributes: Technology embedded environments, responsive processes at micro and macro levels, end-user devices, and stakeholders that actively use smart platforms.

The strategic goal of every STD should be to enhance smart tourists to become co-creators of sustainable tourism experiences and co-managers of tourism resources in the sustainable management of tourism assets and resources at the destination [11]. Therefore, the key challenge is how can STDs make tourists co-managers, co-designers and co-creators of tourism experiences. This section outlines the three main elements of ST framework,

**References**  
 1. Gretzel, U.; Reino, S.; Kopera, S.; Koo, C. Smart tourism challenges. *J. Tour.* 2015, 6, 41–47.

## 2.1 Smart Tourists

Smart tourism. In Jafari, J. and Xiao, H. (Eds.). Encyclopedia of Tourism (862-863). Springer: New York & Wien. 2016.

The tourists themselves are one centrepiece of the ST ecosystem, as it has been pointed out by Femenia-Serra et al. [3]. Since last decade, tourist behaviour has undergone a significant transformation because of consumers' use of ICTs for tourist purposes. The advances in ICTs have evolved very quickly with the rapid emergence of user-generated content [4][5][6][7][8][9][10][11][12][13]. The rise of smartphones [14][15][16] in the context of location-aware services [17] and the Hyperlocality of tourism [18][19]. Tourists have become more active, independent, informed and skilled, and have discovered new ways of planning, interacting, evaluating, sharing and recommending. The European Union. Smart Tourism Capital. <https://smarttourismcapital.eu/downloads/guide-for-implications-of-these-changes-have-shaped-a-digital-tourist-1418.pdf>. Accessed on 12 August 2019. EU Commission: Brussels, 2019.

of the IoT, ubiquitous connectedness, the big data analytics and the widespread adoption of mobile devices have influenced new factors, such as, real-time interaction and ubiquitous computation [19][20], new types of technology-mediated social connections, or superior levels of context-awareness [15][21].

7. Gretzel, U.; Zhong, L.; Koo, C. Application of smart tourism to cities. *Inter. J. Tour. Cit.* 2016, 2. Based on identified technology-related factors influencing the tourist in the ST context, the study by Femenia-Serra <https://doi.org/10.1108/IJTC-04-2016-0007>

et al. [10] defines the smart tourist as: "The tourist who, by being open to sharing his or her data and making use of smart technologies, interacts dynamically with smart tourism. Foundations and developments" [10] and personalized smart experience. This tourist is open to innovations, social and pro-active and finds his or her natural environment in the smart tourism ecosystem and the smart destination." (p. 125). The same authors indicate that (i)

9. Gretzel, U. From smart destinations to smart tourism regions. *Invest. Reg. – J. of Reg. Res.* 2018, 42(1), 171-184. the role of smart tourists is crucial; (ii) their behaviors answer to more profound motivations and values, socioeconomic/psychographic traits, life cycle stage and other variables which need to be addressed in detail; and (iii) the smart tourists' behaviors have become a driving force for the development of STDs. They also call for a broader empirical research to further comprehend tourists in the smart paradigm.

11. Shen, S.; Sotiriadis, M.; and Zhou, Q. Could smart tourists be sustainable and responsible as well? The contribution of social networking sites to improving their sustainable and responsible behavior. *Sustainability* 2020, 12(4), 1470; <https://doi.org/10.3390/su12041470> of smart technologies. An interesting study was performed by Gajdosik [22] approaching and analysing smart tourists as a market segment. Author implements a two-step cluster analysis, analysing the characteristics and tourism behaviour of the ST market segment. This segment differentiates in all travel cycle phases. Therefore, management organizations of STDs should create value proposition during all travel cycle stages based on personalization and experience enrichment.

14. Benckendorff, P.; Sheldon, P. J.; Fesenmaier, D. R. *Tourism Information Technology*, 2nd ed.; CABI: London, 2014. Tourists' role and experiences mediated by ICTs are decisive in STDs, and consequently they have to be properly managed in order to attain aims. The strategic goal of every STD should be to enhance smart tourists to change their attitude and adopt a more responsible behaviour. The strategic aim is not about how to better manage tourists; it is rather how can STDs make tourists co-managers, co-designers and co-creators of tourism experiences [6][11]. Therefore, the ST technologies are the tool/medium of achieving that aim.

16. Wang, D.; Park, S.; Fesenmaier, D.R. The role of smartphones in mediating the touristic experience. *J Travel Res.* 2012, 51, 371–387.

17. Buhri, S.; Fransch, M. *Smart City Marketing: A framework for tourism and smart city development*. *Int J Environ Res Public Health*. 2014; 11: 1644–1667.

18. Sotiriadis, M. *Sharing tourism experiences in social media: A literature review and a set of suggested business strategies*. *Int J Cont Hosp Manag*. 2017; 29, 179–225.

19. Xiang, Z.; Magnini, V. *Table 1: Smart technologies and consumer behavior in travel and tourism: Insights from travel planning using the internet*. *J Retail Cons. Serv.* 2015; 22, 1–10.

Form of Smart Technology	Short description	ability
Internet of Things (IOT)	A network capable to process identification, location, tracking, monitoring, and management through RFID, infrared sensor, GPS, laser scanning, and other information sensing equipment, and connect the goods with the network for information exchange and communication.	res.
Cloud computing technology	This technology has two meanings: (i) It refers to the system platform used to construct applications, whose status is equivalent to the operating system on a personal computer, (called cloud platform); and (ii) it describes the cloud computing application built on this platform (cloud application).	on.
Artificial Intelligence	Technology allowing use of computer software and hardware to simulate intelligent human behaviours to effectively process and analyse data and information, and to support decision-making and problem-solving. Examples: Driverless cars, virtual assistants.	urney in .2(10), ultiple and
Mobile communication technology	The technology used for wireless communication allowing wireless real-time connection between systems and remote devices. 5G is the fifth-generation mobile communication technology, much faster and reliable than the previous (4G).	tourism
Mobile devices and applications	Electronic equipment, such as mobile phones and tablets, and the technology connected with them. The mobile internet comprises various different devices and platforms; i.e., smartphones, tablets, in-car systems, and wireless home devices. It includes personal and business applications.	per Os
Big Data	Big data is a term that describes the large volume of data—both structured and unstructured—that inundates a business on a day-to-day basis. Big	er

30. Khan, S.M., Wu, M., Nabi, R., Sharif, R. *Smart city and smart tourism: A case of Dubai*.

*Sustainability*. 2017; 9, 2279.

3		data can be analysed for insights that lead to better decision-making. It is worth noticing that this is exclusively used by businesses, not consumers.	through 015; 015,
3	Ubiquitous connection between Wi-Fi and other networks	A technology that allows electronic devices to connect to a wireless local area network.	3
3	Virtual Reality	A form of information technology which enables users to navigate in computer-simulated environments. VR is a computer-generated environment in which people can experience places and situations as if they were actually present. Example: Virtual tour	Henan destination
3	Augmented Reality	An enhanced version of reality by which people see the real world with a digital display superimposed technology. AR enhances people's current perception of reality and enhances and leverages visitor experience through additional digital content.	ions 2019, indoor 4–253.
3	Intelligent chat robot	A robot able to understand and talk using human language with users.	FC dings of 5
3	Wearable devices	A portable device that can be worn directly on the body or integrated into the user's clothes or accessories. For example, smart watch, smart bracelet, etc.	lication -Image
3	Beacon network	Transparent GIF or PNG images that can be hidden in any web element or email are often used to collect data such as online habits of targeted computer users.	museum

40. Wang, X.; Li, X.R.; Zhen, F.; Zhang, J.H. How smart is your tourist attraction? Measuring tourist preferences of smart tourism attractions via a FCEM-AHP and IPA approach. *Tour. Manag.* 2016, 54, 309–320.

Source: In Shen et al [24] based on various sources [25][26][27][28][29].

41. Sotiriadis, M. (Forthcoming). Cybertourism: Tourist consumer behavior in the cyberspace. In: Yan Zheng (Eds.) *Cambridge Handbook of Cyber Behavior*. Cambridge University Press, Cambridge, UK.

42. Morrison, A.M. *Marketing and Managing Tourism Destinations* (2nd ed.). Routledge: New York & Oxon (UK), 2019.

43. London School of Economics Travel Distributions. *The Evolution of the World's tourism markets* through Consulting & Amadeus: London. 2016.

Their experience [25][28]encyclopedia/entry/1073#180nt potential for co-creation of experiences at both destination and business levels [29][30][31].

## 2.3. Smart Tourism Businesses

Smart tourism businesses are the suppliers of tourism services and value propositions/experience opportunities within the ST ecosystem; in simple terms, suppliers that are adopting and making efficient use of smart technologies. Literature suggests that these technologies have the potential to contribute to asset management and business efficiency improvement and value co-creation [17][22][31]. Smart technologies help tourism businesses and other stakeholders to break through the limitations of traditional data analysis, process huge amounts of data, and produce meaningful and valuable information [32], expand consumers' social intelligence, improve the quality of the interpersonal communication, and make SM more intelligent and effective [31][32].

Literature also indicates that smart technologies promote the resource allocation and cooperation between suppliers/firms and improve the quality of tourism experience [33]. According to these authors [33], the design of smart tourist attraction depends on the integration of these two dimensions. Smart businesses can benefit from big data analysis. When the concept of smartness is applied to the design, management, and operation of tourist attractions, it means that these tourism businesses have moved from the concept to practice [34]. Their strategic aim should be to enhance the co-creation of tourist experiences and to improve the resource management efficiency [33][35]. Only a few studies were performed in this field from a supply/destination perspective, with a specific focus on the interrelation between tourism destinations and smart tourists and the impact of smart services on tourism experiences.

A number of studies explored this topic from the technology perspective. Smart environments are exploited to rejuvenate consumers' interest in the cultural heritage by guaranteeing really interactive cultural experiences [36]. Hereafter are outlined some studies analysing projects/initiatives that were designed and are taking place in other countries, especially in Italy. The paper by Ceipidor et al. [37] presents the design of a mobile multimedia guide for the visitors of the Wolfsoniana Museum, Genoa, Italy. Their study is based on the assumption that the visitor experience could become more interactive and engaging through a mobile application implementing along with smart technologies. Authors discuss an application of Usability and User Experience (UX) of Near Field Communication (NFC) technology applied to the cultural tourism field. Another study by Chianese et al. [38] outlines and discusses a location-based application, called 'Smartweed', developed within a high technology district for cultural heritage management. The project was aiming at exploiting several location-based services and technologies to craft a smart multimedia guide system able to detect the closest artworks to visitors, make them able to 'tweet' and 'talk' during their visit and be capable of automatically telling their stories using multimedia facilities. Moreover, the project deployed some sensors that allow the visitors' mobile devices—by using Wi-Fi technology—to detect the closest artwork in a museum context. The study by Amato et al. [39] presents a project, named Talking Museum and developed within the same technology district (cultural heritage management). The project exploits the IoT technologies in order to make objects of a museum exhibition able to "talk" during the customer's visit and capable of automatically telling their story using multimedia facilities. As a case study, these

authors used an example of a talking museum as a smart guide of sculptures' art exhibition within the Maschio Angioino Castle, Naples, Italy. The final outcome of both projects should be the facilitation and increased stimulation of visits.

The study by Alletto et al. [36] discusses the design and validation of an indoor location-aware architecture able to enhance the visit experience in a museum. In particular, the proposed system relies on a wearable device that combines image recognition and localization capabilities to automatically provide the visitors with cultural content related to the observed artworks. The smart infrastructure provides localization information, and the system interacts with the cloud to store multimedia content produced/shared by visitors. All the above-mentioned studies illustrate the valuable contribution and utility of smart technologies in making customer journeys more interesting and memorable.

The study by Wang et al [40] is the only one that addressed the issue of evaluation in the context of smart tourist attractions. It takes a consumer perspective and performs a quantitative evaluation of these attractions by identifying tourist preferences and measuring the strengths and weaknesses of a smart attraction. Their study identified the important aspects tourists consider when evaluating a smart tourist attraction and suggested a set of 28 key evaluation items. These attributes were grouped into eight categories, namely: 'smart information system', 'intelligent tourism management', 'smart sightseeing', 'e-commerce system', 'smart safety', 'intelligent traffic', 'smart forecast' and 'virtual tourist attraction'. Their study [40] is a valuable contribution in the sense that it suggests a quantitative evaluation based on tourists' preferences. They point out the imperative for smart tourism projects to have a tourist-centric approach. Thus, tourist attractions should make an optimal use of smart tourism facilities by offering the right smart tourism devices and services that suit tourist preference in the right context and at the right time. The main challenge and key strategic management and marketing aim is to implement smartness in such a way to offer the adequate services and value propositions.

In the same vein, the study by Shen et al. 2020 [24] indicates that there is an imperative for tourist attractions to follow the technological advances and incorporate smart tourism technologies in their management functions for a series of reasons, mainly: (i) To achieve better efficiency and effectiveness in terms of operations and performance; (ii) to become more attractive in terms of offering value propositions, and (iii) to attain a competitive advantage in the market.

The above discussion highlights the key elements of the ST management framework and points out that there is a need for more conceptual and empirical research in the field of ST management framework to apprehend the tourist consumer behaviour in general, and the influence of smart technologies on consumers' experience in specific contexts and settings in particular.

### 3. Current state of academic research

Nowadays, smartness and smart management of tourism destinations and suppliers are becoming a top priority and big challenge. As already highlighted, a key strategic aim of tourism destinations within the ST paradigm is to

achieve efficient, responsible and sustainable use of tourism resources. Inevitably, the growth of ST phenomenon has attracted attention from scholars. Over the last five years, this field has attracted academic interest, with scholars attempting to explore related elements, issues, and aspects [42]. ST is a hot topic that has been gaining attention from academics, the main elements of this research stream are outlined below.

ST is integrated into the idea of service co-creation under Service-Dominant logic (SDL) [3]. The prevalence of Internet of Things (IoT), mobile applications, location-based services, geo-tag services, virtual and augmented reality (VR and AR), SM, and smart devices offers immense opportunities for tourism stakeholders to generate, store, and retrieve big data that serve various purposes. Examples of these applications include tourist experience enhancement, destination competitiveness, and sustainability improvement. Ye et al 2020 [3] conducted a systematic review of 124 related articles on ST and identified ten categories of related articles. The review's results show that the largest proportion focus on the influence of technology on tourists' perceptions, behaviours and experiences. The topics of technology and tourist behavior, perception and experience constituted nearly 40 per cent of all publications, followed by technology adoption, which reflected that the research emphasis on how ST affects individuals remains a top priority. The topic 'Technology and tourists' experience' includes studies related to the effect of technology on tourists' experience.

The study by Shen et al. 2020 [11] argues that STDs should manage their resources in a sustainable way and that smart technologies can make their contribution. Their study's findings indicate that the use of social networking sites influences smart tourists at all three stages of tourism experience (before, during and after) on adoption of sustainable and responsible behaviour, the most significant influence is at the first two stages. The second study by Shen et al 2020 [24] takes a consumer behaviour perspective with a specific focus on the visit cycle (prospective, active, and reflective phases), based on the theoretical foundations of 'customer journey' model. The study focuses on tourist attractions with the aim at exploring how smart technologies influence the customer journey. This investigation allows us to get insights into consumer behaviour, which is useful for tourist attraction to become 'smarter'. The study's findings indicate that smart technologies have an influence on the customer journey at all three phases, the most significant being at the prospective and active phases, without neglecting the reflective one. It is worth pointing out that early studies tended to focus more on technologies and devices.

Ye et al [2] indicate that since 2017 a shift toward big data analytics, experiential marketing, and service innovation was found. Despite the proliferation of the pertinent literature, the research development in this realm is still at its infancy. It is believed that ST will experience remarkable growth in decades to come [3][41].

Sotiriadis [41] suggests that the leading researchers in the area of ST are (in alphabetical order): Namho Chung, Francisco Femenia-Serra, Ulrike Gretzel, Chulmo Koo, Barbara Neuhofer, and Zheng Xiang. Regarding the theories used, some scholars viewed ST initiatives through the SDL, which appears to be an important theoretical foundation for understanding the implications of ST. In addition, existing behavioural models such as the Technology Acceptance Model, Theory of Planned Behaviour , and Technology Readiness and Acceptance Model were used as theoretical foundations to examine tourist behaviours of ST. Methods used were varied and ranged

from case study, conceptual paper, to methodology/technology-driven research and behavioural model building study [3].

A large number of themes and approaches has enriched current research into the close links between ICTs and tourism in the recent years. However, topics are still in infancy. Future research initiatives could consider some pathways/directions. Sotiriadis [41] argues that the potential for future research could be classified into two main realms: Consumer behaviour and Technological developments/advances, obviously the two domains are closely interrelated and interconnected. Tourism and travel are witnessing a consumer revolution, enhanced mainly by the technological advances. The combination of mobile devices, big data and AI and other enabling technologies is set to revolutionize the consumer experience [42]. A new world, driven by consumer expectations influenced by mobile virtual assistants, chatbots interacting with SM conversations among friends and peers, and making suggestions, VR and AR replacing/substituting physical experiences [43]. Research is necessary in profiling the future tourist consumer, motivations and influences. These developments require more holistic and all-encompassing approaches in terms of academic research. A better understanding of ST demand, more academic initiatives should be dedicated to elucidate tourist preferences of ST [3][41].

Moreover, the evolution of technology and its applications to tourism and travel are very fast-moving. SM and other Web 2.0 platforms have become extremely important in the digital and smart tourism domain and have considerable effects on tourist consumers. This research realm offers potential of future endeavours in terms of interaction and engagement, co-creation of experiences and in terms of various mediating factors such as generations and user contexts [41]. The effects of ST on tourists should be explored carefully. Prior research mainly focused on the positive consequences brought by ST. Studies are equally needed to verify ST's potential positive and negative effects on an individual's fundamental psychological state, well-being (e.g., life satisfaction, happiness, and loneliness), and behavioural changes in social life. Scholars may consider contextual and psychological moderators that may contribute to a deep understanding of the effects. Additionally, the potential negative effects of ST on tourists (i.e. alienation, authenticity, and customer's privacy protection) should receive more academic attention and be further investigated [3].