© *Investigaciones Regionales – Journal of Regional Research, 42 (2018) – Pages 129 to 150*
Section ARTICLES

Journal of Regional Research Investigaciones Regionales

Smart tourism experiences: conceptualisation, key dimensions and research agenda

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ABSTRACT: «Smart tourism» has gained momentum in research fostered by the revolution of the latest generation of information and communication technologies and has rapidly become a leading stream of literature. The concept has permeated governments and the business sphere and has been accompanied by the quest for developing smart devices, services and tourist destinations. However, experiences as the main focus of smartness development in tourism and destinations have received comparably little attention in *the smart discourse.* Smart destinations, as new ecosystems backed by concrete geographical contexts, facilitate the co-creation of a rich, technology-based, smart tourism experience (STE). Yet, a clear definition and examination of the dimensions of what constitutes a smart tourism experience is still to be developed. This paper aims to discuss the main core precedent constructs of STEs, namely: *a)* technology enhanced experiences and *b)* smart destinations, to underpin a holistic definition of a smart tourism experience. Based on an in-depth literature review, a novel conceptual model for this concept is developed and an agenda for further research is proposed drawing on the identified key themes and dimensions of this construct. By mapping out smart tourism experiences and providing real examples, this research contributes to the theoretical foundations of smart tourism and tourist experiences.

JEL Classification: L83; O32; R1.

Keywords: smart tourism experience; tourist experience; smart tourism; smart destination; co-creation; research agenda; smart tourism destination.

Smart tourism experiences: conceptualización, aspectos clave y agenda de investigación

RESUMEN: El llamado «turismo inteligente» ha ganado relevancia impulsado por la revolución que han supuesto la última generación de tecnologías de la información y la comunicación, convirtiéndose rápidamente en una destacada co-

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Received: 30 june 2018 / Accepted: 05 october 2018.

rriente de investigación. El concepto ha permeado gobiernos y ámbito empresarial y su consolidación ha ido acompañada del desarrollo de dispositivos, servicios e incluso destinos turísticos inteligentes. No obstante, *la experiencia turística,* como mayor preocupación y motor de desarrollo del turismo inteligente, ha recibido relativamente escasa atención en el discurso *smart*. Dentro del mismo, los destinos turísticos inteligentes son entendidos como un nuevo ecosistema, basado en un espacio geográfico determinado, que facilita la co-creación de experiencias turísticas inteligentes. A pesar de ello, no existe hasta el momento una definición clara de lo que supone una experiencia inteligente, ni tampoco de sus dimensiones. Partiendo de esta realidad, el presente trabajo tiene como objetivo llevar a cabo una discusión sobre los constructos teóricos precedentes de la experiencia turística inteligente (*smart tourism experience*), a saber: *a)* las experiencias mejoradas tecnológicamente, y *b)* los destinos inteligentes, con el fin de desarrollar una conceptualización holística de la misma. Asimismo, se propone un modelo conceptual para la experiencia inteligente y una agenda de investigación futura. A través de la nueva conceptualización ofrecida y la ejemplificación de la misma a través de casos reales, el presente trabajo contribuye a los fundamentos teóricos del turismo inteligente y de las experiencias turísticas.

Clasificación JEL: L83; O32; R1.

Palabras clave: experiencia turística inteligente; experiencia turística; turismo inteligente; destino inteligente; co-creación; agenda de investigación; destino turístico inteligente.

1. Introduction

In the past few years, a novel and global stream of research has emerged under the umbrella of the popularised «smart» tag, applied not only to technological artefacts and buildings (Snoonian, 2003), but also to cities (Caragliu, Del Bo and Nijkamp, 2011; Chourabi *et al.,* 2012; Komninos, Pallot and Schaffers, 2013) and increasingly to tourism (Gretzel, Werthner, Koo and Lamsfus, 2015). In general, the notion of smartness advocates the application of technological advances and automation to increase efficiency, save costs and offer more sustainable and enjoyable solutions. In tourism, the application of smartness principles is primarily aimed at enhancing the tourist experience through state-of-the-art technologies and big data exploitation in order to facilitate stakeholder value co-creation across the smart service ecosystem (Gretzel, Sigala, Xiang and Koo, 2015; Xiang and Fesenmaier, 2017). Smart tourism propositions to date have generated great expectations (Gretzel, Werthner *et al.,* 2015) and have found its most fruitful application in the discourse surrounding smart destinations (Buhalis and Amaranggana, 2014; Lamsfus, Martín, Alzua-Sorzabal and Torres-Manzanera, 2015), and new realities and business landscapes still under construction (da Costa Liberato, Alén-González and de Azevedo Liberato, 2018). However, despite the recent attention that the smart tourism literature has received, the impact of information and communication technologies (ICTs) is not new or unacknowledged in the field. ICTs have completely disrupted the tourism system (Ip, Leung and Law, 2011),

from businesses operations to customers behaviours, and also destinations as the main encounter space. This revolution together with an accelerated globalisation movement, has resulted in a compression of time and space and a de-differentiation of social spectrums (Cohen and Cohen, 2012). As a result of ICTs integration, the barriers between life and travel, home and away, work and leisure, and daily life and tourist experiences have been blurred (Uriely, 2005). However, the era of smartness goes one step further in the recognition of the impact of ICTs in tourism.

In this context, two elements have gained particular attention in recent years within tourism and ICTs research: smart tourism destinations and tourist experiences. On one side, while the notion of «e-destination» is still valid (Buhalis, 2003), the debate goes beyond the implementation of ICTs within destinations towards a «smart destination» that encapsulates a holistic shift of destinations for becoming fully immersed in the current technological change (Boes, Buhalis and Inversini, 2015; Buhalis and Amaranggana, 2014; Jovicic, 2017). In terms of experiences, major changes can be observed due to the proliferation of ICTs. Experiences have been mediated, extended and enhanced due to ICTs and their influence on the entire customer journey (Neuhofer, Buhalis and Ladkin, 2012; Tussyadiah and Fesenmaier, 2009). This change means that the rapid adoption of certain technologies has shifted from the usual study of the business-centred transformative power of technology, to a more user-centred approach.

Nonetheless, the discussion of smart destinations on one side and experiences on the other side, have followed to some extent separate paths in research. Most studies to date in the stream of smart tourism have focused on the necessary theoretical development (*e. g.,* Boes *et al.,* 2015; Buhalis and Amaranggana, 2014; Femenia-Serra, Neuhofer and Ivars-Baidal, 2019; Gretzel, Sigala, *et al.* 2015; Gretzel, Werthner *et al.,* 2015; Jovicic, 2017; Lamsfus *et al.,* 2015; Li, Hu, Huang and Duan, 2016), single or multiple smart destinations case studies (Boes, Buhalis and Inversini, 2016; da Costa Liberato *et al.,* 2018; Del Vecchio and Passiante, 2017; Khan, Woo, Nam and Chathoth, 2017; Micera, Presenza, Splendiani and Del Chiappa, 2013), or concrete technological applications in the smart context (Park, Lee, Yoo and Nam, 2016; Sedarati and Baktash, 2017). However, the tourist experience, despite being a core construct of smart tourism and destinations, has been partly overlooked in applied works with some exceptions (Buonincontri and Micera, 2016; Femenia-Serra, Perles-Ribes and Ivars-Baidal, 2018). It is based on this rationale that this paper seeks to explore the smart tourism experience (STE) concept in more depth to facilitate future empirical contributions. There is a need to better delineate the real scope of the STE and to delve into aspects on how a smart tourism experience is co-created and what kind of environment is needed for such an experience to emerge. Departing from the above-mentioned gaps in literature, the aim of this paper is to outline the main themes and current research on tourist experiences in smart contexts and to propose future directions of inquiry in this field. This is done by bridging the literature around technology-mediated tourist experiences and smart destinations. This paper contributes to literature in that it offers a holistic definition for STEs, a conceptual model and sets out to offer directions for further research.

The paper is structured as follows. First, we offer a synthesis of the main theoretical themes which are currently being addressed by academia in the two main theoretical streams that underpin the STE, namely: *a)* tourist experiences and ICTs, and *b)* smart destinations. Following this, a definition of the smart tourism experience and its dimensions is proposed and captured in a conceptual model. Finally, a research agenda is provided based on the detected research gaps and some examples of real best practices in the facilitation of STEs are offered, together with the final conclusions.

2. Tourist experiences and ICTs: state of the art

2.1. The tourist experience, under constant evolution

The «tourist» and the «tourist experience» are core constructs in tourism research and occupy a central position since the 1960s, with the advent of the first studies devoted to the nature of experiences in a broad-brush and critical fashion (Boorstin, 1964), evolving progressively towards more complex interpretations (MacCannell, 1976; Turner and Ash, 1975). Cohen's phenomenology of tourist experiences (1979) marked a turning point for acknowledging diversity within experiences, and his following work deepened our understanding of motivations, attitudes and behaviours of tourists (Cohen, 1984, 1988) consolidating the sociological foundations of tourists and their experiences. In the 1990s, the subjectivity of experiences and their sensorial dimensions appear gradually within postmodern research, while the differentiation between routine, work-driven everyday life and leisure time starts to blur and positivistic approaches seem insufficient to capture individual experiences (Ryan, 2000; Uriely, 2005; Urry, 1992; Urry and Larsen, 2011).

The need to provide tourists with unique experiences was further acknowledged with Pine and Gilmore's (1999) «experience economy» concept, which posits that companies need to stop simply delivering goods and services, to start engaging customers in a more personal way staging unique, memorable experiences. These experiences are not unidirectional, but rather co-created between the company and the consumer. As Prahalad and Ramaswamy (2004a) argue, consumers realise they want to interact with companies and co-create value, breaking the company-centred traditional market and opening a new era of interaction in which all stakeholders are empowered thanks to the possibilities ICTs offer (Neuhofer, Buhalis and Ladkin, 2012). This way, the co-creation of experiences represents a highly relevant concept for tourism and experience research (Prahalad and Ramaswamy, 2004b; Binkhorst and Dekker, 2009).

The constant quest for these experiences has given rise to a new «creative tourist class» for which the pursuit of experiences and the creation of value and meaning through them is a vital part of living and travelling (Gretzel and Jamal, 2009). Still, while a great amount of intellectual efforts have been put in the experience concept itself during the last years (Quan and Wang, 2004; McCabe, 2005; Mossberg, 2007;

Prebensen and Foss, 2011; Tussyadiah, 2014; Uriely, 2005; Volo, 2009; Walls, Okumus, Wang and Kwun, 2011) there exist a wide range of different conceptualisations around tourist experiences. As argued by Uriely (2005), «the tourist experience is currently depicted as an obscure and diverse phenomenon, which is mostly constituted by the individual consumer» (p. 209). Further definitions emphasise the subjective and plural nature of experiences. Tung and Ritchie (2011, p. 1369) for instance, define it as «an individual's subjective evaluation and undergoing (*i. e.,* affective, cognitive, and behavioural) of events related to his/her tourist activities which begins before (*i. e.,* planning and preparation), during (*i. e.,* at the destination), and after the trip (*i. e.,* recollection)». In line with this, Walls *et al.* (2011) conceptualise the tourist experience as depending on a combination of internal and external factors, such as the individual characteristics, situational factors, physical elements and the human interaction ones. In a similar fashion, Tussyadiah and Zach (2012) deconstruct tourist experiences in four general dimensions: 1) sensory and physical, 2) affective, 3) cognitive and perceptual and 4) social, and one particular for their study context (*en-route*). This way, experiences are multidimensional, involving tourists «emotionally, physically, intellectually and spiritually» (Mossberg, 2007, p. 61). These complementary dimensions of experiences are fussed, interpreted, and maybe translated into durable memories by individuals (Volo, 2009).

2.2. ICTs mediating experiences

Tourists have become «prosumers» and have now technological tools to construct and reconstruct socially their experiences (Gretzel and Jamal, 2009). This has forced businesses, but also destinations, to adapt to a new era of tourist experiences. ICTs have «mediated» the tourist experience in the sense that they have transformed how we interpret the places we visit and socially construct our experience in its three phases (before, during and after the trip) (Tussyadiah and Fesenmaier, 2009; Wang, Park and Fesenmaier, 2012). Some particular ICTs have had a decisive role in mediating experiences, as they have been widely adopted by users, companies and destinations. Social media is one of many examples. They actively support the sharing of personal experiences with others through comments, pictures and videos and other user-generated content (UGC) (Xiang and Gretzel, 2010). Users share their experiences in these media in order to help potential consumers and relatives, or keep tight and endurable social connections, among other motivations (Munar and Jacobsen, 2014). A second major driver of change in this scope has been mobile technology. Smartphones have greatly mediated tourism experiences due to their manifold functions that have allowed tourists to feel better connected, informed and to have more fun while getting higher value (Wang, Xiang and Fesenmaier, 2014). Supported on these devices, augmented reality applications (Yovcheva, Buhalis and Gatzidis, 2013) and mobile apps (Wang *et al.,* 2012) can enhance tourist experiences as well.

But apart from mediating experiences, ICTs have allowed co-creating experiences between tourists, businesses and destinations. The role of technology for co-

creation has been progressively acknowledged as an underlying mechanism for the creation of enriched experiences for travellers (Binkhorst and Dekker, 2009; Prahalad and Ramaswamy, 2004b; Prebensen and Foss, 2011; Sfandla and Björk, 2013) only recent contributions have examined the role of technology on the co-creation of tourism experiences (Gretzel and Jamal, 2009; Neuhofer *et al.,* 2012), and emphasised its relevance within the smart tourism discourse (Del Vecchio, 2017; Femenia-Serra, Neuhofer and Ivars-Baidal, 2019; Gretzel, Sigala *et al.,* 2015; Wang, Li and Li, 2013).

Thus, two aspects stand as critical in research on tourist experiences and ICTs: the technological mediation of experiences, and the co-creation of experiences through technologies. The fusion of both streams has given rise to the «technology enhanced experience», a novel theoretical approach which has been lately combined in research with the advent of the cutting-edge smart technologies and their implications over experience.

2.3. Technology enhanced experiences and the advent of smart technologies

Technology enhanced experiences play a particularly important role as one of the building stones of smart tourism. Neuhofer *et al.* (2012) explored technology mediation in the destination context and shaped the notion of technology enhanced destination experiences. They argue that through the integration of ICTs and co-creation, experiences do not only happen in the physical domain on site, but in online virtual spaces at the same time. For destinations this means that a network of actors become interconnected in the destination ecosystem to facilitate and co-create experiences around a particular tourism destination (Neuhofer *et al.,* 2012). In order to co-create more personalised experiences for and with tourists, Neuhofer *et al.* (2015) define requirements of smart technologies for experience creation. First, ICTs need to allow for information aggregation, meaning that they need to have the capacity to collect and store information about tourists in a central platform. Second, the authors point out the need for ubiquitous mobile connectedness, suggesting that experience creators and stakeholders need to be connected in a system to facilitate personalised experiences, dynamically «on the move». The third requirement regards real-time synchronisation, which builds on connectedness and the ability of the ICTs infrastructure to transmit and exchange information in real time to facilitate experiences that meet the tourists' needs in the right context at the right time (Neuhofer *et al.,* 2015).

Technology enhanced experiences are inherently linked to the destination as a physical co-creation space (Neuhofer *et al.,* 2012). However, since the advent of the concept, and because of the rapid emergence of new technologies, perspectives around destinations have evolved and encapsulated in the novel smart destination approach (Jovicic, 2017). Besides, while some technological antecedents and requirements around personalised and co-created experiences have

been defined (*e. g.,* Neuhofer *et al.,* 2015), it appears that the diversity of smart technologies applicable to experiences in the smart tourism phenomenon is still to be defined on a more granular level. The smart tourism phenomenon brings new perspectives on technology-mediated experiences to the surface that are yet to be addressed.

3. Smart destinations: a new context for experiences

3.1. Smart destinations: New local and technological ecosystems

Smart destinations have been characterised by scholars in many different ways. It is generally agreed that they find their roots in the smart city concept foundations. A smart city is defined by Caragliu *et al.* (2011) as the city in which the «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. 50). Gretzel and Sigala *et al.* (2015) consider that smart destinations apply these principles not only for residents but also for tourists, and highlight the embedment of a technological infrastructure into the physical space of destinations. In a similar vein, the Spanish innovation fostering agency Segittur argues that smart destinations employ state-of-the-art technology to improve their performance in sustainability, innovation and accessibility (Segittur, 2015). These holistic perspectives, while needed, risk being utilised as rhetorical discourse rather than a real and applicable approach. Nevertheless, smart destinations differential factor and value proposition is an intensive use of latest ICTs to improve tourist experiences and destination competitiveness (Buhalis and Amaranggana, 2014). Other definitions of smart destinations emphasise different aspects, such as innovation, knowledge transfer and mobility in these contexts. Still, the technological component is always present as a key feature of the smart destinations. In these spaces, ICTs become transversal and are present in all the elements, in addition to facilitating the dynamic interaction among the different stakeholders (Gretzel, Werthner *et al.,* 2015). A core trait of a smart destination is the use of ICTs to facilitate tourism-related data interchange among the destination stakeholders, in which DMOs are expected to play a critical role (Jovicic, 2017). ICT-based dynamic connection of all stakeholders (Ivars-Baidal, Celdrán-Bernabeu, Mazón and Perles-Ivars, 2017) and intelligent decision making derived from an advanced use of big data (Del Vecchio, 2017; Xiang and Fesenmaier, 2017) constitute key principles of smart destinations.

However, smart destinations are lately going beyond mere theoretical proposals and are progressively acknowledged as a valid destination management approach in many destinations, which are actively applying smart principles in their management (Femenia-Serra, 2018). This is the case in many Spanish cities, where policies are encouraging the creation of big data platforms and the active interchange of ideas through the implementation of the first smart destinations network.

3.2. Tourist experiences centrality and technological solutions in smart destinations

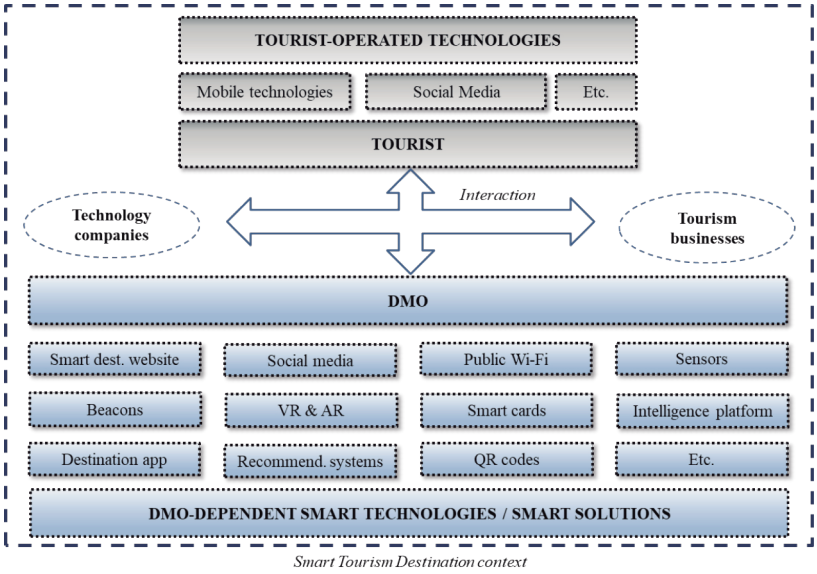
A major objective of smart destinations is enhancing tourist experiences through higher personalisation of services and products (Buhalis and Amaranggana, 2015) and a dynamic joint value co-creation (Boes *et al.,* 2015). This aim is fulfilled by a combined use of technologies and the integration of tourism big data from different sources into one central, real-time platform that allows for better decision making and enhanced experiences (Buhalis and Amaranggana, 2014; Xiang and Fesenmaier, 2017). To personalise experiences, getting as much information as possible about travellers is a crucial step. This means that quantifying tourists' feelings and behaviours (*i. e.,* comments on online communities, spatial movement, expenses, activity on social media) will provide valuable insights about their preferences and needs and will open opportunities to tailor services in a real-time and context-aware fashion (Choe and Fesenmaier, 2017).

Being a heavily public-driven approach (Ivars-Baidal *et al.,* 2017), within the smart destination development it is not only businesses that are called to deliver unique experiences through ICTs, but also destination management organisations (DMOs) (Femenia-Serra *et al.,* 2018). These organisations are challenged to plan and implement technological solutions, which benefit both the own destination from a public perspective, and the tourists visiting it. As argued by Ivars-Baidal *et al.* (2017), DMOs can employ several «smart solutions» in order to enhance tourist experiences, and better market and manage the destination. This indirectly implies and benefits the other two main stakeholders to consider: tourism and technological businesses. Figure 1 reflects this spirit and enlightens how DMOs may employ public-driven smart solutions and combine them with widely adopted technologies by users in the smart destination context. Both types of technologies interact dynamically and entangle indirectly technological companies providing infrastructures, and tourism businesses.

As depicted in Figure 1, and following Femenia-Serra *et al.* (2018) and Ivars-Baidal *et al.* (2017), the typology of technologies available to be used in a smart destination varies from the previously mentioned social media and smartphones and other mobile technologies, which are rather dependent on the user to be activated, to those which depend on the infrastructure provided by the DMO. These are referred to in literature as *smart solutions*, and encompass more established technologies (*e. g.,* public Wi-Fi, destination official website or mobile apps) to more contemporary ones (*e. g.,* virtual and augmented reality tools, sensors, beacons). Their potential to be used at smart destinations for enhancing tourist experiences has been emphasised by several scholars (Femenia-Serra, Neuhofer *et al.,* 2019; Huang, Goo, Nam and Yoo, 2017; Koo, Yoo, Lee and Zanker, 2016). Through this typology of ICTs, tourists and DMOs interact in the smart destination and actively create the bonds for further experience co-creation entangling technological and tourism-related businesses. However, the interaction between tourists and DMOs through technologies is just one

of the steps in the construction of an anticipated holistic smart tourism experience. Therefore, at this point this paper seeks to take the discussion one step beyond the above-described technology enhanced experiences to conceptualise the smart tourism experience and to explore its main dimensions as well as the main topics to address in forthcoming research.

Figure 1. Smart destinations: Technology typology and interaction



Source: own elaboration based on Femenia-Serra *et al.* (2018) and Ivars-Baidal *et al.* (2017).

4. The smart tourism experience

Together with the review of the relevant literature around its main precedent constructs, an in-depth search was performed in SCOPUS database to look for specific uses of the smart tourism experience (STE) notion by using the keywords «smart touris* experience»; «smart tourism» and «smart experience». A total of 221 documents were found and manually examined to check its content and potential interest for the formulated objectives. After this initial screening, a total of 89 documents were taken as related to the field and some of them considered in the above-provided literature review. From these, around one third were found actually meaningful for defining the concept and taken into account for the following conceptualisation. Three preliminary conclusions were reached from analysis: First, scientific papers employing the concept are rare and recent (*e. g.,* Basili, Liguori and Palumbo, 2014; Chung, Tyan and Han, 2017; Gretzel, Reino, Kopera and Koo, 2015; Gretzel, Sigala *et al.,* 2015; Jovicic, 2017) which is understandable because of its novelty. Second, in some cases the above-mentioned keywords are used be-

cause the inquiry is related to concrete (smart) technological applications with some implications for users' experiences (*e. g.,* Basili *et al.,* 2014; Chung *et al.,* 2017). Third, it appears that contributions have offered limited insights or have used the concept briefly in the wider context of smart tourism or smart destinations. In these latter cases, we find some interesting recent perspectives around STEs. Jovicic (2017, p. 3) for instance argues that «the smart experience component implies technology-mediated experiences of tourists, who not only consume, but also create data that can improve the quality of experiences (*e. g.,* by uploading photos on electronic social media, related to a certain destination)». Similarly, Del Vecchio (2017) considers STEs a result of the development of smart tourism and states that big data is key for building them together with context-awareness and real-time personalisation. Deepening on this idea, Gretzel, Sigala *et al.* (2015) identify smart tourism experiences as one of the three components of smart tourism and referring to the previous work of Buhalis and Amaranggana (2015) and Hunter, Chung, Gretzel and Koo (2015), argue that efficiency and rich meaning are core traits of the STE. For them, tourists need to be co-creators of this experience, using technologies (*e. g.,* smartphones) to become an active part of their development. Similarly, Gretzel, Reino, Kopera and Koo (2015) emphasise the centrality of STEs in smart tourism ecosystem as a shared goal. According to these authors, these experiences are reached through a deep awareness of the tourists' context, a high personalisation, real-time monitoring and an appropriate utilisation of smart technologies. The combination of these elements will lead to the emergence of valuable recommendations for tourists co-created experiences, which are further socially shared (Gretzel, Reino *et al.,* 2015; Neuhofer *et al.,* 2015).

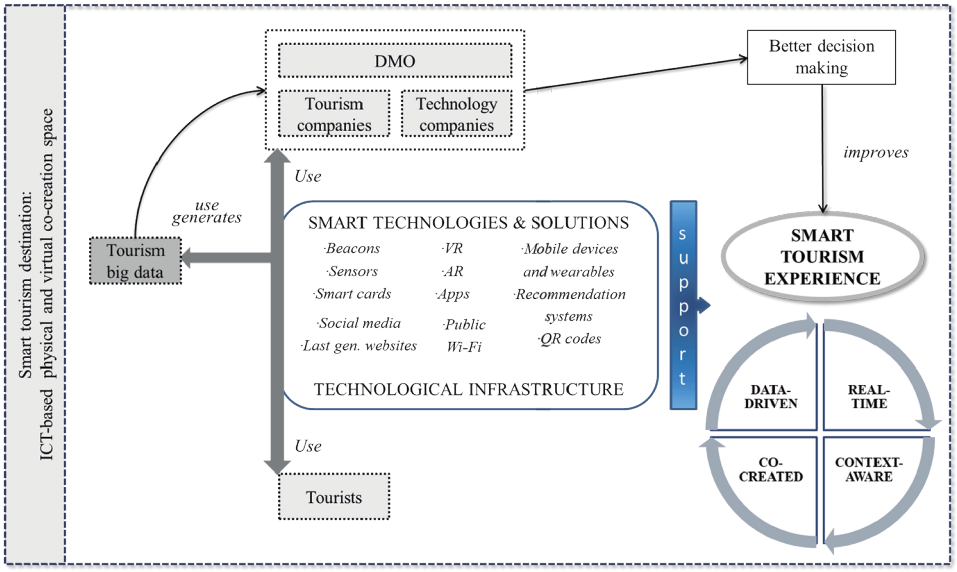
Drawing on these contributions, this paper now further elaborates on the STE and proposes a holistic conceptualisation based on its main characteristics or dimensions. This conceptualisation does intend to be definitive or exhaustive but shall rather serve as a basis for further exploration of the smart tourism experience concept, from a theoretical and practical point of view.

4.1. Conceptualisation of smart tourism experiences

The proposed conceptual model for STEs (Figure 2) offers a global vision of smart tourism experiences and their creation within the context of smart destinations. As mentioned, this conceptualisation further elaborates on previous contributions to come to a better understanding deepen in the different layers of STEs.

Four main dimensions build up STEs and are derived from the technological infrastructure and a close interaction between tourists and the rest of stakeholders at smart destinations. As follows, an exploration of these dimensions of STEs is performed. STEs are:

Figure 2. The smart tourism experience: dimensions and creation in the smart destination context



Source: own elaboration.

4.1.1. Data-driven

Learning about tourists and their behaviour is now more possible than ever before for destinations thanks to the existing information sources and data analysis techniques available to them (Fuchs, Höpken and Lexhagen, 2014). This way, tourism big data can serve as source of intelligence for destinations management and decision-making, for instance in their marketing and policy-implementation actions (Marine-Roig and Anton Clavé, 2015), with a clear impact on travellers' experiences.

Big data is «the blood» of smart tourism (Gretzel, Sigala *et al.,* 2015) and it constitutes the foundation on which the construction of value is based. Therefore, data creation, storing, processing and utilisation emerge as the key steps for STEs construction. In the last years, the introduction of many cutting-edge technologies (*i. e.,* smart technologies and solutions) has fostered an even more user-centric creation of data (*e. g.,* sensors, smartwatches and other mobile devices, use of cloud services...) and has allowed to quantify almost any parameter, opening the possibility to trace tourists' digital footprints in their multiple forms (Choe and Fesenmaier, 2017). DMOs but also businesses in the sphere of smart destinations can use tourists' data to create more personalised experiences thanks to the discovery of patterns, sentiment analysis, prediction of needs and behaviours and construct on these bet-

ter services and products (Del Vecchio, 2017). The personalisation of experiences, as a driving force for smart destinations development (Buhalis and Amaranggana, 2015), is greatly based on the availability and ability to work with data. This constitutes a challenge but also an opportunity to create experiences driven by data at an individual level. STEs are then built up in the collective big data but also in the own individuals' data.

4.1.2. Built in real time

Apart from being data-driven, experiences in smart destinations are constructed in a real-time way thanks to the dynamic interconnection the latest ICTs allow, and the easiness to gain knowledge on tourists' needs and wishes immediately (Wang, Li, Zhen and Zhang, 2016). Interaction «on-the-go', but also marketing based on specific needs of tourists depending on their timing, are great opportunities for smarter experiences in scopes such as gastronomy, transport or hospitality (Buhalis and Amaranggana, 2015). Real-time synchronisation is critical within businesses and in the B2C (*business to consumer*) interaction, and it is precisely the introduction of smart technologies which allows to perform it in a more extensive way (Neuhofer *et al.,* 2015). Thanks to availability of data, now businesses in the tourism sector and also publicly-managed attractions can offer updated information to tourists, such as real waiting times. In the smart destination not only businesses are expected to deliver this real-time experience, but also DMOs enter the experience arena with the application of their smart technologies. The employment of a shared technological platform or intelligence dashboard for decision making by DMOs is much based on the idea of real-time actions for enhancing travellers' experiences (Buhalis and Amaranggana, 2014). Theoretically, this central data centre would be automatically fed by different destination stakeholders: administration-DMO, hoteliers, restaurants, transport companies, museums and other cultural attractions, entertainment and recreation sector, banks, technology companies, etc., and could be the base for making decisions «on-the-go» for issues like tourist flows management, emergencies and maintenance, access to monuments or protected areas as well as to elaborate predictions. This dynamism in decision making is also emphasised by Buonincontri and Micera (2016) when arguing that technologies in the SD support the tourist-suppliers interaction, sharing and active participation. But interaction can even go in this smart context to the tourist-machine level with the development of artificial intelligence and its application in virtual assistants and chatbots, or even robot concierges, who can all provide real-time interaction for a smarter experience. For tourists themselves, having updated information can be critical in some specific situations, such as when navigating the destination, looking for specific information or planning their activities. Thus, real-time use in this context will help to deliver the relevant information to the right person for the right experience.

4.1.3. Based on context-awareness

Understanding tourists' context is critical for delivering the right information and service. However, each tourist and each environment are different. According to Lamsfus, Wang, Alzua-Sorzabal and Xiang (2015), context in tourism is defined by two domains. First, «personal and trip characteristics» entail all individual characteristics (*i. e.,* personality, sociodemographics, values...) and also trip characteristics (*i. e.,* purpose, length, mobility...). Second, the «environment domain» entangles aspects like location or weather but also in the context of travel it includes social factors and different cognitions, or feelings derived from the external context. Depending on the combination of both domains, tourists' needs, particularly of information, will be different and will dynamically evolve as travellers encounter different physical places and social interactions.

Mobile technologies have spurred the development of context-aware systems, and their coupling has been proved to play a critical role in the smart destination, in which relevant information might be facilitated to tourists depending on their location by a given stakeholder (Lamsfus, Martín *et al.,* 2015). In line with this, the progressive development of the Internet of Things (IoT) together with the unstoppable expansion of wireless connectivity at destinations and the use of sensors will create the ubiquitous connectedness that context-aware information systems need to deliver their full potential to experience enhancement (Gretzel, Sigala *et al.,* 2015). Social media have also become a strong pillar in the construction of a smarter experience together with smartphones (Buhalis and Foerste, 2015). The combination of both facilitates more personalised and really context-aware experiences in the sense that the overwhelming information available to all users can be seized down to the individual level. This way, in the smart destination thanks to the ubiquitous connectedness, mobile devices and use of social media it is more possible than ever to advance towards more context-aware experiences.

4.1.4. Co-created

As it can be observed in Figure 2, interaction among stakeholders is basic in the smart destination setting and articulated through a technological infrastructure composed by smart technologies and solutions. Still, technology employment is not enough for developing a full STE. Rather, this technology has to be used to perform a dynamic co-creation of the experience for delivering actual value to all the destination stakeholders (Neuhofer *et al.,* 2012). In the SD, the DMO takes a pro-active role together with businesses and applies the public-owned smart solutions for engaging tourists in a superior level. This way, the data-driven, real-time and context-aware experience is furthermore co-created by the different stakeholders in the SD, including the co-creation between: service provider-tourist, tourist-tourist, DMO-tourist, DMO-service providers (Wang *et al.,* 2013). Thus, value co-creation in the smart

destination is closely linked to the complex ecosystem of stakeholders involved in it (Boes *et al.,* 2016) and the increasingly blurred roles of each of them in the ecosystem (Gretzel, Werthner *et al.,* 2015). In line with this, to take co-creation to a new level, data must be shared, and information silos broken down. Collaboration rather than competition needs to be the philosophy in the smart context depicted in Figure 2.

On another side, while the alliance between cutting-edge technologies and co-creation for better experiences has been proved successful in the domain of hospitality (Neuhofer *et al.,* 2015) destinations are much more complex environments. However, some initial findings from real destinations already suggest that the use of technologies for fostering co-creation in smart destinations has a positive impact on experiences (Buonincontri and Micera, 2016; da Costa Liberato *et al.,* 2018). Additionally, regardless of the specific context, it also seems that younger tourists are particularly predisposed to use certain technologies to further co-create their experience in the context of smart destinations (Femenia-Serra, Perles-Ribes *et al.,* 2018). This could mean a new generation of tourists, prone to use technologies in a higher extend for their experiences, and who will be more open to co-create in all the phases of their trips.

In a nutshell, the STE is a multi-layered type of experience, achievable in ICT-based ecosystems with a dynamic interaction among all stakeholders and with a clear innovative spirit. It is a co-created, data-driven experience constructed on context-aware and real-time way. However, in the current context most destinations do not meet the required infrastructure for this STE to happen. Rather, we find traces of this type of experience and its dimensions in different tourism sectors and destinations where the smart principles are taking form. It is also true that an increasing number of companies and DMOs are evolving towards smarter experience co-creation by innovating in their processes and contact with users. Next, drawing on the dimensions of STEs and the detected research gaps, a research agenda is set and several potential research lines discussed.

5. Research agenda

As follows, this paper sets straightforward research directions for possible future investigations. Considering that research on smart tourism experiences is still at an early stage, this agenda must be taken as an open framework to work on ideas and propositions for advancing in the knowledge of tourist experiences in smart contexts.

In table 1, four main research areas or broad topics to be explored in relation to the STE dimensions, plus one considered as «cross-cutting», are proposed.

Table 1. Smart Tourism Experiences: Research agenda

STEs dimension *General topics*	*Emerging specific research topics*
Data centrality	— Property and access to data (governance). — Capacity of data exploitation and human resources. — Real value of data. — Privacy concerns. — Public-private partnerships in destinations. — Dependence on data providers.
Real-time development	— Stakeholders' action capacity. — Connectivity limitations. — Dependence on mobile technologies. — Response time.
Context-awareness	— Availability of data and access. — Context knowledge and particular conditions. — Diversity of contexts, needs and preferences. — Usefulness/Value of available data. — Privacy concerns.
Co-creation	— Businesses awareness and readiness. — Human resources formation. — Tourists' willingness. — Design of innovative experiences. — Access to smart technologies.
Cross-cutting issues	— Psychological effects of STEs. — Rapid technological evolution: obsolescence and adaptation capacity. — Actual enjoyment assessment. — Digital gaps: young vs. senior tourists; developed countries vs. developing countries. — Implications for environment. — Policies implementation. — Funding of smart solutions.

Many of the proposed research lines to be further explored entangle some of the main challenges and barriers, but also intricate matters that smart tourism experiences conceptualisation has brought to light. Elaborating on the four main identified dimensions of STEs, some common research gaps are found. One of them is the complex interrelationship between private and public entities in the smart destination. In such a changing ecosystem and with roles evolving rapidly in line with technology progress, the specific responsibilities, financial sources and monetarisation options need to be closely considered (Gretzel, Werthner *et al.,* 2015). Related to data centrality and real-time monitoring, privacy emerges as a major challenge for smart destinations, still to be faced. Some evidences already point out to the limited wish of tourists to share part of their private data in exchange of personalised experiences, even among younger generations (Femenia-Serra, Perles-Ribes *et al.,* 2018). Data governance is therefore a major debate point. Moreover, the overload of information and

possible harmful effects of a super-connected tourist experience need to be further examined, as well as the different technology gaps existing between different groups of people, but also in different geographic spaces. Connectivity is not for the moment ubiquitous in every single destination, even though future development of 5G and more wireless networks will help to face this issue. Related to context-awareness and the possibility to implement different smart solutions, it will be interesting to see how different destinations, with their own idiosyncrasy, particular physical configuration and resources, adapt to the smartness era (Ivars-Baidal *et al.,* 2017). In line with this, applicability of smart destinations philosophy in rural, cultural destinations and in developing countries is also a pending issue for research.

6. Implications and conclusions

The above-provided conceptual framework has captured an undergoing shift in experiences and also aims to facilitate to tourism organisations the adoption of actions to cope with and deliver full STEs. Destinations and companies need to embrace this emergent type of experiences and apply the right practices in their marketing and management strategies to do so. To better illustrate this conceptualisation and how STEs are currently being constructed across different tourism industries, now this paper concludes with a couple of real cases which constitute interesting examples of how STEs can be facilitated. These two examples illustrate the implications for companies, but also DMOs, and can provide lessons for them in their facilitation of better experiences by using the right technologies.

One remarkable example of a data-driven, context-aware and real-time experience is offered by technology company *Touring Plans*©. By employing their own patented data processing system, this company offers mobile apps (named *Lines*) for some of the American most popular theme parks aimed at reducing the amount of time spent by users in lines. The apps calculate in real time the expected waiting time in each line for each attraction thanks to their complex algorithm which considers parameters as diverse as unemployment and inflation rates, vacation timing from school systems or price index in different countries. Furthermore, the apps gather back data from real users' waiting times in lines and this way enriches its prediction capacity with historical data from thousands of park-goers. The apps update the information every few minutes, calculate walking times to attractions and design personalised plans for visiting the parks while displaying user-friendly interfaces. This way, the smart experience lived by tourists using Touring Plans apps is built on data and features real-time information for users, making their experience more enjoyable and saving up as much as 4 hours per day in lines (Brown, 2012; Wisel, 2017).

Another good example of how smart tourism experiences can be created also by DMOs is found at the Spanish destination of Palma de Mallorca. The destination smart office, in collaboration with private companies, has deployed in the last years Europe's biggest free Wi-Fi zone in the city main beach, but also historical city and port. Thousands of tourists have already used the network and the obtained data has

allowed the DMO to start using key insights for the destination management and for better tourist experiences, including the control of tourist flows over the most crowded spaces. Thanks to its Wi-Fi, Mallorca knows now demographic information (age, gender, nationality, language) and precise location of users depending on the connection points. This allows the destination a much more context-aware offering of information to tourists and a deeper engagement with them. This way, Mallorca utilises a contextual marketing strategy in its alliance with tourism businesses operating at the city. When using Wi-Fi, tourists accept to receive adverts from close businesses, getting relevant and context-aware information. Wi-Fi availability has also fostered the sharing of user-generated content on social media, facilitating the co-creation of experiences by using common hashtags (like *#VisitPalma*) (SmartOffice Palma, 2018). This results at the end in a co-created and context-aware smart tourism experience for Palma visitors.

These examples of the services provided by a company and a DMO demonstrate how these organisations have successfully released a smart tourism experience to tourists by employing adequately smart technologies and solutions to offer an experience which is data-driven, built in real time, context-aware and co-created. But most of all, these organisations have utilised technologies with the superior end of providing a better experience. This way, other businesses in any of tourism sectors and all DMOs ought to think of how they could improve the experiences they offer and then exploit the potential of using ICTs to facilitate these superior experiences while taking into account tourists' current needs and expectations. Agility in response, higher personalisation and contextualisation are key in smart destinations for the STE to happen. Developing innovative practices like the ones the examples demonstrate might help companies and DMOs to discover their improvement possibilities.

Again, caution must be taken when considering technology for facilitating experiences. Different types of barriers, technology gaps and sometimes the own tourists' willingness, difficult a full adoption of technologies (see Femenia-Serra, Neuhofer *et al.,* 2019). ICTs need to be understood as the means but not the end of the STE. Moreover, it is necessary to further investigate if STEs are actually more enjoyable than «regular experiences» from the very tourists' perspective and to better understand to what extend tourists' involvement is necessary for a full crystallisation of the smart destination paradigm. Research on experiences and tourists' participation in smart tourism requires more efforts (Femenia-Serra, Neuhofer *et al.,* 2019). Smartness is a novel paradigm that fosters a higher stakeholder interaction, acknowledges the increasing relevance of data or the implication of emerging technologies. Nevertheless, the objective has to remain the same regardless of the context: to create more enjoyable experiences.

In a nutshell, the creation, and even more the co-creation, of memorable and superior experiences has become a major *leitmotiv* in tourism and a market imperative for any organisation operating in the sector (Prebensen and Foss, 2011; Walls *et al.,* 2011). The irruption of ICTs has influenced this creation process by mediating experiences (Tussyadiah and Fesenmaier, 2009) but also by allowing to co-create

them in a more extensive degree (Neuhofer *et al.,* 2012). This way, experience design becomes increasingly important in the current context for all tourism organisations (Tussyadiah, 2014). These will need to better understand the kind of experience tourists expect from them and how they can facilitate it at an individual level. In this context, the irruption of the smart destination paradigm has changed the foundations of destinations functioning and has introduced a new philosophy around the role of DMOs in the creation of experiences, calling for a wider implication of these institutions and an advance interaction among all the stakeholders through ICTs (Buhalis and Amaranggana, 2014, 2015; Femenia-Serra, Neuhofer *et al.,* 2019; Gretzel, Werthner, *et al.,* 2015). In smart destinations the availability of smart solutions at the hand of DMOs (Ivars-Baidal *et al.,* 2017) or smart technologies for businesses and users (Neuhofer *et al.,* 2015), creates the perfect environment for the development of smart tourism experiences.

However, to date a clear conceptualisation of what a STE is, its dimensions and its construction was missing. To this end, the present paper has first elaborated on the main precedents of STEs by reviewing the main scientific contributions in the field. Following this, a conceptual model for STEs has been proposed (Figure 2) and the dimensions of smart experiences have been explored and defined. Next, a research agenda has been proposed based on the detected research gaps in the conceptualisation process. Five main research topics or themes have been identified in line with the STE dimensions. To finish, implications and main conclusions have been provided. To further strengthen the implications for companies and DMOs, a couple of examples of current best practices have been referred in this section. Although many barriers and challenges have been also identified and acknowledged here, the progress of technologies and the relevance of experiences in tourism will continue to grow in the following years. It is hoped that this theoretical exercise illuminates further research to better understand how experiences, smart technologies and destinations shape each other.

Acknowledgement: Research carried out within the project «Analysis of planning processes applied to smart cities and smart tourism destinations. Balance and methodological proposal for tourist spaces: Smart Tourism Planning» (CSO2017-82592-R) under the Spanish National R&D&I Plan funded by the Ministry of Economy, Industry and Competitiveness.

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