

# **How Does IT Affect Design Centricity Approaches: Evidence from Spain's Smart Tourism Ecosystem\***

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## **Abstract**

Little or no prior work has examined how information technology enables the development of a design centered digital ecosystem. To examine this research question, we employ a capabilities lens and identify the pathways through which IT drives the development of a design centric smart tourism ecosystem. We analyzed archival data and data collected from interviews conducted in Spain, a country which has embarked on smart destinations projects and topped the World Economic Forum's Travel and Competitiveness Index. From our analysis, we delineate and identify specific IT-enabled capabilities important for a country implementing smart tourism projects. We find that many of the IT resources available help develop key capabilities necessary for creating a design centric smart tourism ecosystem.

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## **Introduction**

### ***Problem of creating a design-centric ecosystem***

Considerable research in the Information Systems area has focused on the importance of IT resources and IT capabilities. Of this, much emphasis has been placed on studying the relationship between IT resources, IT capabilities and firm performance (Banker et al. 2006; Bharadwaj 2000; Sambamurthy et al. 2003). Although scholars in the Information Systems area have focused their attention on understanding this relationship, they have paid much less attention on the relationship between IT resources, IT capabilities and design. While the large number of design science studies suggests that design is a key characteristic of a successful information system, it is intriguing that so far, no study has elucidated how IT resources can actually lead to design objectives and desired outcomes in organizations and more importantly now, digital ecosystems.

It is evident from past research that IT plays a salient role in facilitating this development of digital ecosystems whereby a large number of players are connected with each other (Lusch and Nambisan 2015). For instance, in a digital ecosystem, IT can help to facilitate the exchange of information across different stakeholders and players. With increasing use of information systems in the development of digital ecosystems, how IT capabilities facilitate the creation of a design centric digital ecosystem thus becomes an important question to study. Accordingly, we seek to answer the broader research questions: “What is the relationship between IT capabilities and design?” and more specifically “How does IT resource lead to different design approaches for building a design centric ecosystem?”

The smart tourism context serves as a very good example to help us understand the issues related with technological deployment within and across an ecosystem and what is necessary

for an effective and efficient platform design. In particular, the smart tourism ecosystem constitutes multiple players that interact with one another and are involved to various degrees in the system. These parties include the government<sup>1</sup>, travel agencies, transport and accommodation providers, tour operators, local residents and most importantly tourists. While the area of smart tourism is relatively new (Koo et al., 2017), scholars in the tourism field have already developed useful broad based frameworks for examining smart tourism (Gretzel et al. 2015a; Gretzel et al. 2015b). Smart tourism ecosystem is a “tourism system that takes advantage of smart technology in creating, managing and delivering intelligent touristic services/experiences and is characterized by intensive information sharing and value co-creation” (Gretzel et al. 2015b p. 560). Further, since we are interested in the impact of IT resources on design outcomes in a digital ecosystem, the smart tourism context is an excellent example to examine this impact because of the large extent to which technology is incorporated to develop such a system.

The smart tourism ecosystem can be facilitated with the collection, processing and exchange of tourism related data (Kim, Hlee and Joun 2016, Zhang 2012). From a data driven perspective, several layers contributing to the smart tourism ecosystem have been identified in previous literature (Gretzel et al. 2015a). These foundational layers include: smart destination, smart business ecosystem, and smart experience. The design of a high quality smart experience can be facilitated through data flows across the three layers. However, the literature does not provide much insight into how IT resources facilitate the implementation and development of design centric approaches especially for establishing a design centric smart tourism ecosystem.

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<sup>1</sup> We use the terms public sector and government interchangeably in this paper.

Clearly, the successful implementation of smart tourism requires the active interaction of different diverse stakeholders, processes for integration and processes for technology governance. Among these participants in the ecosystem, the public sector is one very important player in this complex value chain for tourism (Pearce 1998). For instance, the public sector plays a prominent role in formulating tourism policies (Pastras and Bramwell 2013) and providing technological infrastructure (Buhalis and Amaranggana 2014). In fact, many governments in Europe and Asia (e.g. Spain, China and South Korea) have been a major driving force in supporting smart tourism related projects through investments or infrastructure (Hwang et al. 2015; Lamsfus et al. 2015).

There are two objectives we aim to achieve through this research. First, there has been no theoretical grounding which attempts to link IT resources to design centric ecosystems and thus one of the objectives of this study is to build a theoretical perspective using a capabilities approach in understanding how the development of IT resources leads to different design approaches. Second, we would like to address a practical purpose, i.e. to highlight what IT resources are critical for establishing a design centric smart tourism ecosystem. The findings to this question will be able to shed some light on how IT provides capabilities useful to the tourism industry and to delineate what a tourist destination needs for creating value in smart tourism. We apply the capabilities lens to uncover the mechanisms underlying the success of creating and developing a design centric ecosystem. This approach brings forth a processual lens by applying the capabilities lens in the following manner: IT resource accumulation leads to capability creation, and finally to design outcomes.

We study this question through a qualitative approach, conducting and analyzing responses from semi-structured interviews with a broad range of travel related organizations consisting

of both public and private sector organizations in Spain. Spain has recently launched various smart destinations projects. Spain's ascent to become the top ranked country in terms of tourism competitiveness makes it an appropriate country to examine our research question in detail. Our results indicate that the public sector indeed plays an important role in the smart tourism ecosystem and in particular, IT resources promote public sector's capabilities which in turn enables a design centric approach to be deployed with greater ease in various smart tourism initiatives.

This study contributes to the existing literature by delineating the IT capabilities which facilitates the design centric approach. The study responds to calls for research on the effective and efficient development of critical public services, including tourism services, by cities and local governments (Gil-Garcia et al. 2016, Chourabi et al. 2012). In particular, it is one of the first studies to examine how IT helps in enabling a design centric smart tourism ecosystem. We propose a framework consisting of several theoretical propositions that will serve as a building block for future studies examining how IT can be utilized by the public sector in driving design centric outcomes especially in smart tourism initiatives. Further we extend extant studies on smart tourism, establishing the necessary foundational components in smart tourism by gaining in depth understanding of the ways IT resources can impact the design of experience in the smart tourism ecosystem.

## **Conceptual Background**

### ***IT Capabilities and Design***

Many studies linking capabilities to firm performance draw upon the theory of dynamic capabilities, i.e. higher order skills that affect the firms in creating value and responding to

environmental changes which thereby enables the firm to possess competitive advantages (Teece et al. 1997; Winter 2003). This stream of literature suggests that firms that are better able to leverage capabilities to reconfigure assets adeptly and uniquely can have a better competitive edge over its peers (Garrison et al. 2015; Leiblein 2011; Park et al. 2012). Similarly, in the Information Systems literature, it has been suggested that IT capabilities are organizational routines related with the use of IT and are critical to firms. A large body of literature in this field has established the link between IT capabilities and firm performance, in that IT capabilities can drive firm performance (Banker et al. 2006). Similar to these studies, we posit that certain capabilities facilitated by IT may be favourable for establishing a design centric digital ecosystem. While the link between IT capabilities with design centric ecosystems is less clear, there is extant literature and anecdotal evidence to suggest that IT capabilities yield an influence on design outcomes. Yoo, Boland and Lyytinen (2006) proposes that a common set of capabilities that combines ideas, values, resources, tools and people, allows the creation of desired design outcomes. IT resources, being one source of these capabilities, can be mobilized by organizations for design which in turn shape the user experience. This is possibly one of the reasons why large technology firms with a design centric focus, are capable of developing successful products with massive uptake. As another example, IT capabilities afforded by a customer relationship management system which allows for visualization and collection of feedback that can help enhance design outcomes. In general, IT capabilities may have the potential to generate other superior capabilities which will lead to a better designed ecosystem. However hitherto, IT capabilities and design science literatures have developed independently which suggests that a convergence in these two streams of literature could deepen our understanding of how firms can achieve design

outcomes through IT. As such, we approach the problem of developing a design centric smart tourism ecosystem using an IT capabilities lens. To the extent that IT resources is being employed in the development of smart tourism ecosystem, the relationships between IT capabilities and design centric approaches could generate useful insights for understanding how IT resources lead to IT capabilities which in turn affect design outcomes. Our study is the first attempt to link these two concepts.

### ***Fundamentals of Design Approaches for Smart Tourism Experiences***

A critical outcome of a successful smart tourism ecosystem is its ability to develop smart experiences. However, attainment of this goal appears elusive as previous studies find that the usability of tourism products and services has been a persistent problem and tourists often find themselves frustrated and unable to get good information about tourist destinations (Pan and Fesenmaier 2006). As such, tourism scholars have suggested that a design centric approach should be utilized when creating tourism related products or services (Tussyadiah 2014).

In the design literature, there have been several proposed approaches including the popular ones such as user centered design and design thinking. User centered design (Abrams et al. 2004) is essentially a design “philosophy based on the needs and interests of the user” and has an emphasis in making products or services “usable and understandable” (Norman 2002). Several key principles were developed as a result which has been applied in the design of products and services. Generally, design should help the user determine all possible actions at any time. As such, features, actions and the consequences of any action, should be clearly visible to the user and will ensure that a user can evaluate what he or she has to do, and

constantly make assessments of the current state of the destination. Applying a user-centered approach in tourism requires incorporating these principles which enhance the quality of tourists' experiences. The complete list of principles is available in Norman (2002).

Others call for incorporating design methodologies such as design thinking (Brown 2008) into the process of developing products or services. Design thinking refers specifically to a method of designing which is associated with the notion of ideation, rapid prototyping and holistic designs. This approach has caught the attention of other fields and is now applied widely as it has been proven to be an effective way to solve problems or create products. In tourism, design thinking has been applied and studies in this area emphasize on the use of the design methodology in creating new tourist experiences (Stickdorn and Zehrer 2009; Lee, Tussyadiah and Zach 2010).

Tussyadiah (2014) conducted a comprehensive review on the fundamentals of design approaches which may be applied in tourism and summarized design practices into three

**Table 1. Fundamental Approaches in Experience Design** (adapted from Tussyadiah 2014)

<b>Approach</b>	<b>Definition</b>	<b>Goal</b>
Human-centered design	Designing with an in depth focus on user's (or human's) needs, wants, expectations and limitations.	Create a direct link between users' thinking, design factors and the contexts of interactions between users and design.
Iterative designing process	Designing through a cyclical process consisting of many iterations where outcomes of each iteration are used to improve the design.	Enhance the quality and functionality by adaptive learning and fast responses to changes throughout the design cycle.
Holistic experience concept	Designing for user experiences as a complex interaction between design factors and socio-cultural	Elucidate the complexity and richness of experience to create a comprehensive concept that connects customers' intellectual

	contexts where meanings and values are discovered.	experience and the strategic objectives of organizations.
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major categories which we utilize in this study: (i) human-centered design (ii) iterative designing process and (iii) holistic experience concept. See Table 1 for definition and goal for each approach. The first approach, human-centered design, refers to the user-centric approach of designing with the goal of reducing the gulf between the user's internal mental model and the actual context or experience. The second approach of iterative designing process is similar to the notion introduced in design thinking (Brown 2008), where the process of designing is iterative and rapid. The goal of this approach is to increase quality and to enrich the features of the design through rapid prototyping and continuous refinements, in line with Norman's (2002) conceptualization of assuming that errors will always happen, so it is only natural to continuously perform refinements. Finally, the third approach of holistic experience, conceptualizes the notion of human experience as a network of interactions between the design features and sociocultural contexts. In this last approach, the goal is to create a holistic experience where meanings and values surface through the experience.

### ***IT-enabled Capabilities***

Embedding design centric approaches into the smart tourism ecosystem is not a straightforward process. The ecosystem is complex with a large number of participants, tourism suppliers or consumers (Gretzel et al. 2015b), who need to be orchestrated in order to facilitate a design centric smart tourism ecosystem. Smart technologies such as sensors, big data, open data, Internet of Things, RFID and NFC are often implemented and plays a key role in these ecosystems (Dwivedi et al. 2017, Gretzel et al. 2015b, Hashem et al. 2016).

The public sector is a key player in this smart tourism ecosystem, acting as an orchestrator of the interactions between participants and destinations using technology. This is in addition to the role of the government in implementing the technological infrastructure that supports this ecosystem. However, in order to perform this role effectively, the public sector needs to possess certain capabilities. While much research has been done in organizational and information systems fields to examine the different types of capabilities necessary for organizational performance, no previous work has been done to examine the types of IT capabilities necessary for the public sector to orchestrate and facilitate design approaches in smart tourism ecosystems.

In order to successfully differentiate themselves from their competitors, companies often leverage technology to create value. This capability driven by IT is also known as IT-enabled capabilities (Bharadwaj 2000). IT-enabled capability traces its source to the extensive literature in organizational capability (Winter 2003), which refers to the coordination of resources, processes, routines and activities within the organization to generate productive activities of a firm. Previous studies suggest that organizational capability occurs in high performing firms as a result of high-level organizational practices (Winter 2003). In line with these findings, scholars in the Information Systems (IS) area have found evidence of IT-enabled capability, which refers to the ability to “acquire, deploy, combine and reconfigure IT resources” that leads to better organizational performance (Bharadwaj 2000). Several IT-enabled capabilities identified in previous literature include: knowledge management, communication, productivity, innovation and transformation (Grover and Kohli 2012; Gu and Jung 2013; Mithas et al. 2012; Pan et al. 2015). The concept of IT-enabled capabilities has only been recently applied in the tourism sector thus there are relatively fewer studies.

For instance, Cabiddu et al. (2013) find that tour operators are likely to gain better performance if they are more IT-ready, have the capabilities to strategically align different objectives and appropriate value co-created through partnerships. The authors find that the co-creation process is facilitated through IT, which promotes exchange and interaction between different partners to create better value propositions for customers.

Table 2: Definitions of IT resources and IT-enabled Capabilities in Public Sector

<b>Concepts (Pang et al. 2014)</b>	<b>Definition</b>
<b>IT resources</b>	
Digitized administrative processes	Information systems and infrastructure that automate tasks that are administrative or routine.
Public intelligence analytics	Technological tools to obtain and analyze information from stakeholders and the environment to derive knowledge.
Inter-organizational system integration	Integrated systems and technologies that facilitate exchange of information with other organizations.
Online public interactive interfaces	Online and interactive channels such as websites, social media, or mobile channels and the ability to interact with stakeholders through these methods.
Public information dissemination	Infrastructures and channels to publish government related data or information.
<b>Organizational Capability</b>	
Public service delivery	The ability of the public sector “to deliver the maximum possible outcome of public services with as limited resources given by the public as possible”
Public engagement	The ability of the public sector to generate “participation of a broad range of necessary stakeholders in every step of policy formulation and implementation”
Co-production	The ability of the public sector to promote co-production between more than one organization (public sector agency, private firms and other stakeholders) through acquiring the

	necessary resources from partners and “align their competing interests, and coordinate their efforts and activities”
Innovation	The ability of the public sector to recognize the importance of innovation and the ability to lead, initiate and implement valuable and innovative projects.
Resource acquisition	The ability of the public sector to “pursue and build adequate resources needed to initiate and sustain their public-value efforts”.

While IT-enabled capabilities have been well explored in the private sector, research on IT-enabled capabilities in the public sector has been relatively muted, with an exception of Pang et al. (2014). This study suggests that IT resources enable public sector capabilities. IT resources in the form of digitized administrative processes, intelligence analytics, inter-organizational systems, online interactive interfaces and public information dissemination are capable of driving and producing capabilities such as public service delivery capability, public engagement capability, co-production capability, resource acquisition capability and public sector innovation capability (see Table 2 for definitions).

Given that IT-enabled capabilities have the potential to affect the organizational performance of tour operators (Cabiddu et al. 2013), by implication, IT-enabled capabilities of the public sector will potentially influence the smart tourism ecosystem. We argue that IT-enabled capabilities in the public sector are likely to increase design centricity of a smart tourism ecosystem. In examining how public sector helps in the smart tourism ecosystem, it is imperative to understand what are the IT-enabled capabilities that afford design-centered elements in a smart tourism ecosystem. In this study, we employ the characterization of IT-enabled capabilities in the public sector as proposed by Pang et al. (2014) and suggest that these IT-enabled capabilities can impact the smart tourism ecosystem.

## **Research Method**

### *Background on site*

In 2015, Spain topped the rankings in the World Economic Forum's Travel and Competitiveness Index. Spain has received 609 million tourists in 2015 and has been consistently ranked as one of the top five countries in the world in terms of the number of tourist arrivals in the last 3 years. The level of international tourist arrivals has been fuelled partly by a weaker euro and the ongoing recovery of the economy (UNWTO 2016). As such, tourism is a key contributor to Spain's economy contributing more than 10% of its GDP. The conversation about smart tourism in Spain will not be complete without discussing the notion of smart destination. Smart destination refers to the strategy for making a "tourist destination" smart through innovation, technology, accessibility and sustainability (Lopez de Avila 2015). The World Tourism Organization, has made Spain's model of smart destination a key reference for the tourism industry to strive towards the goals of becoming a smart city. Buhalis and Amaranggana (2015) defines smart tourism destination as "requiring stakeholders to be dynamically interconnected through technological platforms to collect, create and exchange information that can be used to enrich tourism experiences in real-time". Technologies such as cloud computing, social networks, internet of things, mobile apps, context awareness technologies have all been described in relation with smart destinations (Lamsfus, Xiang, Alzua-Sorzabal and Martin 2013). In Spain, to be recognized as a smart destination, a location is evaluated in key areas such as the deployment of new technologies, the push for open data, the use of data analytics, and the emphasis on accessibility that demonstrates inclusiveness, sustainability and culture. We identify various smart destinations and smart tourism initiatives within Spain to examine our research question.

### *Data collection and analysis*

Our data collection was conducted via a purposeful sampling of interviewees and extensive archival data to provide a comprehensive view of the tourism sector in this country. The first data set contains a total of 13 semi-structured interviews conducted in the year 2015 with various stakeholders from both public and private organizations specializing in tourism. To ensure a comprehensive analysis and avoid selection bias, we interviewed informants representing the stakeholders participating in the smart tourism ecosystem using the smart tourism destination framework proposed by Boes et al. (2016). According to Boes et al. (2016), stakeholders should comprise of economic, social and technological actors. As such, we select our interviewees such that they come from these categories of actors - the ministry, tourism boards, travel agencies, tourism research labs, tourism technology providers, third party software developers for tourism apps and hotel associations. The directors of each organization who has the expertise in technology and innovation related to tourism deployed in their organizations were interviewed. Details of the individuals interviewed are provided in Table 3. An interview protocol that served as a guideline to questions asked is provided in Appendix 1. The protocol contains questions focused on the technologies adopted in tourism, their impact on the tourism industry, and the government's role in developing the tourism industry.

Secondary data sources were sought, and **140** relevant news articles related to the developments of the tourism industry in the most recent year (January 2015 - September 2016) were reviewed to provide a detailed view in chronological order. We also went over 13 public sector reports, presentations and meeting notes totalling **1281** pages that were prepared for various projects related to strategies and tourism promotion in the country. In

addition, we reviewed all the websites that belongs to the tourism boards and provinces.

Details of the secondary data sources and the rationale for using these sources are provided in Appendix 2.

To obtain further insights into our research question, we triangulated data from multiple sources to ensure construct validity and to deepen our understanding of the themes (Yin 2003). In particular, we checked for the occurrence of smart tourism initiatives and assessed elements such as the technology and partners that were reported. This step ensures that the smart tourism initiatives, the technological resources utilized, and the different partners involved in the projects, were accurately represented. The coding process consisted of two authors tagging text segments of each interview transcript with the coding scheme of public sector capabilities defined in Table 2 with the use of NVIVO. The details of the coding process are provided in Appendix 3 while detailed evidence for the occurrences of each theme is presented in Appendix 4.

Table 3. Profiles of organizations and interviewees

<b>Organi zation</b>	<b>Sector</b>	<b>Description</b>	<b>Number of Interviews</b>	<b>Role of Interviewee</b>
Org1	Public sector	Ministry of Industry, Energy and Tourism	2	Director of organizational unit - Tourism Director of organizational unit – Development and Sustainability
Org2	Public sector	Organization for managing innovation and technology in the tourism sector	1	Director of organizational unit - Innovation
Org3	Public sector	Regional center for tourism management	1	Director of organizational unit - Innovation
Org4	IT	Technology provider for the tourism sector	1	Director of organizational unit - e-commerce
Org5	IT	Technology provider for the tourism sector	1	General Director
Org6	IT	Technology platform and technology transfer center	1	Director of organizational unit - IT

Org7	Business	Online Travel Agency	1	Director of organizational unit - Marketing
Org8	Business	Online Travel Guide	1	General Director
Org9	Business	Hotel Association	1	Director of organizational unit -- Innovation
Org10	Business	Association of tourism businesses (airlines, cruises, hotels, travel agencies, tour operators, credit cards, rent-a-car, tourist hospitals, and GDSs)	1	Director of organizational unit – Research
Org11	Business	Hotel Association Innovation Center	2	General Director Director of organizational unit – IT

## Findings

Our study reveals several pathways by which IT resources, specifically through the capture, exchange and analysis of various data, creates capabilities which helps to incorporate fundamental design elements as described earlier into the smart tourism ecosystem. These principles are useful for creating a design-centric smart tourism ecosystem. We present four major IT-enabled public sector capabilities that facilitate a design centric smart tourism ecosystem.<sup>2</sup>

### **Mechanisms by which IT resources enhance the human centeredness in a design-centric smart tourism ecosystem**

#### ***Public engagement capability enhances human centered approach in the design of smart tourism ecosystems***

A tourist typically starts off by conducting research about the places to visit prior to his arrival. Therefore, it is important that the destination country provides a presence through an online web portal and social media so that a tourist can conduct his research before he arrives

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<sup>2</sup> Resource acquisition capability is not included as there was inadequate evidence from our analysis to suggest that this capability will facilitate design centric approaches.

(Yuan et al. 2016). What makes such IT resources valuable is not just that a lot of relevant content is offered on the site, but also the ability for the tourists to engage with others, be it other tourists or locals alike, who offer useful feedback and suggestions to his itinerary. In Spain, a web portal called Spain.info is developed that is actively managed by Turespaña, an official government tourism promotion agency. The tourism board's social media presence is also managed through various accounts on popular social media sites such as Twitter which increases the points of engagement that the tourism board has with other stakeholders especially potential tourists.

In analyzing the data, we find that key IT resources such as online interactive interfaces (i.e. web portal) and accounts on existing social media platforms, were used in enabling public engagement capability, for the public sector to reach out to different stakeholders. Several web portals have been created and supported by the public sector. For example, Spain.info targets potential tourists from both local citizens and non-residents. Not only does the portal provide a tourist with all the essential information about a tourist destination, it also acts as a single entry point for trip planning by a tourist with a free registered account for all his/her travel needs during pre-trip, during-trip and post-trip. Tour or service providers list their offerings on the portal but with direct links to their own booking websites where the tourist can finalize their reservations. Additionally, the engagement of tourists, help refine itineraries on the portal. In turn, this enhances the ability of the public sector to identify and target new segments of tourists. By segmenting tourists, better marketing and promotional activities can be developed. Innovative offerings can be provided to tourists such that different itineraries cater to different personalities and tastes of travelers. For instance, with information collected

about what tourists like about the country, specialized tours such as wine tours and gastronomy tours can then be developed and publicized on the portal.

In addition, the potential of government portals in facilitating the development of products and services in smart tourism through the exchange of information about tourism experiences among stakeholders and leveraging the data from portals, emerged during the interviews.

*“Within the spain.info portal there is a channel about tourism experiences, and they have developed a technological tool that allows SMEs to upload their experiential packages ... In addition, the spain.info information can be linked to channels from other online travel agencies” (Organization 2)*

*There is an extraordinary opportunity for the government to provide data for the [tourism] sector. Government portals generate market information, trends, motivations, risk factors, information on competitors, information about business opportunities ... Information that can help small business to access the big data and business intelligence (Organization 10)*

The use of portals such as spain.info has given the tourism industry the opportunity to upload their experiential packages, and at the same time, provides SMEs a sense of ownership and participation in managing tourism for the country. Such a portal also facilitates the exchange of information between the government and companies from the tourism sector, which can be exploited in future programs for promoting tourism.

There is much initial resistance to the use of online interactive interfaces from service providers (e.g. travel agents, hotels) due to the risk of having lousy reviews. However, the benefit of using online interactive interfaces provides an improved engagement capability that surpasses this risk. In fact, such engagement of their customers through these channels

helped service providers refine their offerings and which in turn promote customer loyalty and referrals.

Social media, a type of online public interactive interface, also emerged as a key IT resource used by stakeholders in the ecosystem. In 2016, a web portal containing information for the famous pilgrim route to Santiago was launched and a digital guide was available on the portal itself. Multiple channels of engagement including social media sites (e.g. Facebook), mobile apps, and augmented reality services (e.g. the augmented reality service Layar) further drives a design centric approach in creating tourist experience. In particular, PREDIF, the platform for people with disabilities, has been promoting this pilgrim route through social media and providing customized tours for the disabled. In turn, the data collected from these channels are used to promote a human-centered approach in designing the tour experience for this special group of users.

Figure 1 summarises how the IT resources employed in several smart tourism initiatives increased the public engagement capability and enhanced a human centered design approach in the design of product and services. From our analysis, we propose:

*Proposition 1: IT resources increases public engagement capability which in turn enhances a human centered design approach for developing products and services in the smart tourism ecosystem.*

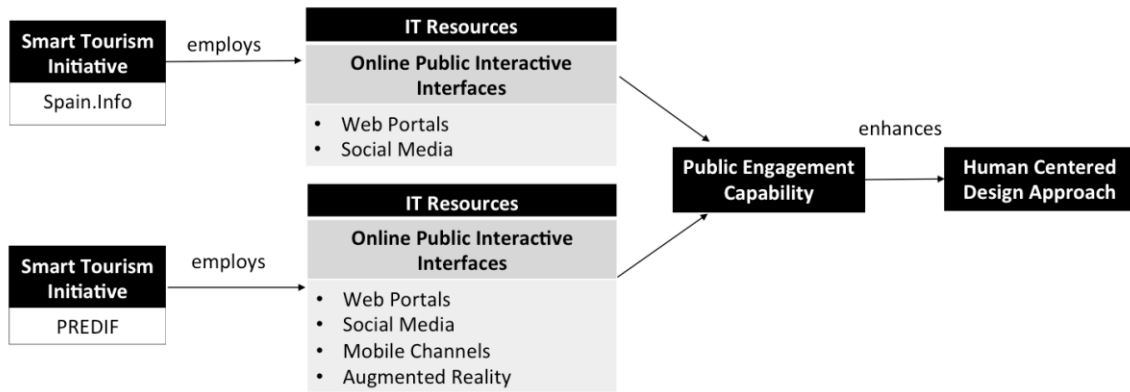


Figure 1. Relations among IT resources, public engagement capability and human centered design approach.

***Public service delivery capability enhances the creation of human centered smart tourism ecosystems***

IT resources in the form of online public interactive interfaces and digitized administrative process systems are key enablers of public service delivery capability. Public service delivery capability refers to the ability of the public sector to deliver the maximum possible outcome of public services with as limited resources as possible. This capability in turn facilitates the addition of human-centered design elements into the smart tourism ecosystem.

Over the years, the Spain government has been improving and centralizing their IT architectures across the entire public sector. During this time, online public interactive interfaces (e.g. web portals) and digitized administrative processes, i.e. information system that is used to automate business processes within the public sector, were being implemented. Such IT resources replaced many of the manual processes within the public sector and promoted coordinated actions across all public sector agencies.

An example to illustrate the public service delivery capability in enhancing the human-centered approach created for tourists is the visa application before the start of the tourist's trip and the tax refund process at the end of a tourist's trip. In the case of the Ministry of Foreign Affairs, this new IT system led to greater efficiency and lower costs of visa approvals for inbound tourists. In the push to increase the number of tourists from countries subjected to visa approvals, the enhanced public service delivery capability improved the speed of visa approvals. Checking the background of visa applicants became easier because individuals' identity and fingerprints can be stored and retrieved electronically in advanced database management systems. This use of database technologies also facilitated the sharing of information between different security agencies or even foreign countries that in the past were difficult or even impossible. The easy access and matching of digital information greatly expedited the checking process and provided a more efficient way to reduce potential risks such as terrorism incidents. Public service delivery capability facilitating a human-centered design approach was also evident. As an example, the cooperation at European level for the visa process has helped the Ministry of Foreign Affairs to work in a coordinated way in compliance with international standards.

*“[We are] taking full advantage of the resources, prioritizing what adds more value to the department ... For example, the Visa Information System, where all countries in the Schengen area work with their own systems, but cooperate with a common European system in real time ... All this obliges us to operate in a coordinated way ... we are all working in compliance [with standards]” (Ministry of Foreign Affairs, archival data)*

From the tourist's vantage point, the introduction of an expedited process for visa application and the online self-application option simplifies the structure of the task of obtaining a visa and reduces the barrier between the tourist and the goal of travel by eliminating complicated manual steps that were required in the past.

At the end of the tourist's trip, tourists can automate their tax refunds using a web portal implemented by the Ministry of Finance. This new system reduces the gap between tourists' needs and execution. In the past, a tourist will have to schedule time in his or her limited travel time frame for submitting tax refunds manually at the airport. Now, because of the portal, the inconvenience experienced by a tourist is eliminated and he/she does not have to worry about this process as part of his or her travel. A public service delivery capability such as a portal allows new features for obtaining tax refunds online to be incorporated in the portal that caters to the needs of the tourists, allowing tourists to enhance their experiences and introduce the element of human-centeredness into the tourist's experience which forms an important basis for the smart tourism ecosystem.

These examples clearly illustrate that public service delivery capability can help to advance the goals of human-centered design that are being manifested in the smart tourism ecosystem. Figure 2 illustrates how IT resources employed in smart tourism initiatives increased the public service delivery capability and enhanced the creation of human centered smart tourism ecosystems. We postulate the following proposition:

*Proposition 2: IT resources increases public service delivery capability which in turn enhances the creation of a human centered smart tourism ecosystem.*

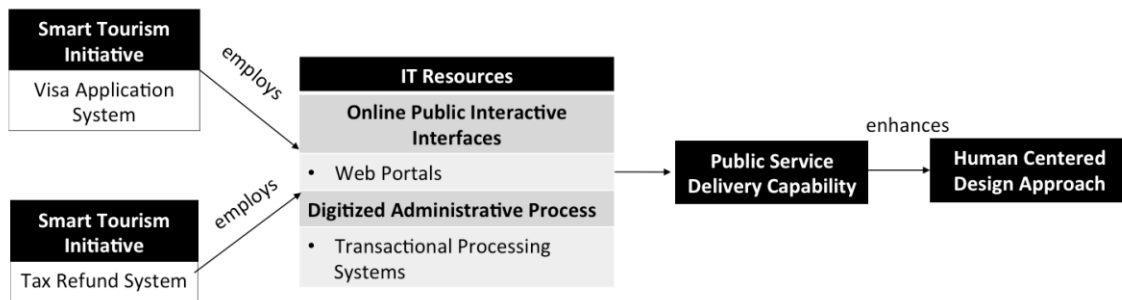


Figure 2. Relations among IT resources, public service delivery capability and human centered design approach.

***Co-production capability enhances a human centered approach for designing smart tourism ecosystems***

Co-production capability is important to a smart tourism ecosystem in facilitating different organizations and stakeholders to come together so as to create the best experience for tourists. Given that no single stakeholder in the smart tourism ecosystem will have all the necessary resources for deploying large-scale smart tourism projects, the co-production capability resulting from the cooperation and coordination of different stakeholders (e.g. forming partnerships) in the smart tourism ecosystem especially the public sector, becomes critical in marshaling resources for developing smart tourism projects. Further, this co-production capability can encourage a far more user centered approach for developing smart tourism products and services.

Online interactive interfaces such as a web portal help to showcase projects which are being developed for smart tourism. This is especially useful for projects that require talents or resources that are not traditionally found in the tourism industry. One example is the “Plan to Promote Language Technologies”, a government initiative that taps on experts in natural

language processing. Through this web portal, experts in this area participated in the development of various smart tourism systems such as that for mining opinions about tourist services and destinations in social networks posted in different languages. This program also accelerated the development of other applications such as the automatic translation of tourist guides and tourist related websites.

The Spanish public sector has a tradition in promoting collaborative efforts for the tourism industry. For instance, during the years 2011 to 2013, the government in Basque region sponsored BaliaTours, an integrated platform for the management of tourism infrastructures. BaliaTours was developed as a collaborative effort between technology-based Basque tourism and leisure companies, as well as members of the Basque Science, Technology and Innovation Network. BaliaTours has configurable parameters to manage, recommend and publish real-time information for tourism facilities and equipment, and to provide advanced services for the tourism providers, users and visitors using content generated from various service providers. It uses the concept of tourism facilities and providers to categorize stakeholders in the tourism value chain, i.e. independent hotels and hotel chains, rural accommodation and resorts, cruise liners, marinas, conference centers, cultural institutions and nature reserves. Each of these stakeholders can generate their own content via this platform (e.g. in the form of offers, special events or discounts) on a timely basis which will be published via an app to tourists.

Such initiatives which involved co-production between the public sector and service providers can be seen as a precursor to many of the commercial products for sharing tourism content in Spain. One example of such products is Synctur, a contextual application that allows tourists to explore real time information of several localities. Tourists are able to

access content that enable them to explore in detail the customs, monuments, routes, environment, entertainment, shops, etc. of all locations available on the system. The collection of localities supported by the application thereby becomes a network of content from which tourists are able to access complementary services enabling tourists to know a location and share their own experiences.

The above examples go in line with the comments expressed by interviewees when discussing about the design and development of systems for smart tourism. They expressed the need for coproduction with content being created by several stakeholders.

*“The axis to develop smart destination systems are, in our view, universal accessibility - for example, public wireless networks, and multidisciplinary - it is essential that we converge public and private companies from different sectors. The challenges include managing data responsibly and in the common interest, and the ability of companies from different sectors to establish alliances that allow them to share their data to provide relevant content for the users” (Organization 6)*

*“[In the development of content sharing systems] the idea is to have a system to manage and organize content ... For example, if the system includes hotels, the hotels have to provide information/content about them ... Each party is responsible for providing its own content” (Organization 6)*

Figure 3 illustrates main findings relating IT resources, co-production capability and human centered design. Overall, we find and posit that IT resources, in the form of content sharing system, public intelligence analytics and online interactive interface, provide and enhance the co-production capabilities that facilitate human centered design approaches for smart tourism projects and services.

*Proposition 3: IT resources increases co-production capability which in turn enhances a human centered design approach for developing products and services in the smart tourism ecosystem.*

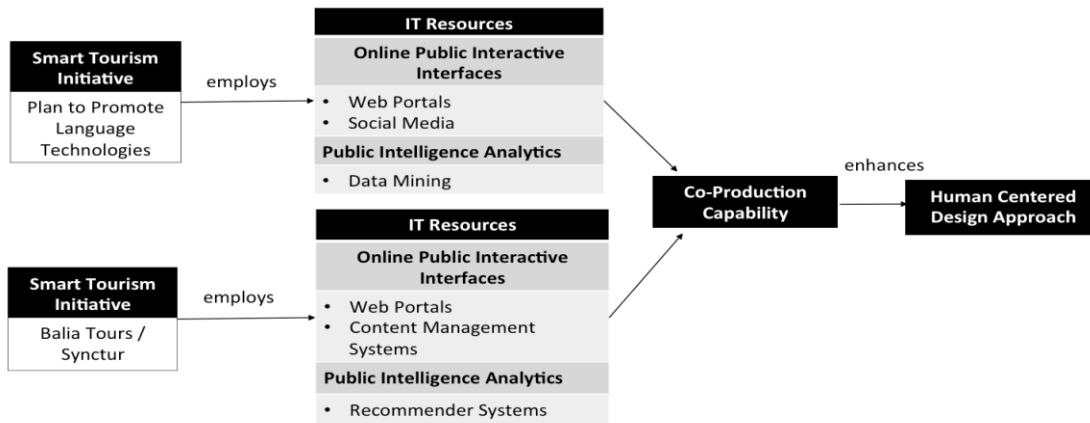


Figure 3. Relation among IT resources, co-production capability and human centered design.

### **Mechanisms by which IT resources enhances the iterative approach**

#### ***Public engagement capability enhances iterative approach in the design of smart tourism ecosystems***

In creating a design-centric smart tourism ecosystem, one of the key approaches that has to be supported is the iterative designing process. An iterative design process allows the information technology built for the tourists to undergo several rounds of implementation, feedback and using this feedback to implement new features. The outcome of this approach is a technology that has the functionalities that are high quality, hardened through user feedback.

Two different forms of IT resources, online public interactive interfaces and public intelligence analytics, work together to support and promote such an iterative approach necessary for building a design-centric smart tourism ecosystem. With the online public

interactive interfaces in general, and social media in particular, tourism boards are able to capture feedback from not just tourists, but also from citizens, businesses and other organizations. For instance, one of the interviewees suggests that the social media is an important source of data for understanding the customer, in terms of opinions and trends. Incorporating these feedback helps to improve their products developed for the tourists.

*“Companies require two-way communication between them and the customer, and this is more relevant in the tourism sector where it is important to know opinions and trends. Social media help companies to get these opinions to improve their products” (Organization 5)*

Similarly, as the tourism board launched each smart destination, i.e. a region which has incorporated elements of smart tourism, data was collected from each of these smart destinations. The data was then analyzed which provided a form of implicit feedback for the different stakeholders in the ecosystem. The adaptations and modifications as a result of the feedback served as new learnings for the next smart destination. The Director of Innovation in the public agency for Tourism Innovation, reveals that there is a lot of emphasis on experimentation, with constant adaptation to data such that the learning from each “experiment” is being utilized for adapting the next product of destination:

*“In Spain, we have developed over four years across 11 smart destinations, ... each pilot destination gave us different information which we use as learning as we go forward with the next smart destination. Each destination taught us something and increased the speed of launching the next destination ... The result is a dynamic model of Smart Destinations... new technologies have changed the entire value chain and the behaviour of all stakeholders in the tourism sector”*

One initiative highlighting the relation between IT resources, public engagement capability, and iterative approach is the case of the smart tourism management platform developed for the Rías Baixas area in Galicia. The Rías Baixas is the fifth most popular tourist destination in Spain, attracting nearly 2 million visitors a year. The initiative is part of the "Pontevedra, Destiño Intelixente" (Pontevedra, Smart Destination) project, a pilot project in Spain funded by the European Union. It includes a portal for promoting and marketing the Rías Baixas with the key differentiator of "understanding" what travelers really need or want. The platform integrates the knowledge it gathers about users, as users browse through the portal, offering further details on information and services offered at the smart destination. The design followed an iterative approach, including the application of Customer eXperience Management (CXM) technologies, which store the data that tourists generate as they browse and customize the portal and mobile apps; and the use of business analytics tools to exploit all the information obtained from tourists' interaction with other stakeholders in the tourism sector. Another novelty is the inclusion of a tourism resource-management system so that businesses, such as travel agencies, hotels, hostels, restaurants, and wine cellars, can maintain and update information (e.g. their availability, special promotions, last-minute offers and other relevant information) directly on the portal, and allows the various businesses to disseminate information on social media sites. The use of these IT resources has increased public engagement. The design and development followed an iterative approach, exploiting adaptive learning, after which several functionalities were added to the system according to the knowledge gathered. For instance, the first update of the site optimized and facilitated the consultation and use of the resources and services on the portal; the second update, utilized augmented reality technology, which allowed travelers to explore and learn about the

resources in the Rías Baixas before they arrive; and a subsequent update allows businesses to manage information about their establishments.

Another initiative is “Experience Spain”, a travel guide developed as an iPad app that promotes Spain as a tourist destination based on the experience of the users of the social network Minube. The initiative, promoted by Turespaña, includes information about 350 sites, as well as information about travelers’ experience, photos and maps. The design followed an iterative approach, allowing users to adapt their travel itineraries according to their needs. For instance, the guide includes the possibility of integrating small in-apps thematic guides according to the tastes of the travelers. Initial thematic guides included topics such as sports activities, travelling with children, and additional history information. Other thematic guides were added following users’ experience in Minube. The guide includes a “Favorites” section that allows users to save the sites that interest them most, as well as share them in the main social networks, amplifying the tourist promotion of Spain. Following the above discussion, Figure 4 summarizes the relation between IT resources, public engagement capability, and iterative approach to the design of smart tourism ecosystems. The proposition below arises from the discussion.

*Proposition 4: IT resources increases public engagement capability which in turn enhances an iterative approach for developing products and services in the smart tourism ecosystem.*

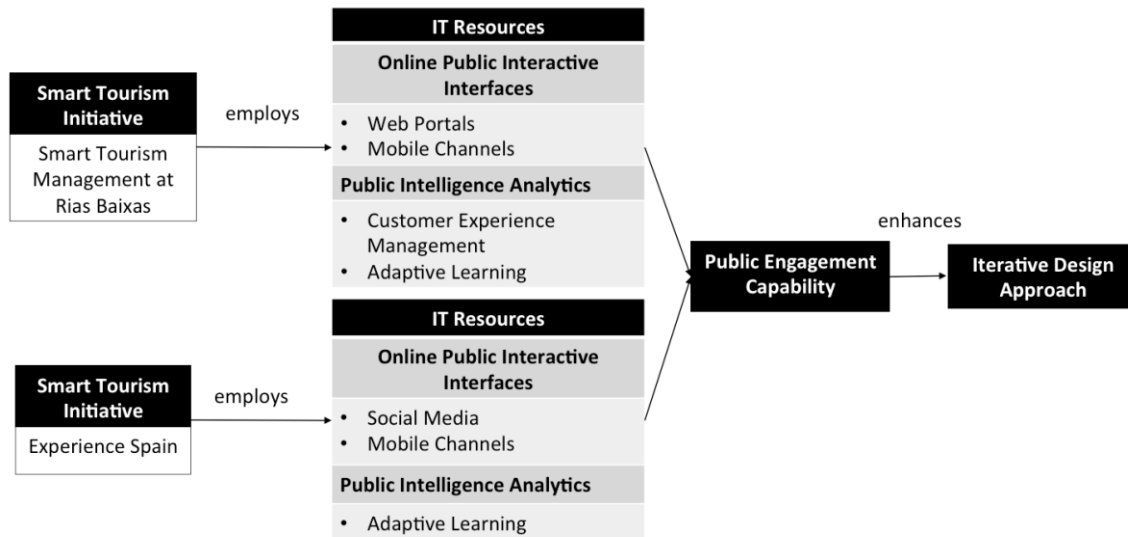


Figure 4. Relation among IT resources, public engagement capability and iterative design approach.

### **Mechanisms by which IT resources lead to the creation of holistic experiences**

#### ***Public sector innovative capability improves the creation of holistic experiences for smart tourism***

IT resources in the form of public information dissemination systems incorporate innovative ideas to create public sector innovative capability which in turn improves the quality of products and services offered within the smart tourism ecosystem. In Spain, several projects made use of open data platforms and intelligence analytics (e.g. business intelligence through dashboards and big data analytics) where data is collected and utilized in ways that enrich the features offered on other products and services. An intelligence analytics system called the “Tourism Intelligence System” was used to consolidate data from multiple data sources (e.g. credit cards, point of sales, hotels, parking garages, tourism office, health centers, sensors, events). The data extracted is analyzed and made available to various stakeholders in the

tourism ecosystem, which include tourists and establishments (e.g. restaurants, hotels) through a dashboard feature. These information sources increase the ability of stakeholders in the smart tourism ecosystem to monitor and evaluate the current state of the destinations, an essential element in user-centered design. For instance, dashboards for seeing real time traffic is being used to monitor the number of domestic and foreign travelers and the amount these travelers are spending at different locations. This information, along with other types of data such as content related to cultural heritage, nature parks, geospatial data, traffic and weather, can then be exploited in the development of new and innovative apps or services.

Another example of this is the Madrid Precious Time project which gathers public and private sector partners from diverse areas such as technology, hospitality, arts and culture, handicrafts, retail, design and insurance, working together to create new and innovative products that would help position Madrid as a 'Premium' destination. This project aims to serve as a template for collaborative approaches to the development of new tourism products in city destinations. Innovative apps for various smart devices such as smart phones, smart watch or other wearable technologies such as Google Glass have been developed as a result. The Madrid Precious Time app will provide access to real time and accurate information about attractions, events or other services. Further, it allows tourists to receive information about routes, shopping and entertainment in their native language. The use of new technologies such as augmented reality can provide an unobtrusive and self-guided travel experience. Tourists will also be dynamically notified of current events and discounts located nearby. The innovative capability enabled through IT resources allows a personalized and interactive experience for the tourists. All of these elements contribute to a holistic

experience for the tourist. As the director of the government's body in charge of innovation and tourism technologies in the Madrid Precious Time project mentions:

*“The wearable technologies start a revolution because they allow service providers to maintain a close relationship with the tourists throughout their trip. This makes it possible to monitor and support tourists' needs upon arrival, offering relevant services to the tourist as and when required. These technologies are extremely useful to provide value added services, including relevant alerts that are catered to the trip.”*

From a design perspective, the ability to tap on innovative ideas and new technologies available in the marketplace in turn improve the user centeredness and provide a more holistic experience for tourists. With the innovative capability afforded through open data, intelligence analytics and Internet of Things, a tourist's experience is made more comprehensive and holistic. This experience arises through a network of interactions between tourists, attractions and service providers. Nearby attractions and services useful to tourists are made more visible through new technology such as augmented reality. Information about services and attractions further enrich travel experiences.

*“The correct use of data allows companies in the tourism sector to improve their ability to make decisions, and to develop closer relationships with customers. [All this] enable a greater innovation in products and services” (Organization 4)*

The tourists in a city will impact the residents and the feedback from residents is an important component in building features that support all the various actors in the ecosystem. Online interactive interfaces such as MalagaCitySense, a citizen engagement app, which helps to sense and collect feedback from citizens living in the smart destination, allows a

holistic view of the tourists' experience. Tourists travel through destinations and impact citizens' lives. This multi-user feedback allows a more comprehensive view of the tourism ecosystem. The ability of technological tools such as iBeacons, which are GPS stations which allow tourists to access WiFi and information about travel through apps, work in conjunction to track traffic and other resources (e.g. parking) that are necessary to maintain a smooth travel for the tourists. Juxtaposing information from different sources of data enhances the creation of holistic experiences for tourists.

Figure 5 shows the relation between IT resources, innovation capability and holistic experiences for smart tourism. Summing up, we postulate the proposition:

*Proposition 5: IT resources increases innovative capability which in turn improves the creation of holistic experiences for smart tourists.*

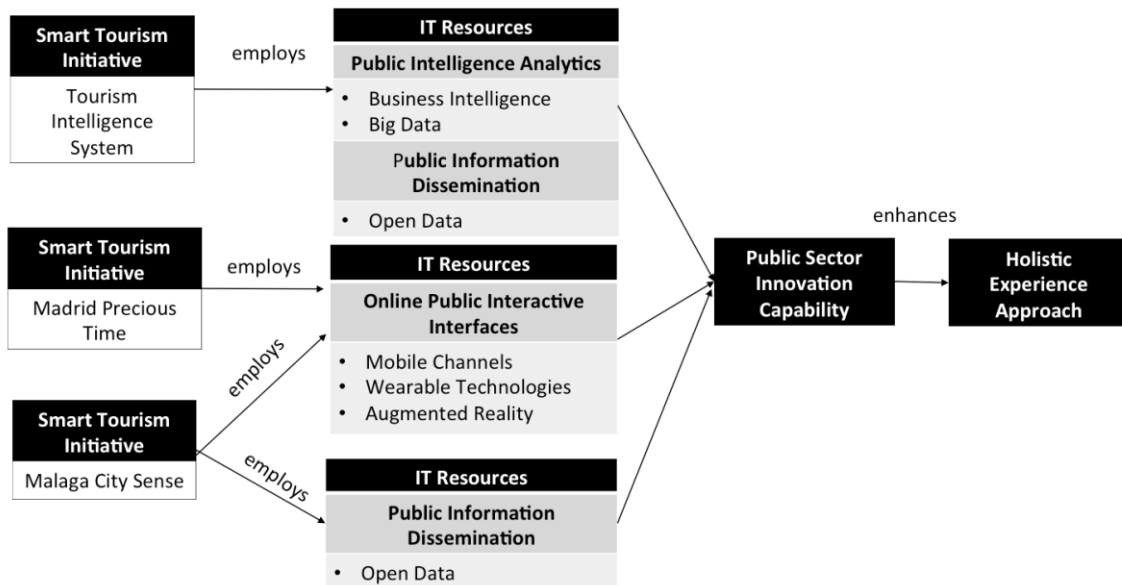


Figure 5. Relation between IT resources, public sector innovation capability and holistic experience approach.

## Discussion

In this study, we examine how information technology in the public sector creates value in the smart tourism ecosystem by embedding fundamental elements of design approaches within the system using a capabilities framework.

Our findings suggest that four IT-enabled capabilities of the public sector are especially salient in enabling a design centric smart tourism ecosystem for designing smart experiences (see Figure 6). Each of these capabilities facilitates and enables different fundamental design approaches. Public service delivery, public engagement and co-production capability enable the human-centered design approaches in a smart tourism ecosystem while public sector innovation capability enables holistic experience design. Additionally, public engagement capability facilitates an iterative designing process within the smart tourism ecosystem.

First, public service delivery capability is likely to provide a human centered design approach. A recent study suggests that the website of the government tourism authority is important in driving the choice of destination (Koo, Chung, Kim and Hlee 2016). Together with our findings, we show how the public service delivery capability is crucial to building a tourist centered approach right from the inception of the notion of travel, and that it is a key part of enabling a smart tourism ecosystem. In addition to human centered design approach, the public engagement capability drives the human centered design approach and iterative designing process. Citizen engagement, which refers to how citizens may engage in new governance mechanisms such as ICT tools in government, emerges and enables collaboration and participation, and fosters a stronger relationship between citizens and government (Foth et al. 2011). Previous studies on smart cities show that citizen engagement has the potential to develop citizens' sense of ownership in their city, improve the local authority's awareness of their needs, and reshape the citizen-government relationship (Nam & Pardo 2011). From

our findings, a parallel emerged for smart tourism. Through the capability of engaging with different stakeholders namely the participants in the smart tourist ecosystem, the public sector can easily monitor the needs of different stakeholders (e.g. tourists) and quickly adapt accordingly to these needs.

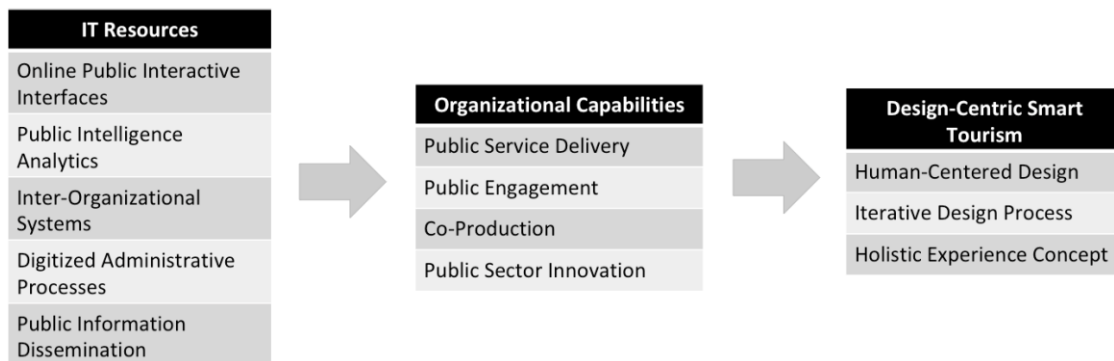


Figure 6: Public Sector IT-enabled Capabilities for Design-Centric Smart Tourism Ecosystem

Similarly, the public sector co-production capability facilitates human centered design through the different content generated from all different stakeholders in the smart tourism ecosystem. This finding is in line with prior research suggesting the importance of co-creation capability in tourism (Cabiddu et al. 2013). Further, we find that this co-production capability improves the human centered design through the timely and personalized delivery of content (Neuhofer, Buhalis and Ladkin 2015) and is often achieved alongside public engagement capability.

Lastly, we find that public innovation capability is crucial in creating holistic experiences for tourists. The public sector’s ability to take the initiative in leading new projects and adopt new technological infrastructure is pivotal to building holistic experiences as they comprise of a complex network of interactions between tourists, tourism suppliers, attractions and

other participants in the ecosystem through the flow of content. To the extent that holistic experience is critical in the design of smart experiences, the public innovation capability appears to be the most straightforward way of adding value to the smart tourism ecosystem. From a theoretical standpoint, this study teases out the key IT-enabled capabilities in the public sector and delineates the specific processes that will lead to a design centered smart tourism ecosystem.

There are other aspects of our findings that are worth underscoring. Our findings highlight the importance of citizen centricity and social capital in the design and development of smart tourism destinations. Several of the IT-enabled capabilities in the public sector (e.g. public service delivery, public engagement and co-production), enhance a user centered approach for designing smart tourism ecosystems by incorporating elements of citizen centricity.

Citizen centricity implies that governments provide services and resources tailored to the actual needs and preferences of users, including citizens, businesses, government employees, and others (Bertot et al. 2008). Previous e-government studies have established a relation between citizen centricity and human centered design, promoting the inclusion of human practices when implementing citizen-centric e-government systems (Saeed, 2013). Similarly, we find that citizen-centric systems allow personalization of services for smart tourism that improve the capture and infer the needs, as well as facilitate interactions for each member in the tourism ecosystem.

The term social capital was originally used to describe the relational resources that are useful for the development of individuals in community social organizations (Jacobs, 1961). In line with the results presented in a recent study (Boes et al. 2015), we find that social capital facilitating the web of relationships between members in the tourism value chain to be

essential in creating a design-centric smart tourism destination. IT resources helped create social capital by providing a platform to facilitate collaboration, innovation and co-creation, which in turn enhanced the human-centered approach for the design of smart tourism ecosystems.

We also find that online public interactive interfaces and public intelligence analytics are especially crucial to the public sector in effectively enabling capabilities though we do not assume that the impact to be limited to these two types of IT resources. More importantly, our results demonstrate that a composite of different types of IT is necessary to facilitate the human centered design approach.

## **Conclusion**

The primary theoretical contribution of this work is a framework that elucidates the pathways from IT resources to design centric ecosystem and delineates the IT capabilities necessary for a public sector to establish a design centric smart tourism ecosystem. We know very little about how IT resources lead to design outcomes and our paper addresses this gap by tracing the pathways by which IT resources are accumulated in the public sector which will result in a set of IT-enabled capabilities and lead to design centered outcomes. This is possible through the content collected and extracted from information system which is generative, i.e. it is used in multiple channels and ways, as suggested by prior work (Kim, Hlee and Joun 2016).

Our work contributes to the literature on IT value whereby IT creates value by enabling capabilities that facilitates the establishment of a design-centric ecosystem. While there has been a lot of work in this stream of literature linking IT resources to IT capabilities, so far, no

study has attempted to bridge the theories on IT capabilities and design. Our study is the first to do so through a processual analysis, identifying the mechanisms by which IT-enabled capabilities which help establish the foundations for a design centric smart tourism ecosystem. We provide an alternative capabilities lens to understand how IT facilitates the development of a design centric smart tourism ecosystem.

As of any study, this study has several limitations. First, this study focuses on a single case in a specific country and thus results may not generalize to other countries and settings.

However, we selected this particular country because of its ability to achieve top worldwide rankings and its advance use of the latest digital technology in the tourism sector, both factors which make it more pertinent for examination. Insights that are obtained from the study should still serve as an interesting case to highlight the role of IT-enabled capabilities of the public sector to create a design centric smart tourism ecosystem. Second, our data precludes us from differentiating the owner of the IT resources and we are not able to differentiate exactly if the IT resources was owned by the public sector or private sector. For instance, while Facebook is a private company, the social media site could be utilized by the public sector in their marketing campaigns. Rather than focusing on the source of the IT resources, this study focuses on the utilization of IT resources.

Future studies attempting to research the role of public sector in other contexts such as smart cities (Rana et al. 2018) and green IT (Koo, Chung and Nam 2015) may find our proposed framework useful. By developing the four propositions, we provide a more nuanced approach to describe how IT-enabled capabilities of the public sector plays a critical role in orchestrating various stakeholders and data which will later be used to develop a design

centric smart tourism by embedding design centric approaches. These approaches can be used more generally in enhancing smart experiences.

From a practical vantage point, our model may provide some insights for countries to successfully navigate the complex requirements associated with developing smart tourism and create unique and compelling smart experiences for tourists. New technologies such as mobile apps have immense potential in growing and transforming the travel industry.

Understanding how to incorporate key design centric elements of smart tourism ecosystems through these technologies is the first step in helping cities improve the tourism value chain and value proposition which will in turn benefit both citizens and visitors. Practitioners can use our proposed model to identify and assess the different types of IT-enabled capabilities necessary for design centric services and this understanding can help maximize the ability to capitalize on the changing and different needs of various types of travellers. Our findings also shed some light on the different approaches by which cities can incorporate design centric elements that will enhance smart tourism experiences and satisfaction. While our study focuses on smart tourism, cities striving to become smart cities may benefit from incorporating this design centric approach to designing their ecosystem.

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## **Appendix 1. Interview Protocol**

1. Could you tell us what is your vision and actions aimed at creating smart destinations, and for transforming mature destinations into smart destinations?
2. Could you tell us what is the current status of initiatives being developed?
3. What are the challenges facing smart destinations in an increasingly competitive environment?
4. What are the challenges of the tourism industry in the development process and management of tourism quality content? What role should destinations play in this process and what is the role of the specialized industry? What business models and what tools are being developed associated with the generation of digital tourist content?
5. What do you think about ICT projects that promote touristic cultural content using open data?
6. What is your view about current and future challenges that the tourism industry and destinations generally associated with the use of ICT in developing products and services and their distribution?

### **To understand the impact of IT resources on tourism sector**

1. What are the current processes and challenges of the distribution of tourism services?
2. What is your opinion on the role of smartphone and other wearable technologies in the development of new tourism products and services?
3. What is your opinion on the use of mobile applications in the deployment of tourist services?
4. What is the impact of traditional web app access on services?
5. Could you indicate what are the business intelligence processes applied to the tourism industry and what impact does it have on innovation processes? What is the impact of these techniques in the tourism industry?
6. What do you think about ICT projects that promote tourism content using open data?
7. What are the major technological milestones that the industry has undergone in the last 10 years?
8. What are the challenges of the tourism industry in the development process and management of tourism quality content? What role should destinations play in this process and what is the role of the specialized industry? What business models and what tools are being developed associated with the generation of digital tourist content?
9. The National Tourism Plan which is the current framework of the tourism policy aims to increase the competitiveness of industry and destinations of this country. Among the elements that constitute the vision of the future of figure immersion in the digital

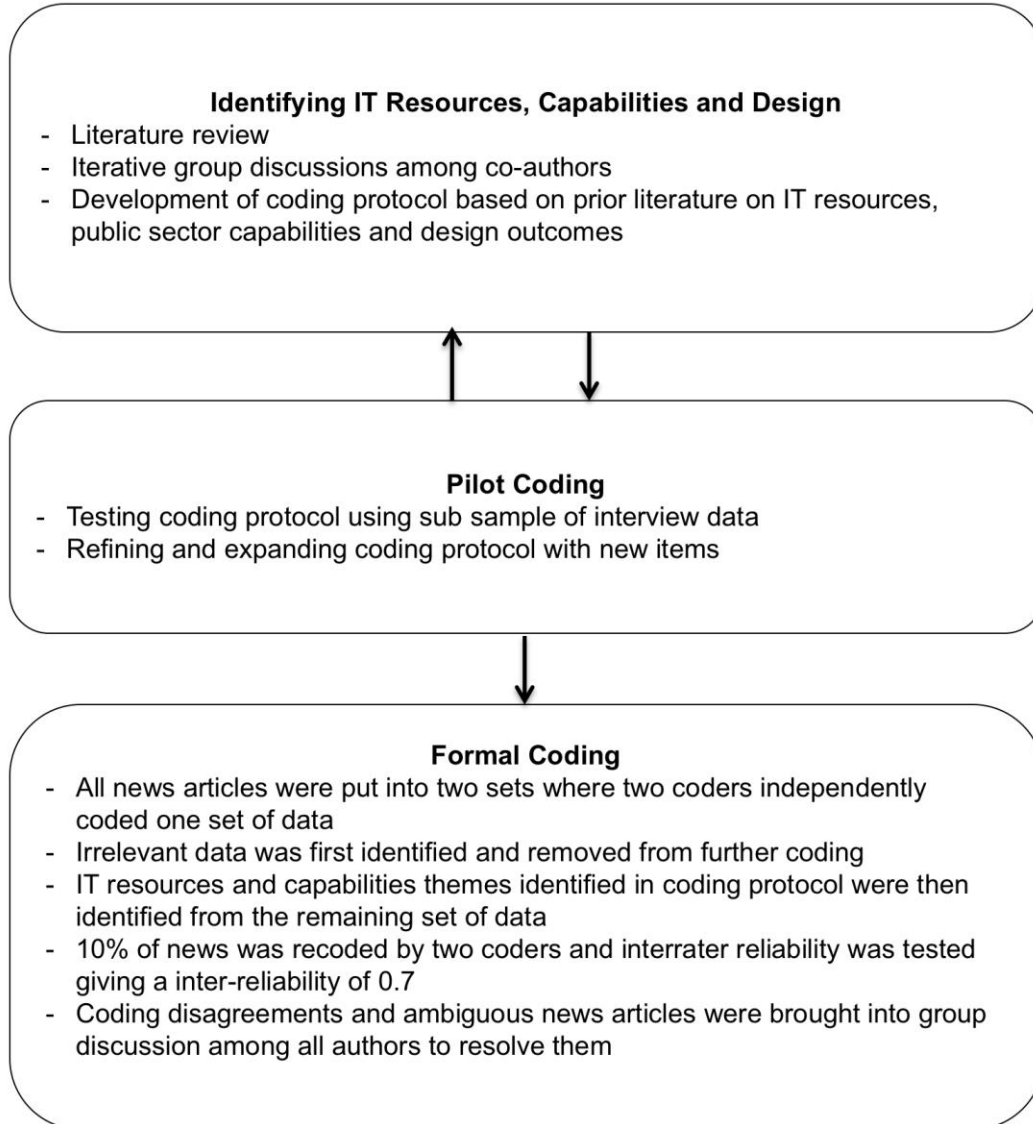
- age sector, which involves establishing ICT as a vehicle for transformation. What is your opinion about the National Plan of Tourism in promoting the use of ICT?
10. Specifically, the Plan proposes the development of one-stop information services for entrepreneurs and other businesses. What do you think about these policies, business advice and guidance? What segments of the tourism industry should policies focus on?
  11. For R&D related organizations: What are the actions to develop new products and services based on ICT and the Internet? How is knowledge disseminated and generated to promote innovation in companies?

**Appendix 2. Table Showing Details of Data Sources For Qualitative Data Collection and Analysis**

Our data was collected from three primary sources. Details of each data source and their use in the analyses are provided in the table below.

<b>Data Source</b>	<b>Details and use in the analysis</b>
<p>Interviews with Tourism Related Organizations            Number of informants: 13            Dates: 2015</p>	<p>Interviews lasted between one and two hours.</p> <p>Interviews were conducted on-site or through telephone. Notes were recorded during the interview and accounted for a total of 74 double-spaced pages.</p> <p>Questions in this interview inquired about the organizations’ goals in smart tourism projects, practices. The list of questions is provided in Appendix 1.</p>
<p>Archival data obtained or published by the public sector about Smart Tourism or Smart Destination related projects dated between 2014 and 2016.            Number of documents: 13            Total number of pages: 1281</p>	<p>Triangulate observations about Smart Tourism or Smart Destination projects in Spain to identify IT resources and organizational capabilities associated with these projects.</p>
<p>News articles about smart tourism projects in Spain            Source: Factiva            Dates: January 2015 – September 2016            Total number of articles: 140</p>	<p>Triangulate observations about Smart Tourism projects in Spain to identify IT resources and organizational capabilities.</p>

### Appendix 3. Coding Procedure



#### Appendix 4. Thematic Coding For Each Data Source

Theme*\Source	Interviews (% occurrences)	Archival data (% occurrences)	Newspaper articles (% occurrences)
<b>IT Resources</b>			
Digitized administrative processes	18.2	16.7	2.9
Public intelligence analytics	63.6	16.7	24.3
Inter-organizational system integration	54.5	50	22.1
Online public interactive interfaces	81.8	33	16.4
Public information dissemination	18.2	16.7	12.9
<b>Organizational Capability</b>			
Public service delivery	45.4	16.7	15.7
Public engagement	81.8	50	25.7
Co-production	36.4	50	21.4
Innovation	18.2	83	32.9
Resource acquisition	0	0	2.9

\*We use prior literature as a guide to identify relevant themes. Two authors coded the data and a research assistant was employed to perform independent coding of 10% of the data source to assess for inter-coder reliability within the accepted range.