Smart tourism destinations: a critical reflection

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Abstract

Purpose

The aim of this paper is to provide a critical analysis of the main literature contributions that concern smart tourism development and management, highlighting gaps and logical inconsistencies. In addition, to further stress the importance of the issues at stake, a simulation is performed for showing how technology allows achieving better outcomes when a certain level of efficiency is obtained via re-engineering of main organizational and operational processes.

Design/methodology/approach

A content analysis of recent relevant literature is performed with the help of machine learning topic modelling algorithms. A network analytic approach to digital ecosystems, then, is used to study the relationship between technological tools and physical entities in a destination and how these and their combination affect the efficiency of the system at a local and global level.

Findings

The literature analyzed lacks a good discussion on the necessity to improve and rationalize the operational and organizational processes while emphasizing mostly the technological aspects. On the other hand, the simulation case presented show that if information and knowledge flows are reasonably efficient and well organized in the physical world, the integration of digital components further enhances these processes, while inefficiencies can hinder the flow of information and reduce its efficiency.

Originality/value

Apart from the methods employed, relatively little explored, we show that, as also much of the computer science literature states, a fundamental prerequisite for successful 'smart' projects is a logical and effective restructuring of the main operational and organizational processes.

Keywords

smart tourism destination; literature survey; topic modeling; network analysis; knowledge flows

1. Introduction

The wide diffusion and the evolution of digital technologies have profoundly changed all aspects of our lives and have had an incredible impact on countless economic sectors, tourism above all. The idea of ascribing 'intelligence' to the modern technologies has, recently, led to the emergence of the concept of "smartness". Although different disciplines provide many definitions that recall the term 'smart', in practice a smart environment can be loosely thought to be one in which a widespread use of ICTs allows all stakeholders to easily access knowledge and information thus facilitating innovation of their activities and providing value to their users or customers (see e.g., Kearns & Lederer, 2003; Zhou & Li, 2012).

In the last few years, these concepts have been applied to tourism destinations and the term 'smart tourism destination' has been coined (Boes et al., 2016; Buhalis & Amaranggana, 2014; Del Chiappa & Baggio, 2015; Wang et al., 2013). A growing number of academic studies have been attempting to analyze, also empirically, the technological and business foundations of this concept. What appears to be quite evident is that it is actually very difficult to find or imagine a tourism destination that can be considered totally smart. Further, the most part of existing studies seems to suggest, at least implicitly, that wide and pervasive use of technology alone might make it possible to consider the destination as being 'smart'. Hence, it seems crucial to deal with the smart-driven approach in destination management and marketing by devoting relevant attention to everything that needs to be planned and implemented (e.g., a profound revision of organizations, processes and practices, a change in the organizational culture, etc.) to render this fascinating technology-driven business model real and effective.

Moving from these considerations, this study examines the ideas and the concepts that inform smart tourism development and management and performs an analysis of recent literature highlighting the gaps and the logical inconsistencies that still exist in current literature around the concept; to this end a content analysis has been used. Then, a network analytic approach is applied to three Italian tourism destinations: Elba Island in the Tuscany Region, Gallura in the

region of Sardinia and Livigno in the Italian Alps. The goal is to analyze the extent to which the physical and digital components of the networked system of stakeholders co-exist, and how the technological infrastructure can ease cooperation, knowledge sharing, open innovation and co-creation. Specifically, the study aims to show the extent to which such combined systems (i.e. smart tourism destinations) can attain a level of efficiency, higher than that achievable considering the physical 'hardware' only. Further, it aims to empirically test the idea that the integration of a digital network greatly improves the overall efficiency of the whole system just when information and knowledge flows are reasonably efficient in the physical world, thus making technology echo the effectiveness or ineffectiveness of the physical world. In other words, we aim at understanding whether merely injecting technology into the organizational dynamics of a tourism destination is a sufficient condition for the destination to be *smart*. Based on empirical findings, the paper also intends to shed light on the main conditions favoring the transformational process of a tourism destination into a smart tourism destination. The implications for destination and stakeholders' managers are discussed and possible future research avenues are sketched.

2. Theoretical Background

The scientific debate developed over the last five years on smart tourism destinations (STDs) is rooted in the application *mutatis mutandis* of the concept of smart city and its main features to the tourism domain (Ivars-Baidal et al., 2017). The concept of STD, in fact, is directly linked to that of smart city, where sustainability is the main strategic aim of the tourism planning process (Khan et al., 2017).

As claimed by Errichiello and Micera (2017), the Smart Tourism Destination concept is the result of two converging trends: on the one hand the unstoppable spread of eTourism (Buhalis, 2003; Buhalis & Jun, 2011; Buhalis & Law, 2008), on the other hand the opportunities generated by the adoption of the smart city paradigm to optimize the use of tourist resources, enhance tourist experiences, increase the competitiveness of destinations and improve the quality of life of residents (Buhalis & Amaranggana, 2014; Lopez de Avila, 2015).

At the same time, as underlined by Ivars-Baidal, Celdrán-Bernabeu, Mazón & Perles-Ivars (2017), the theoretical debate was articulated in different geographical areas in relation to the different development policies of smart tourism destinations.

In Asia, China and South Korea, tourism development policies are strongly oriented towards smart development, through the massive financing of initiatives that can promote the creation of a technological infrastructure for marketing and management of destinations and resources (Gretzel et al., 2015a; Guo et al., 2014; Hwang et al., 2015; Li et al., 2017; Wang et al., 2013). This has supported scientific studies focused on the technological tools essential to the creation of a STD, in which the need for an evolution of the traditional Destination Management Systems in Smart Tourism Systems was underlined: i.e. open technological architectures in which Cloud Computing, the Internet of Things (IoT) and the End-User Internet Service Systems coexist, capable of favoring the exchange of knowledge among the stakeholders, increasing the intelligence of the destination (Wang et al., 2013; Zhu et al., 2014). Here cloud services provide remote access to multiple applications, software and data; the IoT provides services to optimize

the interaction among tour operators and users; finally, end user devices support users with tools (equipments) and applications to access services related to tourism.

Obviously, these tools assume an enormous strategic relational value, as they become essential to support the synergies between the actors of the tourism supply system, the decision-making process of the DMO and new experience design (Fuchs et al., 2014; Gretzel, 2011; Gretzel et al., 2015a; Hall & Williams, 2008; Ivars-Baidal et al., 2017; Schianetz et al., 2007).

In Europe, tourism policies associated with the spread of the smart city paradigm, are aimed more at increasing innovation and competitiveness of destinations, by including thorough relations with other sectors, as, for example, the Italian synergy between tourism and culture (Errichiello & Micera, 2017). The seminal work of Buhalis and Amaranggana (2014) showed that in order to increase the competitiveness of destinations it is necessary to connect stakeholders dynamically, allowing that the instantaneous exchange of information and accessibility is guaranteed from a variety of end user devices. The emphasis is mainly on the so-called smart tourism experience, i.e. the opportunity to enhance the mediated tourism experience of smart technologies. The connected tourist, interacts, participates and shares more easily, increasing the co-creation level of the tourism product and adding new value for all (Del Vecchio et al., 2018; Almobaideen, et al., 2017; Buonincontri & Micera, 2016; Cacho et al., 2016; Neuhofer et al., 2012). Moreover, as Vargas-Sánchez (2016) argues, the intensive use of technological infrastructure enhances the consumer perspective, improving the tourist experience of visitors in terms of co-creation and customization, thus playing both the consumer role and producer of data and information role.

Australian tourism policies paid more attention to issues concerning smart governance and the use of open data. On the subject of governance, Funilkul and Chutimaskul (2009), with reference to smart cities, had already focused their attention on the web as a tool for increasing interaction among stakeholders, including tourists and residents, who in addition to being able to collaborate and to exchange information and knowledge in an attempt to converge towards a common vision. In this context, the DMO must encourage communication that can support a supply design that is appropriate to the needs of consumers (Jovicic, 2019).

In order to design unique tourism experiences, it is essential that the DMO is able to use the data collected to provide solutions that satisfy all stakeholders of the tourism system. This has led to a knowledge management perspective as one of the main aspects of the processes of a STD. The key features of an intelligent tourism destination, as Khan, Woo, Nam, Chathoth (2017: 6) argue, include *'the digitization of systems, processes and services; a higher level of interface between the tourist and the destination, which takes into account, among other sectors, the local community and government; a greater involvement of the local residence in the provision of products/services; a higher level of generation and use of data through integrated intelligent systems; and, above all, a better orientation to the management of the tourist experiences'*.

However, many Authors converge towards the need for a holistic approach in defining a STD. Boes et al. (2015), in one of the first works on STDs, provide a conceptualization identifying some key dimensions complementary to technology: leadership, human and social capital, entrepreneurship, innovation, social capital and human capital. Leadership makes possible a

coordination based on inclusion and participation of stakeholders in all phases of destination planning. Entrepreneurship and innovation support tourism projects at the destination level and concretize ideas that can attract new entrepreneurial initiatives. The creation of social capital is the result of integrated processes of collaboration and competition between stakeholders, which increase the potential of knowledge of the entire tourism system of the destination. Finally, a continuous evolution of human capital is guaranteed by the participation of stakeholders, the development of collaborations, processes of cross-fertilisation, as well as by innovation itself. Starting from these studies, Lopez de Avila (2015) has defined a STD as an *'innovative tourism destination, built on a state-of-the-art technological infrastructure that guarantees the sustainable development of tourist areas, accessible to all, that facilitates interaction and integration with the surrounding environment, increases the quality of the experience in the destination and improves the quality of life'.*

Despite the numerous theoretical contributions, that of smart destination is still an emerging topic in the literature, that requires the combination of knowledge from different disciplines (Vargas-Sánchez, 2016): information systems, tourism management, marketing, urban planning, destination management and governance, but also data processing and analysis. Moreover, there are no studies that propose a process model providing an operational path for transforming a destination into a smart destination and that suggest best practices to ensure its sustainable management (Boes et al., 2016).

A recent attempt in this direction has been offered by Ivars-Baidal, Celdrán-Bernabeu, Mazón & Perles-Ivars (2017). These authors relied on the concept of smart tourism ecosystems (Baggio & Del Chiappa, 2014b; Gretzel et al., 2015b) seeing a tourism destination as a networked physical system integrated by a technological infrastructure shaping a digital environment that aims to favor cooperation and knowledge transfer. Based on this theoretical lens, Ivars-Baidal et al (2017: 570) have proposed a model of STD structured in three levels: *the strategic-relational level, based on a governance characterized by public-private cooperation to ensure the sustainability of the destination and an environment of open and collaborative innovation; the instrumental level, based on digital connectivity and sensoring to configure a destination information system essential for decision making; the applied level, which allows the development of intelligent solutions for marketing and management of the destination resulting in greater efficiency in communication actions and an improvement of the tourist experience.*

However, the existing literature suffers from a lack of empirical studies aimed to investigate to what extent a smart tourism destination is smart because of a relevant injection of various types of technologies that theoretically should enable B2B, B&C and C&C relationships or whether, and better, is smart because it builds first, or simultaneously, an effective environment that can be supported and echoed by technology. This study was therefore carried out to contribute filling this research gap by applying a network analytical approach to the physical and digital components of three tourism destinations.

3. Materials and methods

This section is divided into two parts that correspond to the two goals of the paper. The first one contains a literature review of recent studies on smartness in tourism destinations; the

review was performed as a content analysis to identify the most relevant and popular concepts related to smart tourism in existing scholarly works. The second part applies the methods of network science to identify the effects of a technological layer to the overall efficiency of the smart tourism system when this layer is well integrated with the physical network made of the stakeholders of the destination and a good revision of the main processes is performed with the objective of enhancing their effectiveness.

3.1. Content analysis

For the purposes of our work we selected the most relevant papers on smart destinations. There is practically no literature review that can claim to be fully exhaustive, and obviously, there is no pretense of completeness here as well, but rather the attempt to understand what the main trends in the research for this area are. Therefore, we choose the papers to be analyzed using the SCOPUS database. Other possible sources exist, but in selecting the most relevant publications the overlap is almost certain, and adding less popular venues, provided they exist, would have not improved much the conclusions we reached.

Scopus is considered by many to be probably the most comprehensive source of scholarly articles and academic work in the social sciences (Vieira & Gomes, 2009), and covers 5,000 publishers, 23,700 titles, and over 71 million records. According to Chadegani et al (2013), it is the largest searchable citation and abstract source of searching literature, which is continually expanded and updated. These authors also underline that Scopus allows users to evaluate journals based on the number of citations, articles published, and percentage not cited. While Scopus only contains articles starting from 1996, a main limitation of the database (Viera and Gomes 2009), this has no impact on the research about innovative issues such as smart tourism.

The Scopus database was interrogated using ‘smart AND tour* AND destination’ as search terms for titles and abstracts. The results were then inspected visually to remove items irrelevant for the purposes of this work. The final list contains 147 papers published between 2010 and 2018 (see Appendix 1). Obviously, the sample is not “statistically significant”, but, given the wide coverage of relevant journals in the Scopus database, we consider the selected papers more than suitable for providing an overview on the main themes investigated in the area of smart destinations.

Titles, abstracts and keywords were examined with standard textual analysis techniques, implemented through scripts using the Natural Language Tool Kit (Bird et al., 2009), Gensim (Řehůřek & Sojka, 2010) and Scikit-learn (Pedregosa et al., 2011) Python packages. After cleaning of the text to remove punctuation, common words and inflectional forms (via stemming and lemmatization) we derived a frequency distribution for words and 2-grams (contiguous sequences of two words).

We then applied a stochastic algorithm for topic modelling. The general idea of the technique is that a person who writes a document has certain topics in mind and uses words, with a certain probability, chosen from the pool of words characterizing that particular topic. A whole document can then be represented as a mixture of different topics. Among the many possible modelling algorithms, we chose the Latent Dirichlet Allocation (LDA) and Latent Semantic

Indexing (LSI) as they are consistently mentioned as the most reliable (Eickoff & Neuss, 2017; Sharma & Sharma, 2017).

The Latent Dirichlet Allocation (LDA) is a generative statistical model for ensembles of discrete data (e.g. text collections). It uses a hierarchical Bayesian model to extract the latent, or hidden, topics present in a collection of documents and to model each document as a finite combination of the set of topics. Each topic is associated with a probability distribution over the set of terms that make up the vocabulary of the collection. Latent semantic indexing (LSI) is an indexing method based on a mathematical technique called singular value decomposition (SVD). SVD is employed to identify patterns in the relationships between the terms and concepts contained in a collection of text. It is based on the assumption that words used in similar contexts tend to have similar meanings.

The outcomes of these algorithms are list of topics: each topic comes with a list of words associated, with a certain probability, to each topic.

3.1.1. Network analysis

The second part is a reinterpretation of previous studies on digital ecosystem networks in which the effectiveness of the combination of physical and virtual systems has been described and discussed (Baggio & Del Chiappa, 2014a, 2014b; Del Chiappa & Baggio, 2015). The networks represent three Italian destinations: the Elba Island, a known marine destination belonging to the Tuscany region, Livigno, a northern Italian mountain area in Lombardy, and the marine region of Costa Smeralda – Gallura in Sardinia. These destinations have relatively similar structural and 'touristic' characteristics (see Baggio & Del Chiappa, 2014b and references therein for more detailed descriptions). All data regarding these networks were obtained by combining different documentary sources complemented with field interviews to informants and a crawling of the destinations' web spaces (detailed descriptions and discussions on the collection of network data can be found in: Baggio et al., 2010 and Christopoulos, and Aubke, 2014). In more detail: lists of core tourism stakeholders (accommodation, travel agencies, restaurants, associations, consortia, etc.) were obtained by the local tourism boards together with those formed by their websites. These stakeholders form the nodes of the networks. The links between any two of them were uncovered following the methods extensively described in Baggio et al. (2010). In short, they represent the possible connections and relationships due to commercial agreements, co-ownership, partnerships, membership in associations or consortia derived from publicly available sources (listings, management board compositions, catalogues of travel agencies, marketing leaflets and brochures, official corporate records, etc.). All links were also validated through a number of in-depth interviews to knowledgeable informants such as directors of tourism boards, tourism consultants or experts. The networks were then complemented by the websites belonging to the different stakeholders that are connected via the existing hyperlinks uncovered with a simple crawler.

Digital ecosystem networks are thus modelled as a composition of two components: the 'physical' network of stakeholders of the destination with their relationships, and the 'virtual' websites network. All networks are weighted. The connections between the different elements were assigned a 'score' that translates, on a 1 to 3 scale the different costs or efforts in building

and maintaining these connections. The values assigned are: 1 for a link between two physical nodes, 2 for a link between a physical and a virtual node and 3 for a link between two virtual nodes (for a detailed discussion see: Baggio & Del Chiappa, 2014a, 2014b; Del Chiappa & Baggio, 2015). The basic data for the three networks and their components are shown in table 1.

Table 1. Main dimensional characteristics of the destination networks

Destination	Type	Nodes	Edges
Elba	Physical	713	1636
	Virtual	443	494
	Ecosystem	1156	2712
Gallura	Physical	2235	6077
	Virtual	1477	2165
	Ecosystem	3712	9718
Livigno	Physical	468	1388
	Virtual	283	566
	Ecosystem	751	2740

Nodes are weighted as well. The weights represent the absorptive capacity of the different entities included in the networks, that is their ability to acquire, retain and transfer the knowledge available to them due to their internal functioning or because of the associated costs (Cohen & Levinthal, 1990).

Intuition suggests, and research has confirmed, that improving the efficiency of internal processes positively affects the absorptive capacity of an organization (Berente & Lee, 2014), that is the effectiveness and efficiency with which different organizations can understand the value of external information, internalize it and use it in their own operation (Cohen & Levinthal, 1990; Dyer et al., 2001; Nooteboom, 2000). Besides that, and more relevant for our arguments, revision and rationalization of the digital components has a similar effect. As Roberts (2015) shows, a good integration of data and procedures, along with efficient connections, jointly influence absorptive capacity. These effects also depend on the environment in which the organization is embedded. In short, for smart tourism, if a destination is efficient in its internal processes (operational and organizational), or works towards this goal, an improvement is ensured.

For assessing the efficiency in information and knowledge transfer, a crucial element for that 'technology savviness' which profoundly affects the smartness of a region (see e.g. Gil-Garcia et al., 2016), we used the metric recently suggested by Su et al. (2017). The authors recommend including in such metric not only the efficiency of the transfer between actors (operationalized as the weighted shortest path, or distance, between them, where the weight is an estimate of the cost in communicating) but also the weighted clustering coefficients (here representing the tendency to collaborate within the neighborhood) and the nodal characteristics (the absorptive capacity). They also show theoretically and empirically how their metric better serves the purpose with respect to the usual measures of transfer efficiency that consider only the distances between nodes (Latora & Marchiori, 2001).

An important feature of this method is in the consideration of the nodal characteristics (nodal weights) that usually are not present in standard network analytic procedures. Since we have no information about the characteristics of the different stakeholders, we assign as absorptive capacity a value from 1 to 4 (1 = lowest) randomly drawn from a geometric distribution (the discrete version of an exponential distribution). For all virtual elements we assign the value 5, which represents the high capability to store and transfer information of a digital system. To simulate the increase in absorptive capacity due to a re-engineering of the internal processes we increase (by 1) all stakeholders' values that are lower than the maximum.

Although this procedure might seem arbitrary, as the assignment of weights to the links, it fits our objective. In fact, we are not interested in the 'real' values of the absorptive capacities or other actors' features, but only in how the system changes its efficiency when there is a positive variation in them.

The single actor's transfer efficiency coefficient between two nodes *i* and *j* is:

$$T_{ij} = \frac{\left(A_i A_j\right) \cdot S_{ij}}{d^w(i,j)} e^{(C^w(i)C^w(j))-1}$$

where A is the absorptive capacity, S is the weighted degree of the link, d^w is the weighted distance and C^w the weighted clustering coefficient of the nodes involved. In their proposal the authors also add *relevance* weights to the different components that here we disregard assuming all elements equally important.

The overall knowledge transfer efficiency of the network (*KEN*) is obtained by summing all the T_{ij} and normalizing to the number of nodes N:

$$KEN = \frac{\sum_{i \neq j} T_{ij}}{N(N-1)}$$

In essence, starting from a given network of relationships in a digital ecosystem, and a given distribution of actors' characteristics, that can be assumed to represent both individual and global 'efficiency', a numerical simulation is performed. In this, the effects of improving these individual efficiencies on the whole digital ecosystem are assessed.

4. Results and discussion

4.1. Content analysis

The results of the content analysis are shown in table 2 and 3. Table 2 contains the most relevant words and 2-grams used in the titles, abstracts and keywords in the papers chosen. Table 3 contains the topics identified using the procedures described in the previous section. The combination of the two gives a clear idea of the main topics explored in the works considered and can provide a better view on the main interests around which the idea of 'smartness' has evolved so far.

Far from pretending to be a complete systematic literature review, our findings show that most (if not all) terms used in existing studies aimed to debate, investigate and analyze the concept of smart tourism destination are of technology-related nature.

Limited, if not absent, references to organizational processes, or items that imply changes or restructuring of the entities examined appear to exist. This strongly confirms our impression that existing literature seems to ignore, or at least to consider just implicitly, the need of re-engineering the main processes related to the intra and inter-organizational dynamics, and does not fully judge this aspect as a precondition to obtain effective outcomes from the spreading of technology in a destination.

Table 2 The most frequent (top 25) words and 2-grams

Rank	Words	Rank	2-grams
1	tourism	1	smart tourism
2	smart	2	tourism destination
3	destination	3	smart city
4	tourist	4	smart destination
5	information	5	communication technology
6	datum	6	public transportation
7	city	7	mobile device
8	technology	8	destination management
9	based	9	social medium
10	service	10	tourism industry
11	user	11	tourist experience
12	experience	12	cultural heritage
13	application	13	location based
14	mobile	14	smart phone
15	management	15	social network
16	travel	16	tourism information
17	network	17	smart tourist
18	development	18	tourist attraction
19	planning	19	augmented reality
20	location	20	datum mining
21	online	21	real time
22	device	22	tourism experience
23	industry	23	business model
24	internet	24	competitive advantage
25	medium	25	cultural tourism

Table 3 The main (top 15) topics with their main components (top 10 words) discovered with the LDA and LSI algorithms

Method	Top topics	Term 1	Term 2	Term 3	Term 4	Term 5	Term 6	Term 7	Term 8	Term 9	Term 10
LDA	Topic #1	city	smart	transportation	cities	public	destination	bus	data	tourism	urban
	Topic #2	smart	information	destination	tourism	destinations	application	service	competitive	travel	recommendations
	Topic #3	smart	guides	destination	tour	transportation	audio	tourists	tourism	service	web
	Topic #4	destination	tourism	information	smart	online	model	analysis	web	data	tourist
	Topic #5	smart	tourism	information	data	travel	destinations	destination	gps	city	tourist
	Topic #6	data	destination	smart	tourism	city	application	mining	tourists	services	experience
	Topic #7	tourism	destination	smart	data	destinations	tourist	management	tourists	information	mobile
	Topic #8	information	smart	data	tourism	destination	travel	city	users	people	technologies
	Topic #9	tourism	smart	city	transportation	people	public	integrated	cities	destinations	data
	Topic #10	tourism	smart	cultural	destination	information	mobile	tourist	technology	model	data
	Topic #11	city	smart	bus	tourism	rural	local	tourists	cars	destination	cities
	Topic #12	tourist	information	smart	tourists	mobile	tourism	destination	travel	data	planning
	Topic #13	smart	tourist	data	destination	tourism	travel	information	charging	navigation	walking
	Topic #14	smart	tourist	tourism	network	traffic	gaze	tourists	destination	selfie-taking	heritage
	Topic #15	tourism	smart	destination	information	online	tourists	destinations	city	data	model
LSI	Topic #1	tourism	smart	destination	information	data	tourist	tourists	city	destinations	study
	Topic #2	city	tourism	transport	urban	smart	cities	interchange	information	city-hub	public
	Topic #3	information	tourism	tourist	data	smart	mobile	travel	traffic	cultural	planning
	Topic #4	destination	media	information	tourism	model	exposure	smart	intention	visit	reputation
	Topic #5	data	tourist	tourists	planning	smart	trip	mining	mobile	tourism	online
	Topic #6	information	smart	tourist	study	data	tourism	media	model	visit	cultural
	Topic #7	traffic	tourist	smart	information	network	frame	data	node	tourism	algorithm
	Topic #8	mobile	tourists	smart	risk	information	devices	perceived	traffic	travel	model
	Topic #9	cultural	destination	information	online	data	mobile	heritage	reputation	model	traffic
	Topic #10	tourist	mobile	transportation	tourism	network	public	smart	experience	planning	algorithm
	Topic #11	cultural	model	media	information	online	experience	data	destination	smart	technologies
	Topic #12	city	transportation	public	information	cultural	management	payment	user	application	traffic
	Topic #13	online	city	transportation	analysis	management	tourists	destination	mobile	experience	people
	Topic #14	tourists	transportation	public	integrated	smart	mobile	management	application	tourism	experience
	Topic #15	mobile	analysis	management	tourists	smart	mining	social	destinations	reputation	transportation

4.2. Network-based analytical approach

Findings of the network-based analytical approach (table 4) provide insights about the overall knowledge transfer efficiencies of the network (*T*), before and after the improvement in absorptive capacity (*AC*) that the technology components can inject in the ecosystem when correctly coupled with an effective functioning of the physical component of the inter-organizational network. As it can be noticed, when *AC* increases, even if of a modest quantity, a significant improvement in the overall knowledge transfer and assimilation efficiency can be obtained for the three networks.

Table 4 Knowledge transfer efficiencies (T): the difference and the AC improvement for the three networks

Destination	ΔAC	T_Before	T_After	ΔT
Elba	20.7%	0.0124	0.0181	46.2%
Gallura	17.9%	0.0062	0.0084	36.1%
Livigno	21.0%	0.0334	0.0471	41.1%

These results suggest that tourism destinations can benefit from an injection and a rational use of information and communication technologies (characterizing them as *smart*), especially if their overall absorptive capacities increase. To improve in absorptive capacities an effective process re-engineering within intra and inter-organizational groups needs to be put in place so that the digital component of the business ecosystem can be furthering the efficacy of the physical component in a search of a smart effectiveness of the destination as a whole. It must also be noted here that the average contribution of a node to T (e.g. knowledge transfer efficiencies) is of the order of 10^{-4}. So, unless a large proportion of them moves towards a revision of their processes we would not see much improvements at the destination level. Again, the importance of working coordinately and cooperatively is very high as often claimed in much research (e.g. Del Chiappa & Presenza, 2013; Wang & Xiang, 2007).

In summary, the content analysis has allowed to identify the main topics discussed in the most relevant literature on smart tourism, from this analysis a 'missing' issue has been identified, that of basic re-engineering and rationalization of the processes of that should be the basis to an effective use of information and communication technologies. Starting from this consideration, a numerical simulation has shown how an improvement in this respect (process efficiencies) can benefit not only individual entities, but the functioning of the whole digital ecosystem.

5. Concluding remarks

This study aimed at contributing to the scientific debate on the relatively recent strand of research on smart tourism destinations. Supported and stimulated by the insights of a content analysis applied to recent papers (published in the period 2010-2018) sourced from Scopus, it presents and discusses findings of a network analytic investigation of three Italian tourism destinations with the objective of providing further evidences to the idea that smartness of

tourism destination require that the physical component of the inter-organizational network is able to function effectively in order to allow any technological injection to produce its benefits.

Findings confirm this idea. The starting point is the idea that a smart tourism destination is a complex and dynamic ecosystem where the physical and digital components are structurally and strongly coupled and co-evolve as a single entity. This, as we show, means that the digital component, by itself, is not a sufficient condition able to render a tourism destination smart. The digital injection can support the transformation of a tourism destination toward smartness only when the physical component of the ecosystem is profoundly reengineered and rationalized. Under these circumstances the blended co-evolution renders the overall network smart and allows it to benefit from higher level of efficiency and effectiveness in knowledge transfer and information acquisition processes which, in turn, favors value creation within the destination. Moreover, echoing Del Chiappa and Baggio (2015), this study strongly suggests that knowledge-based destination management studies should consider both physical and digital components of the ecosystem.

Besides its theoretical and contribution, this work stresses the importance of adopting a more critical-driven thinking when viewing information and communication technologies (ICTs) as a possible solution of the problems in destination competitiveness. This issue is well examined in a long tradition of studies on computerized information systems. Since the 1990s the literature has provided examples and warnings on the risks of using technological tools without first going through a deep revision and re-engineering of the systems or procedures at play, and how this 'forgetfulness' might produce situations in which even heavy investments in ICTs result in very poor efficiency or economic progresses (Brynjolfsson, 1993; Hammer, 1990). It has also been clearly demonstrated how the impacts of ICTs on organizational performance is fully mediated by business process agility. (Chen et al., 2014). These considerations have also been made in the analysis of smart cities, where recent research shows the importance of a revision of the main processes before adopting a technological coverage. (Budhiputra and Putra, 2016). In other words: injecting technologies into tourism destinations and organizations working within them, and allowing them to have available, potentially, a huge amount of information and data to be shared, without intervening in assuring an effective networking in the socio-physical component of the network is not per se a solution. Actually, if this injection is proposed deceiving tourism stakeholders and making them think that technologies will automatically boost the smartness of the tourism destinations, one could create over-expectations that, if not satisfied, could result into a further distrust in any destination management operations.

5.1. Theoretical implications

The main contribution of this study is methodological. We have provided, with the analysis of three digital ecosystems, and the simulation performed, a way to assess the relative importance and the role played by their physical and virtual components and shown how using state-of-the-art network analytic methods is possible to evaluate the extent to which one of the components influences the other. This can be better gauged and made more realistic if the weights used for the nodes and the links of the destination ecosystem are calibrated with data coming from empirical studies or observations.

5.2. Practical implications

From a practical point of view, this contribution provides two important indications. First of all, policy makers and destination marketers should persuade stakeholders that a tourism destination is the expression of a collective effort by different actors belonging to different (but interlinked) tourism sub-sectors that requires a profound process re-engineering within intra and inter-organizational relationships to become efficient and effective in the way the knowledge dissemination, transfer and absorptions can occur within the destination; this in turn, would increase innovation and destination competitiveness. In an attempt to achieve this goal, destination marketers and policy makers should also rely on using a broader set of coordination mechanisms that go beyond the mere internal communication and marketing; these might include any effort directed to affirm social norms (e.g. trust and reciprocity) and to create and sustain interlocking directorates and temporary staff exchange (e.g. Bregoli and Del Chiappa, 2013).

Secondly, destination marketers and policy makers should intensity their efforts in motivating stakeholders in investing in various types of technologies aimed at shaping a common technological-driven infrastructure and giving rise to a proper business digital ecosystem. This simultaneous reinforcement of both the physical and digital components of the ecosystem (i.e. the tourism destination) would help to achieve higher effectiveness in knowledge transfer, innovation and destination governance. Any circumstances in which one of the two components is neglected or ill-evaluated (under- or over-) will result in a sub-optimal level of information and knowledge sharing and, in turn, in lower degrees of destination efficiency and competitiveness.

Tourism stakeholders need to be educated and informed that technologies can facilitate the operations and improve the competitiveness of their businesses and their destination only if they facilitate a cultural and organizational change and a transformation in the way they manage their intra and inter-organizational processes and relationships. In this vein, policy makers and destination marketers should focus their efforts on running internal marketing operations aimed at reinforcing simultaneously both the components of the ecosystem (i.e. the tourism destination) when trying to achieve effectiveness in destination branding and governance.

5.3. Limitations and future research

Although this study helps to fill a gap in the existing knowledge and proposes some implications for practitioners, limitations still remain. First, the study was limited just to three tourism destinations. For the future, it would be interesting to repeat the analysis widening the number of destinations involved, possibly sourcing them from different countries. Second, the study suffers from an arbitrary assignment of nodal and link characteristics (weights). Future studies could address this limitation by better measuring these dimensions and relate them to real situations using some kind of empirical investigation.

This study aims to be a starting point for scholars interested in the topic of “smart tourism destinations” so that they can direct their research on the ways, mechanisms and tools to implement a smart approach, both for policy makers and private actors.

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