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Progress and stakes in sustainable tourism: indicators for smart coastal destinations

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ABSTRACT

The paper is based on territorial intelligence (TI) and its application to the sustainability of tourist destinations. The TI focus is viewed as being suited to dealing with the problems of tourist destinations, as well as the integrating nature of different aspects of their reality.

The aim of this research is to design a System of Smart Coastal Destination Indicators (SD-Coast) that allows the level achieved by a destination to be measured and a comparison in time and space to be made.

The selected study scope comprises 14 destinations on the Spanish Mediterranean coast. The tool proposed for the evaluation of territorial intelligence in coastal destinations is based on the generation of standards that enable the measurement and explanation of variables to be clearly delineated. For this purpose, 30 indicators are considered, covered by six dimensions (Smart Governance, Smart Environment, Universal Access, Smart Business, Smart Technology and Smart Innovation).

What most coastal destinations have in common is specialisation in technological advances and the respective application of these advances to long-term sustainability. Yet the municipalities in question are far from being considered a shining example in terms of accessibility or governance.

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Territorial Intelligence (TI); Indicators; Smart Destination (SD); Coast

Introduction

The study is framed by the tendencies of smart tourism that propose a need to integrate information and communication technologies (ICTs) into territorial planning and management, this integration giving rise to the concept of Territorial Intelligence (TI), which when specifically applied to tourist areas generates Smart Destinations (SDs).

The relationship between the concepts of TI and sustainability derives from the fact that the TI approach entails coordinating all the stakeholders in order to bring about actions that favour the collective good (of citizens and companies, for example) through an interaction of the three concepts of sustainable development—economic, social and environmental—(Laurini, 2017). In this way, TI becomes the focus of action for territory, and sustainability becomes the result or objective. This interrelationship and the role that sustainability plays within it are summed up in the idea according to which TI aspires to be the multidisciplinary science whose objective is the

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sustainable development of territories in the knowledge society, and whose subject is the territorial community (Girardot, 2008).

However, it can be stated that TI has thus far had little repercussion on international scientific literature, being used most by authors from the south of Europe—France, Italy and Spain—(Herbaux & Masselot, 2007; Laurini, 2017, Luque et al., 2015), although little by little it is finding its way into the language of the social sciences through studies that attempt to define the characteristics that render territories smart.

It is more common to find international precedents of the interrelationship between sustainability and SDs. As a way to link between these two concepts, it can be affirmed that TI is the differential feature that distinguishes SDs, and that a destination cannot be smart if sustainability is not its main objective, an idea that is already widely supported by published works (Gretzel, 2011; López-Sánchez & Pulido-Fernández, 2016).

Tourist activity is characterised by an intensive use of information, which explains the notable impact of ICTs on consumption and production processes in this sector. At the same time, TI also has an interrelationship with territorial and environmental issues, since the tourist space itself is the product valued by the consumer. It can thus be seen that TI is appropriate for dealing with the problems of tourist destinations, since their integrative nature demands the holistic approach that in practice should be adopted in the planning and management of these destinations. Their long-term competitiveness will depend on their integrative quality and not on the quality achieved by only one of their components.

The topic of SDs has presented a problem that thus far has not been definitively solved. Despite the existence of an already extensive scientific literature on this subject (as will be seen in the Theoretical Framework section), the advances made in being able to evaluate or measure the level of a destination's TI have been scarce, as they have been in finding instruments that allow the positive or negative evolution of a destination over time to be determined, or several different destinations to be compared.

The aim of this research is to address this scarcity and find a solution through the design and application of a system of specific indicators. So, the ultimate goal of the paper is to design a System of Smart Coastal Destination Indicators (SD-Coast) that allows the level achieved by a destination to be measured and a comparison in time and space to be made. Subsequently, the real possibilities of SD-Coast will be tested in the paper itself, through its application to various different coastal destinations.

Theoretical framework

TI is becoming more and more clearly defined and increasingly made use of by the social sciences as the 21st century progresses, consolidating itself as one of the main developments in the field of territorial development. TI has been given various different definitions, such as those penned by Girardot (2000), Dumas (2004) and Bertacchini (2012), and more recently by Laurini (2017), who defines it as an approach regulating a territory, which is planned and managed by the cross-fertilization of human collective intelligence and artificial intelligence for its sustainable development.

One of its principles is seeing territory not as a company or a market, but as an area of cooperation (Masselot, 2008) in which the generation and transmission of information and knowledge at the heart of society acquires a key role (Bozzano, 2013), this principle being based on the idea that territory is an organisational entity with the ability to learn (Devillet & Breuer, 2008).

This approach has been reinforced by the systemic crisis experienced on a global scale in recent years. This crisis has revealed the shortcomings of existing models and highlighted the need to pursue new directions for territorial development (Galindo-Pérez-de-Azpillaga et al., 2014).

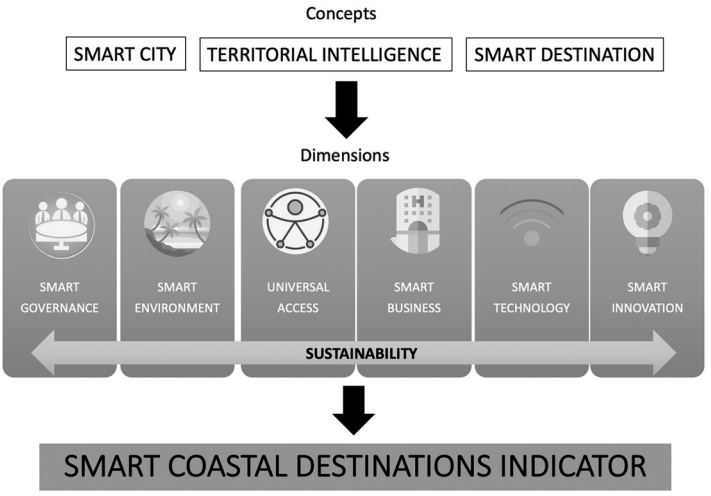

Figure 1. Smart coastal destination model.

In recent years, there have been various new lines added to the focus of IT in tourism activity emanating from both the scientific community (Angelaccio et al., 2013; Ivars et al., 2016; Wang et al., 2013; Xiang & Fesenmaier, 2017) and public administrations (Gretzel et al., 2015, 2016). The origin of these new directions lies in the incorporation of ICTs, and the common consensus is that ICTs have heralded a new period in the evolution of tourism (Ardito et al., 2019; Boes et al., 2015; Brouder et al., 2016; Cimbaljević et al., 2019; Femenia-Serra et al., 2019; Jovicic, 2019; Oye et al., 2013), specifically in the creation and provision of tourism services (Buhalis & Amaranggana, 2013), in the different phases of information, promotion and commercialisation designed to increase demand (Neuhofer et al., 2012), and in general in all of the tourism management processes.

SDs depend on advances in urban and territorial management, through the concept of Smart Cities (Albino et al., 2015; McCartney et al., 2008). In fact, SDs are a result of the evolution and application of the Smart City concept in tourist spaces (Boes et al., 2016; De Esteban et al., 2017; Ivars-Baidal et al., 2019), using Smart City methods and instruments to simultaneously satisfy tourists' needs and residents' demands for services.

However, despite the conceptual interest awakened by SDs, there are still certain weaknesses in the theoretical formulation (Shafiee et al., 2019). Asian countries essentially focus on the construction of the technological infrastructures (Hwang et al., 2015). In Europe, the focus is on innovation, competitiveness and the development of smart applications (Lamsfus et al., 2015). In Australia, the emphasis is on governance and open data (Gretzel et al., 2015). The latter approach shows how knowledge and information management tools make possible the implementation of good governance (Fernández-Tabales et al., 2017), this process leading to the appearance of Smart Governance (Della Corte et al., 2017; Meijer & Rodríguez, 2016). In Spain, most authors use the systemic conceptual framework defined by SEGGITUR (2015) and INVANTUR (2015).

There is also justified criticism that points out how the contributions of the SD approach can already be found in other fields (strategic planning and sustainable tourism management). Townsend (2013) posits that technological bias may generate new dependences for territories and even favour the privatisation of public services (Greenfield, 2013). One of the least developed aspects of the SD is how to take the step of applying the concepts to the generation of practical tools to aid public management (Buonincontri & Micera, 2016), although there are works that have dealt with the case studies of different destinations in some detail (Boes et al., 2015; Brandão et al., 2020; Wang et al., 2016).

The most notable applications of SD models are described by a selection of authors: Santos-Júnior et al. (2017) focus on the vision of the stakeholders and group the indicators together

(conceptual, destination characteristics and aspects that make it smart). Tran et al. (2017) specify the dimensions of smart destinations: smart attraction, smart accessibility, smart amenities, smart ancillary, smart activities and smart available packages. Herrero et al. (2019) define five types of smart service (safety, health, heritage, mobility and environment). Ivars-Baidal et al. (2019) recognise the enabling role played by ICTs in the shaping of smart destinations with the use of several features (governance, sustainability, innovation, connectivity, information systems and smart solutions).

The proposed model is divided into six dimensions—Smart Governance, Smart Environment, Smart Business, Universal Access, Smart Technology and Smart Innovation (Figure 1)—that will allow administration managers to develop their planning from a broader perspective, increase competitiveness, improve the tourist experience and promote sustainability. The proposal arrived at confirm that the Smart Coastal Destination Model both favours the advancement of research with indicators and is a tool that can be used by local public officials.

- Smart Governance is a concept that has been accepted as one of the basic tenets of public management since its inclusion in the White Paper on Governance (European Union, 2001) and is increasingly recognised as one of the essential indicators for smart tourism destinations (Gretzel, 2018), especially when it has the focus given to it in the present research: the idea that through good governance, the participation of citizens in decision making on the management of a destination can be guaranteed (Herbaux & Masselot, 2007; Ivars et al., 2016).
- Smart Environment is especially related to the efficient management of energy and natural resources in tourist destinations (Debnath et al., 2014; Giffinger et al., 2007; Höjer & Wangel, 2015; Schianetz & Kavanagh, 2008) for the achievement of a better quality of life and a cleaner and more efficient environment.
- Universal Access is a dimension whose role in the creation of SD indicators is accepted in the literature. It is a dimension that has been incorporated into numerous SD indicator systems and conceived as both a principle of equal opportunities for citizens to be involved in destination management and a requirement for the competitiveness of a tourist destination.
- Smart Business as a dimension in its own right has thus far been employed by few authors. Its inclusion in the current paper responds to a line of research initiated and developed in a previous paper (Fernández-Tabales et al., 2017), in which it was called "tourism business network".
- Smart Technology is the dimension that is most used as an indicator for SDs. The interest lies in understanding how technology facilitates an improvement in the fluid provision of information (Boes et al., 2015; Minghetti & Celotto, 2014).
- Smart Innovation is based on the conception of the tourist destination as an innovative environment in an integral sense without being exclusively associated with technology (Gretzel, 2011; Schaffers et al., 2012).

Method

Participants

A comparative territorial analysis that facilitates the formulation of a strategy based on TI and the monitoring and evaluation of the actions that are completed should be undertaken using a selection of case studies of homogeneous and comparable territories (Clifton & Usai, 2019). Consequently, the area under study comprises municipalities located on the Mediterranean coastline, and more specifically a number of "consolidated destinations" that are in line with the meaning given to the concept by Butler (1980; 2006), that is destinations on the Spanish coast that are in the consolidation phase of their life cycle. Tourism has undoubtedly been one of the essential economic forces in Spain from the second half of the 20th century, and a large percentage of the national population, housing and economic activity is concentrated on the Spanish Mediterranean coast, a dynamic that has been maintained over recent decades.

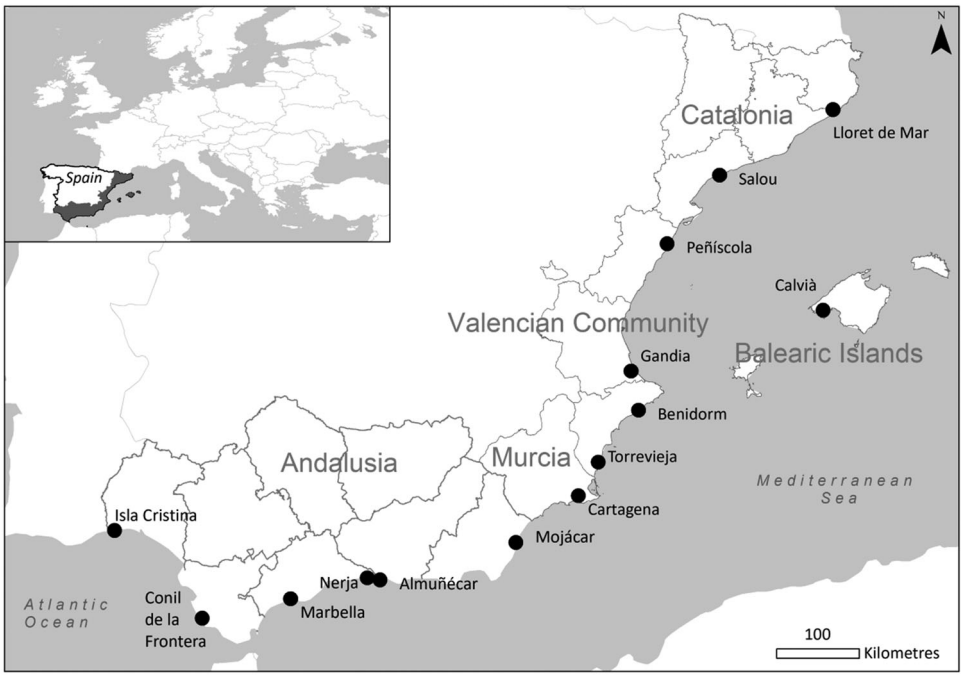

Figure 2. Selected study area.

For this semi-quantitative application to be achieved (Playán et al., 2018), the selected scope of study covers some of the main destinations of the Mediterranean coast, which are representative in terms of both their tourism offer and their tourism demand. So the selection has been made based on what are considered to be tourist spots or destinations according to the Spanish National Institute of Statistics (INE).

The researchers of the current study are familiar with the main characteristics of the possible "tourist spots" to be studied and have made a selection based on the criteria of the panel of experts, which is described in the next section (Carayannis et al., 2018). It consists of fourteen consolidated destinations (Figure 2): Andalusia (Mojacar, Almuñecar, Nerja, Marbella, Conil and Isla Cristina), Murcia (Cartagena), the Valencian Community (Peñiscola, Gandia, Benidorm and Torrevieja), Catalonia (Lloret de Mar and Salou) and the Balearic Islands (Calvia).

Instruments

Tourist behaviour has changed due to the influence of ICTs in the tourism sector, and in order to support the adaptation of destinations, public administrations are championing SDs as an integral management model. The present study is based on the challenges faced by tourist destination managers, the shortcomings of existing management models and the problems generated by SDs.

In statements about SDs made by researchers (Buonincontri & Micera, 2016; Ivars-Baidal et al., 2019; Liberato et al., 2018) and institutions (Centre of Regional Science, 2007; INVATTUR, 2015; López & García, 2013; SEGITTUR, 2015), reference is made to a set of smart dimensions, since the new technologies are not the only factor necessary for success, the others including innovation, creativity, human capital, the attractiveness of products, and accessible services (Caragliu et al., 2011), dimensions that are based on theories of regional competitiveness (Boes et al., 2015; Lombardi et al., 2012).

For the development of the present methodology, we have considered the "Smart Cities Wheel" (Cohen, 2011), which has been used as a conceptual and measurement reference by

both a large number of authors in more global terms (Ahvenniemi et al., 2017; Ching & Ferreira, 2015) and reports on SDs in Spain, the latter including the following: the white paper, "Smart Destinations Report: building the future" (SEGITTUR, 2015); SD quality regulations (Spanish Standard UNE 1,78,501: 2018, and Spanish Standard UNE 1,78,502: 2018); and the paper on SD Indicators and Tools (Galindo-Pérez-de-Azpillaga et al., 2020).

In order to help increase the effectiveness of the Smart Coastal Destinations Model, the study invited the participation of a panel of experts with relevant knowledge, experience in the tourism sector and know-how in the management of SDs (Montoya et al., 2020).

In recognition of the need to combine theoretical and applied contributions and knowledge, the panel was composed of five people, of whom two were academic experts (researchers who have made outstanding contributions in the field of tourism), one was a professional in the tourism industry (a consultant who specialises in innovation in tourism) and two were public administration officials (with important responsibilities in local and regional management).

As part of the indicator selection process, the authors first of all designed a series of indicators based on the established dimensions and gave them to the panel of experts. The experts reduced the number by 25% for a variety of reasons, which were mainly to do with the pragmatic approach and the difficulty in obtaining information, and then proposed other indicators that had not been considered by the authors previously, with the final list of 30 indicators thus being arrived at.

So, the System of Smart Coastal Destination Indicators is composed of 30 indicators (Table 1). On a structural level, the indicators have been categorised into broad dimensions, based on the analysis and evaluation of urban and tourism planning documents, together with actions taken by the local administrations.

Smart Governance is composed of five indicators, four of which have been used in recent publications for the design of governance indicator systems in SD (Fernández-Tabales et al., 2017), these four being the following: the existence of tourism planning with a participative methodology at a local/district level (Gov-A); the existence of a proposed desirable territorial tourism model as part of the above planning (Gov-B); the application of integral administration quality systems at a local/district level (Gov-C); and the existence of public-private tourism administration bodies with the participation of private agents in decision making (Gov-D). The final indicator is the development of an electronic/open administration with mechanisms for a direct response to local citizens (Gov-E). The inclusion of this final indicator is due to the fact that the presence of mechanisms for the citizen to be able to communicate directly with the administration and receive a direct response is essential to the definition of an SD (Dirks & Keeling, 2009; Lathrop & Ruma, 2010).

Smart Environment is composed of five indicators. The presence of urban planning measures of adaptation to climate change—Env-A—(Becken & Hay, 2007; Gössling, 2010) is an addition to the overall view of the destination. The indicators concerning systems for the use of public bicycles (Env-B) and the collection and treatment of waste—the planning of refuse collection routes for vehicles equipped with GPS along with the use of sensors to monitor the state of waste containers (Env-C)—have previously been successfully used in Spanish studies on SDs (INVATTUR, 2015). Other indicators are the existence of tourism resources with environmental certification (Env-D)—in the present case measured by the percentage of beaches in the municipality with Q quality certification—, this corresponding to the need to measure the maintenance of the environmental quality of the main tourism resource of coastal destinations, which is their beaches (Navarro et al., 2013), and the proportion of municipal land given environmental protection (Env-E).

Universal Access taking into account that the average age in tourist demand is rising, which requires the adaptation of facilities to both the local environment—Acc-A—(Femenia & Perea, 2016) and people with reduced mobility—Acc-B—(Morgan et al., 2015). The present research takes on board the principle of integral accessibility (INVATTUR, 2015; WTO (World Tourism Organization), 2015), which has a dual orientation: physical accessibility to beaches—Acc-E—(Dos Santos et al., 2017) and digital accessibility (Acc-C and Acc-D).

Table 1. Indicators proposed for SD-Coast.

Dimensions	Code	Indicators	Description	Intervals	Sources
Smart Governance	Gov-A	Local/district tourism planning	Existence of tourism planning with a participative methodology at a local/district level	NO/YES	Plans.
	Gov-B	Territorial tourism model in local/district plans	Existence of a proposed desirable territory model as part of the plan	NO/YES	Plans and public administration of tourism.
	Gov-C	Integral local administration quality control systems	Has the EFQM system been applied?	NO/YES	Tourist offices.
	Gov-D	Public-private tourism management bodies	Existence of administration bodies with the presence and representation of private agents in decision making	NO/YES	Town council.
	Gov-E	Electronic administration	Existence of an exclusive or integrated platform on the municipal website	NO/YES	Town council websites.
Smart Environment	Env-A	Urban planning adapted to climate change	Adaptation of planning to climate change (reduction of pollutant gases, insulation and air conditioning of buildings)	NO/YES	Town council and public administration.
	Env-B	Systems for the public use of bicycles	Existence of bicycle lanes and material hardware for parking bicycles	NO/YES	Google Street View, plans and town council.
	Env-C	Waste collection and treatment	Planning of refuse collection routes for vehicles equipped with GPS, and the use of sensors to monitor the state of waste containers	NO/YES	Town council.
	Env-D	Tourism resources with environmental certification	Percentage of beaches with Q quality certification	NO $<$ 10% YES $>$ 10%	Tourism websites.
	Env-E	Protected Natural Areas	Percentage of municipal area with environmental protection	NO $<$ 26% YES $>$ 26%	Spanish National Geographic Institute (IGN) and Spanish Government Ministry of Ecological Transition and Demographic Challenge.
Universal Access	Acc-A	Accessible tourism environment	Existence of an integral urban accessibility plan	NO/YES	Town council websites and plans.
	Acc-B	Information service adapted for disabled people	Existence of information services adapted to disabled people or accessibility certification for tourist offices (UNE Standard 170001-2)	NO/YES	Tourism websites.
	Acc-C	Internet accessibility (WAI protocol)	Certification of WAI protocol (UNE Standard 1,39,803: 2004), with a minimum of level A on the official website	NO/YES	Town council websites.

(*continued*)

Table 1. Continued.

Dimensions	Code	Indicators	Description	Intervals	Sources
	Acc-D	Promotion of accessible tourism	Existence of audio guides, sign language guides, accessibility signs, braille guides and adapted tourist visits	NO/YES	Tourist offices.
	Acc-E	Accessible beaches	Existence of one or more beaches of the total number with provision for accessibility	NO/YES	Tourism websites.
Smart Business	Bus-A	Evolution of tourism employment	Increase in the number of hotel employees in August (2010–15)	NO Low: < 0% / Medium: 0%–5% YES High: > 5%–10% / Very high: > 10%	Statistics – INE.
	Bus-B	Evolution of attracting demand	Increase in the number of registered overnight stays in hotels (2010–15)	NO Low: < 0% / Medium:0%–5% YES High: > 5%–10% / Very high: > 10%	Statistics – INE.
	Bus-C	Evolution of seasonality	Interannual evolution of the Gini index applied to monthly overnight stays (2010–15)	NO: negative value YES: positive value	Statistics – INE.
	Bus-D	Evolution of profitability in terms of revenue per available room	Increase in the RevPAR indicator (2010–15)	NO Low: < 0% / Medium:0%–5% YES High: > 5%–10% / Very high: > 10%	Statistics – Exceltur
	Bus-E	Business associationism	Existence of local tourism association(s)	NO/YES	Town council.
Smart Technology	Tech-A	Free WiFi with QoS in public spaces	Availability of 100 KBPS of bandwidth per terminal when the area is at 20% of its habitual user capacity	NO/YES	Town council.
	Tech-B	Automation of tourist offices	Application of an automated data gathering system in tourist offices	NO/YES	Tourist offices.
	Tech-C	24-hour information points	Existence of touchscreens and/or virtual information points in the destination's tourist information offices and nerve centres / strategic points / busiest parts	NO/YES	Tourist offices.
	Tech-D	Tourism website	Existence of an attractive and fast website, adapted to technological devices and offering the possibility of making reservations	NO/YES	Tourism websites.
	Tech-E	NFC, QR, RFID, etc.	Information posters and promotional material with NFC/RFID/QR	NO/YES	Tourist offices.
Smart Innovation	Innov-A	Quality management systems in the destination	Existence of tourism quality certification through the Spanish SICTED system	NO/YES	Statistics – SICTED.

(*continued*)

Table 1. Continued.

Dimensions	Code	Indicators	Description	Intervals	Sources
	Innov-B	Certification with Q of tourism quality	Existence of elements (spas, campsites, natural spaces, hotels, tourist offices, beaches) with Q tourism quality certification (UNE Standard 1,87,003: 2008)	NO/YES	Tourism websites.
	Innov-C	Brand and media monitoring	Analysis of the destination's image in Google Analytics, Google Alerts, TweetDeck, Social Mention, and so on	NO/YES	Tourist offices.
	Innov-D	Social media plan	Definition of the destination's aims and strategies using social networks	NO/YES	Town council and tourist offices.
	Innov-E	Internet positioning	Presence of the destination's website among the first five Google Web Search results	NO/YES	Google Web Search.

Smart Business has had very little coverage in the study of SDs, where research tends to focus more on market trends. The present paper places special importance on the profitability—Bus-D—(López et al., 2018) and competitiveness (Bus-B and Bus-C) achieved by companies (Turrión-Prats & Duro, 2018**)**, their capacity to generate employment (Bus-A), and the associative business network—Bus-E—(Fernández-Alcantud et al, 2017).

Smart Technology provision of information through free WiFi with QoS (quality of service—a strong signal) in public spaces—Tech-A—(Ylipulli et al., 2014), 24-hour information points—Tech-C—(Ekşioğlu, 2016) and information posters with NFC/RFID/QR technology (Tech-E); the generation of new distribution possibilities for the services offered, through attractive and adapted tourism websites—Tech-D—(Kotoua & Ilkan, 2017); and an improvement in the interaction between destinations, companies and consumers through the Automation of Tourist Offices (ATO)—Tech-B.

Special attention in **Smart Innovation** is paid to observing the existence of quality management systems in the destination (Innov-A), as well as to the promotion of this quality by consumer markets through certification with Q of tourism quality—Innov-B—(Álvarez-García et al., 2015), social media plans (Innov-D), brand and media monitoring—Innov-C—(Kumar & Kaushik, 2017) and Internet positioning—Innov-E—(Rojas-Méndez & Hine, 2017).

Data collection

As has already been mentioned (Table 1), several indicators were generated through the analysis and evaluation of existing urban and tourism planning documents. For those depending on quantitative data, the most used statistical sources were the following: the Spanish National Institute of Statistics (INE), where the 2016 Hotel Occupancy Survey can be found; the Business Alliance for Excellence in Tourism (Exceltur), from 2010 to 2015; and for information on protected natural areas, cartographic material from the Spanish National Geographic Institute (IGN) and the Spanish Government Ministry of Ecological Transition and Demographic Challenge (2019).

Municipal government web portals constituted a fundamental source of information, with the consultations being carried out from January to February 2018 and the same parameters always

being used in order to objectivise the search. The sections consulted were those concerned with urban planning, public transport, local business associationism and electronic administration. At the same time, municipal web portals specifically dedicated to tourism were also used. As a general rule, these portals provided sufficiently detailed information, and only in very specific cases was it necessary to contact the town/city councils directly by telephone or e-mail in order to contrast or extend information. Other web portals that were used to obtain information on tourism were those belonging to several regional governments, which provided information on strategies, guidelines and other issues related to tourism planning.

Additionally, existing tourism consortiums were used as sources of information with which to analyse the presence of public-private tourism management bodies in the municipalities, as were consortiums for the treatment of solid urban waste and the monitoring of the condition of urban waste containers.

For the Innovation dimension, the Spanish SICTED system was used to verify tourism quality certification, and the Google Web Search engine was used to establish the presence of the destination's website among the first five search results.

In general, the availability or lack of information was taken into account in the design of the indicators, given the complexity involved in obtaining some of the data due to the statistical shortcomings that might have existed at a local level. That is why this system is mainly transferable to European coastal destinations, these having statistical and institutional systems that are comparable to those of Spain, although the possibility of it also being used as a reference for other destinations cannot be ruled out.

Data analysis

For SD-Coast, as has already been pointed out, 30 indicators have been designed, in each one of which a dichotomous indicator has been established. The use of this dichotomous measurement—as it is applied to small sample groups that are scaled according to the maximum range of indicators (with the consequent reduction in atypical values), and with known estimations of the property under study—allows information to be obtained that is similar to other alternatives in terms of its reliability and validity, and also facilitates the comparison of case studies (Krylovas et al., 2018).

In 24 of the indicators, a nominal rating is assigned through a single standard (Achieved/Not achieved). The remaining six indicators are divided into two groups. In the first, comprising three indicators, the dichotomous standard is established at a threshold relative to the exceeding of a value:

- for tourism resources with environmental certification, either less than 10%, or equal to or greater than 10%;
- for protected natural areas, either less than 26%, or equal to or greater than 26%;
- for the evolution of seasonality, either less than 0, or equal to or greater than 0.

In the second group, comprising the three remaining indicators, a ranking at four levels (Low, Medium, High and Very high) is used, these levels once again being turned into dichotomous indicators (Mastronardi et al., 2015). The results are related to significant increases in specific quantitative indicators of the tourism network, these increases not being achieved at the Low ($<$0%) and Medium (0%–5%) level, and being positive at the High ($>$5%–10%) and Very high ($>$10%) level. For both groups, an analysis of the tabulation ranges of the results has been carried out, looking specifically at national averages, as well as those averages that are specific to the territories under study (Maráková et al., 2016).

When the tabulations have been completed, a radial graph has been created that displays the tabulations achieved in each destination. This technique is based on the principles of flat geometry and guarantees that the results obtained are contrastable through the indicators used in a synthesis of the performance achieved in each dimension (Claveria et al., 2019). This semi-quantitative approach will allow the scaling of an index from 0 to 5 for each of the dimensions and the achievement of a final aggregate Index of 30 (i_t), which will facilitate the subsequent identification of good practice and its direct use by the territorial managers responsible for the destinations (Nikolova & Sinnyovsky, Nikolova and Sinnyovsky, 2019; Pilone & Demichela, 2018).

$$i_t = \sum\nolimits_m Gov_n + Env_n + \ Acc_n + \ Bus_n + \ Tech_n + \ Innov_n$$

Once the results for the destinations have been identified, the following step consists of completing the comparative territorial analysis (Litardo et al., 2020). There is a conglomerate analysis of the six dimensions, using the results from the 14 destinations, carried out through k-means clusters.

$$\underset{S}{\operatorname{argmin}} \sum_{i=1}^{k} \sum_{X_j \in S_i} |X_j - \mu_i|^2$$

For this grouping, points of departure from which to begin the study have been chosen. In the analysis, the distance of each data point from the centre of a cluster has been calculated. For the calculation of this distance, the Sum of Squared Error (SSE) method has been used. This involves a calculation of the squared difference between each one of the 14 data points of the whole, which provides the minimum distance for each case included (and indicates which segment is closest). Once this operation has been completed, the average of each cluster is calculated, as is the average corresponding to each of the dimensions. The groupings with the highest distribution percentage and the lowest SSE result (33.92) are those with five clusters.

In this way, it is possible to identify which destinations display higher performance in SD-Coast and determine the strengths and weaknesses of each of them. The cluster as a method of analysis, which is consistent in the production of the abovementioned distance matrix, allows the generation of a destination typology, according to the baseline conditions in the case studies, and a more complete and integral vision of these destinations (Claveria & Poluzzi, 2017).

Results

The series of graphs (Figure 3) expresses the results of how TI improves the performance of the coastal SDs in a synthesis of the performance achieved in each dimension. Without doubt, the majority of the destinations have focused on developing digital destinations where innovation and technology are key concerns, but smart destinations are much more than that. This bias can impoverish the innovative nature of an SD and the applicability of TI therein.

Using the above data, the creation of clusters allows the study cases to become more clearly defined, with their position in each reiteration of the process being adjusted until they converge in five clusters (Table 2). With these results, it is possible to classify the clusters into two large groups, the first involving greater specialisation in one of the dimensions, and the second greater homogeneity in each of the variables analysed.

In the results for Smart Governance (Gov), the low level of compliance with the established indicators stands out, as the average of the dimension shows. This may be due to the principles and practices of governance having been applied to tourist destination management only a relatively short time ago and not yet having become widespread, as a result of which there are still many cases of non-participative operational behaviour. This shortcoming can be observed more in day-to-day management than in planning. So, in a clear majority of the municipalities there is tourism planning involving a participative methodology, but in no case have standardised

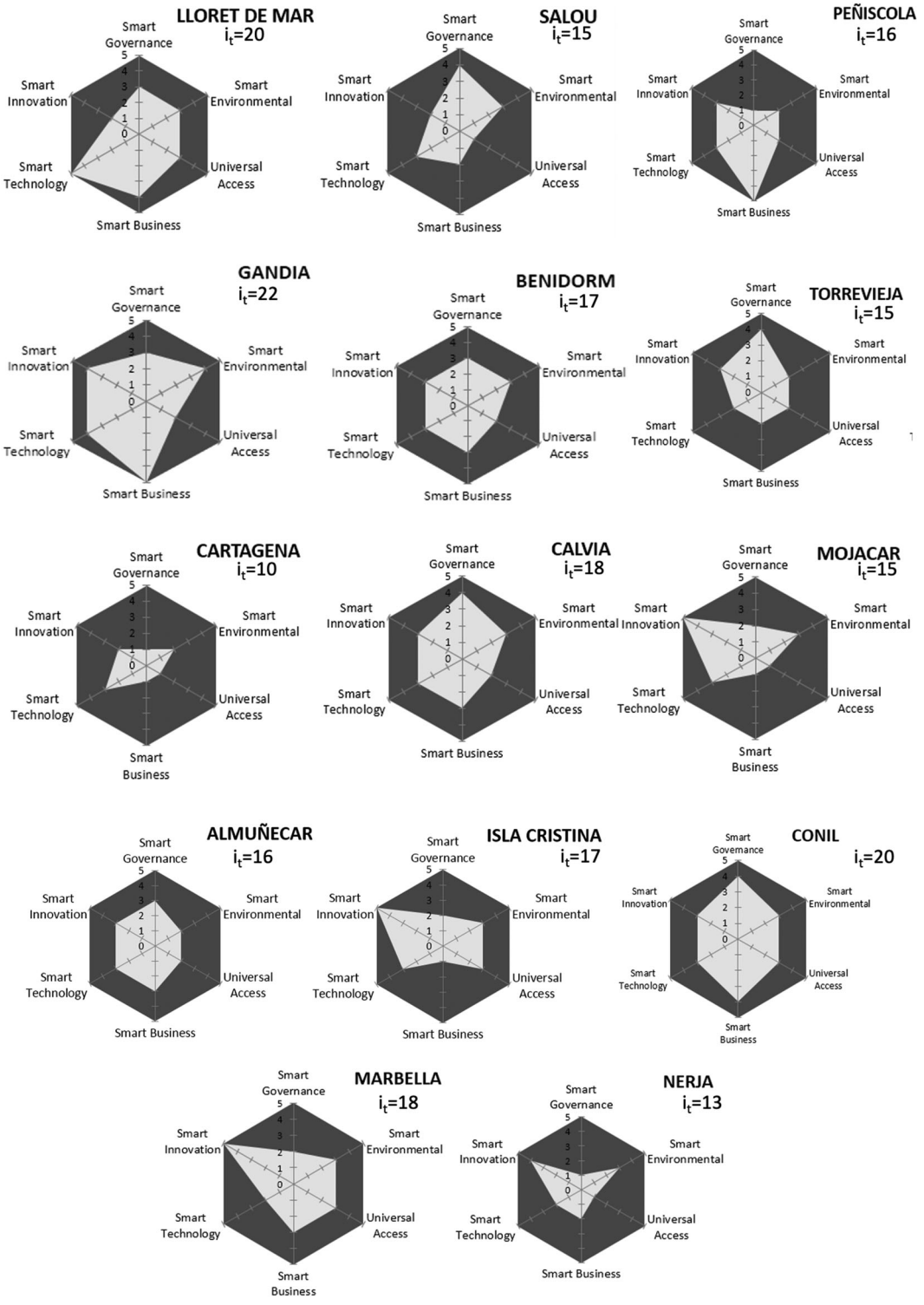

Figure 3. Comparative analysis of the smart coastal destinations indicator (SD-Coast).

Table 2. Output of the five clusters in the Smart Coastal Destinations Indicator (SD-Coast).

Mean/Centroid	Gov	Env	Acc	Bus	Tech	Inn	SDs
Cluster 1	2.67	2.00	1.67	2.00	2.67	2.67	Torrevieja Cartagena Almuñecar
Cluster 2	4.00	3.00	2.00	3.00	3.00	2.67	Salou Calvia Conil
Cluster 3	1.67	3.00	1.67	1.33	2.67	4.67	Mojacar Isla Cristina Nerja
Cluster 4	2.75	3.25	2.50	3.75	3.50	3.50	Lloret de Mar Gandia Benidorm Marbella
Cluster 5	1.00	2.00	2.00	5.00	3.00	3.00	Peñiscola
Average	2.64	2.79	2.00	2.79	3.00	3.36	–

integral quality systems, such as the EFQM system, been implemented by the administration. Also, there is a scarcity of instruments of electronic administration or open administration involving mechanisms for a direct response to requests from individual citizens. However, the existence of Cluster 2 demonstrates a degree of specialisation on the part of the municipalities included. In these cases, there is a positive trend towards incorporating institutional measures in order to assure the participation of organised social agents, which is proof of the existence of tourism administration bodies in which private agents participate in decision making.

As regards Smart Environment (Env), a greater homogeneity in the results achieved can be observed. Cluster 4 presents the most outstanding results in this dimension and generally maintains a homogeneous profile in the others. All of the municipalities achieve a medium level of fulfilment. However, within this context of homogeneity, the more consolidated destinations may find it more difficult to incorporate environmental criteria than destinations that have experienced tourism development more recently. The criteria for the highest level of achievement in Smart Environment are those most related to the incorporation of technological improvements into management. Examples include the incorporation into urban planning of technical measures to deal with climate change, such as the insulation and air conditioning of buildings, and for rationalisation and the control of gas emissions in the management of urban waste, such as the installation of GPS in refuse collection lorries and the use of sensors in waste containers.

Universal Access (Acc) contributes to providing disabled tourists with satisfaction and companies with competitiveness. With reference to physical accessibility, Lloret de Mar, Marbella and Conil are the only destinations with an urban accessibility plan, through which barriers are being eliminated in public spaces, public buildings and transport networks with the aim of making the destinations more accessible. Then, the fulfilment of UNE Standard 170001-2—taking in both the universal accessibility of information services adapted for disabled people and the accessibility certification of tourist offices—is achieved by ten out of the fourteen destinations. The presence of at least one accessible beach is achieved by all of the destinations, none of the town council websites follow the WAI (Web Accessibility Initiative) design guidelines, and in general the use of disabled accessibility criteria shows a high level of social commitment. An analysis of the remaining indicator reveals that none of the destinations provide information through the different senses (audio guides, sign language guides or braille guides). In summary, the destinations do take physical accessibility into account, although the majority make no provision for digital accessibility. This dimension is where the lowest results appear, with Cluster 1 playing an outstanding role by maintaining homogeneity in all of the results, which have a markedly low level.

With respect to Smart Business (Bus), factors such as the production structure, the level of associationism and the nature of other economic sectors have a decisive influence on the definition of the tourism model. The competitiveness of tourism is related to the contribution of

tourism to both the prosperity of SDs and an increase in quality of life for the residents. In this dimension, Cluster 5—consisting of only one SD, Peñiscola—stands out for achieving all of the indicators. The dimension provides an analysis of a destination's profitability, in terms of its capacity to generate both economic wealth and employment. The business dynamism indicator shows that inter-business cooperation exists in 78.5% of the destinations.

In the results for Smart Technology (Tech), the main motivation is linked to the fact that even though the concept of technology has theoretically become a very well-established part of territorial intelligence, when it has subsequently been put into practice shortcoming remain. In this dimension, it is still difficult to achieve some of the indicators—such as the existence of touchscreens and/or virtual information points—due to its technological nature, but there are other indicators—such as the provision of an attractive website—for which this technological conditioning should not determine the results and for which the values obtained can clearly still be improved. The cluster with the highest results in this context is Cluster 4, which thus maintains the homogeneity of its medium-high results.

For Smart Innovation (Innov), three municipalities (Mojacar, Isla Cristina and Marbella) achieve all of the five possible indicators. The first two of these three, together with Nerja, comprise Cluster 3, where it is once again possible to highlight the existence of a degree of specialisation. In general, the results are very positive. The certification with Q of tourism quality appears in the entire study sample. Quality management systems introduced with certification—such as the Integral System of Tourism Quality in Spanish Destinations (SICTED), promoted by the Spanish Government Ministry of Energy, Tourism and the Digital Agenda—exist in all of the municipalities. This indicator is an example of an interest in providing destination management with normalised certification in order to highlight the importance of the policies that are developed in the destinations. The same degree of interest can be seen in website positioning, for example.

Discussion

It can be affirmed that the stated objectives have been achieved in three essential regards. First of all, it has been demonstrated that SD-Coast can be a useful tool for management, since it highlights both the positive aspects of a tourist destination and, more importantly, those aspects in which weaknesses can be observed in comparison with other destinations in the same geographic area. Secondly, SD-Coast's pertinence has been proved with a demonstration of the viability of its application in fourteen real examples of a coastal municipality. Finally, the results are especially useful for public administrators in an environment as challenging as the one under study is for deciding which course of action to take due to the speed of change making it difficult to find pertinent guidelines.

This last observation deserves special attention, since the proposed system of indicators, through its different dimensions, provides public managers with a decision-making tool in a smooth and easy manner. Specifically, it allows them to conduct a diagnosis of the situation in their destination with respect to both a theoretical SD model and competing destinations with the help of useful information about the strengths and weaknesses found in each dimension. In this way, using the proximity to or distance from the optimal achievement of the indicators as a reference, they can make their decisions to dedicate more resources to improving a weak point, and carry on with successful courses of action or correct those that veer to far away from the model.

The support provided to public management is one of the contributions that distinguish the present study from other similar studies. This very contribution attempts to make up for the lack of applicability of other studies to the integral management of SDs. An SD can empower management organisations, local institutions and tourism companies to take their decisions within the destination itself (Vargas, 2016).

One of the characteristics of the presented Index is a marked territorial component, something that has not often appeared in previous contributions (Buhalis & Amaranggana, 2015; Gretzel et al., 2015). This attention to the territorial components of SD-Coast includes the dimension Smart Business, due to importance in the destinations' success—as is highlighted in the current article—and because it is a dimension that has not been adopted in previous proposals.

Of the other dimensions, Innovation stands out as that which has achieved the highest results, especially in relation to obtaining quality certification, the implementation of quality management systems and the work put into positioning the destination on the Internet. This is proof of the effort made in recent years by numerous municipalities to adapt to the new conditions. The conclusion to be drawn from these results is that the destinations are paying an increasing amount of attention to updating their management methods and instruments. This is a trend that they see as inevitable if they are to maintain their capacity to compete on a stage that is increasingly demanding and on which the continuous development of territorial learning processes is no longer an option but an absolute necessity. On the other hand there is the Universal Access dimension, which has achieved the least satisfactory results—in particular in the indicators representing Internet accessibility and the promotion of accessible tourism—due to the late incorporation of the necessary systems and instruments in coastal destinations. It is also worth highlighting the grouping in clusters of the destinations analysed, carried out according to the specialisation and homogeneity criteria for the achievement of the dimensions; placement in one cluster or another is one more indication for destination management organisations of the facets to be corrected or promoted.

As has already been noted, the main contribution of the present study, which is not common in the scientific literature, is a markedly territorial approach that pays considerable attention to the sustainability of the physical effects of tourism activity on a territory. This approach is a response to the seriousness of the territorial problems that have recently been experienced in Spanish coastal SDs, where the rate of land development has accelerated significantly since the beginning of the 21st century, due to which territorial and urban challenges have acquired a heightened and immediate importance, with a reduction in these destinations' levels of environmental sustainability in the medium to long term.

The authors consider that the results obtained are also representative with respect to other Spanish and European destinations, since the case studies were chosen in part due to their representativeness. In fact, all 14 destinations selected have previous experience of public SD policies and are among the main tourist destinations of Spain and Europe (in terms of their quantitative data in relation to the number of accommodation vacancies, visitors and jobs). The case studies were also chosen with the idea that they would be representative of different coastal environments (Atlantic and Mediterranean), with differentiated characteristics.

The first limitation in carrying out the research and applying the system of indicators was the lack of accurate information concerning the destinations in the study sample; it was not always possible to access information sources that were homogeneous, reliable and up to date. Another possible limitation arises from the potential weaknesses present in the use of a panel of experts, which can be sensitive to the design characteristics of the system of indicators, might use subjective information and may experience limited interaction among its members. However, the main limitation turned out to be the difficulty in adapting the system to different territorial and tourism contexts, since it was designed for specific consolidated destinations and based on the principle that the different territorial characteristics of different destinations require instruments that are differentiated according to their specific attributes. The proposed Index was specifically designed for coastal destinations, it being considered that urban or rural destinations would need other types of indicators. A significant adaptation would also be needed were it to be applied to less developed environments.

Thus, future research challenges could include the streamlining of the indicator system through its application to other geographic areas, and its adaptation to tourist destinations in areas with less advanced levels of administrative and statistical development.

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