This is the authors' final version of the paper published in the
Journal of Destination Marketing & Management.

You can cite this paper as:

Ivars-Baidal, J.A., Celdrán-Bernabeu, M.A., Femenia-Serra, F., Perles-Ribes, J.F. and Giner Sánchez, D. (2021) Measuring the progress of smart destinations: The use of indicators as a management tool. *Journal of Destination Marketing & Management*, 19, 100531. https://doi.org/10.1016/j.jdmm.2020.100531

Measuring the progress of smart destinations: The use of indicators as a management tool

Josep A. Ivars-Baidal[1], Marco A. Celdrán-Bernabeu[2], Francisco Femenia-Serra[3*], José F. Perles-Ribes[4] and David Giner Sánchez[5]

[1] Tourism Research Institute, University of Alicante, Campus Sant Vicent del Raspeig, 03080 Alicante, Spain. Email: josep.ivars@ua.es

[2] Tourism Research Institute, University of Alicante, Campus Sant Vicent del Raspeig, 03080 Alicante, Spain. Email: ma.celdran@ua.es

[3] Department of Tourism, Nebrija University, Campus de Princesa, 28015 Madrid, Spain. Email: ffemenia@nebrija.es

[4] Department of Applied Economic Analysis, University of Alicante, Campus Sant Vicent del Raspeig, 03080 Alicante, Spain. Email: jose.perles@ua.es

[5] Instituto Valenciano de Tecnologías Turísticas (Invat.tur), Paseo Tolls, 2, 03502 Benidorm, Spain. Email: giner_dav@gva.es

**Corresponding author*

ABSTRACT

This paper aims at developing and applying an indicators system for smart tourism destinations in order to better understand the current situation of a set of destinations which are developing smart tourism policies. The indicators were developed by adapting existing indicators in tourism destination management and smart cities literature, creating a new system based on a smart destination theoretical model that establishes three interrelated levels in which smart destinations are grounded: strategic-relational, instrumental and applied levels. Within these levels, nine different dimensions to be measured were identified. The indicators were constructed in collaboration with a public organisation (INVAT.TUR) devoted to providing technical assistance to smart destinations and were pre-tested, readjusted and then applied to a set of destinations of the Region of Valencia (Spain). Obtained findings reveal an uneven performance of destinations in the different dimensions of the three levels. A notable performance is observed in indicators for connectivity and online marketing, while more efforts need to be done in accessibility and sustainability initiatives. However, disparities are evident between different indicators and destinations. These results are discussed and framed within the relevant literature on smart destinations while providing information for destination managers and policy makers to adapt and replicate these indicators in their own territories. This paper is a first attempt to develop and apply indicators to measure smart destinations progress in literature and therefore constitutes an important precedent for future studies.

Keywords: Smart destinations; Indicators; Governance; Destination management; Smart tourism

1. Introduction

The concept of smart destinations, inspired by smart cities discourses (Boes, Buhalis & Inversini, 2015; Buhalis & Amaranggana, 2015; Gretzel, Sigala, Xiang, & Koo, 2015; Ivars, Solsona & Giner, 2016), has gained recognition as a useful destination management approach to face the profound impacts of digitalisation processes on tourism (Jovicic, 2017). Smart destinations (SDs) are a key piece of the smart tourism ecosystem, which is principally based on the widespread use of technology and data by different agents (Gretzel, Werthner, Koo, & Lamsfus, 2015). Both smart cities and destinations have attracted great interest by media outlets, have become the core of a considerable business volume for technological and consulting firms, and are the leitmotiv of public investment programmes as well as increasing academic research (Celdrán-Bernabeu, Mazón, Ivars-Baidal, & Vera-Rebollo, 2018; Johnson & Samakovlis, 2019; Mehraliyev, Choi, & Köseoglu, 2019; Mora, Bolici, & Deakin, 2017). However, these concepts remain fuzzy theoretical constructs built on the vision of different interested agents (mainly technological companies and governments), that vary from place to place. Smart tourism has

not been considered from its real contribution to the actual transformation of destinations. Based on this fact, there is a clear need to concretise the concept of smart city and destination and to develop operational definitions in order to assess the real effects of smart projects, which have been neglected so far (Femenia-Serra & Ivars-Baidal, 2020). With this aim, several indicators systems have been implemented in tourism and urban management in the past.

In the case of smart cities, Giffinger et al. (2007) conducted a pioneer study in order to develop a ranking of medium European cities through the application of 67 indicators classified in six dimensions associated with smart cities: smart economy, mobility, environment, people, living and governance. In line with this, Caragliu, Del Bo & Nijkmap (2013) measured European cities smartness by employing the indicators included in the Urban Audit data set (EUROSTAT), while Cohen (2014) implemented a similar set of indicators organized in a "wheel" in which different dimensions to be measured by indicators were captured. Other smart city rankings, such as *IESE Cities in Motion Index* incorporate different perspectives and new cities every year (IESE, 2018). Similarly, international standards like ISO 37122:2019 (*Sustainable Cities and Communities: Indicators for Smart Cities*) are based on a set of indicators classified in manifold axes: Economy, Education, Energy, Environment and Climate Change, Finance, Governance, Health, Housing, Population and Social Conditions, Recreation, Safety, Solid Waste, Sport and Culture, Telecommunication, Transportation, Urban/Local Agriculture and Food Security, Urban Planning, Wastewater and Water. These smart cities indicators systems are of a critical importance for smart destinations analysis and management.

In the field of tourism, efforts have been focused on developing indicators for sustainable tourism destinations (e.g. Blancas, González, Lozano-Oyola, & Pérez, 2010; Cabello, Navarro-Jurado, Rodríguez, Thiel-Ellul, & Ruiz, 2019; Fernández & Rivero, 2009; Miller & Twining-Ward, 2005; Schianetz & Kavanagh, 2008; Tanguay, Rajaonson, & Therrien, 2013; Torres-Delgado & Saarinen, 2014; Vera-Rebollo & Ivars-Baidal, 2003). In most cases, difficulties arise due to the complexity and multidimensional nature of sustainability in a destination (urban model, water consumption, transportation, waste generation, etc.). Indicators are also common in Tourism Studies for analysing destinations' competitiveness and its determinant factors (e.g. Dwyer & Kim, 2003; Mazanec, Wöber, & Zins, 2007). Indicators are a critical tool for destination planning and management and are frequently utilised by public administration and policy makers in their design of measures-actions and plans.

However, smart destinations are missing a comprehensive set of indicators that consider the performance of destinations in the different scopes in which they are expected to make efforts, such as connectivity, big data treatment, technology deployment and their interrelationship with the sustainability and accessibility of destinations (Gretzel, Sigala et al., 2015; Gretzel, Werthner et al., 2015; Ivars-Baidal et al., 2017). Beyond limited previous works (e.g. Huertas, Moreno & Ha My, 2019),

there is no indicator system to date that can measure how destinations are progressing regarding the expectations and objectives set by smart tourism literature and discourse. Based on this research gap, the objective of this research is to understand the current situation of a set of tourism destinations in terms of their level of progress towards becoming a smart destination by developing an indicator system and applying it. Moreover, we aim at constructing a useful indicators system that can be replicated and applied in other contexts in which smart tourism policies are being implemented. These indicators are different to smart cities ones and other existing systems in tourism literature in that they are specifically based on the foundations of smart tourism and encompass the different dimensions in which SDs need to perform. Therefore, this paper makes an important contribution by providing the first comprehensive and applicable set of indicators for smart destinations and by proving its usefulness among a sample of real destinations. By doing so, this paper tackles the need noted by scholars and experts to link smart destinations development to a better governance of these territories through implementation of transparent assessment methods (Ivars-Baidal et al., 2017). Indicators are essential for monitoring smart destination initiatives effectiveness and readiness for further progress, but a cohesive system has been missing so far (dos Santos Júnior, Mendes Filho, Almeida García, & Simoes, 2017). In this regard, SDs can follow the lead set by smart cities. In the case of smart cities, indicators have been embraced by manifold public organisations, including the European Innovation Partnership on Smart Cities and Communities (EIP-SCC). With the development of parallel initiatives such as "Smart Tourism Capitals" by the EU, indicators could be required to monitor the position of destinations in indexes and the progress of potential candidates to different funding lines, programmes or initiatives. The indicators here presented are an important precedent for the construction of such indicators, with the potential of being adapted and replicated at different scales, cities and regions around the world.

The obtained results reflect a high diversity and uneven performance of the destinations in the different dimensions that smart destinations comprise (sustainability, online marketing, connectivity, etc.). Most importantly, these findings and the proposed indicators are useful for researchers, DMOs, policy makers and designers of smart tourism projects and programmes.

2. Smart destination policies in Spain and the creation of smart indicators

The digitalisation process of tourism and its impact on destinations management is present in the international political agendas, being approached in countries like Spain, South Korea or China through the lenses of smart destinations (Gretzel, Sigala et al., 2015; Lee, Lee, Chung, & Koo, 2018; Um & Chung, 2019). In fact, the smart destination discourse has permeated beyond the territories where it was initially conceived and is now being used to support initiatives in many cities across the globe. This is

the case, for instance, of Buenos Aires, an urban destination that has recently deployed a digital platform to facilitate the collection, analysis and visualisation of data from different sources (Gestido, 2019). Another great example of these efforts are Chinese cities such as Beijing or Chengdu, and their projects to implement data platforms and to use of 5G technology and mobile applications to facilitate destination navigation (World Tourism Cities Federation, 2019). Among existing examples and cases, Spain constitutes probably the most renown case due to the institutional commitment and the creation of specific funding lines, support programmes and long-term strategies (OECD, 2018). In this country, SDs were included as a strategic priority in the National Tourism Plan for 2012-2015, which established a series of actions to be coordinated by SEGITTUR (the public agency devoted to tourism technologies and innovation associated with the Ministry of Industry, Energy and Tourism). This institution defines a smart destination as a "an innovative space, accessible to everyone, and consolidated on a cutting-edge technological infrastructure that guarantees the sustainable development of territories, facilitates the integration and interaction of visitors with the environment, and increases the quality of their experiences at the destination as well as residents' quality of life" (SEGITTUR, 2015, p.104). SEGITTUR's programme in Spain is being developed in parallel to different plans that fund smart city projects, including the National Smart Cities Plan (2015-2017) and the National Smart Territories Plan (2017-2020), which includes a specific category for SDs projects. Additionally, AENOR (the National Standardisation Agency) has elaborated two standards for smart destinations: UNE 178501:2016 (Requirements for smart destinations management systems), revised in 2018, and UNE 178502:2018 (Indicators and tools for smart tourism destinations). The creation of these standards has been positively received by international organisations (OECD, 2018). Finally, the central administration created in 2019 the Spanish smart tourism destinations network, being the first initiative of this kind in the world.

Because of the decentralised administration of the country, indicators systems and initiatives have been also adopted at the regional level. The Region of Valencia (*Comunitat Valenciana*) has fostered a pioneer process coordinated by the Valencian Institute for Tourism Technologies (INVAT·TUR). This organisation collaborates with SEGITTUR and has created a regional network of SDs that is the most dynamic in the country so far. The Valencian network classifies destinations according to their development stage into three levels: Level 1 implies the initial step of joining the network and the willingness to develop a working plan as well as the attendance to all meetings. Belonging to Level 2 requires being assessed through a self-diagnosis tool based on indicators that will be presented as follows, as well as the active participation in the network. Level 3 requires the development of a smart destination plan based on the results of the diagnosis and the involvement in research projects and pilot testing of different technologies. It must be noted that the parallel implementation and development of both networks (the Spanish and the Valencian) has facilitated a strong integration of

Valencian destinations in the national network. Level 3 destinations are automatically included in the national scheme. Furthermore, INVAT.TUR conceives the use of indicators as a key element in the smart tourism planning process. The fulfilment of the self-diagnosis, a groundbreaking tool in the field, becomes the starting point for the detection of improvement areas and the identification of strategies and actions for each destination in each dimension. By following this continuous evaluation and monitoring the evolution of real destinations, an essentially academic concept (SDs), has been put into practice. Therefore, Spain, and particularly the Region of Valencia, have become leaders in the development of smart tourism initiatives and their models are serving as inspiration for the above-mentioned EU initiatives. This approach is also being directly replicated in Latin America. Countries such as México and Argentina are developing networks of SDs inspired by the Spanish experience, and are progressively adopting the indicators methodology of SEGITTUR and INVAT.TUR.

This institutional framework has been considered by different scholars in their assessment of the performance of specific destinations, mainly through qualitative methods (e.g. dos Santos Júnior et al., 2017; Gomes, Gandara & Ivars, 2017). Case studies employing other methods for assessment of a single destination or comparison between destinations are abundant in literature (Boes et al., 2015; Buonincontri & Micera, 2016; da Costa Liberato, Alén-González, & de Azevedo Liberato, 2018; Gajdošík, 2019; Liberato, Alen, & Liberato, 2018; Micera, Presenza, Splendiani, & Del Chiappa, 2013). The focus in most case studies is put on the actions developed by DMOs and how these initiatives can impact on the performance, experience or competitive position of destinations. Thanks to increased business intelligence, DMOs in smart destinations can improve their marketing and management strategies, using for instance data from review sites (Mariné-Roig & Antón-Clavé, 2015) or data from social media (Brandt, Bendler, & Neumann, 2017). Beyond big data analysis, smart destinations might employ a wide array of technological tools not only to improve their performance, but also to enhance the experience of tourists (Buonincontri & Micera, 2016; Femenia-Serra, Neuhofer, & Ivars-Baidal, 2019; Liberato et al., 2018). SDs are also expected to develop initiatives that render a better performance in terms of sustainability (Gomis-López & González-Reverté, 2020).

However, while studies focused on destination cases or specific technologies are abundant in academic literature (Gretzel, Sigala et al., 2015), research on the identification and use of indicators for smart tourism is very scarce. This situation is quite different in the case of smart cities, an arena in which there is a profuse number of indicators, rankings and benchmarking initiatives promoted by scholars or consulting firms (Albino, Berardi & Dangelico, 2017). Smart cities are furthermore developing standards oriented towards general urban management monitoring (Huovila, Bosch & Airaksinen, 2019), a philosophy that is also being adopted in the field of smart destinations in Spain through the creation of specific standards.

The application of indicators is essential in the evaluation and monitoring in the tourism planning and policy-making processes (Hall, 2008; UNWTO, 2004), and has become a critical issue in tourism destinations sustainability and competitiveness research. Hence, smart destinations indicators are embedded in a wide and profuse research field, with its own limitations, controversies and success stories. The concept of smart destination is a new approach towards destinations planning and management that incorporates sustainability and competitiveness as part of its philosophy and objectives (Boes, Buhalis & Inversini, 2016; Del Vecchio & Passiante, 2017; Koo et al. 2016). This requires the implementation of specific indicators that contribute to clarify smart destinations concept and measure the real progress towards these goals. Applying indicators prevents discourse appropriation and guarantees a real transition from the imprecise rhetoric around smart destinations towards real practice. As Butler (1999) argued regarding sustainable tourism, without indicators, smart destinations concept is meaningless. However, not all indicators are appropriate, and even scientific and consensual indicators are at risk of being exploited for political purposes (Tanguay, Rajaonson & Therrien (2013). Indicators systems synthetize a complex and multidimensional reality according to predetermined objectives. Their success depends on their scientific legitimacy and their relevance for policy makers, or at least, on finding an equilibrium between both sides (Tanguay et al., 2013). SD as a new planning and management approach include new dimensions to be added to the existing indicators systems. These dimensions are identified according to the conceptualisation of SDs, strongly influenced by smart city models, and integrate sustainability and competitiveness as key issues that are ingrained in the own foundations of their definition.

The logic behind the creation of indicators is similar in most cases: Building on a model or framework for smart cities (Giffinger et al., 2007), destinations competitiveness (Dwyer & Kim, 2003) or destinations sustainability (EC, 2016), several indicators are identified and measured in a given sample, which results into indexes or sub-indexes, such as the one by WEF (2019). Some of the models that have inspired SDs indicators are summarised in Table 1, which provides fundamental information and solid examples of different type of dimensions to be measures. Smart city indicators, represented by the model of Giffinger et al. (2007), present a comprehensive structure and are connected to the traditional regional and neoclassical theories for urban growth and development (Caragliu et al. 2013), to which new technologies are incorporated. These indicators have inspired many others, such as the CITIkeys indicators framework, which synthetises the dimensions to measure in five topics: people, planet, prosperity, governance and propagation (scalability and replicability) (Bosch et al. 2007). This structure bridges smart city indicators with the envision of sustainability as the equilibrium between the environmental, economic and social issues. Through this process, sustainability assessment has been progressively integrated in smart city goals and urban management agenda (Ahvenniemi et al.

2017). This trend is generating an intense debate around the reach of smart and sustainable indicators systems and the priorities of each type of approach (Ahvenniemi et al. 2017; Huovila et al. 2019).

Table 1. Dimensions of different indicators systems related to smart destinations model

SMART CITY (Giffinger et al. 2007)	SUSTAINABLE DESTINATION (EC, 2016)	COMPETITIVE DESTINATION (WEF, 2019)	SMART DESTINATION (Ivars-Baidal et al. 2017)
• Smart governance • Smart economy • Smart people • Smart living • Smart environment • Smart mobility	• Destination management • Economic value • Social and cultural impact • Environmental impact	• Enabling environment • Travel & Tourism policy and enabling conditions • Infrastructure • Natural & Cultural Resources	• Governance • Sustainability • Innovation • Accessibility • Connectivity • Intelligence • Information • Online marketing • Performance

Own elaboration

On one side, indicators for destinations sustainability adopt the balance approach (economic, social and environmental sustainability) as the most visible position in public policy-making and the dominant one in the academic discourse (Hall, Gössling and Scott, 2015). This view of sustainability is usually complemented with destination management indicators (EC, 2016), which could be integrated within the more inclusive concept of governance (Rasoolimanesh et al. 2020). However, technology has been barely considered in sustainability indicators (Agyeiwaah et al. 2017). Overall, existing indicators systems vary according to factors such as scale (national, regional, local), type of geographical space (urban, rural, coastal destinations for instance), organizational framework (thematic, using sustainability dimensions, or causal: Pressure-State-Response -PSR model-); indicators development process (research, development and implementation) or purpose (planning tool, benchmarking indexes, performance dashboards, etc.).

On the other side, competitiveness indicators have not been as widely applied as sustainability ones. The existing indicators usually derive from competitiveness destination models (e.g. Dupeyras & MacCallum, 2013; Dwyer & Kim, 2003; Ritchie & Crouch, 2003; WEF, 2019), which were developed mainly based on international macro-perspectives that encompass social, cultural and economic variables affecting the performance of nations (Dwyer & Kim, 2003). The model by WEF (2019), synthetized in Table 1, is structured in four dimensions that are applied at the national scale: (i) enabling environment (including business environment, safety and security; health and hygiene), (ii) travel and tourism policy and enabling conditions (tourism policy, international openness; price competitiveness and environmental sustainability), (iii) infrastructure (air transport, ground and port and tourist service infrastructures), (iv) natural and cultural resources. This model has inspired other indicators systems applied at the local level, such as the Index of Urban Tourism Competitiveness

published in Spain by EXCELTUR (EXCELTUR, 2017), even though the applicability of this type of indicators is problematic at the municipal level. Additionally, these models usually encompass indicators for market performance (Dupeyras & MacCallum, 2013; Dwyer & Kim, 2003; EXCELTUR, 2017), according to the vision of competitiveness from a macro-perspective as a construct that comprises all variables affecting the performance of a nation in international markets (Dwyer & Kim, 2003).

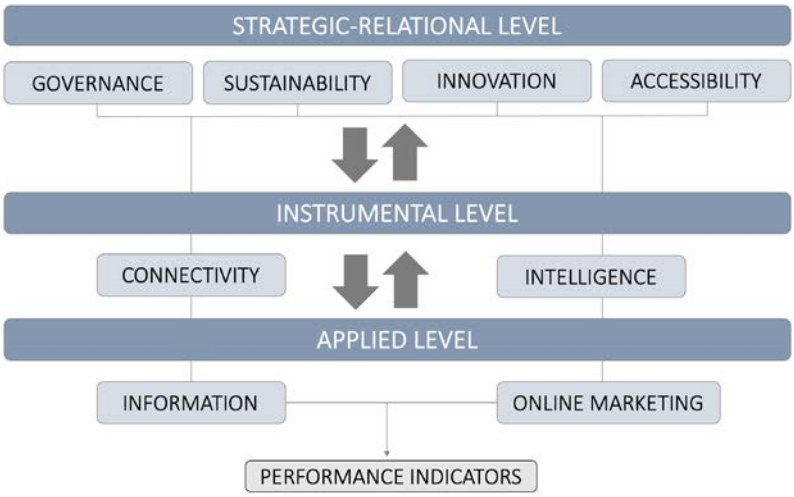
All in all, the analysed indicators systems are strongly related to the smart destination concept, but are unable of capturing its singularity and complexity, which makes necessary to develop specific indicators such as the ones this paper presents building on the smart destination model of Ivars-Baidal et al. (2017) and inspired by others of a similar nature (e.g. González-Reverté, 2018). The presented indicators system involves some basic dimensions of smart city, sustainable and competitive destinations, such as governance or sustainability, from a new perspective. Also, new dimensions strictly related to the smart tourism management approach, based on data-driven knowledge and ICTs, have been introduced from both the instrumental perspective (connectivity and intelligence) and the applied perspective (information and online marketing).

3. Methodology

In order to fulfill the stated objectives, this research followed several phases. First, with the purpose of developing and classifying a set of indicators, it adopted the model introduced by Ivars-Baidal, Celdrán-Bernabeu, Mazón & Perles-Ivars (2017). This holistic model conceptualises the smart destination as structured in three interrelated levels with their respective principles:

1. *Strategic-relational level:* The smart destination is based on governance, is founded on planning, public-private collaboration and coordination in administration to obtain a sustainable tourism development, an innovative environment and a tourist territory accessible to everyone.
2. *Instrumental level:* The SD is built on digital connectivity, sensorisation and big data, which constitute the infrastructures in which information and intelligent systems rely. This system facilitates the interaction between physical and digital worlds, a key characteristic of smart tourism.
3. *Applied level:* SDs generate smart solutions for the management and marketing of destinations as well as for tourist experience enhancement.

Figure 1. Smart destination model structure: levels and dimensions



Own elaboration based on Ivars-Baidal et al. (2017)

Together with the already identified dimensions (Governance; Sustainability; Innovation; Accessibility; Connectivity; Intelligence; Information; Online Marketing), a new dimension to measure the overall performance of destinations was included. The inclusion of this new dimension is driven by the need to measure the result of smart destination initiatives in the real tourism activity in terms of demand satisfaction levels and socioeconomic impact (occupancy rate, expenditure, seasonality and tourist sector unemployment) from an evolutionary perspective, based on inter-annual data. This dimension is aimed at monitoring the evolution of destination competitiveness and observe how this could be related to smart initiatives development. Hence, while existing literature argues smart development improves destinations competitiveness (Boes et al., 2016; Koo et al., 2016), the indicators in this dimension are necessary to estimate, together with other variables, the real impact of SDs on this regard.

Once the levels and all dimensions were conceptually developed (Figure 1), the second phase consisted in developing the indicators. The indicators were developed together with INVAT.TUR, including three types of indicators: First, sustainable and competitive destination indicators were analysed to identify those that fit with the SD model (EC, 2016; WEF, 2019). Second, some indicators were derived from smart cities indexes (Caragliu et al., 2013; Cohen, 2014; Giffinger et al., 2007; IESE, 2018) and adjusted to the tourism context. Third, beyond theory-grounded indicators, other indicators were self-developed according to the referential theoretical model (Figure 2), feedback provided by smart destination programmes developers and smart destinations literature, which sets the foundations and expected performance of SDs in a set of dimensions, such as connectivity, use of big data or information provision (Boes et al., 2015; Buhalis & Amaranggana, 2015; Femenia-Serra & Ivars Baidal, 2020; Femenia-Serra et al., 2019; Gretzel, Sigala et al., 2015; Gretzel, Werthner et al., 2015; Ivars-Baidal

et al., 2017; Jovicic, 2017; Wang et al., 2013; Wang et al., 2016). Building on this literature, some indicators were developed and then contrasted with experts and with the responsible technicians from the Valencian Institute of Tourism Technologies (INVAT.TUR). Therefore, the proposed indicators system is based, on one side, on the adaptation of existing smart cities, sustainability and competitiveness indexes, specifically the indexes developed by Caragliu et al. (2013) and Giffinger et al. (2007) for European urban areas, and by Cohen (2014) and the by Center for Globalization and Strategy and IESE Business School's Department of Strategy (2018). On the other side, the newly developed indicators were collaboratively developed building on the above-referenced smart tourism literature and the perspective of experts from INVAT.TUR who provided their opinion and expertise on the potential indicators that could better measure the performance of SDs.

The preliminary set of indicators were then pre-tested with a reduced set of destinations during 2017. After the pre-test, the indicators were refined, reformulated and adjusted according to the observed results and feedback provided by DMOs managers and practitioners. The feedback provided by DMOs included suggestions to modify some indicators, requests to incorporate new ones or to delete the others that were virtually impossible to obtain or to answer. Those indicators for which there was no adequate and updated information were discarded. The definition, measurement, and coherence of each of the proposed indicators was contrasted with these technicians. Their suggestions were discussed by the research team and the indicators contrasted with external researchers and further adjusted.

After this process, the final set of 72 indicators were obtained (see Appendix A) and gathered in an *ad-hoc* designed online software in the form of a "self-diagnosis" survey that each destination's DMO representatives had to fill in. Hence, DMOs personnel evaluated the performance of their destination in each indicator for each dimension, expressing this performance through a numeric value between 0 (*non-compliance*) to 100 (*full compliance of the indicator*). Most indicators are composed by several sub-requirements, while others are unidimensional, as it can be observed in detail in the full indicators list provided in Appendix A. They are assessed with numeric values in all cases, thus keeping the evaluation process as objective as possible. To facilitate this task and to ensure the quality of the self-assessment, managers had at their disposal a technical document, entitled "Guide for the Implementation of Smart Destinations" (see Ivars-Baidal, Celdrán-Bernabeu & Femenia-Serra, 2017). This document offers a detailed guide for DMOs in which support was provided to obtain the necessary data to respond to each indicator. Therefore, this set of indicators is not based on secondary data, but rather on first-hand information on the destination performance facilitated by destinations managers, who had to support their answer to each indicator by providing evidences of their score between 0 and 100: specific data, attached documents, examples and further information that proved their

fulfilment degree. Throughout this process, and due to the cross-cutting nature of the indicators, a close collaboration between the different departments of the local administration emerged and forced different departments to collaborate and meet frequently to complete the indicators system questionnaire. For most destinations this process took several weeks.

The results provided in this paper are based on the application of the final set of indicators to a total of 18 destinations from the Region of Valencia, including its capital (the city of Valencia) which are all members of the mentioned network. These 15 destinations belong to the Level 3 of the classification system established by INVAT.TUR (most advanced SD projects), and three destinations are still in Level 2 (Alicante, La Nucia and Santa Pola) but close to becoming part of the top level. Therefore, these destinations represent the totality of cities that have completed the self-diagnosis so far and can be evaluated, and therefore, they represent the entire population of Valencian smart destinations in this advanced stage.

It must be noted that due to the geographical and economic structure of the region, there are notable differences between destinations in terms of specialisation of their local economy in tourism, which is usually higher in coastal destinations (see Table 2). In this regard, Perles-Ribes, Ivars-Baidal, Ramón-Rodríguez & Vera-Rebollo (2019) established a classification of the tourist destinations of the Region of Valencia using cluster analysis techniques based on a wide range of indicators related to the tourism activity. Regarding coastal destinations, and according to these authors' classification, Valencia and Benidorm appear together in the same group, composed only by these two destinations. However, as Spain's third largest city, Valencia is a clear representative case of urban tourism, while Benidorm is the quintessential sun and sand destination of Spain. As for the rest of the municipalities, Calp, Finestrat and Peníscola would be among the residential tourist type of destinations (abundance of second homes rather than hotels), whereas, Benicarló, Benicàssim, Gandia, La Vila Joiosa and Vinaròs make up a mixed or undifferentiated model somewhere between the residential destinations and the holiday resort model of Benidorm. Regarding to the inland destinations, Alcoi and Villena represent larger inland municipalities in which industrial activity is predominant and the tourism functionality is relatively low, while Morella is a small agrarian municipality with some tourism activity.

Table 2. Main features of the analysed sample

Destination	Typology	Destinations clustering	Inhabitants	Tourist accommodation offer
Alcoi	Inland	Intermediate city with a medium-low tourist function	58,994	1,614
Alicante/Alacant	Coastal	Mixed destination	334,887	23,873
Benidorm	Coastal	Hotel destination	68,721	85,441
Benicarló	Coastal	Mixed destination	26,912	2,408
Benicàssim	Coastal	Mixed destination	18,192	9,730

Calp	Coastal	Residential tourist destination	22,725	30,658
Campello	Coastal	Mixed destination	28,349	8,476
Cullera	Coastal	Mixed destination	22,145	8,172
Finestrat	Coastal	Residential tourist destination	6,715	4,487
Gandia	Coastal	Mixed destination	74,562	21,500
La Nucia	Inland	Intermediate city with a medium-low tourist function	18,603	1,081
Morella	Inland	Agrarian small municipality with limited tourism activity	2,430	742
Peníscola	Coastal	Residential tourist destination	7,612	31,537
Santa Pola	Coastal	Mixed destination	32,306	11,200
Vila Joiosa	Coastal	Mixed destination	34,673	7,510
València	Coastal	Hotel destination	794,288	45,168
Villena	Inland	Intermediate city with a medium-low tourist function	33,964	200
Vinaròs	Coastal	Mixed destination	28,682	5,276

Source: Perles et al (2019), National Statistics Institute (INE, 2019) & Valencian Region Tourism Board (2019)

While this number of destinations is limited, it includes all the destinations that have hitherto been capable of completing the self-diagnosis. Hence, they provide stimulating information on several destinations progressing towards the smart destination model, a purpose for which they are receiving in some cases external funding and in all cases technical support from the administration. Additionally, this application of indicators is, to the knowledge of the authors, the first of its type and offers qualitatively rich information for other destinations and contexts where this method could be applied.

Furthermore, the conducted analysis, based on exploratory data analysis techniques, is useful in measuring the adequacy of the indicators system and can contribute to its improvement. This data analysis is aimed at two specific objectives:

1. Measuring the fulfilment degree of the indicators of the smart destination model among a sample of destinations that belong to the Valencian network of SDs.
2. Assessing the suitability of the indicators system that has been used to measure the progress of destinations according the SD model.

4. Results

The obtained data allow to measure the fulfilment degree of the indicators, this is, the situation of destinations in complying with the attributes of a smart destination in each of its dimensions (Figure 2). The results of this section reflect the performance of destinations in each indicator and aggregated performance for each dimension. The performance of destinations is expressed in percentages (%),

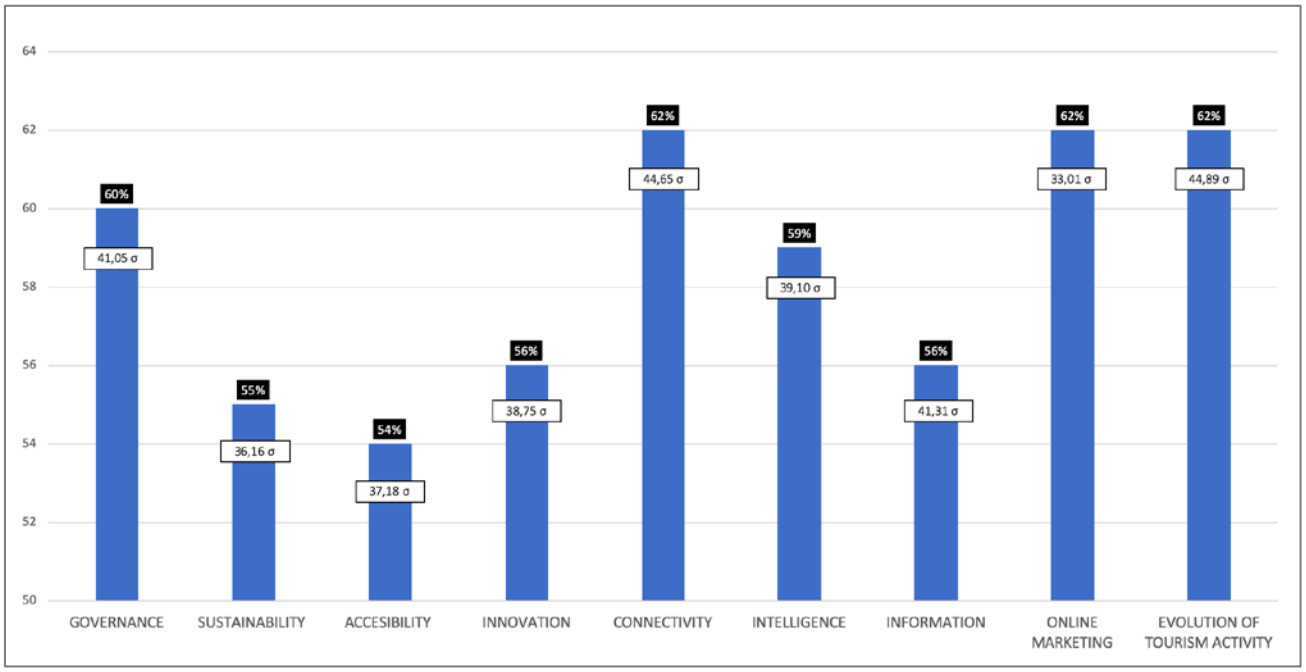
which illustrate in a scale from 0% to 100% (lowest to highest possible score) the situation of destinations in these scopes. These indicators, as stated above, were calculated based on the data provided by DMOs managers and personnel through the online self-diagnosis tool. When fulfilling each indicator, DMOs needed to demonstrate why and how their destination performed to that level. This made managers response as objectively as possible, as the research team and Invat.tur checked their results according to the data and documents they had provided to support the indicated score in each indicator and sub-requirements (see Appendix A).

Regarding the general results, the overall general mean of the indicators for the nine dimensions (*Accessibility; Connectivity; Evolution of tourism activity; Governance; Information; Innovation, Intelligence; Online marketing; Sustainability*) is 58,44%, which reflects a medium degree of compliance and demonstrates that there is room for improvement, even more, when considering that they represent the destinations of the region that have enrolled the regional smart destinations network and are doing greater efforts in this regard. The standard deviation (s.d.) of this general mean reaches 39.07, which reflects a high variability among indicators and destinations and big disparity between the different territories in their progress towards smart destination models.

The dimensions with higher degree of fulfilment are “connectivity”, “online marketing” and “evolution of tourism activity” (average 62%), while “accessibility” shows the lowest score (average 54%). The highest dispersion is found for “evolution of tourism activity” (s.d. 44.89) and “connectivity” (s.d. 44.65). Conversely, the lowest dispersion is observed in “online marketing” (s.d. 33.01), “sustainability” (s.d. 36.16), “accessibility” (s.d. 37.18), “innovation” (s.d. 38.75) and “intelligence” (s.d. 39.10). If demographic size is considered, municipalities with a population between 50,000 and 100,000 inhabitants show a better performance in practically all dimensions of SDs (68.5 %), while the only two municipalities with over 100,000 inhabitants have a much better performance in all indicators (72.66%).

Among the objectives of this paper, it was expected to explore the reliability of the indicators system and its different dimensions. This has been done using Cronbach’s Alpha coefficient. The obtained results for each dimension are: 0.72 for Governance, 0.74 for Sustainability; 0.46 for Accessibility, 0.65 for Innovation, 0.34 for Connectivity, 0.56 for Intelligence, 0.75 for Information, 0.72 for Online Marketing, and 0.39 for Evolution of Tourism Activity. Almost all of them are above the recommended threshold of 0.60 except for the case of Accessibility, Connectivity and the Evolution of Tourism Activity dimensions where results suggest that a room for improvement exist. More descriptive statistics for all items can be found in Appendix B.

Figure 2. Level of compliance: Aggregated mean (%) and standard deviation (σ) by dimension



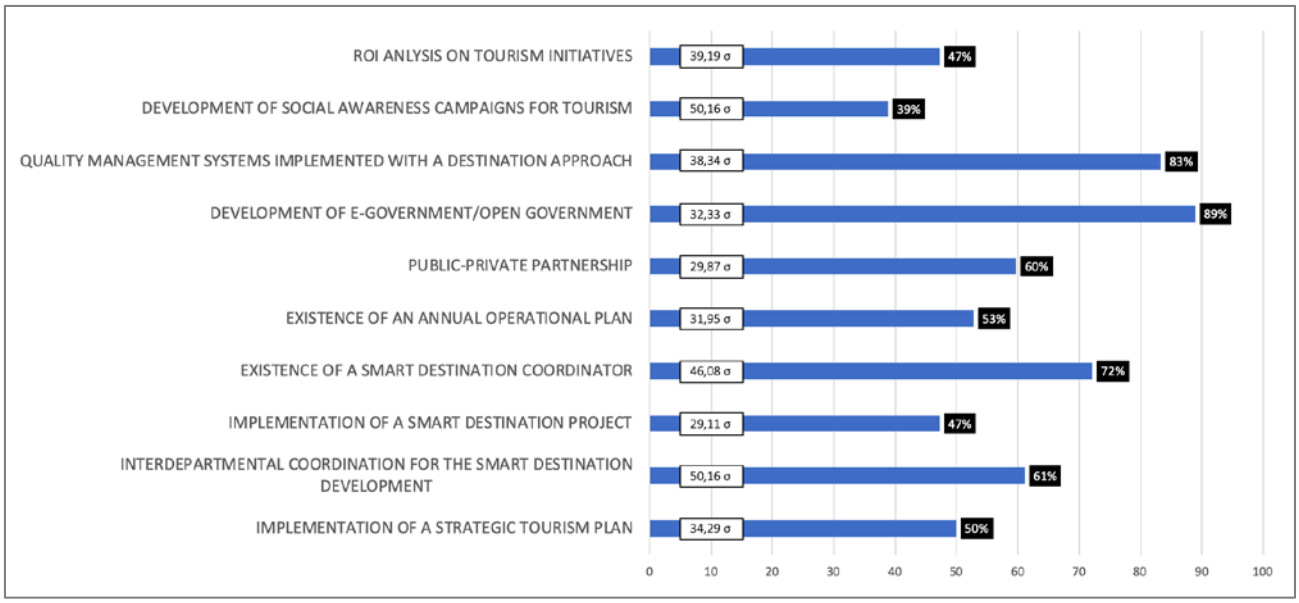
Own elaboration

According to the above-displayed reference model (Figure 1) by Ivars-Baidal et al. (2017), the analysis of the indicators was also conducted following the three mentioned levels: strategic-relational, instrumental and applied. These levels are subdivided in several dimensions. In the following lines and graphs, the results are presented in a concise format, but further detail and requirements for each indicator can be observed in Appendix A.

The strategic-relational level comprises the indicators for "governance", "sustainability", "accessibility" and "innovation". When looking at the results for governance indicators (Figure 3), we find a notable score in development of electronic administration, a horizontal process beneficial for SDs, as well as a high level of adoption of a quality control system in destinations (SICTED), created by the General Secretariat for Tourism and implemented in collaboration with regional and local administrations. The indicators for implementation of tourism awareness campaigns and the application of SDs master plans have a lower degree of fulfilment. This demonstrates a clear deficit in terms of strategic, long-term planning. The analysis of standard deviation shows that higher dispersion is found for the items "Interdepartmental coordination for the smart destination development" (s.d. 50.16) and the "Development of social awareness campaigns for tourism" (s.d. 50.16), being the lowest the corresponding to the items "Implementation of a smart destination project" (s.d. 29.11) and "Public-private partnership" (s.d. 29.87). This reflects how the intrinsic conditions of destinations, with

different available financial, technical and human resources, have an impact on their capacity to conduct governance-oriented initiatives.

Figure 3. Level of compliance: Aggregated mean (%) and standard deviation (σ) for Governance

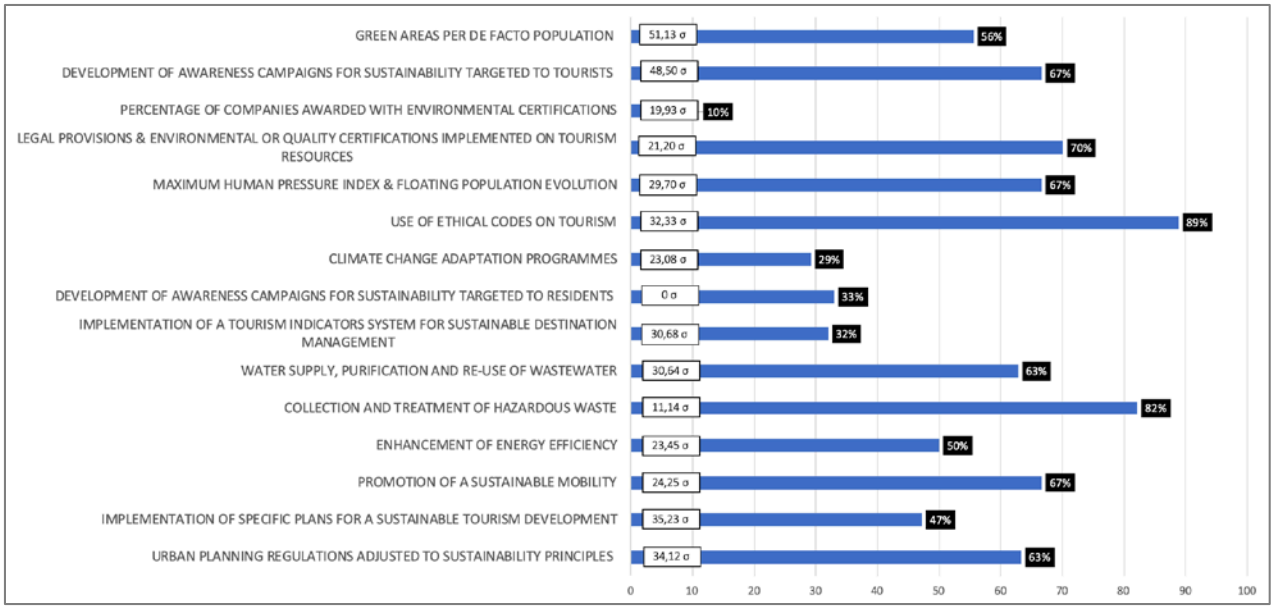


Own elaboration

Regarding sustainability (Figure 4), the accession by destinations to the ethical code in tourism practices enacted by the regional government reflects a good performance in political will to advance towards sustainability goals. On another side, the high scores obtained in waste management represent a positive step in terms of environmental protection, but data also reveals room for improvement in efficient energy and water supply systems management. Finally, good performance in number of protected natural areas and urban planning adapted to the sustainability goals seems to demonstrate that destinations are distancing themselves from the expansive urban sprawl that was preponderant before the 2008 financial crisis. The indicator with the smallest compliance level is the one reflecting the number of companies which have been recognised with an environmental certificate (14%). We also find a deficient degree of implementation of indicators to measure environmental performance (which is key for a solid application of sustainable tourism policies), a scarce number of initiatives to raise awareness of sustainable development among residents, and few adaptation plans to climate change. The higher standard deviation values are found for indicators “Green areas per de facto population” (s.d. 51.13) and “Development of awareness campaigns for sustainability targeted to tourists” (s.d. 48.50), while the lowest values are found for “Development of awareness campaigns for sustainability targeted to residents” (s.d. 0.00), “Collection and treatment of hazardous

waste" (s.d. 11.14) and "Percentage of companies awarded with environmental certifications" (s.d. 19.93).

Figure 4. Level of compliance: Aggregated mean (%) and standard deviation (σ) for Sustainability



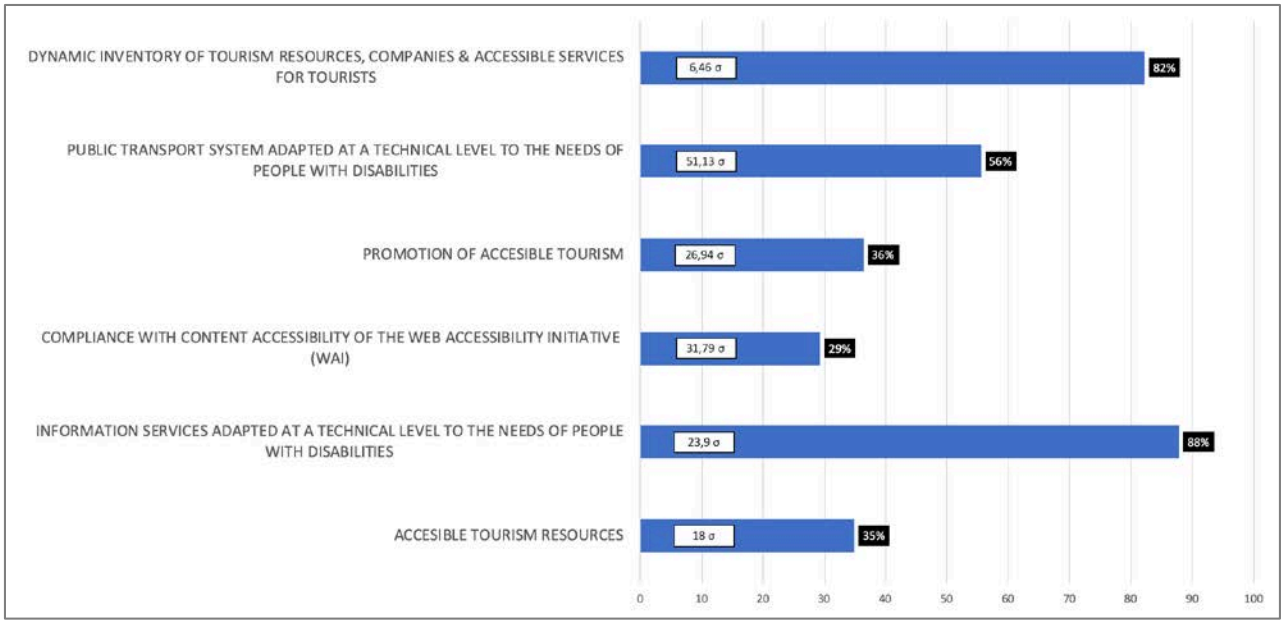
Own elaboration

Accessibility indicators are the dimension with the worst performance (51%) (see Figure 5). Within these indicators, there are two which present better scores: "Availability of tourism information services adapted to disabled people", and "Existence of inventories with accessible resources, companies and services". Nonetheless, there is room for improvement in terms of adapted attractions, accessibility of tourism websites (WAI protocol) and promotion of accessible tourism. Additionally, adaptation level of public transport to disabled people is below 50%. Consequently, universal accessibility, considered as a cross-cutting and vital element of smart destinations, must be considered as a priority in future political actions.

Dispersion analysis for accessibility indicators reveals that higher standard deviations are found for the item "Public transport system adapted at a technical level to the needs of people with disabilities" (s.d. 51.13) followed by the "Compliance with content accessibility of the Web Accessibility Initiative (WAI)" item (s.d. 31.79). Conversely, the "Dynamic inventory of tourism resources, companies & accessible services for tourists" (s.d. 6.46) and "Accessible tourism resources" (s.d. 18.00) items present the lowest dispersions. Dispersion analysis reveals a clear gap between destinations that have advanced

and accessible transport systems (bigger cities, the ones with more resources), compared to municipalities in which public transport is virtually inexistent.

Figure 5. Level of compliance. Aggregated mean (%) and standard deviation (σ) for Accessibility

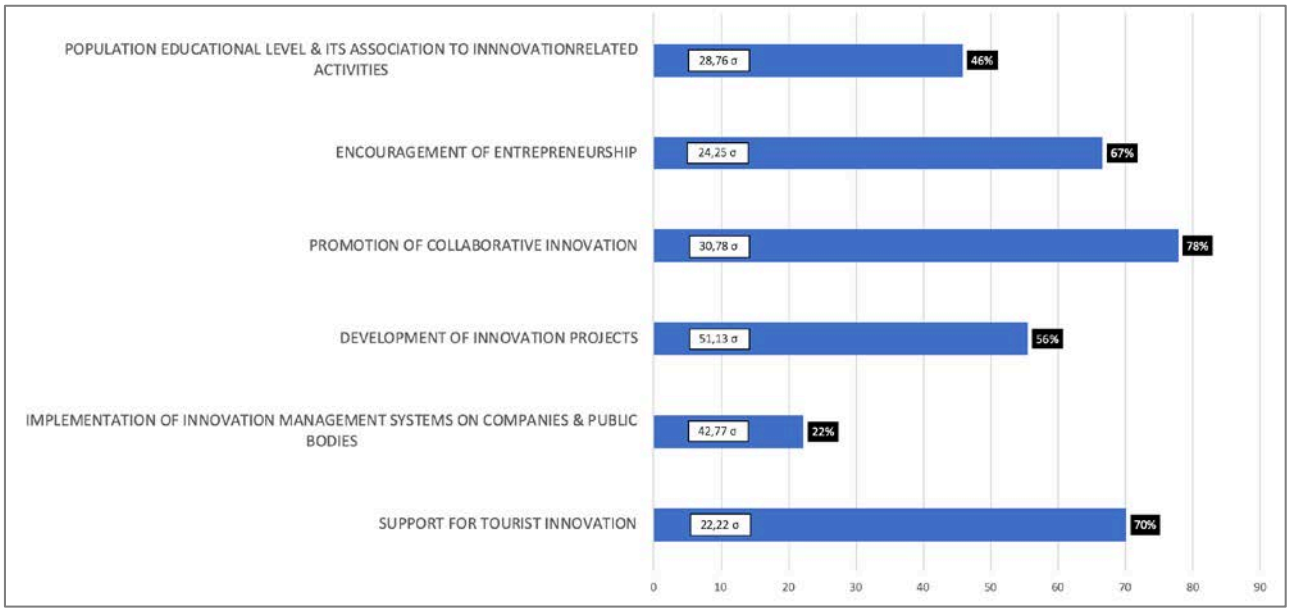


Own elaboration

Regarding innovation dimension (Figure 6), we find a satisfactory performance on the initiatives aimed at encouraging innovation in tourism as well as entrepreneurism. On the negative side, fulfilment degree is poor in the implementation of standardised systems to manage innovation (ISO) in both companies and public administrations. The scores are also below the mean in terms of educational level of residents, employment in innovative economic sectors and development and implementation of innovation projects at destinations. Innovation is basically fostered by public administrations in these territories, but observable results are limited so far.

Dispersion analysis shows that higher disparities among destinations are found for the items "Development of innovation projects" (s.d. 51.13) and "Implementation of innovation management systems on companies and public bodies" item (s.d. 42.77). More cohesion among destinations is observed in the items "Support for tourist innovation" (s.d. 22.22) and "Encouragement of entrepreneurship" (s.d. 24.25).

Figure 6. Level of compliance. Aggregated mean (%) and standard deviation (σ) for Innovation

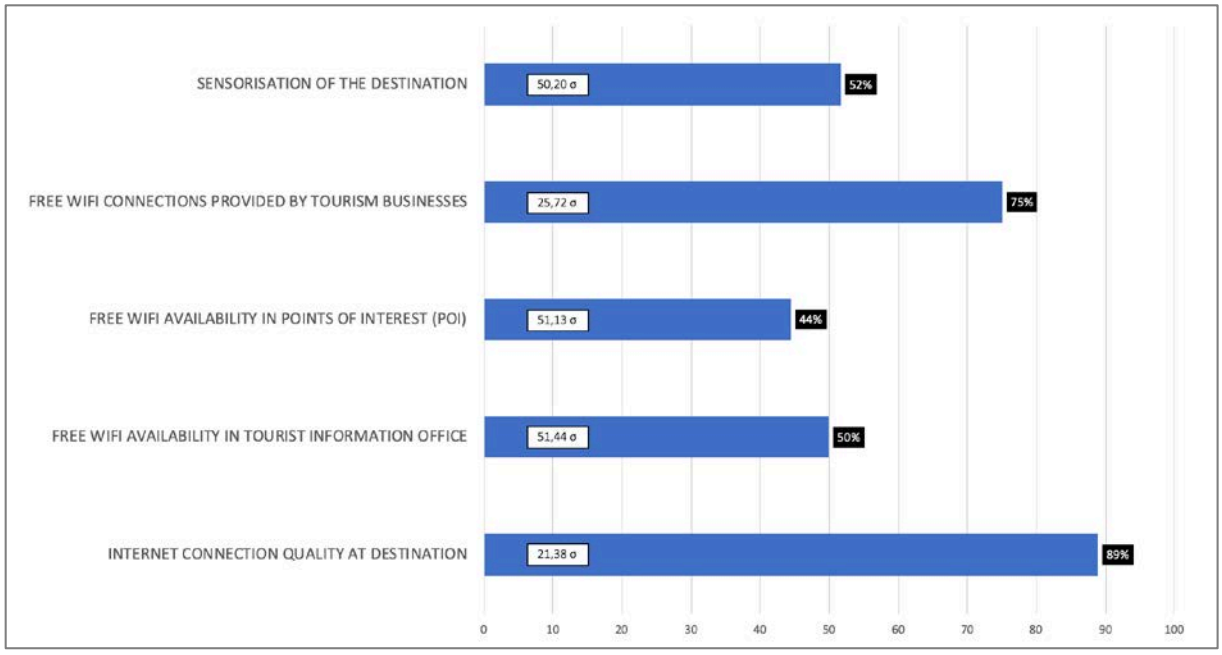


Own elaboration

The instrumental level of the model is composed by the indicators for "Connectivity" and "Intelligence" dimensions. Regarding the former (Figure 7), connectivity in companies indicator has an acceptable level of compliance, but it seems more limited in other areas of destinations, including tourism information offices (54%) and tourism attractions (46%). This deficit is notable when considering that free Wi-Fi is extremely valued by tourists when visiting a destination (Femenia-Serra, Perles-Ribes & Ivars-Baidal, 2019). The implementation of sensors throughout destinations also shows a medium level of compliance. These findings reflect the existing limitations in the integration of the physical and digital spheres for a more cohesive management of smart destinations and enhancement of experiences.

Dispersion analysis in this case reveals higher values for the items "Free Wi-Fi availability in tourist information office" (s.d. 51.44), "Free Wi-Fi availability in points of interest (POI)" item (s.d. 51.13) and "Sensorisation of the destination" (s.d. 50.20). The lowest values are present in the item "Internet connection quality at destination" (s.d. 21.38). The observed disparity for Wi-Fi availability is related to the elevated cost of implementing and maintaining public internet networks, which creates unbalances between cities and smaller towns without this infrastructure.

Figure 7. Level of compliance. Aggregated mean (%) and standard deviation (σ) for Connectivity

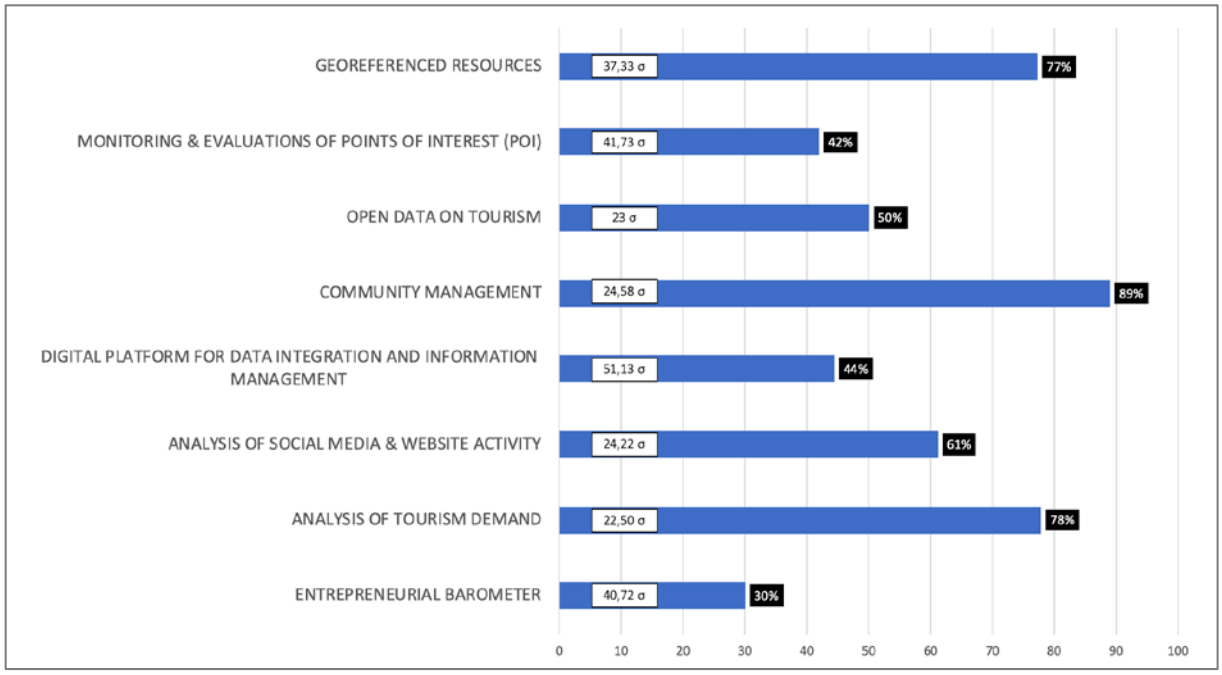


Own elaboration

The indicators for intelligence (Figure 8) display elevated levels of performance in the management of social media (community management), and in a lower degree, tourism demand analysis and georeferencing of resources. We find fulfilment levels below 50% in the monitorisation of points of interest, availability of open data and existence of data integration platforms at destination, which is emphasised by literature but infrequent in reality (Celdrán-Bernabeu, Mazón & Giner, 2018). In this dimension, the continuous monitoring of companies' activity and performance ("Business barometer") has a limited degree of implementation.

Dispersion analysis for intelligence indicators shows higher values for existence of a "Digital platform for data integration and information management" (s.d. 51.13) and "Monitoring and evaluations of POI" (s.d. 41.73). The lowest values are found for the items "Analysis of tourism demand" (s.d. 22.50), "Open data on tourism" (s.d. 23.00) and "Analysis of social media and website activity" (s.d. 24.22). The elevated dispersion regarding digital platforms availability shows the existing gap between big cities with potential to come to agreements with telecommunication companies and technology providers, and other municipalities with rather limited budgets.

Figure 8. Level of compliance. Aggregated mean (%) and standard deviation (σ) for Intelligence



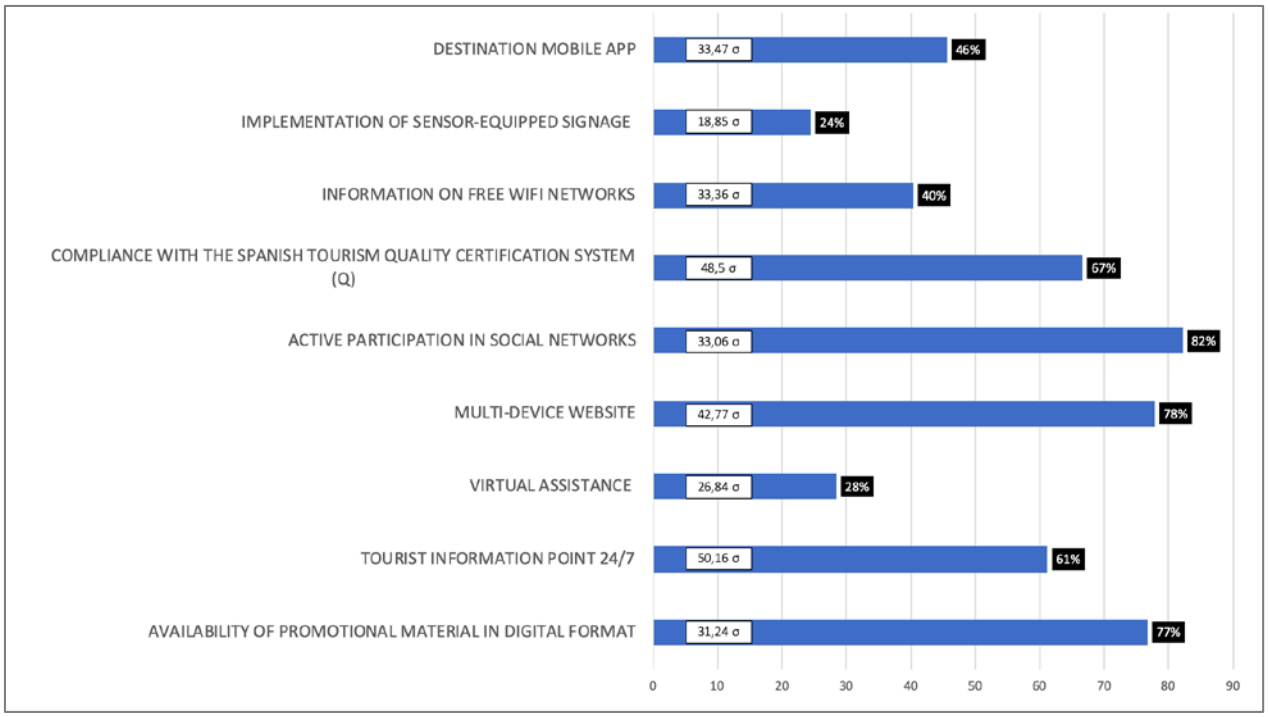
Own elaboration

Finally, the applied level of the model comprises the dimensions of information and online marketing. It must be noted that both dimensions are strictly dependent on destination management organisations, while others (innovation, accessibility, sustainability) are partly or totally dependent on the actions of different departments of the local administration. Regarding information indicators (Figure 9), there is a favorable performance in: actions on social media, availability of promotional material in digital format, mobile-adapted websites, quality certificates awarded to tourism information offices ("Q" standard, equivalent to an ISO standard) and existence of permanent information points. However, performance is weaker (below 50%) in development of mobile apps, availability of information on free wi-fi spots, implementation of sensors in signposting and virtual assistance for tourists. Considering these results, technological solutions that facilitate the interaction of tourists with the destination are still scarce, which hinders the obtention of data for the management and marketing of destinations. These findings are in line with Femenia-Serra & Ivars-Baidal (2020), and partly explain the observed elevated unawareness among tourists on the existence of these solutions in their study.

Regarding information items, higher dispersion values are found for the "Tourist information point 24/7" (s.d. 50.16) item, the existence of "Compliance with Spanish tourism quality certification system (Q)" (s.d. 48.50) and "Multi-device website "(s.d. 42.77). There is lower dispersion in the items

"Implementation of sensor-equipped signage" (s.d. 18.85) and the "Virtual assistance" item (s.d. 26.84).

Figure 9. Level of compliance. Aggregated mean (%) and standard deviation (σ) for Information

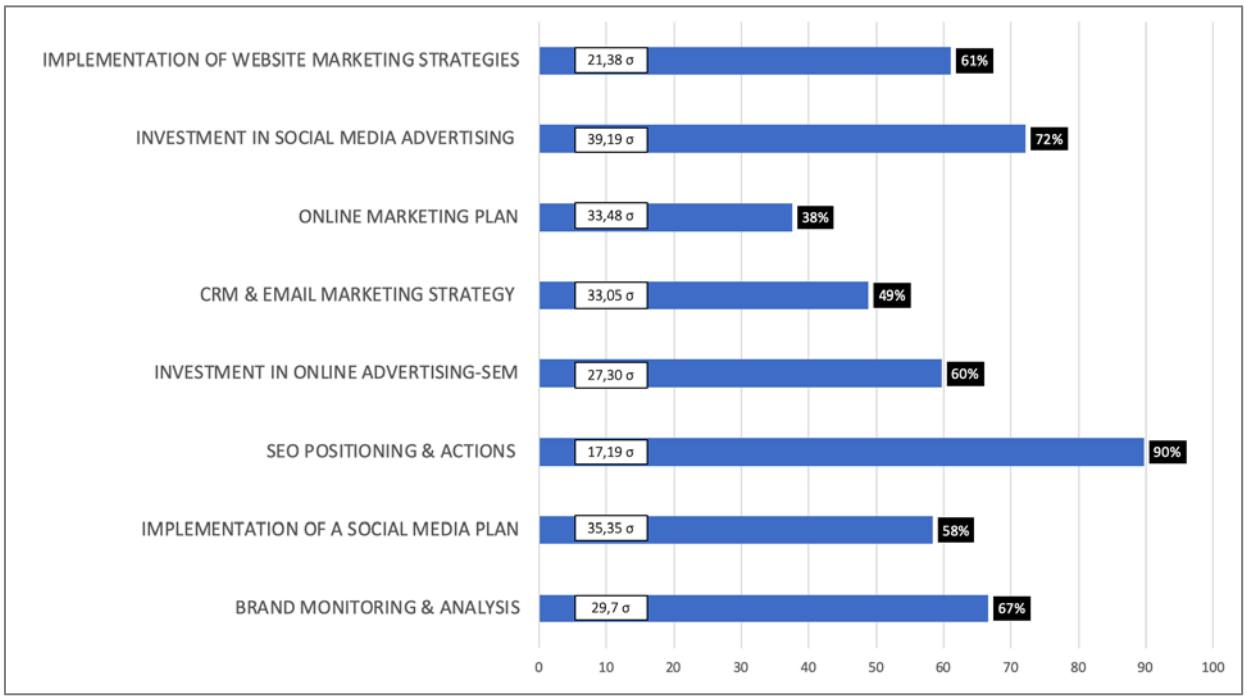


Own elaboration

Among indications for online marketing (Figure 10), we observe a good performance in Search Engine Optimization (SEO) actions. Scores above 50% are found also in investment in social media advertising, brand monitoring, implementation social media plans, investment in Search Engine Marketing (SEM) as well as commercialisation through destination websites. However, initiatives related to Customer Relationship Marketing (CRM) are rare. Surprisingly, there is a clear shortage in the implementation of digital marketing plans beyond social media actions.

Dispersion analysis shows higher disparities among destinations for "Investment in social media advertising" (s.d. 39.19) and "Implementation of a social media plan" (s.d. 35.35). A more solid cohesion among destinations appears in the items "SEO positioning and actions" (s.d. 17.19) and "Implementation of website marketing strategies" (s.d. 21.38). Here an important gap is found between destinations that can invest in more advanced advertising strategies and others that need to stick to more conventional approaches, mainly rural and less structured destinations.

Figure 10. Level of compliance. Aggregated mean (%) and standard deviation (σ) for Online Marketing



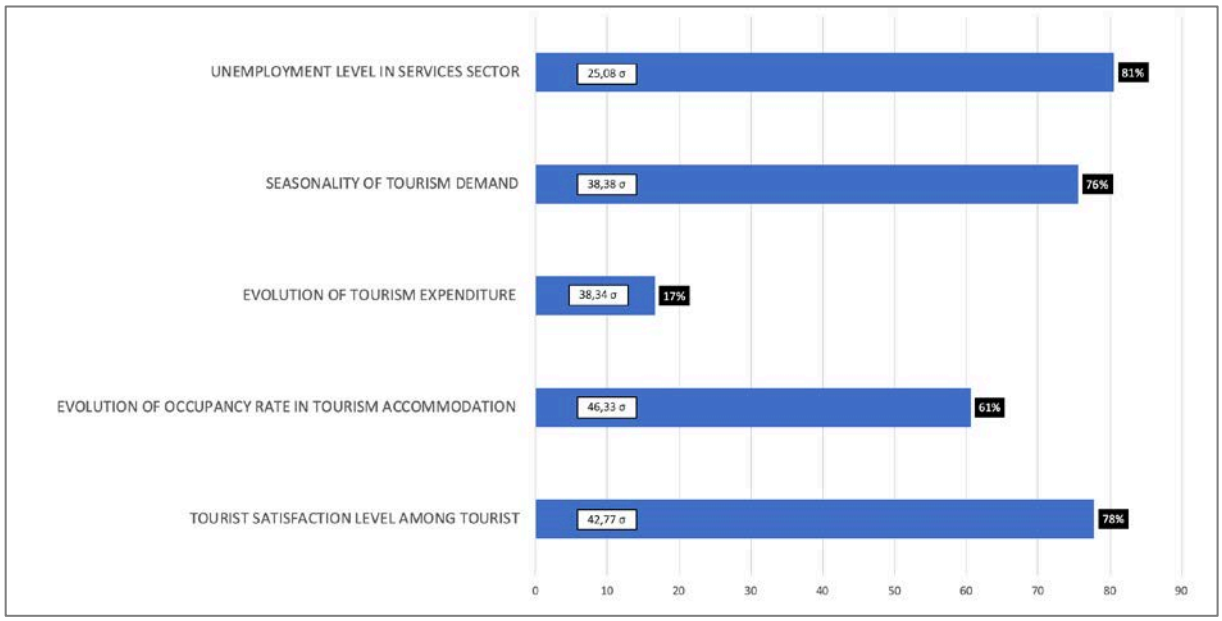
Own elaboration

Finally, activity performance indicators, aimed at measuring the interannual evolution of the main tourism variables, reflect a positive tendency during the last years, with a reduction of unemployment and seasonality, as well as high satisfaction levels among visitors. Occupancy rate in the analysed destinations is positive, with a mean of 61%. The lack of a trustworthy information source for the calculation of tourist expenditure makes it difficult to analyse this scope. Only two out of the thirteen municipalities have information in this regard, and in both cases the evolution seems to be positive. Nonetheless, it must be noted that these data were collected before the COVID-19 crisis, and dramatic changes are expected in 2020 statistics, which will reflect the sharp decrease of international arrivals and its impact on unemployment levels, expenditure and occupancy rates in many coastal areas of Spain.

Analysis of dispersion in this case shows the higher disparities for the item “Evolution of occupancy rate in tourist accommodation” (s.d. 46.33) and the lowest dispersion in the “Unemployment level in services sector” indicator” (s.d. 25.08). This reveals how, while some destinations experience consistent growth in their occupancy rates (mainly coastal ones), others struggle to find enough demand to keep their occupation high, which is also related to seasonality problems. The impact of

coronavirus crisis on these indicators will need to be observed in the following months/years, as changes are foreseeable.

Figure 11. Level of compliance. Aggregated mean (%) and standard deviation (σ) for Evolution of Tourism Activity dimension



Own elaboration

In Appendix B further analysis results can be found, including the mean, the median of the indicators -as a more robust central distribution measure against outliers or other data distribution problems- and uncertainty measures of the estimations carried out using theoretical confidence intervals based on Student's t distribution (which takes into account the sample size) and bootstrap confidence intervals based on 10,000 replications for the indicators. Bootstrap confidence intervals are included the recommendation of Good & Hardin (2012), who state that for samples of size 16 and beyond, bootstrap may provide a good approximation of the shape of distribution.

After cross-checking the results provided by sample means, sample median and the lower bound of the confidence intervals in Appendix B, the main obtained trends appear to be robust. Specifically, the sample median tends to better clarify the obtained results because sample median tends to be higher than sample mean in the cases where the mean is in the medium-high range of the indicator, and sample median tends to be lower than the sample mean in the cases where the mean is in the medium-low range of the indicator. For all these reasons, although with the necessary precautions, the reliability of the indicators would be not compromised.

5. Discussion and conclusions

The use of indicators is an essential tool for the management of companies and public organisations and the control of any economic activity. However, their application in tourism destinations is problematic because of the diversity of stakeholders and type of involved activities. Despite these constraints, indicators are necessary to measure management efficiency and objectives fulfilment, which in the case of destinations are defined by planning instruments. Indicators are also indispensable in the analysis of new management models. "Sustainable tourism destinations" as a reference model offer an interesting example of the need and difficulty of applying indicators for planning, management and progress of scientific knowledge (Miller & Twining-Ward, 2005; Torres-Delgado & Saarinen, 2014). To some extent, there is some similarity between sustainable destination development policies during the 1990s and current policies focused on smart destinations (Ivars-Baidal & Vera-Rebollo, 2019). Both concepts remain vague and require a model that narrows their action scope, both from theoretical and applied perspectives.

This paper has developed and applied an indicators system for smart destinations. Thanks to a collaborative effort with institutions (INVAT.TUR) and local destinations, this system has been deployed at a regional scale by identifying the strongest and weakest points of the analysed destinations. This development and application of indicators allows the measurement of real progress of destinations towards the SD model and offers stimulating conclusions. First, the results from the strategic-relational level suggest a deficit in strategic planning. Without an appropriate planning, progress is and will be limited. Moreover, planning processes need to be more participative and open to all stakeholders. This will reinforce a more inclusive approach that should strengthen the role of local society. E-administration progress can contribute to achieve this objective. The smart destination approach improves interdepartmental coordination within local administration and facilitates a more comprehensive management (Femenia-Serra & Ivars-Baidal, 2020), which can serve as inspiration for sustainability goals. However, the results from the indicators in this scope are uneven. There is a risk of misusing SDs as a greenwashing strategy if sustainability is not taken in its full complexity and is reduced to flashy, but ineffective measures. In fact, it is hard to determine the progress made in this dimension because of the rigid urban and environmental planning that is in force since more than two decades ago. This result is in line with the analysis conducted by González-Reverté (2019) on the inclusion of sustainability principles in smart destinations plans in Spain. Additionally, SDs have practically neglected the social dimension of sustainability, replicating usual dynamics of general sustainability indicators (Kristjánsdóttir, Ólafsdóttir & Ragnarsdóttir, 2018). Additionally, the fulfilment of accessibility indicators is the lowest of all dimensions, and therefore, it seems necessary to develop more ambitious policies. This evidences that while specific actions such as accessible beaches are

interesting, more relevant projects and strategies are needed to achieve the expectations of a SD. Findings for innovation also demonstrate a gap between public policies and obtained outcomes. Innovation remains hard to measure, even more when observing its relationship with tourism activities. The results reflect that we are not in front of very innovative tourism areas.

Second, at the instrumental level, connectivity results suggest the existence of improvement areas. Sensorisation as a basic condition for information generation and services provision is one of the weakest areas. The limitations in terms of sensorisation, which could contribute to bridge the physical and digital layers of SDs, result into a poor performance in the "intelligence" dimension. Intelligence indicators show a high inequality between advanced destinations with new information systems and others that still rely on traditional information sources. The information obtained through web and social media analysis is being used appropriately, while use of business information and capacity to generate and share knowledge must be improved.

Third, at the applied level, we can observe a dichotomy between the considerable attained improvements in online marketing and more modest results for solutions that can enhance tourists' experience. It seems clear that SDs approach contributes to a better destination marketing management (Femenia-Serra & Ivars-Baidal, 2020), but its impact on tourist experience is less evident despite being a priority in the SD discourse, which in some cases blindly assumes the positive impact of technology on tourist experiences (Femenia-Serra & Neuhofer, 2018). In line with this, indicators systems must face the challenge of creating cause-effect relationships between management and performance indicators.

Regarding the potential generalisation of the obtained results, it could be argued that an analysis carried out based on 18 destinations is not enough to verify the reliability of the indicators. However, the set of destinations analysed in this article does not constitute a random sample: it represents the entire number of destinations from the region that have completed the diagnosis and belong to the SDs network. Under this perspective, and following Ziliak & McCloskey (2008), if we assume that the 18 observations were the entire universe of cities under investigation, it would be legitimate to defend that all the measures (means and standard deviation) are found with no margin of error. On the other hand, without assuming such position, it could be argued that the 18 cases are a representative sample of the most advanced smart destinations in Spain.

Overall, the contributions of this paper are multiple. On one side, a set of indicators for smart destinations, the first of its kind, has been developed based on different sources, including review of literature and other indexes, expert opinions from smart destination programme leaders and experience with pilot destinations. Therefore, this indicators system has been built on scientific methods, first-hand experience and checked through fieldwork. Thanks to the collaborative efforts,

the indicators are consistent from the technical point of view but also grounded on reality and attainable for destinations, which ensures high response rates and more objective information. On the other side, these indicators have been applied to a group of destinations in order to assess their performance in the different dimensions of the model. This has offered a holistic yet empirical understanding of the current situation of these destinations and facilitates DMOs a better management of their smart strategies. The results demonstrate that there is room for improvement in many dimensions but also highlight the existing differences between destinations with varying degrees of specialisation in tourism and availability of resources. These findings offer interesting opportunities for further research that will need to confirm if similar results are obtained in other destinations where these indicators can be applied.

6. Implications for destination management and study limitations

The obtained results pose several implications for destination managers and policy makers. The conducted analysis to explore the dispersion of the results demonstrates that even with a limited sample, we can observe great disparities in the situation of different destinations and in each of the dimensions that need to be tackled. The highest dispersion is found in connectivity, governance and evolution of the tourism activity, which require high public investment, strategic vision and planning, and strong demand respectively. This evidences the inequality between urban and coastal destinations that have more resources at their disposal and smaller destinations with weaker specialisation that lack the required means. An effort needs to be made by administrations to amend these inequities and prevent the consolidation of bigger digital gaps and socioeconomic disparities between territories. Accordingly, the indicators system applied to the regional network of destinations in Valencia is a good starting point to develop smart regional strategies based on synergies and complementarities between destinations at local and subregional levels, avoiding the urban bias that prevails in smart tourism (Gretzel, 2018).

The conducted analysis also makes visible the improvement in local information systems carried out by many DMOs, which has a positive impact on the potential application of indicators. These systems are nonetheless below the possibilities new technologies offer. It is necessary to monitor to what extent technology is facilitating the mining, visualisation and communication of data as well as their use for decision-making processes. The potential of big data for SD management is enormous (Li et al. 2018) but its real application is still limited, as it happens with the use of big data in the measurement of sustainable tourism (Pérez & Barreiro, 2019). Administrative coordination should be improved to ensure the alignment between different information sources into a single platform and public-private partnerships strengthened to allow higher development of business intelligence. From the perspective

of destination planning and management, the contribution of indicators in the realisation and progress of SDs is indisputable. However, evolution towards SDs is a complex and long-term process that requires constant improvement to ensure benefits for DMOs, companies, tourists and local societies.

The performance of destinations in the different dimensions requires specific actions to be taken by DMOs and policy makers. Regarding accessibility, it is required to make further efforts to ensure that all tourist attractions, information and infrastructures are accessible to all visitors despite their age, condition or potential disability. As demonstrated by the obtained data, sustainability has also been insufficiently considered until now by smart destinations. Awareness campaigns, implementation of standards in tourism and hospitality companies and climate change adaptation plans are needed. A similar situation can be found regarding governance, with a clear need to promote public participation actions in the planning instruments of smart destinations. In line with this, DMOs should enhance their process of collection and treatment of data, but also to do so from a public-oriented perspective, opening its use to citizens and all stakeholders.

The value and implications of this paper also lie on the developed indicators and their potential replicability in other tourist cities and destinations. In fact, these indicators have already served as inspiration for the overall national Spanish strategy led by Segittur and the set of indicators developed by the standardisation agency AENOR (UNE: UNE 178502:2018), which in the following years will be probably deployed in other countries. Ideally, the indicators for SDs can be adapted and adopted by other destinations outside the region where they were tested and constitute the initial step towards the construction of international indicators and indexes for smart destinations. Destinations and governments from other countries that adopt the presented indicators will need to conduct some adjustments, in line with the ever-present importance of context for the design and use of tourism indicators (Twining-Ward & Butler, 2002). Indicators (Appendix A) need to be revised to detect and adjust those requirements that are driven by the specific political-organisational context where this study was conducted, for instance in the case of indicators that require a DMO to hold a certain type of certificate awarded by local, regional or national institutions (ministries, regional tourism board, national standardization agency...). Policy makers or scholars need to replace these organizations with their local counterparts or find international standards that are equivalent (e.g. ISO standards). Similarly, the required data to complete some of the indicators might depend on availability of secondary data from national or regional statistics institutes or other public institutions (e.g. data on demographics, environmental performance, public transport, etc.). Each country or region will have to adjust these indicators to their own information sources, and potentially, their own legislation. However, most indicators can be replicated as they currently appear or can be easily adapted. Another option for researchers and DMOs is to identify the core indicators that are more relevant for their

tourism strategy development (Agyeiwaah et al. 2017), or even creating a weighting system to obtain rankings (Sánchez & Pulido, 2018) that could be serve as benchmarking tools for smart destinations. Keeping the main objective and intention of each indicator even if modifications are required, is key for a successful adaptation.

In times of COVID-19, it is expected that technologies will play an even bigger role in tourism and destinations will intensify their efforts to digitalise processes and transactions to avoid contact between humans and create more individualised experiences (Gretzel et al., 2020). Because of the need to prevent infections, DMOs can to adapt their offer by implementing smart solutions. Recent findings by Wen, Kozak, Yang, & Liu (2020) demonstrate how smart tourism is gaining relevance in the pandemic context, as now data from individuals -including location tracking- has become critical for a better design and management of space and services. Thanks to availability of behavioural data and mobile technologies, it is possible to reduce crowds, improve queue management or avoid unnecessary contact with objects, for instance replacing classic audio guides with smartphone-based guides or restaurant plastic menus with QR codes. It is expected that contributions like the made by this paper will facilitate destinations the embracement of such changes and the real transition towards the smart tourism era.

Finally, this paper presents several limitations that need to be acknowledged. These include the dependence of the results on the territorial context where data were collected. More results from different destinations are required to contrast the indicators usefulness and to develop meta-analyses that establish definitive conclusions on the subject. This research also assumes that these indicators, as the rest of existing systems, are dependent on available information and data, which can limit their applicability. Additionally, the limited number of analysed cases makes it impossible to conduct in-depth statistical analyses. Finally, the psycho-econometric properties of some dimensions will need to be enhanced according to the data resulting from this first application of the system. Therefore, future studies will have to adjust the proposed indicators, apply them in a different context, compare and analyse data with further detail.

Appendix A: Indicators

Table A1. Valencian Network of Smart Destination Indicators

Dimension 1: Governance	
Indicator #	**Indicator description**
1.1	Implementation of a strategic tourism plan -The strategic tourism plan was approved within the past five years: +25% -The plan is accessible to everyone on the local council or DMO website: +25% -The plan included a public consultation and participation process: +25% -There is a system to monitor the plan implementation and execution: +25%
1.2	Coordination mechanisms between local administration departments for smart destination project development -There is a smart destination project technical committee that involves professionals from different local departments, including at least: tourism, IT, urbanism and environment department: +100%
1.3	Implementation of a smart destination project -The smart destination project plan is accessible on the destination website: +30% -There was a public consultation and participation process for the plan development: +35% -There is a system to monitor the plan implementation and execution process: +35%
1.4	Existence of a smart destination coordinator (responsible technician) -There is a designated coordinator for the smart destination project or a smart tourism office chief: +100%
1.5	Existence of an annual operations plan for the destination -There is an annual budget allocated for the execution of the tourism plan: +25% -The annual operational plan is accessible on the destination website: +25% -The smart destination project has its own budget: +50%
1.6	Mechanisms to facilitate public-private partnership -There is DMO is composed by both representatives of public organizations and private entities: +25% -There is an advisory local tourism board: +25% -Private funds are allocated to manage and market the destination (public-private partnerships to fund actions): +25% -There is an online platform or newsletter that facilitates local tourism knowledge exchange and communication between companies and public organisations: +25%
1.7	Development of E-Government/open government strategies -The destination carries out a monthly, -at least-, update of the municipal transparency website (open data site, shared with other departments or not): +100%
1.8	Implementation of quality management systems with a destination approach -The destination has received a positive evaluation by SICTED (Integral Tourism Quality System Certificate awarded by the Spanish Tourism Secretariat and the Federation of Provinces and Local Councils-FEMP): +100%
1.9	Development of social awareness campaigns on tourism impacts among citizens -Implementation of awareness campaigns, at least annually, on tourism impacts that involves both residents and tourists: +100%
1.10	Application of ROI analysis on tourism initiatives -The results from one tourism marketing campaign or initiative are analysed every year +33% -The results from two tourism marketing campaigns or initiatives are analysed every year: +66% -The results from three or more tourism marketing campaigns or initiatives are analysed every year: +100%
Dimension 2: Sustainability	
2.1	Implementation of urban planning regulations adjusted to sustainability principles -The destination urban plan has been approved within the past 8 years: +20% -The plan is available online: +20% -A public consultation and participation process was implemented for the plan: +2'% -The plan includes an environmental impact study: +10% -The plan includes a strategic territorial study: +10% -The development of new urban areas and future development surfaces is adapted to the Valencian Territorial Strategy (overall regional urbanisation guidelines): +20%
2.2	Implementation of specific plans for a sustainable tourism development -Destination awarded with environmental certification or has implemented plans related to Agenda 21 within the last 4 years: +25% -There was a public consultation and participation in the implementation of certificates or Agenda 21 actions: +25% -Open access to all plans and initiatives for sustainable tourism development: +25% -Existence of operational action plan for sustainable development: +25%

2.3	Public promotion of sustainable mobility (transport) -Existence of a municipal mobility plan: +25% -There are public transport routes linking the main tourist attractions: +25% -City centre is a pedestrian area: +25% -There is a system of bike lanes in the destination: 25%
2.4	Existence of enhancement of energy efficiency strategies (public lightening) -There is a smart grid (intelligent energy system) in the destination: +20% -Public lightening has been adapted to higher efficiency standards (LED lights): +20% -Public administration buildings have been awarded an energy efficiency certificate: +15% -Local council has invested in renewable energy systems in the past year: +10% -There are electric vehicles charging stations in the destination: +10% -Local administration vehicles are electric: +5% -Public transport vehicles are powered by renewable energies: +20%
2.5	Collection and treatment of waste -Waste collection system has implemented sensors (in vehicles, containers, etc.) for higher efficiency in collection process: +20% -Floating population is calculated every year based on amount of waste collected: +10% -There was a positive evolution in the % of recycled waste last year (glass, plastic, cardboard): +70%
2.6	Efficiency in water supply, purification and re-use of wastewater -There was a reduction of leaks in the supply system compared to the previous year: 30% -Floating population is calculated every year based on water consumption levels: +10% -There was a positive evolution in the % of treated/purified wastewater compared to the previous year: +30% -There was a positive evolution in the % of re-used wastewater compared to the previous year: +30%
2.7	Implementation of tourism indicators for sustainable destination management -The destination uses an indicator system to monitor its sustainability performance: +25% -The indicators system is updated periodically: +25% -The indicators results are published online: +25% -The destination has joined the European initiative ETIS: +25%
2.8	Development of awareness campaigns targeted at residents about sustainability -One awareness campaign was implemented last year: +33% -Two awareness campaigns were implemented last year: +66% -Three or more awareness campaigns were implemented last year: +100%
2.9	Creation of climate change adaptation programmes -The destination has a plan to adapt to climate change effects: +50% -The plan considers the tourist and territorial characteristics of the destination: +25% -The plan is available online: +25%
2.10	Use of ethical codes on tourism (regulation of activity, governance, impacts) -The destination has joined an ethical code for regulation of the tourism sector: +100%
2.11	Calculation of Maximum Human Pressure Index and floating population evolution -The destination calculates the maximum pressure index considering all types of tourist accommodation and residential capacity: +50% -There are monthly updates on the floating population based on water consumption levels and waste generation: +50%
2.12	Legal provisions and environmental or quality certifications implemented on tourism resources -Percentage of most visited points of interests that have been awarded a certificate or protection figure (including blue flag beaches, official natural parks, protected heritage sites): +X% (the percentage of protected attractions will be the score obtained in percentage in this indicator)
2.13	Companies awarded with environmental certifications (standards) -Percentage of tourism companies awarded with official and international standard environmental certificates: +X% (the percentage of awarded companies will be the score obtained in percentage in this indicator)
2.14	Development of awareness campaigns targeted at tourists about sustainability -One or more awareness campaigns were implemented last year: +100%
2.15	Surface of green areas per *de facto* population -The destination has at least 10 square metres/total population (including floating population in the highest occupancy month): +100%
Dimension 3: Accessibility	
3.1	Accessibility of tourism resources and attractions -A third of the 10 most visited attractions are accessible to disabled people: +33% -Two thirds of the 10 most visited attractions are accessible to disabled people: +66% -All 10 most visited attractions are accessible to disabled people: +100%
3.2	Information services adapted at a technical level to the needs of people with disabilities

	-Tourist information offices are adapted to disabled people needs (furniture, counter, access through main door): +80% -Tourist information offices personnel have received specific instructions or training to offer the service to disabled people and with special needs: +20%
3.3	Compliance on content accessibility with the Web Accessibility Initiative (WAI) -According to criteria WCAG 2.0, the destination website is adapted to Level A: +33% -According to criteria WCAG 2.0, the destination website is adapted to Level AA: +66% -According to criteria WCAG 2.0, the destination website is adapted to Level AAA: +100%
3.4	Initiatives for promoting accessible tourism -Existence of an accessible local travel guide: +35% -Existence of accessible promotional material (audio guides, sign language and Braille guides, pictograms): +25% -Implementation of awareness campaigns on accessibility among companies and residents of the destination: +25% -Personal support service for disabled people available in tourist information office (to book a service, to conduct a given task, etc.): +15%
3.5	Public transport system adapted at a technical level to the needs of people with disabilities -Percentage of accessible public transport units/total public transport units: +X% (the obtained scored is the same percentage of the proportion of accessible public transport units: taxis, buses, trains, trams, etc.)
3.6	Existence of a dynamic inventory about tourism resources, companies and accessible services for tourists -Implementation of inventory with specific information about accessible resources, points of interests and routes: +60% -Availability of inventory on destination website: +20% -High proportion of tourism companies awarded with accessibility certificates (more than 50%): +20%
Dimension 4: Innovation	
4.1	Existence of support programmes for innovation in the tourism sector -The destination has a business incubator: +25% -Contests for new ideas and workshops for innovators are held at least every two years: +15% -Most innovative tourism companies are awarded by the local council or DMO: +15% -Specialised training for tourism companies' employees are offered by DMO or local council every year: +15% -There is a support programme for entrepreneurs (mentoring, funding lines): +30%
4.2	Implementation of innovation management systems in companies and public bodies -At least two companies or public organizations have been awarded with innovation certificates by AENOR (UNE 166001:2006 or UNE 166002:2014): +100%
4.3	Development of innovation projects in collaboration with universities and R&D institutions -The DMO participates in at least two innovation projects from the official calls by the different public administrations, in which they collaborate with universities, research centres or public bodies: +100%
4.4	Promotion of collaborative innovation between agents (events and joint activities) -Meetings between tourism companies, research centres or universities and institutions are held at least once a year with the aim of developing innovative projects at the destination: +50% -Public events (such as seminars, workshops, fairs) open to any type of participant are held to foster innovation in tourism, at least once a year: +50%
4.5	Local entrepreneurship -Entrepreneurs and company owners represent at least a 10% of local workforce (active workers): +50% -There has been a constant increase in the creation of companies in the tourism and hospitality sector during the past three years: +50%
4.6	Population educational level and occupation in highly innovative sectors -At least 20% of local population holds a university degree: +50% -At least 15% of local population works in innovative companies or organizations classified under CNAE codes: 18,58,59,60,62,71,72,73,74,85,86,90 or 91: +25% -At least 3% of local population works in high technology sectors or research and development activities classified under CNAE codes 20,21,26,27,28,29,30,59,60,61,62,63,72 or 73: +25%
Dimension 5: Connectivity	
5.1	Internet connection quality at the destination -The destination has sufficient internet connectivity and speed thanks to fixed telecommunication networks, having at least 75% of its territory covered with access to 2 Mbps: +50% -The destination has good internet connectivity and speed thanks to fixed telecommunication networks, having at least 75% of its territory covered with access to 10 Mbps: +50%
5.2	Free Wi-Fi availability in tourist information office(s) -All tourist information offices offer free Wi-Fi to tourists: +100%

5.3	Free Wi-Fi availability in tourist points of interest (POI) (main attractions) -The main points of interest and tourist attractions offer free Wi-Fi: At least three major POIs have this service, including beaches, natural/thematic parks, monuments, historical sites, etc.: +100%
5.4	Proportion of tourism businesses providing free Wi-Fi to tourists -At least 95% of hotels, hostels and camping sites offer free Wi-Fi to guests: +25% -At least 70% of tourist apartments/villas/rentals offer free Wi-Fi to guests: +25% -At least 50% of restaurants/bars/cafés offer free Wi-Fi to their clients: +50%
5.5	Implementation of sensors for data collection at the destination -The destination has implemented sensors for management and efficiency improvement (e.g. water supply system management, public transport and traffic, public lightening, waste collection, parking spaces, etc.): +100%
Dimension 6: Intelligence	
6.1	Implementation of a barometer to measure level of confidence of business owners -Surveys among business operators and companies are used to calculate local occupancy rate: +50% -Surveys are conducted regularly to monitor business confidence and expectations: +50%
6.2	Analysis of tourism demand (trends, markets) – business intelligence -The DMO conducts satisfaction surveys among visitors every year: +75% -The results from previous surveys are available on the local website: +25%
6.3	Development of analysis on social media networks and website traffic -The DMO generates an annual report on the destination website traffic and use: +80% -The reports are accessible online or are facilitated to professionals from the sector: +20%
6.4	Implementation of a digital platform for data integration and information management -The destination has a data integration platform in which different data sources and indicators are monitored and visualised: +100%
6.5	Existence of community management (professionalised) -The DMO personnel is qualified for social media management and manages and monitors social media profiles of the destination: +25% -Qualified DMO personnel monitor and analyse regularly social media activity and generate reports: +25%
6.6	Existence of open data on tourism activity (available online to everyone) -The destination has an open data website: +100%
6.7	Mechanisms for monitorization and constant evaluation of points of interest (POI) situation -The DMO has a dynamic inventory of tourist resources in which activity is registered (number of visitors, incidents, changes in management, etc.): +100%
6.8	Implementation of georeferencing systems for tourist resources -Tourist resources are geolocated in a dynamic online map for visitors to consult: +100%
Dimension 7: Information system	
7.1	Existence of digitised promotional material -DMO website has a downloads section (with further information, documents, maps, images, etc.): +50% -There is an online destination travel guide in different languages (at least four languages): +30% -Maps and brochures are available on the DMO's website: +20%
7.2	Existence of a 24/7 information point (touchscreen or similar) -There is a 24/7 information point at the main tourist office of the destination: +75% -There is more than one 24/7 information point in different parts of the destination: +25%
7.3	Implementation of virtual assistance -The DMO has a Whatsapp number for tourist information: +50% -DMO has a chatbot or virtual assistant on website: +20% -DMO can offer videocall to tourists to provide information: +30%
7.4	Adaptation of DMO website to any device -Destination official website is adapted to main mobile devices: +100%
7.5	Active presence on social media by DMO to provide information -There is a positive evolution of the number of followers on DMO social media profiles in the last two years: +100%
7.6	Destination certified by "Q quality" (standard about quality of services, including information) -At least one of the tourist information offices has been awarded the certificate "Q-Quality Tourism" by the Spanish Institute for Tourism Quality: +100%
7.7	Availability of information on connectivity and public Wi-Fi networks -The DMO website offers information on connectivity at the destination: +75% -There is a map with geolocation of free Wi-Fi spots: +25%
7.8	Implementation of sensors in tourist signage -QR codes have been implemented in main points of interest: +20% -Beacons or other NFC technology have been implemented for tourist information provision: +80%
7.9	Existence of an official destination mobile app

	-The destination has its own mobile app: +20% -The mobile app offers added value for tourists (discounts, integrated options for transport, downloadable material): +40% -The mobile app offers added value for the DMO (data to analyse tourist behaviour and preferences, cross-selling, etc.): +40%
Dimension 8: Online marketing	
8.1	Development of brand monitoring and reputation analysis -Web analytics tools (e.g. Google Analytics) are used at least once a month: +50% -Based on traffic analysis and brand monitoring, a global report is produced, at least once a year: +50%
8.2	Implementation of social media plan -The DMO has created a social media marketing plan: +50% -The plan is still in force, not outdated: +50%
8.3	Development of SEO positioning and actions -The destination has an official website (only for tourism purposes, not shared with other departments): +30% -The DMO official website appears in the top five results when searching on main search engines "tourism/visit + name of destination": +25% -The website URL includes the destination name (e.g. visitlondon.com): +10% -New content, news or updates are published every week on the website: +20% -Social media profiles links are visible on the destination website: +15%
8.4	Investment in online advertising-SEM -DMO has invested in SEM (e.g. Google AdWords) at least once in the past year: +25% -Return of Investment/impact of SEM has been calculated: +25% -DMO has invested in online promotion (banners, pop ups, influencers, etc.) in the past year: +25% -Return of Investment/impact of online promotion has been calculated: +25%
8.5	Implementation of CRM & email marketing strategy -Website offers possibility to subscribe to destination newsletter: +30% -A new offer, discount or promotion is offer to newsletter subscribers at least every three months: +20% -DMO responds to all tourists' questions and doubts on social media before 24 hours: +30% -DMO website has implemented a recommender system for personalised travel planning and recommendations: +20%
8.6	Existence and application of an online marketing plan -A general marketing plan has been implemented by the DMO: +25% -An online marketing plan has been implemented by the DMO: +25% -The online marketing plan is current, not outdated: +25% -The online marketing plan involves public-private collaboration to promote the destination and local companies: +25%
8.7	Investment in social media advertising -DMO has used paid advertisement on social media in the past six months (e.g. paid to give more visibility to a page, post, tweet or event, hired influencers): +50% -ROI of social media marketing campaigns is always calculated: +50%
8.8	Commercialization through own website (DMO site) -DMO website offers direct accommodation booking options: +50% -DMO website offers direct experiences/activities booking options: +50%
Dimension 9: Evolution of tourism activity	
9.1	Tourist satisfaction level among tourism demand -Surveys among tourists show a general satisfaction degree above 8/10 in the past year: +100%
9.2	Evolution of occupancy rate in tourism accommodation -Interannual occupancy rate for all tourist accommodation typologies has grown in the past year: +100%
9.3	Evolution of tourism expenditure at destination -Interannual expenditure at the destination per person/day rate has grown in the past year: +100%
9.4	Level of seasonality of tourism demand -The months of July, August and September (or three most busy ones) had a negative interannual occupancy rate evolution (occupation decreased in the past year during these months as compared to previous years): +100%
9.5	Unemployment level in the services sector -Local interannual unemployment rate for tourism and hospitality services workers decreased in the past low season (month with lowest occupancy rate): +50% -Local interannual unemployment rate for tourism and hospitality services workers decreased in the past high season (month with highest occupancy rate): +50%

Appendix B: Descriptive statistics

Variable	Obs.	Mean	Median	Mean Std.Err	Theoretical [95% Conf. Interval]		Percentile Bootstrap [95% Conf. Interval]	
GOV1	18	50.00	37.50	8.08	32.94	67.06	34.72	65.27
GOV2	18	61.11	100.00	11.82	36.17	86.06	38.88	83.33
GOV3	18	47.22	35.00	6.86	32.74	61.70	34.44	60.55
GOV4	18	72.22	100.00	10.86	49.30	95.14	50.00	88.88
GOV5	18	52.78	37.50	7.53	36.89	68.67	38.88	68.05
GOV6	18	59.72	50.00	7.04	44.87	74.58	47.22	73.61
GOV7	18	88.89	100.00	7.62	72.81	104.97	72.22	100.00
GOV8	18	83.33	100.00	9.04	64.26	102.40	66.66	100.00
GOV9	18	38.89	0.00	11.82	13.94	63.83	16.66	61.11
GOV10	18	47.22	25.00	9.24	27.73	66.71	30.55	65.27
SUST1	18	63.33	70.00	8.04	46.36	80.30	47.77	78.33
SUST2	18	47.22	25.00	8.31	29.70	64.75	31.94	63.88
SUST3	18	66.67	75.00	5.72	54.61	78.73	55.55	77.77
SUST4	18	50.00	50.00	5.53	38.34	61.66	39.72	60.83
SUST5	18	82.22	80.00	2.63	76.68	87.76	77.22	87.22
SUST6	18	62.78	65.00	7.22	47.54	78.02	48.33	76.11
SUST7	18	31.94	25.00	7.23	16.69	47.20	19.44	47.22
SUST8	18	33.00	33.00	0.00	33.00	33.00	33.00	33.00
SUST9	18	29.17	25.00	5.44	17.68	40.65	19.44	40.27
SUST10	18	88.89	100.00	7.62	72.81	104.97	72.22	100.00
SUST11	18	66.67	50.00	7.00	51.90	81.44	52.77	80.55
SUST12	18	70.06	70.00	5.00	59.51	80.60	60.16	79.11
SUST13	18	9.89	1.00	4.70	-0.02	19.80	2.66	20.11
SUST14	18	66.67	100.00	11.43	42.54	90.79	44.44	88.88
SUST15	18	55.56	100.00	12.05	30.13	80.98	33.33	77.77
ACC1	18	34.89	33.00	4.24	25.93	43.84	27.50	44.16
ACC2	18	87.78	100.00	5.63	75.89	99.66	75.55	96.66
ACC3	18	29.33	16.50	7.49	13.52	45.14	14.66	44.00
ACC4	18	36.39	30.00	6.35	22.99	49.79	24.72	48.88
ACC5	18	55.56	100.00	12.05	30.13	80.98	33.33	77.77
ACC6	18	82.22	80.00	1.52	79.01	85.44	80.00	85.55
INN1	18	70.00	70.00	5.24	58.95	81.05	60.00	80.00
INN2	18	22.22	0.00	10.08	0.95	43.50	5.55	44.44
INN3	18	55.56	100.00	12.05	30.13	80.98	33.33	77.77
INN4	18	77.78	100.00	7.26	62.47	93.09	63.88	91.66
INN5	18	66.67	50.00	5.72	54.61	78.73	55.55	77.77
INN6	18	45.83	25.00	6.78	31.53	60.14	33.33	59.72
CON1	18	88.89	100.00	5.04	78.25	99.53	77.77	97.22
CO2	18	50.00	50.00	12.13	24.41	75.59	27.77	72.22
CO3	18	44.44	0.00	12.05	19.02	69.87	22.22	66.66
CO4	18	75.00	75.00	6.06	62.21	87.79	63.88	86.11
CO5	18	51.67	65.00	11.83	26.70	76.63	29.44	73.88

INT1	18	30.00	0.00	9.60	9.75	50.25	12.22	48.88
INT2	18	77.78	75.00	5.30	66.59	88.97	66.66	86.11
INT3	18	61.11	80.00	5.71	49.06	73.16	50.00	71.11
INT4	18	44.44	0.00	12.05	19.02	69.87	22.22	66.66
INT5	18	88.89	100.00	5.80	76.66	101.12	76.38	98.61
INT6	18	50.00	40.00	5.42	38.56	61.44	40.00	61.11
INT7	18	42.11	40.00	9.84	21.36	62.86	23.88	61.22
INT8	18	77.39	100.00	8.80	58.82	95.96	59.71	92.27
INF1	18	76.67	100.00	7.37	61.13	92.21	61.66	90.00
INF2	18	61.11	100.00	11.82	36.17	86.06	38.88	83.33
INF3	18	28.33	20.00	6.33	14.98	41.68	17.22	41.11
INF4	18	77.78	100.00	10.08	56.50	99.05	55.55	94.44
INF5	18	82.22	100.00	7.79	65.78	98.67	66.27	95.44
INF6	18	66.67	100.00	11.43	42.54	90.79	44.44	88.88
INF7	18	40.28	25.00	7.86	23.69	56.87	26.38	55.55
INF8	18	24.44	20.00	4.44	15.07	33.82	20.00	33.33
INF9	18	45.56	20.00	7.89	28.91	62.20	31.11	61.11
OM1	18	66.67	50.00	7.00	51.90	81.44	52.77	80.55
OM2	18	58.33	50.00	8.33	40.75	75.92	41.66	75.00
OM3	18	89.72	97.50	4.05	81.17	98.27	80.55	96.11
OM4	18	59.72	50.00	6.44	46.14	73.30	47.22	72.22
OM5	18	48.89	40.00	7.79	32.45	65.33	34.44	64.44
OM6	18	37.50	25.00	7.89	20.85	54.15	22.22	52.77
OM7	18	72.22	100.00	9.24	52.73	91.71	52.77	88.88
OM8	18	61.11	50.00	5.04	50.47	71.75	52.77	72.22
EV1	18	77.78	100.00	10.08	56.50	99.05	55.55	94.44
EV2	18	60.56	90.00	10.92	37.51	83.60	38.88	80.55
EV3	18	16.67	0.00	9.04	-2.40	35.74	0.00	33.33
EV4	18	75.56	100.00	9.05	56.47	94.64	57.22	91.11
EV5	18	80.56	100.00	5.91	68.08	93.03	69.44	91.66

Acknowledgements: Work supported by the Spanish National R&D&I Plan financed by the Ministry of Economy and Competitiveness under grant CSO2017-82592-R ("Analysis of planning processes applied to smart cities and tourist destinations. Balance and proposal of a new methodology: Smart Tourism Planning").

References

Ahvenniemi, H., Huovila, A., Pinto-Seppä, I., & Airaksinen, M. (2017). What are the differences between sustainable and smart cities? *Cities*, 60, 234–245. https://doi.org/10.1016/j.cities.2016.09.009

Agyeiwaah, E., McKercher, B., & Suntikul, W. (2017). Identifying core indicators of sustainable tourism: A path forward? *Tourism Management Perspectives*, 24, 26–33. https://doi.org/10.1016/j.tmp.2017.07.005

Albino, V., Berardi, U., & Dangelico, R. M. (2017). Smart Cities: Definitions, dimensions, performance, and initiatives, *Journal of Urban Technology*, 22(1), 3-21. https://doi.org/10.1080/10630732.2014.942092

Blancas, F. J., González, M., Lozano-Oyola, M., & Pérez, F. (2010). The assessment of sustainable tourism: Application to Spanish coastal destinations. *Ecological Indicators*, *10*(2), 484–492. https://doi.org/10.1016/j.ecolind.2009.08.001

Boes, K., Buhalis, D., & Inversini, A. (2015). Conceptualising smart tourism destination dimensions. In I. Tussyadiah & A. Inversini (Eds.), *Information and Communication Technologies in Tourism 2015* (Vol. 28, pp. 391–403). Cham: Springer. https://doi.org/10.1016/S0160-7383(01)00012-3

Boes, K., Buhalis, D. & Inversini, A. (2016). Smart tourism destinations: Ecosystems for tourism destination competitiveness. *International Journal of Tourism Cities*, 2(2), 108–124. https://doi.org/10.1108/IJTC-12-2015-0032

Bosch, P. Jongeneel, S., Rovers, V., Neumann, H. M., Airaksinen, M., & Huovila, A. (2017): *CITYkeys indicators for smart city projects and smart cities*. Retrieved 01.03.2020 from: <http://nws.eurocities.eu/MediaShell/media/CITYkeysD14IndicatorsforsmartcityprojectsandsmartcitiesFINAL.pdf>

Brandt, T., Bendler, J., & Neumann, D. (2017). Social media analytics and value creation in urban smart tourism ecosystems. *Information and Management*, *54*(6), 703–713. https://doi.org/10.1016/j.im.2017.01.004

Buonincontri, P., & Micera, R. (2016). The experience co-creation in smart tourism destinations: a multiple case analysis of European destinations. *Information Technology & Tourism*, *16*(3), 285–315. https://doi.org/10.1007/s40558-016-0060-5

Buhalis, D., & Amaranggana, A. (2015). Smart tourism destinations enhancing tourism experience through personalisation of services. In I. Tussyadiah & A. Inversini (Eds.), *Information and Communication Technologies in Tourism 2015* (pp. 377–389). Cham: Springer.

Butler, R. W. (1999). Sustainable tourism: A state-of-the-art review. *Tourism Geographies*, 1(1), 7–25. https://doi.org/10.1080/14616689908721291

Cabello, J. M., Navarro-Jurado, E., Rodríguez, B., Thiel-Ellul, D., & Ruiz, F. (2019). Dual weak–strong sustainability synthetic indicators using a double reference point scheme: The case of Andalucía, Spain. *Operational Research*, *19*(3), 757–782.

Caragliu, A., Del Bo, Ch. & Nijkmap, P. (2013). Smart cities in Europe. In M. Deakin (ed.), *Creating Smarter Cities*, London: Routledge

Celdrán-Bernabeu, M.A., Mazón, J.N., Ivars-Baidal, J.A. & Vera-Rebollo, J.F. (2018). Smart tourism. A study on systematic mapping. *Cuadernos de Turismo*, 41 (2018), pp. 655-658

Celdrán-Bernabeu, M.A.; Mazón, J.-N. & Giner Sánchez, D. (2018). Open Data and tourism. Implications for tourism management in smart cities and smart tourism destinations*. Investigaciones Turísticas* (15), pp. 49-78. http://dx.doi.org/10.14198/INTURI2018.15.03

Cohen, B. (2014). *The smartest cities in the world 2015: Methodology*. Retrieved 13.02.2020 from: <http://www.fastcoexist.com/3038818/the-smartest-cities-in-the-world-2015-methodology>

da Costa Liberato, P. M., Alén-González, E., & de Azevedo Liberato, D. F. V. (2018). Digital technology in a smart tourist destination: The case of Porto. *Journal of Urban Technology*, *25*(1), 75–97. https://doi.org/10.1080/10630732.2017.1413228

Del Vecchio, P., & Passiante, G. (2017). Is tourism a driver for smart specialization? Evidence from Apulia, an Italian region with a tourism vocation. *Journal of Destination Marketing and Management*, *6*(3), 163–165. https://doi.org/10.1016/j.jdmm.2016.09.005

dos Santos Júnior, A., Mendes Filho, L., Almeida García, F., & Simoes, J. M. M. (2017). Smart tourism destinations: A study based on the view of the stakeholders. *Revista Turismo Em Análise*, *28*(3), 358–379.

Dupeyras, A. and N. MacCallum (2013). Indicators for Measuring Competitiveness in Tourism: A Guidance Document, *OECD Tourism Papers*, 2013/02, OECD Publishing. http://dx.doi.org/10.1787/5k47t9q2t923-en

Dwyer, L., & Kim, C. (2003). Destination competitiveness: Determinants and indicators. *Current Issues in Tourism*, *6*(5), 369–414. https://doi.org/10.1080/13683500308667962

European Commission (EC) (2016). The European tourism indicator system. ETIS toolkit for sustainable destination management. Publications office of the European Union. Luxembourg. Retrieved 02.02.2020 from: <https://ec.europa.eu/docsroom/documents/21749>

EXCELTUR (2017). *Monitor de competitividad de los destinos urbanos españoles, URBANTUR 2016*. Retrieved 28.01.2020 from: <https://www.exceltur.org/urbantur/>

Femenia-Serra, F., & Neuhofer, B. (2018). Smart tourism experiences: conceptualisation, key dimensions and research agenda, *Journal of Regional Research*, 42: 129-150

Femenia-Serra, F., Neuhofer, B., & Ivars-Baidal, J. A. (2019). Towards a conceptualisation of smart tourists and their role within the smart destination scenario. *The Service Industries Journal*, *39*(2), 109–133. https://doi.org/10.1080/02642069.2018.1508458

Femenia-Serra, F., & Ivars-Baidal, J. A. (2020). Do smart tourism destinations really work? The case of Benidorm. *Asia Pacific Journal of Tourism Research*, (Forthcoming). https://doi.org/10.1080/10941665.2018.1561478

Femenia-Serra, F., Perles-Ribes, J. F., & Ivars-Baidal, J. A. (2019). Smart destinations and tech-savvy millennial tourists: Hype versus reality. *Tourism Review*, 74(1), 63–81. https://doi.org/10.1108/TR-02-2018-0018

Fernández, J. I. P., & Rivero, M. S. (2009). Measuring tourism sustainability: Proposal for a composite index. *Tourism Economics*, *15*(2), 277–296. https://doi.org/10.5367/000000009788254377

Gajdošík, T. (2019). Smart Tourism: Concepts and insights from central Europe. *Czech Journal of Tourism*, *7*(1), 25–44. https://doi.org/10.1515/cjot-2018-0002

Gestido, M.C. (2019). *Buenos Aires trabaja para ser un destino inteligente*. Retrieved 03.09.2020 from: <https://www.reportur.com/argentina/2019/05/01/buenos-aires-trabaja-destino-inteligente/>

Giffinger, R., Fertner, C., Kramar, H., Kalasek, R., Pichler-Milanovic, N., & Meijers, E. (2007). *Smart cities: Ranking of European medium-sized cities*. Retrieved 15.01.2020 from: <http://www.smart-cities.eu/download/smart_cities_final_report.pdf>

Gomes, E. L., Gándara, J. M., & Ivars-Baidal, J. A. (2017). Is it important to be a smart tourism destination? Public managers understanding of destinations in the state of Paraná. *Revista Brasileira de Pesquisa Em Turismo*, 11(3), 503–536. https://doi.org/10.7784/rbtur.v11i3.1318

Gomis-López, J. M., & González-Reverté, F. (2020). Smart tourism sustainability narratives in mature beach destinations. Contrasting the collective imaginary with reality. *Sustainability*, *12*. https://doi.org/10.3390/su12125083

González-Reverté, F. (2019). Building sustainable smart destinations: An approach based on the development of spanish smart tourism plans. *Sustainability*, 11, 6874, https://www.mdpi.com/2071-1050/11/23/6874

González Reverté, F. (coord.) (2018): *Les destinacions turístiques intel.ligents a les comarques de Barcelona. Diagnosi i propostes d´actuació*, Barcelona: Diputació de Barcelona

Good P.I & Hardin, J.W. (2012). *Common Errors in Statistics (and How to Avoid Them).* 4th Edition. Hoboken (NJ): Wiley & Sons

Gretzel, U. (2018). From smart destinations to smart tourism regions. Investigaciones Regionales-*Journal of Regional Research*, 42(42, SI), 171–184.

Gretzel, U., Fuchs, M., Baggio, R., Hoepken, W., Law, R., Neidhardt, J., … Xiang, Z. (2020). e-Tourism Beyond COVID-19: A call for transformative research. *Journal of Information Technology & Tourism*, *43*, 1–21.

Gretzel, U., Sigala, M., Xiang, Z., & Koo, C. (2015). Smart tourism: Foundations and developments. *Electronic Markets*, 25(3), 179–188. https://doi.org/10.1007/s12525-015-0196-8

Gretzel, U., Werthner, H., Koo, C., & Lamsfus, C. (2015). Conceptual foundations for understanding smart tourism ecosystems. *Computers in Human Behavior*, 50, 558–563. https://doi.org/10.1016/j.chb.2015.03.043

Hall, C. M. (2008). *Tourism planning: policies, processes and relationships* (2nd ed). New York (NY): Pearson/Prentice Hall.

Hall, C. M., Gössling, S. & Scott, D. (2015). The evolution of sustainable development and sustainable tourism. In Hall, C. M., Gössling, S. & Scott, D. (Eds.) *The Routledge handbook of tourism and sustainability* (pp. 15-35). New York (NY): Routledge.

Huertas, a.; Moreno, a.; Ha my, T. (2019). Which destination is smarter? Application of the (Sa)6 framework to establish a ranking of smart tourist destinations. *International Journal of Information Systems and Tourism*, 4(1), 19-28.

Huovila, A., Bosch, P., & Airaksinen, M. (2019). Comparative analysis of standardized indicators for smart sustainable cities: What indicators and standards to use and when? *Cities*, 89, 141–153. https://doi.org/10.1016/j.cities.2019.01.029

IESE (2018): *IESE Cities in Motion Index, 2018*, Retrieved 18.01.2020 from: <https://media.iese.edu/research/pdfs/ST-0471-E.pdf>

INVAT.TUR (2015): *Manual operativo para la configuración de destinos inteligentes*. Retrieved 20.12.2019 from: <https://www.slideshare.net/invattur/manual-operativo-para-la-configuracin-de-destinos-inteligentes>

Ivars-Baidal, J. A., & Vera-Rebollo, J. F. (2019). Planificación turística en España. De los paradigmas tradicionales a los nuevos enfoques: planificación turística inteligente. *Boletín de la Asociación de Geógrafos Españoles*, 82, 2765, 1–31. http://dx.doi.org/10.21138/bage.2765

Ivars-Baidal, J. A., Celdrán-Bernabeu, M. A. & Femenia-Serra, F. (2017): *Guía de Implantación. Destinos Turísticos Inteligentes Comunitat Valenciana*, Agencia Valenciana de Turismo-Invat.tur. Retrieved 17.12.2019 from: <http://invattur.gva.es/estudio/guia-de-implantacion-de-destinos-turisticos-inteligentes-de-la-comunitat-valenciana-2/>

Ivars-Baidal, J. A., Celdrán-Bernabeu, M. A., Mazón, J.-N., & Perles-Ivars, Á. F. (2017). Smart destinations and the evolution of ICTs: A new scenario for destination management? *Current Issues in Tourism* (forthcoming). https://doi.org/10.1080/13683500.2017.1388771

Ivars Baidal, J. A., Solsona Monzonís, F. J., & Giner Sánchez, D. (2016). Gestión turística y tecnologías de la información y la comunicación (TIC): El nuevo enfoque de los destinos inteligentes. *Documents d'Anàlisi Geogràfica*, 62(2), 327-346. https://doi.org/10.5565/rev/dag.285

Johnson, A. G., & Samakovlis, I. (2019). A bibliometric analysis of knowledge development in smart tourism research. *Journal of Hospitality and Tourism Technology*, *10*(4), 600–623. https://doi.org/10.1108/JHTT-07-2018-0065

Jovicic, D. Z. (2017). From the traditional understanding of tourism destination to the smart tourism destination. *Current Issues in Tourism*. https://doi.org/10.1080/13683500.2017.1313203

Koo, C., Shin, S., Gretzel, U., Hunter, W. C., & Chung, N. (2016). Conceptualization of smart tourism destination competitiveness. *Asia Pacific Journal of Information Systems*, 26(4), 561–576. https://doi.org/10.14329/apjis.2016.26.4.561

Kristjánsdóttir, K. R., Ólafsdóttir, R., & Ragnarsdóttir, K. V. (2018). Reviewing integrated sustainability indicators for tourism. *Journal of Sustainable Tourism*, 26(4), 583–599. https://doi.org/10.1080/09669582.2017.1364741

Lee, H., Lee, J., Chung, N., & Koo, C. (2018). Tourists' happiness: are there smart tourism technology effects? *Asia Pacific Journal of Tourism Research*, 23(5), 486–501. https://doi.org/10.1080/10941665.2018.1468344

Li, J., Xu, L., Tang, L., Wang, S., & Li, L. (2018). Big data in tourism research: A literature review. *Tourism Management*, 68, 301–323. https://doi.org/10.1016/j.tourman.2018.03.009

Liberato, P., Alen, E., & Liberato, D. (2018). Smart tourism destination triggers consumer experience: the case of Porto. *European Journal of Management and Business Economics*, *27*(1), 6–25. https://doi.org/10.1108/EJMBE-11-2017-0051

Mariné-Roig, E., & Antón Clavé, S. (2015). Tourism analytics with massive user-generated content: A case study of Barcelona. *Journal of Destination Marketing & Management*, *4*(3), 162–172. https://doi.org/10.1016/j.jdmm.2015.06.004

Mazanec, J. A., Wöber, K., & Zins, A. H. (2007). Tourism destination competitiveness: From definition to explanation? *Journal of Travel Research*, *46*(1), 86–95. https://doi.org/10.1177/0047287507302389

Micera, R., Presenza, A., Splendiani, S., & Del Chiappa, G. (2013). SMART Destinations: New strategies to manage tourism industry. In *8th International Forum on Knowledge Asset Dynamics: Smart growth: Organizations, cities and communities (IFKAD)* (pp. 1405–1422). Zagreb: Emerald. https://doi.org/http://dx.doi.org/10.1108/MBE.26717daa.001

Miller, G., & Twining-Ward, L. (2005). *Monitoring for a sustainable tourism transition: The challenge of developing and using indicators*. Wallingford: CABI

Mehraliyev, F., Choi, Y., & Köseoglu, M. A. (2019). Progress on smart tourism research. *Journal of Hospitality and Tourism Technology*, *10*(4), 522–538. https://doi.org/10.1108/JHTT-08-2018-0076

Mora, L., Bolici, R., & Deakin, M. (2017). The First Two Decades of Smart-City Research: A Bibliometric Analysis. *Journal of Urban Technology*, 1–25.

National Statistics Institute (INE) (2019). *Statistics on tourism and hospitality*. Retrieved 20.12.2019 from <https://www.ine.es/dyngs/INEbase/es/categoria.htm?c=Estadistica_P&cid=1254735576863>

OECD. (2018). *OECD Tourism Trends and Policies*. Retrieved 10.01.2020 from <https://doi.org/10.1787/tour-2012-en>

Pérez, Y. P., & Barreiro, D. B. (2019). Using big data to measure tourist sustainability: Myth or reality? *Sustainability*, 11(20). https://doi.org/10.3390/su11205641

Perles-Ribes, J.F.; Ivars-Baidal, J.A.; Ramón-Rodríguez,A.B. & Vera-Rebollo,J.F. (2019). The typological classification of tourist destinations: The region of Valencia, a case study. *Tourism Economics*, https://doi.org/10.1177%2F1354816619838413

Rasoolimanesh, S. M., Ramakrishna, S., Hall, C. M., & Esfandiar, K. (2020). A Systematic Scoping Review of Sustainable Tourism Indicators in Relation to the Sustainable Development Goals. *Journal of Sustainable Tourism*, 0(May), 1–21. https://doi.org/10.1080/09669582.2020.1775621

Ritchie, J. B. and Crouch, G. (2003). *The Competitive Destination: A Sustainable Tourism Perspective*. Oxon: CABI

Sánchez, M., & Pulido, J. I. (2008). *Medida de la sostenibilidad turística. Propuesta de un índice sintético*. Madrid: Editorial Universitaria Ramón Areces.

SEGITTUR. (2015). *Informe destinos turísticos inteligentes: construyendo el futuro*. Retrieved 20.11.2020 from <https://www.segittur.es/opencms/export/sites/segitur/.content/galerias/descargas/proyectos/Libro-Blanco-Destinos-Tursticos-Inteligentes-ok_es.pdf>

Schianetz, K., & Kavanagh, L. (2008). Sustainability indicators for tourism destinations: A complex adaptive systems approach using systemic indicator systems. *Journal of Sustainable Tourism*, *16*(6), 601–628.

Tanguay, G. A., Rajaonson, J., & Therrien, M.-C. (2013). Sustainable tourism indicators: Selection criteria for policy implementation and scientific recognition. *Journal of Sustainable Tourism*, *21*(6), 862–879. https://doi.org/10.1080/09669582.2012.742531

Torres-Delgado, A. & Saarinen, J. (2014). Using indicators to assess sustainable tourism development: A review, *Tourism Geographies*, 16:1, 31-47, DOI: 10.1080/14616688.2013.867530

Twining-Ward, L., & Butler, R. (2002). Implementing STD on a small island: Development and use of sustainable tourism development indicators in Samoa. *Journal of Sustainable Tourism*, 10(5), 363–387.

Um, T., & Chung, N. (2019). Does smart tourism technology matter? Lessons from three smart tourism cities in South Korea Does smart tourism technology matter? Lessons from three smart tourism cities in South Korea. *Asia Pacific Journal of Tourism Research*, *0*(0), 1–19. https://doi.org/10.1080/10941665.2019.159569

UNWTO (2004) *Indicators of sustainable development for tourism Destinations: A guidebook*. Madrid: UNWTO

Valencian Region Tourism Board (Turisme Comunitat Valenciana) (2019). *Current statistics on tourism offer*. Retrieved 11.12.2019 from: <https://www.turisme.gva.es/opencms/opencms/turisme/es/contents/estadistiquesdeturisme/estadistiquesdeturisme.html>

Vera-Rebollo, J. F., & Ivars-Baidal, J. A. (2003). Measuring sustainability in a mass tourist destination: Pressures, Perceptions and policy responses in Torrevieja, Spain. *Journal of Sustainable Tourism*, *11*(2–3), 181–203. https://doi.org/10.1080/09669580308667202

Wang, D., Li, X. R., & Li, Y. (2013). China's "smart tourism destination" initiative: A taste of the service-dominant logic. *Journal of Destination Marketing & Management*, *2*(2), 59–61. https://doi.org/10.1016/j.jdmm.2013.05.004

Wang, X., Li, X. R., Zhen, F., & Zhang, J. (2016). How smart is your tourist attraction?: Measuring tourist preferences of smart tourism attractions via a FCEM-AHP and IPA approach. *Tourism Management*, *54*, 309–320. https://doi.org/10.1016/j.tourman.2015.12.003

World Economic Forum (WEF) (2019). *The Travel & Tourism Competitiveness Report 2019*. Retrieved 08.01.2020 from: <https://www.weforum.org/reports/the-travel-tourism-competitiveness-report-2019>

Wen, J., Kozak, M., Yang, S., & Liu, F. (2020). COVID-19: potential effects on Chinese citizens' lifestyle and travel. *Tourism*

Review (forthcoming). https://www.emerald.com/insight/content/doi/10.1108/TR-03-2020-0110/full/html
World Tourism Cities Federation (2019). *Global Report on Smart Tourism in Cities.* Retrieved 02.09.2020 from: <https://prefeitura.pbh.gov.br/sites/default/files/estrutura-de-governo/belotur/2020/wtcf-global-report-on-smart-tourism-in-cities.pdf>
Ziliak, T. & McCloskey D.N. (2008). *The Cult of Statistical Significance. How the Standard Error Cost Us Jobs, Justice, and Lives.* Ann Arbor (MI): The University of Michigan Press.