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DEVELOPMENT OF A HUMAN-CENTRIC MODEL FOR ASSESSMENT OF SMART AND SUSTAINABLE TOURISM DESTINATION[4]

The goal of this article is to present a methodology for assessing smart and sustainable destinations' development. There are plenty of studies on the determination of concepts and models of smart destination and smart tourism. But to implement them, there is a need for initial knowledge of the status quo and opportunities for comparing best practices and similar destinations. The management of tourist destinations needs an instrumentarium for assessing the achievements and status in regard to the model of smart destinations. The focus should be on the use of strategic-oriented development in the course of the evolution of technology infrastructure, infostructure (Buhalis, 2020, Gretzel et al., 2015) and pool of knowledge and skills, as well as their interrelations with sustainability. This paper augments theory and practice with a methodology that can be used for the elaboration of a strategy for smart destination development based on sustainability and a human-centric approach. The presented methodology in the article includes a model of a smart, sustainable destination and is applied in the case study. The strategies and development of tree cities are researched.
Keywords: smart destination; sustainable development; human-centric approach; smart city
JEL: L83; O20; Q01; Z32

1. Introduction

The goal of this article is to present a methodology for assessing destination development as smart and sustainable. There are plenty of studies for the determination of concept and model of smart destination and smart tourism. Based on them, there are strategic programs and initiatives oriented to the development of smart tourism and smart destinations (Femenia-

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Serra, Perea-Medina, 2016; Ivaras-Baidal, Hernandez, Mendoza de Miguel, 2019). But to implement a well-defined concept of smart destinations, there is a need for initial knowledge of the status quo and opportunities for comparing with best practices and similar destinations. The existing research in smart destination development defines approaches to apply innovative digital technologies and create a smart ecosystem (Gretzel et al., 2015), and their role in enhancing the tourist experience (Buhalis, Neufor, 2014; Lopez de Avila, 2015) and quality of life of local residents (Ivars, 2016; Ribes, Baidal, 2018). Other topics include exploring an interrelation between smart destination and sustainability, taking into account mainly ecological aspects (Gonzales-Reverte, 2019; Pawlikovska-Piechotka et al., 2016); analysing policy and practice in smart development of cities and destinations (Vargas-Sanches, Abbate, Perano, 2019); determining and explaining a collaborative value creation in the framework of S-D logic theory (Xiang Li, Younpeng li, 2013; Boes, Buhalis, Inversini, 2016). In plenty of research, the smart destination concept has evolved from the idea of smart cities. It is important for the orientation of smart tourism development to achieve enhanced tourist experience and quality of life for the local community. At the same time, there are methodologies with indexes for measuring the smartness level of cities and comparing them. The management of tourist destinations needs an instrumentarium for assessing the achievements and status determined by the model of smart destination. The focus should be on the use of strategic-oriented development in the course of the evolution of technology infrastructure, infostructure (Buhalis, 2020; Gretzel et al., 2015) and pool of knowledge and skills, as well as their interrelations with sustainability. The development of smart destinations has to be connected with the competitiveness and attractiveness of tourist destinations. The methodology is developed in the context of S-D logic theory, which places knowledge and skills at the core of value creation and competitiveness (Vargo, Lusch, 2008); smart and sustainable development as well as the theory and practice of Destination Management & Marketing and smart cities policy. This paper augments theory and practice with a methodology that can be used for the elaboration of a strategy for smart destination development based on sustainability and a human-centric approach. The presented methodology in the article includes a model of a smart, sustainable destination and is applied in the case study. The strategies and development of tree cities are researched.

2. Theoretical Background

2.1. Smart destination and smart cities

Smart destination is a concept of applied principles of smartness and pillars of a smart city in tourism. Smartness, defined as an innovative approach to solving problems based on a combination of knowledge in a variety of areas, real-time information and digital support of AI, machine learning, modelling, visualisation (Gretzel, 2015; Vargas, 2016) etc. The concept of smart city is developed with the growth of urbanisation (Lee, Hunter and Chung, 2020; World Bank, 2020) and density of the towns, and the need for overcoming their negative consequences – pollution, heavy traffic, stressful life for citizens, over-exploitation of resources etc. That requires complicated urban planning and a new approach of governance, based on a wide variety and quantity of data and knowledge, predicting models and balance of stakeholders' interests, including residents. The goal is, through the

digitalisation of infrastructure and city governance, to heighten the quality of life, to optimise the resources management and create an urban place harmonised with the environmental policy. Over the years, smart cities have become the symbol of ICT – driven urban innovation and development and have attracted the increasing attention of university researchers, governments, and businesses (Mora et al., 2017). Areas of smart city development are smart governance, smart mobility, smart living, smart economy and smart environment (Boes, Buhalis, Inversini, 2016; Giffinger et al., 2007; Winkowska J. et al., 2019; Lee et al., 2013; Caragliu et al., 2011). The most relevant area to this study is smart government. It uses big and open data and shares the decision-making process with stakeholders (Buhalis, Amaranganna, 2014; Gretzel, 2018).

The smart destination concept is developed with the dynamic evolution of ICT first to contribute to solving and preventing urban problems associated with tourism growth, such as pollution, overcrowding, heavy traffic and congestion, and second to allow effective networking of stakeholders (government, tourist business, cultural institutions, transport operators, NGO's), to create a greater tourist experience and living standard for residents.

According to Gretzel et al. (2015), the basis of smart destination development is "integrating ICT into physical infrastructure" and transforming data into an enriched experience: "the smart tourism destination (STD) can be defined as a tourism system that takes advantage of smart technology in creating, managing and delivering intelligent touristic services/experiences and is characterised by intensive information sharing and value co-creation".

Components of smart destinations are divided into hard and soft smartness (Gajdosik, 2017; Kulualp, Sari, 2020; Vargas-Sanches et al., 2019). Hard smartness is the foundation of smart tourism and destination development, embracing digital infrastructure, roads and buildings equipped with ICT, communication networks, platforms etc. The engine of smart destination development is the soft smartness expressed by data, connections, intelligence and knowledge, open innovation etc. According to Boes, Buhalis and Inversini (2016), only "intertwined and interconnected ICT, people and leadership within the ecosystem can contribute to the smart tourism destinations".

A Smart (business) ecosystem is an ecosystem which contributes to the competitiveness and growth of stakeholders by allowing them to share information, knowledge, resources and support, easy networking and participation in value co-creation processes (Gretzel, 2015; Boes, Buhalis and Inversini, 2016). The premises for this ecosystem are ICT, mainly the Internet of Things, tags, sensors, beacons, RFID etc. (Gretzel et al., 2015; Wise, Heidari, 2019). But only "dynamically interconnected" (Buhalis, Amaranganna, 2014) are actors such as businesses, governments, institutions, local communities and travellers, who collaborate and are open to an exchange of information, services and resources, construct and evolve it. Smart destination management supports this process through participative actions.

In theory and applied research, there are a variety of approaches and methodologies for the study, determination and evaluation of smart destinations. Based on components of smart destinations, most of them analyse and measure areas such as digitalisation, innovation, sustainability, connectivity, mobility in destinations, smartness and openness of its government. Invaras-Baidal et al. (2021) use three levels of indicators for smart destination

explanation and evaluation – strategic-relational (governance, sustainability, innovation and accessibility), instrumental (connectivity and intelligence) and applied (online marketing, information and performance). The European Commission uses four categories of indicators for awarding European towns as The European Capital of Smart Tourism (Smart Tourism Capital, 2019; Smart Tourism Capital, 2022) – digitalisation, sustainability, accessibility and creativity. They are based on SEGGATOUR (Segittur, 2015) pilot areas of smart tourist destinations. There are indexes for smart cities rankings[5], in at least 6 groups, such as environment (natural and built, water and waste, energy, technologies), society (culture, innovation and science), social cohesion, economy, mobility (inc. transportation), government, and quality of life (well-being, education, health and safety etc.). The existing and applied indicators are a good foundation for creating an assessment methodology for the status and progress of destinations' smart development, which is needed for strategy elaboration.

2.2. Sustainable development and smart destination

The concept of a smart destination consists of several intertwined elements. One of them is sustainability. Scientists have opted for different approaches in order to describe the correlation between the two concepts: smart and sustainable and their role in the development of the tourism destination.

According to González-Reverté (2019), there is a direct link between them. Theoretically, a destination can be considered intelligent if it is also sustainable. Nevertheless, in practice, this is not always the case. Most of the time, sustainability is underrepresented in the strategies of smart cities. The authorities should include this variable more actively on an operational level. The connection between the two approaches – smart and sustainable destination lies in the strategy of the destination and the implementation of technologies for more effective environmental management (Ribes, Baidal, 2018). A good conceptualisation of this statement is given by SEGITTUR (State Company for the Management of Tourism Innovation and Technologies in Spain) through their definition of the smart tourist destination. According to them, this is an innovative tourist destination, based on an infrastructure of modern and well-developed technologies, that ensures the sustainable development of the tourist area, facilitates the tourists' interactions, increases the quality of the experience at the destination and also improves the quality of life of the locals.

Shafiie et al. (2019) develop and propose a model for sustainable smart tourism destinations in which the two terms sustainability and smartness are important determining factors. The authors use the grounded theory method as a framework for their analysis. The aim of their systematic review is to explore the different aspects of smart tourism destinations and to develop the foundations of sustainable smart tourism destinations in order to create a conceptual model. Creating their model, Shafiee S. et al. (2019) conclude that when society utilises modern technologies for the economic and social prosperity of tourist destinations, they become factors for the successful development of smart destinations. They are considered important as a facilitating condition and stimulus affecting the dynamics of

[5] ISO indicators, European Smart cities Index, Cities in Motion, IMD Smart City Index.

destination development. In their presentation, the sustainable smart destination is a logical consequence of external factors. These casual conditions, along with context conditions such as economic and financial factors, technical and infrastructural factors, environmental factors and social and cultural factors, as well as intervening conditions such as government support, influence a wide range of actions within the concept of a sustainable smart tourism destination. They are categorised into 4 distinctive groups: Environmental Actions, Economical Actions, Social Actions and Technical Actions (Shalfie et al., 2019). They lead to several consequences related to a better quality of life and experience for local residents and visitors alike. However, sustainable development remains a focal point of the model. The current research paper suggests a change in the model-building process by applying a human-centric approach in the assessment of a smart and sustainable tourism destination. Although detailed, this model is rather static. The evolution of a sustainable smart tourism destination is an ever-evolving and complex process. There is a dynamic link between the factors influencing growth and the actions taken. Within the framework of the destination, the amelioration of the quality of life of the locals and the experiences of the tourists, among others, should not be considered as a simple consequence but rather a preset strategic goal.

Ribes and Baidal (2018) introduce a synergetic model incorporating smartness and sustainability. It has a more human-based approach. The tourist experience, as well as the well-being of the local residents, lies on the objective level of the concept. In this model, smartness is connected to sustainability via different technologies. They influence five destination areas. They are planning, efficient management of resources; monitoring transparency and participation, public-private cooperation, knowledge, innovation; and communication, awareness raising and the improvement of the tourist experience (Ribes, Baidal, 2018). The improvements proposed by the authors suggest more tourists, but with less intensive consumption of resources and with a less negative impact on the environment. This model is once again less dynamic. It shows the link between the two concepts, but the role of the various parties involved (government, locals, tourists and others) within the tourist destination is not evident, as well as the opportunities for their prosperity.

Many of the existing models related to sustainable smart tourist destinations focus on tourism competitiveness, rather than applying the principles of sustainability (González-Reverté, 2019). Their focus also shifts from the social dimensions of the concept. The direct impact on all of the involved parties is less researched. Tourists, locals and authorities should remain a vocal point in the model for a sustainable smart destination.

2.3. Destination Management

Destination management is oriented to the enhancement of destination competitiveness and attractiveness. To achieve that DMO focus on developing 6 “A” components of the tourism destination – attractions, amenities, available packages, accessibility, activities and ancillary services (Buhalis, 2000). But there is still a lack of enough theoretical explanation for the existence and character of a connection between the development of smart destinations and their level of competitiveness and attractiveness for tourists. Today, that insists, from one side, to be developed, supported and managed in the context of sustainability and smartness

(Gajdosik, 2018). On the other side, there is a need to connect the smart development of a destination with its attractiveness for tourists, residents and business.

2.4. S-D logic theory

S-D logic theory is fundamental for explanation and planning smart development because of its premises. Value co-creation by multiple actors (Kryvinska, Strauss, Olexova, 2013), always including the beneficiary and all social and economic actors are resource integrators. The smart tourist experience is based on the value of co-creation (Neuhofer, Buhalis and Ladkin, 2014). Value proposal is oriented to tourists in the context of their surroundings, behaviour and personality, and unique because of their contribution to it. Buhalis (2015) suggests that "interoperability and ubiquitous computing ensure that everybody is interconnected and processes are integrated towards generating value, through dynamic co-creation, sustainable resources and dynamic personalisation and adaptation to context". But that happens in a network of actors – businesses, residents, government, institutions and associations, who exchange services and at the same time consume them. Using S-D logic theory as an instrumental framework guarantees a human-centric approach to smart destination development or development oriented to the needs, rights and benefits of tourists, residents, and society. At the same time provides opportunities for collaboration between different stakeholders which enriches the social capital and stimulates innovation and enhances "collective intelligence" (Buhalis, 2020).

3. Methodology of Research

The methodology of research in the current paper comprises qualitative research with a review of articles, policy documents and programmes for sustainable and smart destination development and a case study. Theoretical analysis is useful to find pillars for elaborating a model for a smart, sustainable destination and, respectively, the measuring indicators. The case study is used to apply the elaborated model and to determine its workability.

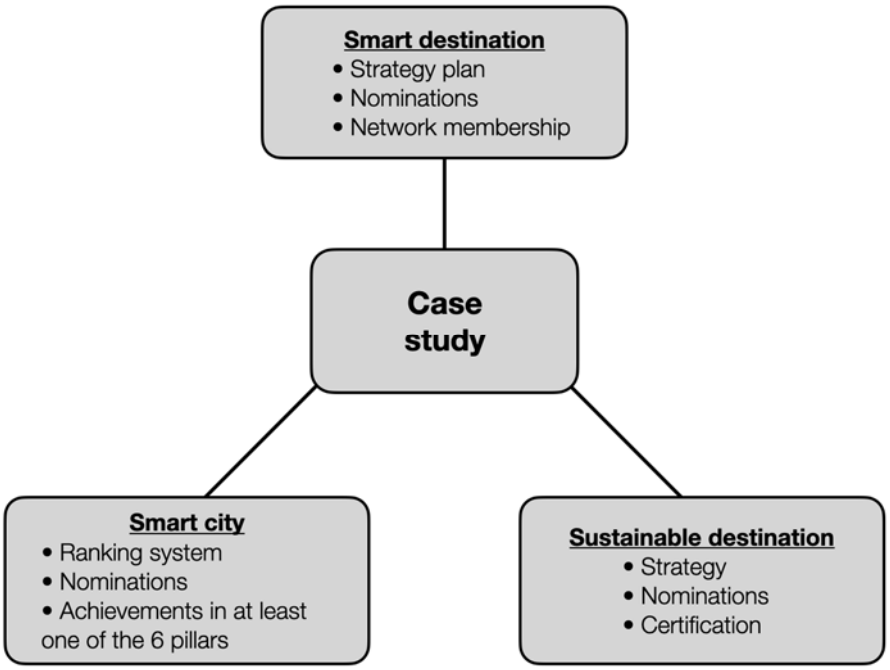
The theoretical review was implemented in three steps. First, scientific articles in ResearchGate, Web of Science and Scopus in areas of "smart cities", "smart destinations and smart tourism", "sustainable development of destinations" and "S-D logic theory" were collected and classified according to the keywords and topics. Then their abstracts were reviewed and selected, which present an intersection between at least two of the areas and at the same time, are relevant to the goal of this research. At the end, selected articles were analysed and a theoretical base was extracted. This review was used to find out and classify good practices in smart cities and destinations.

The inspection of policy documents and programs was online. First, it was implemented through found examples of good practices in smart cities and destinations, as well as in sustainable development. The ranking systems for smart cities, smart tourism destinations and sustainable destinations in 2020, 2021 and 2022 were surveyed. The available strategies and policies of the first 10 nominated or awarded places in Internet databases were

researched. If there was no access to documents and the date of one of the cities or destinations in the top ten, it was skipped to the next one in the list.

The case study is applied because of its advantages as a research method to study in depth very dynamic and relatively new areas of theory and practice as well as to implement and check elaborated concepts and models. The first criterion for the selection of places for the study is their presence in the ranking systems for smart and/or digital, sustainable and/or green city and tourist destinations. The second criterion is to be marked with official strategies, programs, processes and achievements in 3 areas – smart city, smart destination and sustainable destination (see Figure 1).

Figure 1. Areas of selection criteria for case study



Source: Authors elaboration.

4. Methodology for Assessment of Smart Sustainable Destination Development

4.1. Premises for the methodology

Applying the smart destination concept in destination management contributes to an enhanced experience for tourists and better quality of life, mainly from a hard smartness view – digitalisation and developed infrastructure for mobility and accessibility. But it is still questionable if that is strategically oriented and explicitly interconnected with sustainable development. Tourists in smart destinations can enjoy a better experience thanks to real-time, personification and context-aware information, connectivity with surroundings and easy

mobility. Nevertheless, they need an environment and services which allow them to fulfil their travel purposes and desires, such as relaxation, enrichment, entertainment etc. Even though one of the premises of STD is a better quality of life for citizens, there should be a guarantee that residents are involved in development of their living place and co-creation of the tourist experience in an enjoyable way. They need knowledge and capability to participate in these processes and contribute to smart development. The sustainability of smart destinations is mainly presented by measures for environmental protection and energy efficiency, which are not enough. From a strategic point of view, they should be locally determined and connected with policy for combating climate change, sustainable models of urban development, management of local resources and local community growth. There is a call for a goal which expresses an integrative view for STD development – as a tourist place, urban space, space for living, working and economic prosperity, for community life and values, environmentally friendly, decoupled from factors impacting climate change.

Applying the concept of smart destination first at all insists on assessing achievements, compared with the best practices, which can allow taking strategic decisions on what to be developed in a local context. The indicators for smartness can be used, but they should be subordinated to the integrative goal and idea, which reflects the smartness concept and human-based approach. There is a demand for a framework for assessment indicators, which is based on smart destination principles, oriented to sustainable development and focused on human aspects. They have to measure the status and progress of smart development in relation to forming a smart ecosystem, based on S-D logic, which guarantees effective collaboration between different actors – residents, tourists, tourism and other stakeholders. In order to accomplish the above-mentioned, the article presents a model for a smart and sustainable destination.

4.2. Model of smart sustainable destination development

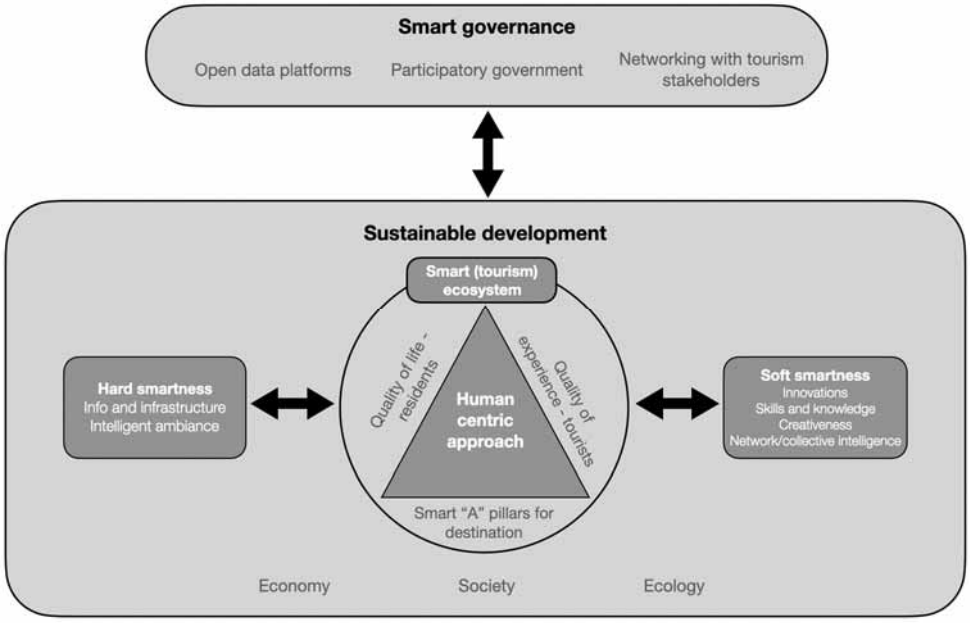
The theory and study for smart destinations give us the dimension for its application and realisation, expressed in developing a smart ecosystem (Vargas-Sanches, 2016; Dogra, Kale, 2020), based on the interrelation of hard and soft smartness and created, supported and managed by a smart government with a purpose to enhance the quality of life, tourists experience and destination competitiveness (see Figure 2).

Smart government shares information and resources and uses big data and open innovation to involve all stakeholders in the decision-making process, planning, monitoring and control. Smart government, together with business, residents, education and science, develops, supports and regulates hard smartness and soft smartness in the context of sustainable development, which guarantees strategic aspects of its policy. Evaluation of progress and status is through 3 categories of indicators – digitalisation, sustainability orientation and participatory.

Infrastructure with integrated ICT and developed infostructure shape hard smartness. Investments in smart technologies and their implementation are oriented to the construction of an "intelligent ambient", which allows and stimulates innovation and creative processes in the context of sustainable development. That insists hard smartness be developed in

combination with soft smartness. The last is determined by innovations such as ideas, products, technologies, enterprises and a combination of them; skills and knowledge, and creativity of residents, tourists and businesses. The indicators for hard smartness are digitalisation, sustainability and human approach. The indicators for soft smartness are intelligence, creativeness and innovativeness in the context of sustainability.

Figure 2. A model of smart sustainable destination



Source: The figure is elaborated by the authors, based on Gretzel et al. (2015), Boes, Buhalis and Invarsini, (2016), González-Reverté (2019); Vargas-Sanches et al. (2019); Invaras-Baidal et al. (2021).

A result of smart governance and developing hard and soft smartness connected with sustainability is creating a sustainable smart (tourism) ecosystem which allows all stakeholders to be involved, connected and interact with each other. The smart ecosystem gives opportunities and stimulates tourists and residents to co-create tourist products, share values and have enjoyable experiences. At the same time, the attractiveness of the destination is protected and evolving, and stakeholders are prospering. This ecosystem contributes to a rising quality of life and allows the operant resources to be used as a source of destination competitiveness (Wang et al., 2013) and success of destination management. The pillars of destination attractiveness have to be developed and managed in a smart and sustainable way. The indicators are connectivity, sustainable mobility, satisfaction of citizens and tourists, and destination competitive positioning.

5. Case Study

The aim of the case study is to apply the developed model for smart, sustainable destinations in three selected worldwide cities based on their strategies for smartness and sustainability. The selected cities are Copenhagen, Bordeaux, and Seoul (see Table 1), according to the criteria that places have to be nominated or awarded, as well proceed official strategies and programs in the following areas – smart cities, smart destinations and sustainable destinations (see Figure 1).

The selection process (Pozdniakova A, 2017) includes 3 steps:

1) Reviewing indexes that measure smartness and sustainability (IMD Smart City Index) (IMD, 2021), Quality of Life Index (Numbeo, 2022), SDG (Sustainable development Goals) Index score (Sustainable Development Report, 2019) (see Table 1);
2) Awards and nominations for European Smart Tourism Capital and
3) Finding out the existence of official city policy and/or formally adopted SSC (Smart and/ or sustainable cities) strategies and responding to the general SSC concept (Pozdniakova, 2018).

Table 1. The ranking of Copenhagen, Bordeaux and Seoul

City	IMD, Smart City Index 2021	Awards and nominations	Quality of Life Index, June, 2022	SDG (Sustainable Development Goals) index score, 2019
Copenhagen	7 (rating A)	European Smart Tourism Award '2019 for outstanding achievements in digitalisation	185,69 (very high)	68,7
Bordeaux	32 (rating BB) new in the ranking	European capital of smart tourism 2022	167,09 (very high)	62,6
Seoul	13 (rating BBB)	-	125,74 (moderate)	77,9 (for South Korea)

Source: The table is elaborated by authors.

The IMD Smart City Index assesses the perceptions of residents on issues related to structures and technology applications available to them in their city. Cities are grouped based on the HDI (Human Development Index) score. Group 1 is considered to have the highest HDI level with AAA-AA-A-BBB-BB.

The Quality-of-life Index (highest value is 240) shows the quality of life by measuring important criteria such as safety/crime, health care, climate, cost of living, public transport/traffic, pollution etc.

The SDG index score measures the total progress of a city towards achieving all 17 SDGs. The score can be interpreted as a percentage of SDG achievement. As very high achievement is considered > 70, the next levels are 65-70 and 60-65.

The three cities Copenhagen, Bordeaux and Seoul are situated in different geographical areas, with different types of planning legislation and administration. The arguments for choosing

Copenhagen and Seoul are related to the fact that both cities have well-established policies, related to smart tourism and many achievements in the field of smartness and sustainability (see Table 1). Copenhagen is rated 7th place according to IMD Smart City Index for 2021 and awarded for its achievements in digitalisation in 2019 (Smart Tourism Capital, 2019). Seoul is rated 13th place as a smart city for 2021, but it is distinguished by government policy and program for digitalisation. Bordeaux, on the other hand, is a special case with its prosperous city background, dynamic development and significant achievements in smartness and sustainability. This is proven both by the Award and nomination for European capital of smart tourism 2022 (Smart Tourism Capital, 2022) and by the recognition, including for the first time Bordeaux in the IMD Smart City Index 2021, putting Bordeaux straight on 32nd position.

COPENHAGEN

Copenhagen (population 1 350 000) is the largest city in Denmark, with awards that honour the city as: European Green Capital (European Union); the Most Livable City in the World (Monocle, 2021); the most advanced city in the world in terms (Smart City Expo World Congress, Barcelona) etc.

Copenhagen is the most popular city in Denmark for international travellers. In 2019 it reached 73rd place among the world's most popular cities, with 3.19 million tourists (WorldData.info, 2020a). The total number of arrivals in tourist accommodations in Denmark for the same year is 8,3 million arrivals (Statista, 2020a), so Copenhagen has 39% of all tourists arriving in Denmark. The number of overnight stays of tourists in Denmark's regional destinations in 2019 shows that the urban area of Copenhagen had the most overnight stays of tourists, reaching over 10.9 million overnight stays (2019 – total 33,09 million overnights in Denmark) (Statista, 2020b).

Smart Governance

Copenhagen's smart city approach is strongly anchored in the three main objectives of achieving carbon neutrality by 2025; creating a greener, more sustainable, and more livable capital city; and supporting economic growth.

Proposed to strong decentralisation, the Danish basic data program introduces the once-only principle, under which, for example, public authorities cannot ask citizens for the same data provided earlier, savings yielded by this program reached around thirty-five million euros by 2020 owing to the decrease in administrative costs.

Hard smartness

Smart Info and Infrastructure is developing under Smart city integration progress (Quelin, Smadja, 2021):

- Development of an intelligent traffic systems framework (to ensure that 75 per cent of all trips within the city should be taken by bike, public transport, or on foot; Denmark is known as a "bike nation", and over one million journeys are taken by bike in Copenhagen every day – efforts to provide better conditions for cyclists;

- Copenhagen Intelligent Traffic Solutions (CITS) platform consists of a network of Wi-Fi access points that can geolocate Wi-Fi-enabled devices on the streets without compromising privacy and monitor traffic in real time;
- Recycling services: Denmark aims to be recycling 70 per cent of all its waste by 2025, and it produces a comparable per-person rate of municipal waste;
- Housing and energy: The city is seeking to reform its current building stock so that it makes smarter use of energy by decreasing the electricity usage of all buildings by up to 10 per cent and reducing their heat consumption by 20 per cent by 2025;

Soft smartness

- Employment-finding services: Denmark characterises its labour model as one of "flexicurity" (OECD Better Life Index, 2021). The model allows employers to easily hire and fire employees, to adapt to marketplace conditions and gives employees a secure safety net;

Quality of life

According to the OECD, Denmark is among the best places to live (see Table 2) in terms of the work-life balance that it offers (OECD Better Life Index, 2021).

The city is best explored by bike using one of the world's most developed bike-path systems. The high standard of living, easy access to the Internet, modern metro system and thriving business environment attract talent from all over the world.

Quality of tourist experience

The municipality of Copenhagen is the leading tourism region in Denmark by turnover. It ranked first in 2018 with 33,4 billion Danish Kroner (or 4,7 billion dollars) (Statista, 2021).

The contribution of travel and tourism to the GDP (% of GDP) of Denmark grew by 0.27 % from 8.1 % in 2018 to 8.2 % in 2019 (Knoema, 2021). Within 24 years, the country's dependence on tourism has increased noticeably, as in 1995, tourism revenue was about 2% of the gross national product. In the first 6 months of 2022, Tripadvisor has 669558 reviews (Tripadvisor, 2022a) of Copenhagen hotels, restaurants and attractions

Smart tourist business and pillars of destination

- Wonderful Copenhagen, the city's official tourism organisation, declared 2017 the end of tourism as we know it. So, tourism would be considered a means to a more sustainable future, so both the city and visitors alike can benefit.
- The visitors are guided around with the help of AI technology;
- Innovative technologies such as moving posters, robotics, or VR goggles are some of Copenhagen's best attractions;
- Tourists can take advantage of the city's app, which guides users between attractions. Within the app, a tracking module helps the authorities to understand better movement

patterns both around the city and at attractions on the outskirts. The collected data is helping to improve services continually.

- An app offers self-guided tours through local Copenhagen neighbourhoods, meaning tourists get to see the "real" side of the city.

BORDEAUX

Bordeaux metropolis (750 000 residents) is France's 6th largest urban area and the most attractive city in France to live and work (Foncière des régions report, 2014), having undergone a thorough urban and economic metamorphosis. Designated by UNESCO as a World Heritage Site and recognised as the world's major wine industry capital representing around half of the local economic base, Bordeaux is also one of the leaders in higher education and a pioneer in digital and green development.

Bordeaux is announced as the winner of the European Union's competition for the European Capital of Smart Tourism for 2022 (European Commission, 2021), presenting remarkable achievements in all four categories of the competition.

Smart Governance

Bordeaux has opened its data portal with high transparency. An open data portal is the quickest and simplest way to communicate information.

Hard smartness

Bordeaux is part of one of 16 pilot projects selected through SynchroniCity (Open&Agile Smart Cities, 2019), one of the IoT European Large-Scale Pilot Projects, which started in 2019. With the experience from SynchroniCity, the city expects to complete the cycle on a technical level between the sensors connected to the urban data platform and the applications, which provide citizens with better digital services.

The management of the intelligent city of Bordeaux includes initiatives for digitalising the urban infrastructure, such as developing smart parking, smart lighting, and smart buildings. A system called Things as a Service (TaaS) (Kerlink, (2019) was installed in a smart-city trial system in Bordeaux. The pilot program was recognised by Solutions Numeriques magazine with the Digital Transformation Trophy in 2019. The deployment included approximately 500 sensors connected to more than 200 public streetlights, e-vehicle charging stations, refuse-sorting containers, waste bins and public buildings.

Soft smartness

In Bordeaux, there are unique advantages to studying. As an educational centre, it has a great student atmosphere and gives an opportunity to supplement the educational level with knowledge and skills that can be used in various future careers in the food and hospitality industry. Bordeaux has become one of the favourite Erasmus destinations for international students. Bordeaux also pays attention to young people and their problems. Such an example is Pixpay's Teenage Lab which is exploring the habits of young people and is offering solutions to support them.

Quality of life

Bordeaux is a good place to live, with high ratings in housing, safety and healthcare. Bordeaux is considered a very tolerant and relaxed place. The city attracts with the cheaper-than-Paris cost of living, good weather, excellent transportation system, proximity to the Pyrenees (for skiing in the winter), and UNESCO World Heritage status.

The Agora Tourism Bordeaux website – residents, visitors and tourism professionals can share their ideas and opinions to build the tourism and events of tomorrow.

The Bordeaux metropolitan area is considered attractive by 98% of its residents: interesting architecture that gives it elegance, a particularly high-quality range of shopping and restaurants, and an ideal geographical location. Most inhabitants in the metropolitan area support tourism.

More and more residents believe that the development of tourism in Bordeaux has a positive impact. Tourism is perceived as a driving force – 68 % of the residents in 2021 voted positive on culture and leisure offer (in comparison to 2018 – 64 %) (Agoda Tourism Bordeaux, 2021) and 58 % voted positive on infrastructures (55 % in 2018). 14% of the residents (2021) believe that the development of tourism in Bordeaux has a positive impact on their quality of life (7% in 2018). According to the same study for 77% of residents, it is important to support the tourism industry to boost the economy. Six out of ten residents say they would be willing to help welcome visitors. 62% of Bordeaux inhabitants think that "Bordeaux must continue to promote itself in order to attract tourists".

Quality of tourist experience

The Bordeaux metropolitan area saw a significant improvement -78 % score (or +34 points compared to 2019) in its second year of taking part in the Global Destination Sustainability Index 2021, which analyses the environmental and social performance of the local territory and the sustainable commitment of partners and the Tourism and Convention Office.

- 4 million stays in Bordeaux in 2021, mainly French tourists (Agoda Tourism Bordeaux, 2022);
- 16.4 million overnight stays recorded in Bordeaux Metropole in 2021;
- 80% of the overnight stays – by French people, 20 % – by foreigners (18% of them Spanish, 15% – British, 9% – German);
- 16 000 private-sector jobs linked to tourism in Bordeaux Metropole;
- In 2021 59% of customers in paid accommodations came for business, 41% – for leisure;
- The attractiveness of the destination (Agoda Tourism Bordeaux, 2022);
- 2 million wine tourists in the Bordeaux wine region in 2018 (average production of 5 million hectoliters of wine per year);
- 1.1 million visitors to museums and exhibition spaces in 2019 (638 000 in 2020);
- 42 097 river cruise passengers in 2019;

- 1 734 congresses hosted in Bordeaux in 2021 and 97 million Euro million in economic benefits from hosting these congresses;
- Overall satisfaction index for Bordeaux – 210 points, which is slightly higher than the Eurocities standard (+7 points compared to the average of 203 points), according to the 2019 TCI Research visitor satisfaction survey.

In the first 6 months of 2022, Tripadvisor has 461 856 reviews of Bordeaux hotels, restaurants, and attractions. Among the first 10 activities in France, according to Tripadvisor, is Saint-Emilion Electric Bike Day Tour with Wine Tasting&Lunch (Tripadvisor, 2022b) in 5th place.

Smart tourist business and pillars of destination

Bordeaux takes action to encourage positive tourism, according to the 3 pillars of sustainability: economical, environmental, and social. Good examples are Bordeaux Trip, which proposes guided tours of the Gironde capital on electric bikes; a slow tourism experience with Ataho, a local tourism organisation, that offers outdoor micro-adventures; a "clever bike tour" of Bordeaux and also exploring the vineyards of Bordeaux without leaving the city; eco-responsible leisure in the city; gourmet tours; Darwin village gives a second life to former military barracks as an inspiring and alternative ecosystem in the Bastide district.

SEOUL

Seoul (population 9 960 000) is the capital city of the Republic of South Korea. The huge metropolis combines traditions, leading-edge innovations, strict environmental politics, and people-oriented initiatives. That makes Seoul a truly Smart City. Seoul invests $1.19 billion (About Smart Cities, 2021) in the innovation of the daily lives of citizens.

Seoul City has been perceived as a global city of merit. Seoul was a finalist in the annual World Smart City Awards for its "Global Digital Capital and City of Digital Social Innovation" project (Smart City Expo World Congress, 2022) twice in 2016 and 2017.

Smart Government

The local government developed a big data-based Smart City master plan in several categories, including IoT-based Shared Parking System, Taxi with artificial intelligence and smart surveillance cameras. E-Governance of the city of Seoul – Seoul's open governance strategy encourages transparent city governance. The Dasan Call Center is a 24/7 government agency that fields all questions regarding city services. Residents also have the option to book public services and utilities through the internet 24/7. So far, Seoul has always held the first position in the performance of municipal e-government among the major 100 cities around the world since the Global E-Governance Survey started.

A smart city digital platform called "Digital Mayor's Office" is successfully operating in Seoul. Every citizen can check the status of the entire city at a glance in real time.

Hard smartness

In 2014, Seoul was recognised as the world's most wired city and took first place in technology readiness by Price Waterhouse Cooper's "Cities of Opportunity Report".

- Road recharging vehicles during the drive – OLEV is an online electric vehicle technology that charges vehicles wirelessly from the road.
- U-Seoul Safety Service involves every citizen (from 2008), combining location services and CCTV technologies. This solution enables one to notify family members of emergencies of their relatives.
- The city's high-tech streetlamps reduce electricity consumption and provide residents with wireless internet access.

The u-Green service of Seoul represents a network of sensors assessing factors such as water and air quality, transmitting this information directly to public spaces and the devices in citizens' living rooms

Significantly enhanced convenience of public transportation through "Seoul's Intelligent Traffic System" (ITS), Smart Transportation Card, and Bus Information System (BIS).

Seoul is supporting other cities by exporting smart city solutions, including TOPIS (Transport Operation and Information Service), IoT-embedded LED streetlights, and smart garbage processing systems.

- Seoul plans to install 50,000 IoT- embedded sensors across the city and to gather "city life data", including floating population, UV rays, fine dust, noise, vibration, and more.
- Seoul is working hard towards "urban regeneration" instead of "demolishing" the city. Seoul has established the "Seoul-type Sustainable Development Implementation System" and is running the evaluation of sustainability across the administration.

In terms of energy policies, the production of new and renewable energies will be expanded, such as solar power and electric/hydrogen-powered vehicles and citizen participation to prepare against energy depletion will be encouraged.

Soft smartness

Main steps made to fulfil the strategy of the digitalised city:

- Seoul has provided education courses on smart technologies since 2008;
- Offering lectures and city-funded classes through private education institutions;
- Forced low-income individuals and elderly people, as well as immigrants, to use smart devices;
- Smart citizens – some of the examples of expanding citizens' engagement are "Democracy Seoul," a citizen participation policy proposal platform; "M-Voting," a mobile voting system; and "Seoul Online Civil Complaints," an online/mobile window to register and process civil complaints.

Quality of life

In 2015, Seoul was rated as Asia's most livable city with the second highest quality of life index globally by Arcadis.

Seoul is a fast-paced metropolis with 24-hour facilities and an expat-friendly social environment. Local citizens and visitors benefit from Seoul's affordable and reliable public transport system, which is also equipped with public Wi-Fi common to the most wired city in the world. Another example is the late-night bus called "Owl Bus". This is an innovative scheme for night-time transportation. After surveying the opinion of the citizens, a total of nine routes of the Owl Bus have been designated in the areas with the highest demand for public transportation at night time. These buses are now responsible for the safe trip home for more than 10,000 people a night.

Seoul has made significant progress over the past few decades towards providing services to its citizens more intelligently and improving their quality of life. It consistently appears in the leading pack of global rankings. In 2019, Seoul Metropolitan Government (SMG) announced an investment of $1.2 billion until 2022 on smart initiatives to drive further improvements (Smart Cities World, 2020).

Quality of tourist experience

Seoul is the most popular city in South Korea for international travellers. In 2019, Seoul ranked 23rd among the world's most popular cities, with 9.11 million tourists. It makes 52 % of the total number of international tourists (total 17.5 million) visiting South Korea in the same year (World Bank. Data, 2022). On average, each of the tourists arriving in 2020 spent about 3,953 US Dollars (WorldData.info, 2020b).

In 2016, Seoul had a total of 126,785 guest accommodations and restaurant establishments employing 480,090 people (UNWTO-WTCF, 2017).

Seoul attracts domestic and international tourists coming mainly from East Asia, principally China, Japan, and Southeast Asia. According to Tae-Hyoung and T.Gim (2018), the Seoul City Tourism satisfaction index in 2018 was 4, 38 (from 1 to 5), which is a sharp increase in comparison to 2016 – 4,15 and to 2015 – 4,14 (UNWTO-WTCF, 2017).

In the first 6 months of 2022, Tripadvisor has 494 497 reviews of Seoul hotels, restaurants, and attractions (Tripadvisor, 2022c).

Smart tourism business and pillars of destination

As a result of over-tourism, the city is now revising and re-shaping its tourist destination policies towards developing quality tourism rather than quantity tourism and to disperse tourists into a larger number of tourist precincts in other districts.

The summarised results of the development of Copenhagen, Bordeaux, and Seoul as smart destinations are expressed through indexes for climate and pollution and the total quality of life index in June 2022 (see Table 2).

Table 2. Quality of life indicators for Copenhagen, Bordeaux and Seoul, June 2022

Quality of life index June, 2022	Copenhagen	Bordeaux	Seoul
Quality of life	185,69 (very high)	167,09 (very high)	125,74 (moderate)
Climate	83,74 (very high)	93,30 (very high)	68,39 (high)
Pollution	21,23 (low)	39,27 (low)	58,77 (moderate)

Source: Quality of life index June '2022 (Numbeo.com, 2022).

6. Discussion

The case study reveals that high quality of life and quality of tourist experience are results of policy and initiatives of smart governments that support and develop smart ecosystems but only in the context of sustainable development and a human-based approach. Digitalisation, oriented to create high-tech infrastructure and infostructure, doesn't guarantee an enjoyable experience for residents and tourists. This issue also concerns the protection of the environment and achievements towards climate change prevention. Seoul is one of the best-digitised cities in the world but has a moderate result according to the Quality of Life Index, which puts some challenges to the city to be solved. The Quality of life index for Copenhagen and Bordeaux is considered very high. These two cities have high and moderate achievements in SDG. Even though the attainments in climate change prevention and decreasing pollution are high and moderate in Seoul, they are behind these in Copenhagen and Bordeaux. The smart government of Bordeaux develops a smart ecosystem through projects and investments in hard and soft smartness and orientation to increase the attractiveness of the city for its residents, tourists and business. As a result, Bordeaux is considered as an attractive place for living, working, studying, leisure and business. The relation of the number of tourists to local citizens is approx. 4 to 1, which is higher compared to this one in Copenhagen – 3 to 1 and Seoul 1 to 1, but residents of Bordeaux enjoy welcoming visitors and accept tourism development. Seoul faces many challenges concerning over-tourism. Even though the statistics show an increase in tourists' satisfaction, their quality of life needs further improvement. Therefore Seoul's government policy is centred on developing quality tourism and dispersing tourists to other districts. That proves that the presented human-centric model is effective and the most appropriate for the well-being of everyone involved in the process: tourists, locals and authorities.

The case study shows different degrees of progress and challenges for the three cities. What unites them are the efforts towards digitalisation and improving the quality of tourists' experience. But the governance, which is oriented to developing a smart tourism ecosystem in the context of sustainable development and human-centered, has better results. They are enhancing the quality of life and tourists' experience as well as destination attractiveness and stakeholder prosperity.

The analysed cities prove the efficiency of the proposed model of a smart sustainable destination. All of them present a balanced mix between soft and hard smartness as well as the active participation of the government in further development of the concept of a smart sustainable destination. Based on several indexes (IMD Smart City Index, The Quality-of-life Index, The SDG index score), Copenhagen, Bordeaux and Seoul show very high scores.

This serves as proof that a human-centric approach is one of the most efficient strategies for a successful smart sustainable destination.

7. Conclusion

The research presents a human-centric model for a smart and sustainable destination, focused on creating a smart tourist (business) ecosystem. It is applicable for the assessment of the status and development of smart destinations and elaborating strategies for smart and sustainable development. The model is used for the case study.

The model is a good base for elaborating a framework for the assessment of the status and development of smart destinations, which enriches the already existing evaluation systems. The indicators in this framework reveal the connection between pillars of smart and sustainable destination – smart government, sustainable development, hard and soft smartness, and a smart tourism ecosystem. The main group of indexes should present the links between governance, smart infrastructure and infostructure, innovations, creativeness and sustainability and smart ecosystem.

There are some limitations of this research. The number of studied destinations is limited. They need to be divided into several groups according to their size, type of tourism, location, urban classification and others. The indicators are presented only in categories and they have to be further developed. In order to achieve that, future research on a bigger number of destinations needs to be conducted. They could be categorised into different groups according to the above-mentioned criteria.

The proposed model could be used as a base for developing a smart ecosystem index. It can contribute to measuring achievements and comparing different destinations.

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