Management Mode for Sustainability in Touristic Destinations in Portugal.

Case Study: Defining routes for Sintra and Cascais Region.

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Extended Abstract

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ABSTRACT

Currently, the demand for sustainability represents a cross-paradigm to all areas, including the expanding touristic sector, which represents a key role in the world economy contributing 10% to the global Gross Domestic Product in 2014. Being a dynamic and complex system that produces impacts, both in social and environmental levels, it leads to a need of adopting a more sustainable development.

Accordingly, the concept of Sustainable Touristic Destination endorses the touristic potential of each region, which is considered as a set of touristic services that it offers and its natural and cultural characteristics, allowing the construction of spatial networks composed by activities with sustainable concerns in that destination, supported by Geographic Information Systems (GIS) and namely QGIS.

The case study is the destination composed by the municipalities of Sintra and Cascais, whose analysis focused primarily on the review of its touristic potential, followed by the study of the tourist profile.

Secondly, the space network with activities with sustainable concerns was built, as well as the development of the route calculation model. The obtained results are seven routes with different durations, presenting also sustainable mobility alternatives to tourists.

Finally, the publication on the web of the obtained routes has the objective of enabling its utilization by tourists. Further developments concerns the evolution of the management model and exportation of this approach to other destinations, in order to achieve sustainable development of the tourism sector.

Raising awareness about sustainability in tourism for both tourists and touristic entities, as well as about the environmental and social impacts associated, is crucial to adopt sustainable practices in this sector.

Keywords: Tourism, Geographic Information Systems, Sustainable Development, Routes, Sintra, Cascais

1. INTRODUCTION

In a global perspective, tourism stands out as one of the activities with major participation in the socio-economic strand, having a high potential for expansion and comprising large amounts of revenues. Responsible for the mass movement of tourists around the globe, tourism is in constant development and consequently has a significant growth of the associated carbon footprint. According to World Tourism Organization (UNWTO), tourism is defined by the set of activities of people traveling to any place and settle in places outside their usual environment for less than a year, either for leisure, business or other purpose (UNWTO, 2015a).

The current expansion of tourism is related to several factors such as the decrease of travelling prices, the improvement of the itineraries and the revolution in information and communication technologies (ICT), with special notation to Web GIS (Web Geographic Information Systems) models. These allow to the inclusion of all the detailed geo-referenced tourist information, emphasizing economic and

leisure touristic activities. It also provides the possibility of shaping routes in touristic destinations according to its resources and requirements of tourists.

According with the World Travel & Tourism Council (WTTC), the tourism sector has generated worldwide 6.97 trillion euros (10% of global Gross Domestic Product), 227 million jobs (1 in 11 jobs) and a number of visitors of 1.1 billion in 2014, which supports its significance for the global economy (WTTC, 2015). In Europe, the arrival of international tourists represented 51.8% in 2013. In the housing sector in Portugal, guests equaled 15.3 million in 2013, translating into 43.5 million overnight stays, respectively over 4.6% and 5.3% compared to the figures recorded in 2012 (Instituto Nacional de Estatística, 2013).

1.1. Objectives

The main objective is to create a formal network of Sintra-Cascais region, translated into a Web GIS Model that will perform as a management model, through Quantum GIS (QGIS), including categories of economic and leisure activities for tourists. The elements that compose the network are analyzed in order to check whether their sustainability standards are suitable to the expected ones, being subsequently included in the network as optional points of tourist interest. Secondly, another objective is to publish the constructed routes on Web, to enable the tourists to consult and manage the obtained routes when visiting this destination.

1.2. Methodology

As a first approach, the methodology includes a state of the art review regarding sustainable development in tourism, specifically concepts related to sustainable touristic destination, criteria of sustainable development and management models in tourism. A critic review to several approaches concerning these concepts is also performed. Its advantages and disadvantages are enumerated, comparing with the methodology applied in the present dissertation.

Successively, description of web mapping models particularly in tourism is presented, highlighting the main tools to create spatial networks and routes, as well as their potentialities and limitations.

The case study of Sintra and Cascais is analyzed thereafter, with focus on the potential of each county as a touristic destination, including activities with sustainable concerns and analysis of the characteristics of tourists as well as the evolution of tourism. The case analysis is partially supported by information provided by the Tourism Division of the Câmara Muncipal de Sintra, Associação de Turismo de Cascais, Cascais Ambiente and Parques de Sintra - Monte da Lua (PSML).

Following, the destination management model is developed, based on the construction of a database of touristic local services, according to the offer of each county. Also based on the database, the route calculation model is developed, which describes the possible approaches to develop paths according to the sustainability criteria and the analysis of the tourist profile. The results are presented, namely the defined paths which construction is justified, as well as the touristic services involved. It is also described the methodology used in the publication of routes on web, as well as their functionalities.

Finally, a discussion of the results is carried out, describing the limitations and potential of approaches adopted, as well as if those approaches satisfy the expectations. A set of proposals and recommendations for the sustainable development of tourism in the region is also presented.

2. SUSTAINABLE TOURISTIC DESTINATIONS – STATE OF THE ART

The development of the tourism industry greatly depends on natural environmental resources, given that the environment is a fundamental pillar in this activity and can also represents the only source of attraction for tourists in certain cases. Therefore, it is imperative to carry out the maintenance or improvement of the quality of the tourism environment in a destination, developing methods to transform the rapid development of tourism into sustainable development, while preserving the quality of the environment through coordination between it and tourism (Tang, 2015).

Defining the concept of touristic destination is crucial for this approach, and the global entity in the tourism sector UNWTO defines it as the physical space where the visitor spends a night at least, and that includes tourism products such as support services and attractions. This delimited physical space also includes tourism resources at a distance of a day trip including round trip and the physical and administrative boundaries defining its management, as well as images and perception that define its competitiveness as a destination. The local community and the present tour agents are also included in and the destination can also collaborate with other neighboring destinations (UNWTO, 2015a).

The case study analyzed in this work is an example of two destinations that complement each other, creating a destination of superior expansion and combining the competitive advantages and characteristics between them.

The touristic destination is the fundamental unity of all tourism, due to being the focal point in the development and distribution of tourism products and implementation of strategy and innovation policies. As unit it includes the full range of product offerings, experiences and services connected to it, either by the public or private sector, in addition to an exposed image, personality and identity associated that define it. The organization's management component of a destination arises with the introduction of benefits to itself, namely the establishment of competitiveness, securing the sustainability in tourism, promoting the benefits of tourism itself and building a strong and attractive identity (UNWTO, 2015).

Within the definition of sustainable practices in destinations, the entity Global Sustainable Tourism Council (GSTC) emerges as the entity internationally responsible for managing and certifying sustainable tourist destinations. The main focus for GSTC is to promote the global adoption of sustainable tourism standards, ensuring the continuation of the tourism industry and its role in opposing the global economic poverty. To achieve this, the GSTC has developed a set of 41 international standard criteria, facilitating the creation and adoption of universal principles of sustainability, known as Global Sustainable Tourism Council's Criteria (GSTC Criteria). Each touristic service that desires to protect natural and cultural resources and practices the respective sustainable use must consider the requirements based on the GSTC criteria in parallel with enhancing tourism as a beneficial tool and help to the growth of the global economy (GSTC, 2015).

In Portugal, the pioneer project in this area is LiderA Destinations, founded by Professor Manuel Pinheiro and Engineer Frederico Galão, by Instituto Superior Técnico. The project has as main focus the promotion and raise of awareness for sustainability in tourism, being conducted by six principles based on the GSTC Criteria.

The approaches on spatial destinations management are frequently based in GIS tools, which facilitates the analysis of the considered area and then the planning of strategies to improve it, mainly referred to tourism and development of routes. There are examples of authors that adopted an approach of paths construction in destinations to support and improve tourism in those areas (Chu et al. (2011); Osório (2010); Silva (2008); Shumowsky (2005)).

3. WEB GIS MODELS

GIS represents hardware systems, software and procedures for capture, storage, editing, manipulation, management, analysis, sharing and visualization of geo-referenced data such as maps and plans. In particular, Web GIS Models are designated as a kind of distributed information system that combines Web technologies and delivery advantages with functions of a GIS program (Fu & Sun, 2010).

Internet accessibility exponential growth in during last years leads to a drastic change of perspective from consumers regarding the search of touristic information. Applications on Internet like Web GIS that includes for example Google Maps, Yahoo! Maps and GlobeXplore, form a set of tools that provides a new generation of client-server interfaces and expands the ways to access travel information. Current developments in Web GIS models affect tourism positively, namely due to the fact that tourists value Web GIS in preparation of travels. This is justified with the fact that during the discovery and search for information of touristic services, sites that have more attractive data, such as landscape photos and other sophisticated visual data, stimulates fun and attractiveness of the location compared to only textual information. Web resources present practical information that is essential to attract users and it also has low monetary costs, which encourages the search behavior (Chang & Caneday, 2011).

In a touristic perspective, planning is defined as the integrated organization of attractions, cultural, natural or human-made, services such as accommodation, restaurants, shops, tourist offices, travel agents or activities, currency exchange and others, and media transportation infrastructures. GIS systems are used for spatial information processing and allow describing and naming the elements of tourist infrastructure with respect to their geometry, topology and theme. GIS also provides the possibility of establishing a digital geographic base for printing maps, digital files to produce maps, both online and for mobile applications, tourist attractions maps and websites with interactive maps. This technology creates opportunities for the development of use application-oriented maps for tourists, integrating database operations such as interrogation and visualization of the response and the advantage of geographical analysis offered by maps (Jovanović & Njeguš, 2008).

Quantum GIS (QGIS) is a software developed by the Open Source Geospatial Foundation (OSGeo). Its compatibilities include operating systems as Linux, Unix, Mac OSX, Windows and Android and supports various database formats such as raster and vector, providing a number of different features and plug-ins (QGIS, 2015).

The process of developing routes in a certain region supported by QGIS is composed of several phases, namely characterization and analysis of tourism in that region, potential of the region as

touristic destination, offer of touristic services and activities, infrastructures and access evaluation and the application of criteria practices with sustainable goals.

Following to this process, Web publication of routes is an important step, since it enables its consultation and management from tourists in any place, performing as an online guide, as long as the tourist has access to a device with Internet. However, the tourist can also download the information previously.

4. CASE STUDY

The case study destination, composed by Sintra and Cascais, stands out for its coastal component of significant area, alongside with the natural landscape and cultural heritage components. This destination is situated in Lisbon, capital of Portugal. The environmental impact assessment of tourism particular in such regions has major importance, given that much of the attractiveness of this type of coastal and cultural regions is linked to their territorial and meteorological characteristics. Both municipalities belong to the ranking "Global Sustainable Destinations Top 100", from the entity Green Destinations, with Sintra in category "QualityCoast Basiq 2014" and Cascais in category "QualityCoast Gold 2013 / VIEWS Silver 2014". The classifications described underline the importance of this destination and its role in the search for sustainability.

The following table describes the tourist services associated with this region inserted into the database. It should be noted that the collection of tourist services on data had as sources websites of touristic activities such as TripAdvisor, Instituto Nacional de Estatística and PROTURISMO.

Table 1 – Number of database entries.

Category		Activities	Bars	Beaches	Housing	Monuments and Museums	Parks and Gardens	Restaurants	Shops
Unities	Sintra	10	19	8	209	28	9	137	13
	Cascais	14	76	17	170	25	15	293	13
	Total	**24**	**95**	**25**	**379**	**53**	**24**	**430**	**26**

4.1. Tourism in Cascais

Cascais has a high touristic potential, based on its cultural heritage, coastal and natural components and numerous touristic services. From the 170 housing units included in the database, 42 belong to the “Hotel” category. In the context of sustainable practices, the units Hotel Cascais Bay, Fortaleza do Guincho, The Oitavos, Quinta da Marina Resort and the hostel Nice Way - Hotel & Surf Camp stand out for its environmental commitment. This municipality has also a wide range in the catering sector with 293 restaurants and 76 bars.

Due to its dominant coastal component, the range of activities related with the coastline is diverse, and there are also 3 bike paths and two markets selling organic products, the Organic Market and Crafts Urban and Agrobio Market Cascais. Related to centers associated with environmental education, Cascais has Borboletário, Núcleo de Interpretação Ambiental da Duna de Cresmina, Centro de Interpretação Ambiental Pedra do Sal and Quinta do Pisão.

During 2014, the guests number in Cascais reached a total of 393 728, with 1 170 862 sleepovers. The tourists are mainly from Portugal, followed by Spain and United Kingdom. The general tourist is mainly included in the 45 to 54 age range, with 26,9% in this sector. The main reason for the choice of destination is "Sea / Beach", with 16,6%, and the average length of stay of 5 to 7 days registered a percentage of 47,7%, followed by 19,2% for a stay of 10 to 15 days. Finally, the overall level of satisfaction is classified as a scale of 1 to 10, with 10 for 29,6% and 9 for 51,3%.

Concluding, Cascais is a destination with high tourist activity and whose services meet or exceed the requirements of its visitors, thereby strengthening its popularity as a tourist destination of quality and reference (Associação de Turismo de Cascais, 2014).

4.2. Tourism in Sintra

The tourism in Sintra is widely associated with their cultural heritage, since Cultural Landscape of Sintra was the first entry of Portugal and Europe in the category of cultural landscapes created by the UNESCO World Heritage Committee in 1992. The ability of parks and monuments to generate revenue based on regular visits by tourists is the center of model of management of cultural and natural heritage, alongside the preservation of the universal value of the landscape itself.

The monuments more attractive to tourists are mainly Pena Palace, Sintra National Palace, Mouros Castle and Regaleira. From the 209 housing units, only 12 are included in the Hotel category, which means that the greater fraction is associated to local accommodation. There are 137 restaurants, essentially located in the historic center, and there is also two markets with biological products. For sustainable activities, the entity Parques de Sintra – Monte da Lua has a diverse range of tourist activities in the various parks and monuments, whose offer includes pedestrian routes with or without a guide, carriage rides, horseback riding, equestrian shows, equestrian tourism, concerts, tour itineraries, walking trails and cycling through the Park and Bike (rental of electric bicycles).

The total number of guests in 2013 was 136 498, with a respective number of nights spent of 289 850, mainly from Portugal, Spain and France. The average age is 36 years and for 55% of the tourists, Sintra was chosen as destination for “Cultural Tourism”, which is strengthened by the fact that the main activity with 67% is “Visits to monuments and museums”.

In summary, it can be said that tourism in Sintra reveals high importance to the municipality. Having a high offer of parks, monuments, museums and visiting places such as beaches and tourist service excellence, it should be considered equally as first visit option by tourists, which doesn’t occur frequently because a large part of foreign tourists only know Sintra when arriving to Lisbon.

5. RESULTS: SPATIAL WEB FOR SINTRA-CASCAIS

Prior to start studying the best strategy to develop the route, it is necessary to collect and analyze the relevant elements for its construction. Being an application project in the tourism sector, the database space network created integrates existing tourist services in the region with the points of tourist attraction and potential sites, which are the result of the analysis of tourism in the destination.

The elements of the database fall into eight different classes for each municipality, namely “Accommodation”, “Activities”, ”Bar“, ”Shops“, ”Monuments and Museums”, “Parks and Gardens”,

”Beaches“ and ”Restauration”. These elements were previously analyzed to realize its tourism potential, in order to add value to the tourism in the destination, increasing its popularity and investigate the possible existence of sustainable concerns in its operation, especially in the “Activities”, “Bars”, “Shops” and “Restauration”.

The model to calculate the routes is composed by three approaches, described in figure 1, which can be combined in order to create a more efficient and adequate methodology of route generation.

Manual	**Creation of maps according to tourist profiles**	**QGIS plug-in GeoSearch**
• Construction of routes in QGIS; • Composition of the atribute table associated with the chosen elements.	• Application of SQL queries conected to the DATABASE, in order to create layers with the results of queries and following construction of routes.	• Application of GeoSearch plug-in for automatic design and calculation of distances and times for selected points.

Figure 1 - Description of the approaches included in the route calculation model.

Accordingly, the obtained routes, which were designed in QGIS, are described in table 2.

Table 2 - Description of the obtained routes.

Duration (days)	Municipality	Mobility
1	Sintra	Pedestrian
		Pedestrian, Bus and Electric Bike
	Cascais	Pedestrian and Bike
3	Sintra	Pedestrian, Bus, Electric Bike and Electric
	Cascais	Pedestrian and Bike
	Sintra and Cascais	Pedestrian, Bus, Electric Bike, Electric, Train and Bike
6	Sintra and Cascais	Pedestrian, Bus, Electric Bike, Electric, Train and Bike

After analyzing all the possibilities and taking into account the purpose of this study, the selected platform for publishing the routes on Web is QGISCloud, a QGIS plug-in that allows publishing projects developed in QGIS in an online platform associated with this software, leading to the creation of access links to desktop and mobile versions. Besides, the generated links can be also accessed directly or housed in websites where are represented.

6. DISCUSSION OF THE RESULTS

The tourism industry is constantly growing, applying intense pressure on the environment that leads to damaging consequences. It is necessary to adopt approaches that lead to sustainable development of this sector through sustainable management and adoption of criteria aimed for sustainability.

The approach presented in the present thesis database service creation and sights and the model adopted for calculation of paths) reaches the desired goal, namely the creation of a spatial network

with pathways composed by activities that fulfill the GSTC Criteria for destinations. Based on this criteria, the approach is considered innovative in a way that it considers the entire region as a tourist destination and consequently as a single unit of study, developing strategies for implementation across it. The development of routes has also an innovative character, since it is a newly adopted methodology.

The selected software for the development of routes is QGIS. It is an appropriate choice due to its user-friendly interface and free use. In addition, it allows the efficient construction of routes and its representation is perceptible to the user, with accessible manipulation and query features.

The destination has a high touristic potential, combining various aspects of tourism such as beach, nature and cultural heritage patrimony and offer of different quality touristic services. While the main characteristic of Sintra's potential focus on its extensive cultural heritage, local products and regional cuisine, also with beaches and high quality landscapes, the tourist value in Cascais is associated to its coastal component and also to the wide range of tourist services within restaurants and accommodation. In addition, it also has a cultural component with various museums and monuments.

Relative to the realized study of tourism in the destination during the dissertation, it highlights some aspects of possible improvement. In the municipality of Sintra, it was found that the supply of vegetarian restaurants is limited to only one unit. Although there are restaurants with vegetarian options on their menu, it is observed that the overall supply of this culinary aspect is scarce.

Another aspect is the existence of difficult access to the monuments, especially on the link between the historic center and monuments around it, because of the terrain characteristics of the municipality such as steep slopes. However, the existence of transportation alternatives is plausible, providing sustainable alternatives to tourists moving in the historic center, in addition to pedestrian mode, although there is a lack of a bike path or building sidewalks. The dominant share of foreign tourists does not usually spends the night in accommodation units in Sintra and the proposed routes with duration superior to one day can support the improvement of this aspect, as well as the spatial display of its touristic and cultural potential. Besides, the hotel offer in Sintra is reduced, while the local housing supply is much higher. Increasing the hotel supply or improve promotion for the existing ones could be a way to attract more tourists to spend the night in this municipality.

Regarding Cascais, the service offer is diverse and a significant portion of tourists that visit Cascais returns to the county to spend their holidays. However, it also have some points that can be improved. Some suggestions for the improvement are the creation of new rental stations of Bicas, with a bike rental card associated that allows lifting and replacement of equipment in various stations across the county, and the installation of drinking fountains along the bike path of Guincho, justified mainly by its reasonable extent. Also the promotion of existing environmental education centers would be an asset and a possible factor of growth in the number of tourists that visit them or the existence of specific sustainable mobility alternative to visit the furthest from the downtown sites, such as Quinta do Pisão.

The database created consists in a wide range of tourist services, and therefore alternatives that can replace elements in the proposed pathways, mainly in the catering and accommodation sectors. Thus, there is provided the possibility of shaping the paths according to the tourist profile and preferences,

being the pre-defined routes a set of relevant proposals to the general tourist profile of the region. According to the duration time, the number of points to visit and time spent in each one is variable.

Concerning the limitations of the suggested approach, those not represent constraints to the development of the project but that should be considered and improved if possible. One of these limitations is the fact that the suggested bike hire routes will only be chosen by tourists who decide to spend money in this service and who wish to make use of it.

Considering the results within the web maps, the selected method is efficient and fulfill the purpose, allowing the publication on web and consulting in desktop and mobile devices. In addition, updating the maps is based on the replacement of the former by the updated map, which supports the development of the tourism sector in the region according to the tourist requirements. Besides, the fact of being a free platform does not imply additional costs or software installation for the tourist and for the agent, who is responsible for the evolution and updating of the maps. The accessibility and simplicity of the method gives it an attractive component for use and ease of export to other platforms and organizations wishing to adopt the method described in the search for sustainability in tourism of their region.

It should be noted that the fact that the routes are can be accessed through web make them accessible for any user, giving it a crucial advantage in the tourism sector and coverage on a large scale, taking into account the massive use of information technology nowadays. Finally, with routes of considerable duration, its constant access gives a guide to the tourists through the places they should visit, with durations and distances associated with each section.

Nonetheless, the display interface presents some limitations, as the fact that the user may be confused in choosing the desired path because of some overlaps. The limitations of the method chosen are associated mainly to its interface, as mentioned, and to the constant need for tourists to have access to the Internet to view the desired route in the QGISCloud platform. In addition, each entity or tourist agent that develops and owns the developed routes may have their own requirements. In fact, each entity can use and customize the route according to their objectives, always having in mind sustainable development of tourism in destination and the inclusion of activities with sustainable concerns.

To maximize operability for the tourist, one point of improvement could be the junction of the attribute table to its spatial visualization, with the option of an indicator for each path and respective legend on the table. The inclusion of photographs of the places of major touristic attraction and landmarks numbered to divide the route into sections would lead to an improvement of the visual aspect in a general view. Moreover, the instructions for the interface operation both in Desktop and Mobile versions would be useful to increase utilization efficiency of this method.

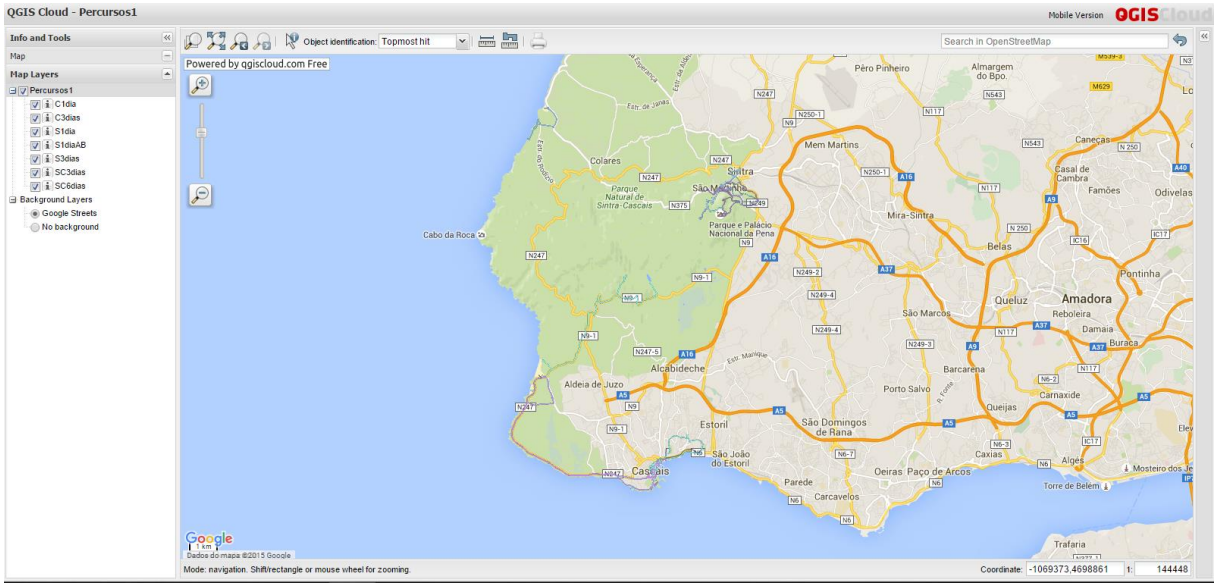

Figure 1 – Web SIG Map in QGISCloud of the routes.

7. CONCLUSIONS AND FUTURE DEVELOPMENTS

Nowadays, society is becoming more aware and concern about the environmental and the impacts that social pressure have associated. However, it is necessary to travel a long way to achieve sustainability in a global level, starting with the adoption of criteria and practices that ensure sustainable development.

Since tourism is a sector with significant direct impacts on the environment, it is consequently increasingly faced with the challenge to develop itself in a sustainable manner, without threatening its expansion and quality of associated services. Management of individual buildings is not enough to ensure sustainable development, it is also necessary to manage touristic destinations as a whole by implementing measures and adopting strategies regionally.

This dissertation aims to demonstrate an approach that supports sustainable tourism management of Sintra and Cascais destination by agents and tourism associations, having into account that the main user is the tourist. Addressing the concept of sustainable touristic destination, it is proceeded the analysis of the tourism sector in this case and developed the DATABASE to build the spatial network of touristic services. As mentioned, the methodology adopted in this dissertation aims to develop pathways to sustainable concerns in Sintra and Cascais.

The categories of touristic services included are Accommodation, Activities, Bars, Shops, Monuments and Museums, Parks and Gardens, Beaches and Restaurants. It is also considered the inclusion of walking routes provided by PSML entity and the layout of the bike paths in Cascais.

The obtained result is a set of seven routes with different duration times, including several mobility sustainable alternatives and highlights of the most important places. It is given priority to services which had concern for sustainable development through their practices or are consistent with the GSTC Criteria. The process of routes development includes three different approaches with different outcomes associated and that complement each other, accomplishing the main objectives. This

process resulted in the spatial representation of the route together with Google Streets as based layer, in order to represent the road structure, green and urban areas and coastal component.

After, the construction of Web GIS maps allows online access by any user to developed pathways, adding elements and exporting to other touristic agents and destinations. In addition, it enables coverage on a large scale and distribution of routes, since that it is enough to have access to internet and to a device that allows such access to search for the developed routes.

Therefore, it is expected that the work contribute to the sustainable management of tourism in the destination of Sintra and Cascais, serving as a strategy to promote sustainability in tourism and planning future developments, as well as for its management and use of tourists.

It is important to refer that sustainable management of a touristic destination is an ongoing process that requires the contribution of all agents and users involved. Especially in the tourism sector, the supply must be constantly innovated and improved, encouraging tourists to return to the destination and reference it positively.

As well as recommendations for future developments, it is highlighted the application of this methodology in this destination, as well its exportation to the remaining territory of Portugal and other destinations and member shipping in tourism websites and entities of this sector. Improving the interface of checking routes in the selected method can be a point of development, in order to maximize the efficiency in use and data consultation by tourists. It is also recommended the application of the GSTC Criteria in the destination management in order to maximize sustainable development.

Being an approach focused on sustainability of demand in the tourism sector, the application results in support for this demand and sustainable development, creating new perspectives and opportunities for tourism without compromising the growth and quality of the sector.

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