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**SMGI in tourism planning:
the role of customers' preferences in spatial decision support.**

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Abstract

The dissertation deals with the role of social media platform is playing as an information resource in tourism both for customers (i.e. the tourists), who gather trustworthy information supporting the choice of destinations and services from peers, and for businesses, which can use the same information for improving their marketing strategies. The use of social media data can also offer new opportunities for decision-support in tourism planning. With improved understanding of the motivations of tourists and tailoring tourism service supply, decision making can be facilitated by emphasizing the strengths of tourist destinations for past and potential visitors.

However, this kind of information about tourists' perceptions and opinions is not always properly analysed by planners. Understanding the user satisfaction, which depends on factors related to both the location and the services that the local industry proposes, may offer valuable information in tourism planning at regional and local level. In the light of the above premises, the goal of this study is to propose an integrated approach to investigate the relationships between tourists' satisfaction, destination resources and tourism industry for supporting design and decision-making in regional tourism planning.

The methodology implemented in the thesis includes data collection from Booking and TripAdvisor.com and their integration with authoritative territorial data. Spatial and statistical analysis techniques are applied in order to assess tourists' perceptions on success factors, which may be used as planning support tools. Four cases study demonstrates the value of social media-related data integrated by authoritative information in tourism planning.

Finally, the dissertation proposes a critical discussion on the effectiveness of using the implemented integrated approach in order to address other planning issues. The discussion underlines the potential of the proposed approach in order to address other planning questions as well.

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CHAPTER 1

Introduction

1.1 Tourism planning in the era of Digital Information

Tourism is one of the largest industries in the world and is based on multifaceted activities, which may generate both positive and negative impacts within the social, cultural and environmental domain. According to Smith (1991), as a complex activity, tourism comprises the travel to and around a destination, with the purpose of exploiting particular natural or non-natural attractions, accommodation, and specialized and general services. These types of resources have been classified by Jafari (1982) into background tourism elements and facilities services. For this reason, tourism is commonly recognised both as a spatial (Peroni, 2007; Cooper, 2008) and soil consumption (Boccagna, 2010) phenomenon. This fact becomes more evident when tourist activities are not adequately developed and planned.

Sustainable tourism – meant in its broader definition as “a set of principles, policy prescriptions, and management methods, which lead to sustainable development such that a destination area environmental resource base is protected for future generation trade” (WTO, 2012) – represents the key element for the delivery of sustainable development in the tourism sector (Hunter, 1997) and is fundamentally linked to the idea of sustainable development (WCED, 1987:43). Enhancing this concept, Theobald (2005) defined the sustainable tourism as “the tourism which is developed so that the nature, scale, location and manner of development is appropriate and sustainable over time, and where the environment’s ability to support other activities and processes is not impaired, since tourism cannot be isolated from other resources activities”. Sustainable tourism was designed not to stop tourism activities but to manage them in the interests of all three parties involved: the host communities, the tourists and the industry itself (Lane, 2008).

In particular, sustainable tourism should i) maintain essential ecological processes and help to conserve natural heritage and biodiversity, which constitute a key element in tourism development, ii) preserve and respect the socio-cultural authenticity of host communities, the architectural characteristics of their monuments and traditional housing, and their cultural heritage and traditional values (Lanzarote Conference, 2005) and iii) provide socio-economic benefits (with long-term economic operations), to stakeholders involved, and social services to host communities (UNWTO, 2005).

According to Briassoulis and Straaten (1992), using programmatic approaches and emphasising a sense of

place and identity could help to develop more effective planning strategies for sustainable development based on tourism, in order to reach services quality goals, preserving the natural resources, the cultural heritage and life quality of the host communities.

In the era of Information and Communication Technologies (ICTs) an unprecedented wealth of digital geographic information, collected into new digital formats, is made available to planners to support design, spatial analysis and decision-making processes. This trend could foster notable innovations in urban and regional planning methodologies.

First of all, the Spatial Data Infrastructures (SDIs) development in Europe, defined as interoperability infrastructures, enabled public access and reuse of Authoritative Geographic Information (A-GI), according to technology and policy standards. In many regions across Europe, the regional SDIs represent technical platforms for the development of planning processes at regional and local levels by means of supplied data and services (Campagna and Craglia, 2012). Secondly, current developments in connectivity, geo-browsers and mobile technologies, enabled by Web 2.0, allow citizens to act as volunteer sensors (Goodchild, 2007) in order to provide real-time Geographic Information (GI). Nowadays, this wealth of digital information, or Volunteered Geographic Information (VGI), can be easily collected, analysed, understood and used to support informed decision-making. In several countries worldwide, the use of VGI is simplifying and fostering participatory processes, becoming the main source of information in planning emergency response, environmental monitoring and spatial planning (Poser and Dransch, 2010), and in local planning for countries affected by the lack of large scale authoritative data sources. These opportunities can both enable a trans-active approach (Friedman, 1973) in planning practices and foster the democracy and the sustainability in making plans at urban and regional levels.

Furthermore, widespread diffusion of social media is fostering the dissemination of geo-referenced multimedia (Sui and Goodchild, 2011), or Social Media related Geographic Information (SMGI), over the global Internet. Users can easily access information and also be the producers of personal geo-referenced contents on location-based social networks. These capabilities have surpassed past limitations in data communication, and are disclosing innovative opportunities for disseminating and gathering geographic information among worldwide users, fostering media convergence with GIS environment (Sui and Goodchild, *ibidem*). The social media contents can be considered as innovative Big Data source (Caverlee, 2010), and need new spatial analysis techniques in managing and exploiting their knowledge potential (Massa and Campagna, 2014).

The integration of SMGI with A-GI can create novel analysis opportunities in spatial planning, with regards not only to measures of geographic facts but also to user perceptions and opinions on places, geographic

locations or tourism destinations.

1.2 The role of tourist Social Networks and the tourists/user perceptions

In the last decade, the fast evolution of ICTs enabled users to ubiquitously access a broad range of information services. The degree of interactivity, established by the Web 2.0 paradigm, enhanced the role of the Internet as information source, with a secondary role as opinion source (Grabner et al., 2012). Tourism is one of the sectors where the wide exploitation of ICTs leads to the development of online tourist communities. Travel topics are among the most popular in on-line social networks (Buhalis and O'Connor, 2005; Baggio et al., 2008).

Tourism on-line platforms development and the e-Tourism advent (Buhalis, 1999), on the one hand, represent an important marketing channel through which destinations and tourism enterprises can reach and persuade potential tourists (Buhalis and Law, 2008). They can also assist consumers in posting and sharing their travel-related comments. Travellers' opinions and personal experiences based on their trips serve, in turn, as information to others.

The future of e-Tourism focuses on consumer needs technologies that will enable organizations to focus on their profitability through a partnerships network. Consumers are more sophisticated and experienced and, therefore, more difficult to please (O'Connor, 1999). The availability of powerful ICTs empowers both suppliers and destinations to enhance their efficiency and re-engineer their communication strategies.

1.3 Research gaps

In Sardinia, the tourism sector is one of the major driving forces of regional economy and most affects coastal areas (CRENOS, 2011), which due to their fragility have generally been considered as areas to be planned and managed in a special way for the number of activities, possible land uses (Hospers, 2003). As a result, various interests, such as those of residents, developers, environmentalists and investors, may meet in coastal areas and come into conflict (RAS, 2006). Because of this apparent conflict between tourism development in coastal areas and the need to safeguard them, the Regional Executive Committee decided to prepare the Regional Landscape Plan (RLP) together with the Regional Plan for Sustainable Development based on Tourism (RPSDT). The RPSDT tourism was approved in order to preserve regional, cultural and natural landscape and promote sustainable development based on tourism. Nevertheless, very little research regarding it exists.

The Sardinian tourism sector has been identified by the RPSDT as one of the strategic sectors capable of

improving the regional socio-economic conditions. However, not all of the possible forms of tourism are desirable due to their irreversible environmental consequences.

The RPSDT focuses on the inter-relationship between the economic benefits and the environmental impacts of tourism enterprise and, in so doing, recognises the lack of a global strategy of sustainable development based on tourism. However the geographic perspective is not properly considered by the plan: it does not analyse the spatial dimension of the tourism enterprise (Cooper, 2008) and its relationship with travel motivations (Dellaert et al., 1998) and tourists' behaviour (Buhalis, 2000).

Another critical aspect is that a good planning process needs to engage local communities and recipients directly in its implementation (Zoppi, 2012; Wates, 2014). This way, it is much more likely to be successful in delivering local benefits and to be sustained over time (Leslie et al., 2007). In the RPSDT, the lack of involvement by stakeholders is notable as much as a careful analysis of tourist behaviour.

Understanding tourist behaviour and psychology may help in assessing some of the problems which planners and decision makers need to solve for the tourism planning implementation (Briassoulis, 2002). In this perspective, with improved understanding of the tourist's motivations and tailoring tourism services, decision making can be facilitated by emphasizing the strengths of tourist destinations for past and potential tourists. Several conceptual models found in the literature dealt with the role of tourist psychology, in terms of needs, perceptions, and motivation (Baker and Crompton, 2000). Such components are considered important contributors to both the understanding of an individual's travel behaviour (Dann, 2010) and in supporting the tourism planning approaches used in the present day.

In the Digital Information age, tourist preferences data, available on forums and reviews, are generated by users/customers and provide relevant knowledge for planning practices. This new trend could foster notable innovations in urban and regional planning methodologies (Zin et al., 2013; Campagna, 2014). Moreover, the integration of this information with traditional authoritative data sources may represent an opportunity of great potential to eventually enrich tourism strategies with a broader, deeper and more pluralist knowledge of the places or destinations.

1.4 Aims and research questions

This thesis focuses on tourism, analysing the relationships between demand, industry and location, identified as fundamental variables. The research aims to understand if the use of SMGI may offer knowledge bases for decision making in tourism planning. The investigations are carried out exploring the potential of public volunteered comments, represented by tourist preferences on destination and tourism-

related services they find, for providing useful knowledge about these inclinations in space and time.

For research purposes, a traditional method for collecting information about such preferences, performed via ad-hoc surveys, can be expensive and time consuming. For this reason an alternative approach is presented, by which tourist preferences are discovered by processing and analysing publicly available social media data. In addition, the investigation aims to demonstrate the potential of SMGI as support for design, analysis and decision making in tourism planning, and the benefits derived from informing regional and local initiatives.

The adopted methodology deals with several questions related to tourist preferences:

1. *Which are the most popular destinations?*
2. *Why do people choose those destinations?*
3. *What attracts tourists' attention and what do they appreciate or disregard?*
5. *Could the relationship between service quality and location be explained both at regional and local level?*
6. *How can this knowledge be used in supporting tourism planning approaches?*

This kind of study and the methodology adopted, which couples SMGI and A-GI from open SDI, may provide a novel kind of information, which could be integrated with traditional knowledge and successfully used in urban and regional planning as well as in tourism planning, for in both cases they contribute to take into account a multifaceted customer-oriented view on strategic development issues. In addition, using SMGI may reveal opportunities for further analysis scenarios in urban and regional planning, and may offer useful suggestions for tourism planning strategies. In an integrated planning support framework, SMGI analytics might help to understand tourists' observations, preferences, interests, feelings, or needs, and possibly affect decision-making dynamics and planning processes with customer oriented strategies.

The methodological approach, adopted in this thesis, has the following goals:

- 1) evaluating the regional tourism supply distribution and location of interest;
- 2) identifying tourists' preferences spatial patterns, including clusters of positive and negative preferences;
- 3) evaluating patterns and individual spots of interest;
- 4) finding a properly calibrated spatial model, which integrates SMGI/A-GI, in order to calculate spatial variation in the relationships among positive preferences, i.e. the dependent variable, and environmental, structural and positional explanatory variables.

The findings could provide important insights into the Sardinian tourism industry, which could be used to develop innovative planning approaches. They could also offer a benchmark for future comparative trend

analysis and directions for tourism policy drafting.

1.5 Research methodology

The methodological approach builds on a preliminary exploratory analysis of social network contents of Sardinia, searching for the most popular destination, the relationships between service quality and location and the spatial distribution of tourist preferences at regional and local levels.

The research has been carried out on considering Leiper's general conceptual model (1990), reviewed by Cooper (2008), as a fundamental starting point. Leiper's model can be summarized by the following equation:

$$\textit{Appreciation and criticisms} = \textit{Location} + \textit{service quality}.$$

In order to determine each variable of this equation, the research uses geographic information data, in particular both Authoritative Geographic Information (A-GI) and Social Media related Geographic Information (SMGI). Combined A-GI and SMGI data are used to express location. Service quality is investigated through SMGI support. Thus, a two dimensional analysis framework is implemented at regional and local levels.

First of all, analyses at regional scale are implemented to describe spatial patterns of tourist preferences and to identify locations of interest; the latter may include clusters of positive or negative preferences, or individual spots of interest. Then, at the local level (i.e. within the single cluster or spot of interest) further analyses are developed aiming at understanding the possible reasons behind the patterns and singularities. The assumption is that findings may help in explaining success or failure factors with regards to destination and services.

Both at regional and local levels, the study is based on four main steps. Firstly, data are extracted from the most popular tourism social networks geocoded and integrated in a geodatabase for analysis. Secondly, data are analysed for the entire region, at the municipal unit of analysis, with spatial analysis, spatial statistics, and spatial textual techniques, in order to detect clusters of positive tourist preferences. Then, the analysis shifts to the local scale; data are integrated with authoritative data from official open data sources, in order to find explanatory hints on the preference dynamics and to get deeper insights on the relationships among tourist preferences, local territorial features and quality of industry services in selected destinations.

Finally, the need to take into elements account that are strongly related to the good location, but not

measurable even with the use of proxy variables, necessarily involves the use of spatial analysis techniques that are able to process the location variable. Geographic Weighted Regression (GWR) quantifies the relationships among variables, which differ from one location to another. GWR is adopted for both modelling preferences phenomenon and to test the reliability of the hypotheses developed from results of the qualitative analysis, in order to make appropriate decisions in terms of policy.

1.6 Summary of the dissertation

The thesis consists of 8 chapters.

Following Chapter 1, which sets out the context, introduces the general aim of the research and formulates the research questions, Chapter 2 contains the state of the art. The chapter deals with the relationships between tourism and environment describing the evolution of the concept of sustainable development and sustainable tourism.

Chapter 3 provides an overview of current trends in tourism, in order to understand how the development of ICTs is changing the travel world and the way in which holiday destinations are chosen. Secondly, a definition of the travel decision-making process is provided, starting from the concept of tourist preferences which lead to different destination choices. The chapter concludes describing the advent of e-Tourism and current changes of knowledge sharing, which influence the tourism industry model and tourism planning approaches.

Chapter 4 deals with the opportunities of SMGI as valuable support for analysis, design and decision-making in tourism planning practices at both regional and local levels. Moreover, the chapter presents a short overview of the most popular tourist social networks, oriented to data creation, dissemination and collection, and describes new perspective and weakness that still limit the integration of SMGI into planning practices.

Chapter 5 provides an explanation of the ruling planning framework of the Sardinian region, in terms of landscape safeguarding and sustainable tourism development. In order to evaluate the efficiency of the Regional Plan of Sustainable Development based on Tourism, both as a landscape preservation plan and regarding its contribution to sustainability, the chapter aims to pinpoint some key characteristics of sustainable plans, by looking at the international literature on the topic, identifying underlying principles and recommendations.

Chapter 6 focuses on the research methodology in detail. In order to understand the tourist preferences dynamics in Sardinia, the chapter provides a novel and integrated A-GI/SMGI analytics model for two scales

(regional and local level) and two dimensions (service quality and location). This kind of approach may provide new opportunities for planners as well as new research challenges, to use A-GI and SMGI for a pluralist and customer-oriented policy-making process in tourism planning.

Chapter 7 sets out the findings from the qualitative and quantitative research, carried out in order to identify spatial patterns of tourist preferences, including clusters of positive preferences and obtain more detailed information about singular spots of interest. The chapter is divided into three parts. The first part presents a mixed methods approach, in which quantitative and qualitative information gathered from two of the major tourism Social networks is collected in a database for analyses. The quantitative information concerns the scores of tourist evaluation criteria, while the qualitative information includes textual descriptive customer reviews. The second part discusses results of the application of spatial analyses of tourist preferences, in order to explore spatial patterns of positive tourist judgments at the regional level. The application of spatial analytical techniques allows for the exploration of spatial patterns of tourists' perceptions and their relationships with different variables. After analysis of tourism dynamics at the regional level, the methodology shifts to the local scale for further analyses, aimed at finding explanatory answers for the phenomena observed in single destinations. The last part quantitatively illustrates outcomes from geographic weighted regressions, used to model spatial relationship and explain the factors behind observed spatial patterns both at regional and local levels.

Finally, chapter 8 summarises the main findings of the thesis, answers the research questions and draws conclusions to indicate possible future research developments.

CHAPTER 2

The issues of sustainable tourism

2.1 Introduction

Tourism is one of the world's most important industries and one of the most developed and marketed economic sectors. Anderson (2008) defines tourism as a mixed industry in which private firms, public agencies and non-profit associations, all of which co-exist in most societies, compete and collaborate in creating the final product for tourists. According to Smith (1991) tourism is a complex activity which comprises the journey to and around a destination, with the purpose of consuming particular attractions (Inskip, 1991), accommodation, catering, entertainment, specialized and general services.

Considering the magnitude of the tourist sector at global level, there is no doubt that its impact comprises both positive and negative effects within the socio-cultural and environmental spheres. This becomes more evident when tourist activity is not adequately developed and planned (Briassoulis, 2002). According to Hall et al (2004) destinations and tourism enterprises around the world experienced a meaningful shift in policy profile, such as government and governance at all levels dealing with travel and security issues and with tourism related economic and employment impacts.

Before explaining the relationship between tourist activity and the environment, this section explains, with a brief premise, the evolution of the sustainable development and the sustainable tourism concepts. Then, it focuses on the positive and negative consequences produced by tourism on geographic locations, considering both the environmental and socio-economic perspectives.

2.2 The evolution of the sustainable tourism development concept

The paradigm of sustainable development based on tourism emerged in the last two decades. As Hunter (2002) argues, a growing proportion of tourism researches focused on the principles and practice of sustainable tourism development. The term "sustainable tourism" encompasses a set of principles, policy prescriptions, and management methods which fostered tourism development (Hunter, 1997). This paragraph reviews the development of the term, beginning with a discussion of the most accredited definitions of sustainable tourism.

The original definition of sustainable tourism is fundamentally linked to the idea of sustainable development, as the Brundtland Report, issued by the WCED, explained in 1987. In this Report, published

as Our Common Future, sustainable development is defined as the “development that meets the needs of the present without compromising the ability of future generations to meet their own needs” (WCED, 1987: 43).

Butler's (1993, p. 29) definition of sustainable tourism development appears to contribute substantially in combining the concept of sustainable tourism with sustainable development. In addition, he stated that “sustainable development, in the context of tourism, could be taken as the tourism which is developed and maintained in an area (community, environment) in such a manner and at such a scale that it remains viable over an indefinite period and does not degrade or alter the environment (human and physical) in which it exists to such a degree that it prohibits the successful development and well-being of other activities and processes. That is not the same as sustainable tourism, which may be thought of as tourism, which is in a form which can maintain its viability in an area for an indefinite period of time”.

In this definition Butler distinguished sustainable tourism development from sustainable tourism. Although this distinction seems not to be widely recognised, it is important. Sustainable tourism development has also been reviewed comprehensively by several other researchers such as Bramwell and Lane (2013) Murphy (1994) and Harris and Leiper (1995). According to Tosun (2001), sustainable development based on tourism should contribute to satisfy the needs of those hitherto excluded in local tourist destinations. Furthermore, it should reduce inequality and poverty in local tourist destinations and accelerate regional and local economic growth. Finally, sustainable development based on tourism should achieve the above objectives or principles for an indefinite period of time, without compromising the ability of future generations to meet their own need.

However, tourism researchers and policy-makers are relatively slow in responding to these concepts and have remained somewhat detached from the continuing debate on the interpretation and implications of sustainability (Butler, 1999).

Tourism has a long history. The real rise of this phenomenon as a major pursuit and as an important industry started in the post-war period. UN World Tourism Organization (UNWTO) statistics are available from the year 1950, when 25 million international travellers were recorded. Then the meteoric rise of the tourism industry began, with an average annual growth of 6.5% over the period 1950-2007 (WTO, 2006).

In 1992, at the Earth Summit in Rio de Janeiro, sustainable development became a goal agreed upon by several countries. Four basic principles are crucial to achieving sustainability:

- 1) the idea of holistic, cross-sector strategic planning;
- 2) the importance of preserving essential ecological processes;
- 3) the need to protect both human heritage and biodiversity;
- 4) the requirement that development should be carried out, so that productivity does not deplete

resources in the long term for future generations (Rio Declaration on Environment and Development, 1992).

The implementation of the Rio Declaration principles is particularly relevant regarding their ambivalence, for they can help to preserve and improve the environment but they can also generate changes in negative terms. After the Rio Declaration several international documents, such as the Charter for Sustainable Tourism, Lanzarote (WTO 1995b), and the Agenda 21 for the Travel and Tourism Industry (WTO 1995a), highlighted the importance of those principles, dealing with the conceptual definition of tourism and the ways to make it operative in planning processes.

Twenty years after the Earth Summit and the Rio Declaration on Environment and Development, the UN Conference on Sustainable Development, known as Rio+20, took place in 2012. This represents the third international conference on sustainable development, which aimed at mediating economic and environmental goals of the global community. Key themes at the high-level conference were jobs, energy, cities, food, water, oceans and disasters (WTO, 2012). Tourism was included for the first time in the UN Conference on Sustainable Development Report, because this phenomenon can make a significant contribution to the three dimensions of sustainable development, has close linkages to other sectors, can create acceptable jobs and can generate trade (WTO, 2012).

The concept of sustainable tourism has been interpreted in many different ways. Butler (1999) states that one of the major problems with the concept of sustainable development has been the way in which the single word 'sustainable' has been applied to a variety of activities, based on the assumption that it carries the ideological and philosophical implications of the concept with it.

According to Eber (1992), sustainable tourism can be defined as "tourism plus associated infrastructures, that, both now and in the future, operate within natural capacities for the natural resources regeneration and their future productivity". Along the same lines, Coccossis (1996) suggested that there are four ways of interpreting tourism within the context of sustainable development:

- an ecological point of view, emphasizing the need of ecologically sustainable tourism;
- a long-term viability of tourism, recognizing the competitiveness of destinations;
- a sectorial point of view, such as the economic sustainability of the tourism sector;
- a point of view accepting tourism as part of a strategy for achieving sustainable development, throughout the physical and human environments.

The most relevant problem with the concept of sustainable tourism is dealing with the word 'sustainable' (Butler, 1993). Sustainable tourism was designed not to stop tourism activities but to manage them in the interests of all three parties involved: the host inhabitants and communities, the tourists and the industry itself (Lane, 2008).

In the light of the above premises, sustainable tourism should:

- maintain essential ecological processes and help preserve natural heritage and biodiversity, which constitute a key element in tourism development;
- preserve and respect the socio-cultural authenticity of host communities, the architectural characteristics of their monuments and traditional housing, and their cultural heritage and traditional values;
- provide socio-economic benefits, with long-term economic actions, to all stakeholders that are unevenly distributed, including stable employment, income-earning opportunities and social services to host communities, as well as contributing to alleviate poverty (UNEP and UNWTO, 2005).

2.2.1 Stakeholders involvement in tourism planning processes

More recently the WTO pointed out that sustainable tourism is a condition of tourism based on the principles of sustainable development, taking full account of its current and future economic, social and environmental impacts (UNEP/WTO, 2005:11 e 12) and addressing the needs of stakeholders (Hunter, 2002).

Sustainable tourism development requires the informed participation of all relevant stakeholders, as well as strong political instruments, to ensure wide participation and consensus building. Many different interests could benefit from sustainable tourism. Tourism businesses should be concerned about their corporate image, the relationship with their staff, and their impact on the global environment and immediate surroundings. Local communities are seeking increased prosperity without damaging their quality of life. Tourists look for a high quality experience in a safe and attractive environment; they are becoming more aware of the impact of their travelling (Crouch et al, 2004).

Governments should provide an environment that encourages the private sector, tourists and other stakeholders to respond to sustainability issues. This can be achieved by establishing and implementing a set of policies in order to achieve tourism development and management. The principles of sustainable development empathise local determination and implementation of policies and actions, within a supportive policy framework at national and regional levels (Briassoulis, 2002).

2.3 Impacts of tourist activities

The relationship between tourism and the quality of environment is highly complex. Tourism industry growth directly affects the natural and non-natural resources of a geographic location because of the

applied anthropic pressures. These involve many activities, such as the construction of general infrastructures (roads, airports and marinas), and tourist facilities, such as resorts, hotels, restaurants and shops (Barberis, 2008), which could have adverse environmental effects (Smith, 2001).

On the one hand, negative impact of tourism development can gradually destroy environmental resources on which it depends. On the other hand, tourism activities may represent a tool to finance protection of natural areas and increase their economic importance, enhancing environmental protection and conservation (Buhalis, 1999). In order to avoid adverse effects, this impact needs to be monitored on a continuous basis and the benefits need to be maximised (Hall, 2008). This is necessary not only for protecting the well-being of the community (Briassoulis, 2002), but also to ensure quality tourist services and long-term viability at individual destinations (Smith, 2001). If properly planned, tourism may lead to conservation, environmental protection, and could represent an economic development strategy (Ivars, 2004).

Local communities consider tourism industry exclusively in terms of economic impact jobs, and taxes. However, the range of impact is broad, and often influences areas beyond those commonly associated with tourism. As a matter of fact, researchers have identified several forms of tourism impact deriving from tourist activity development at regional or local context, (La Rocca, 2008; Cicerchia, 2009), and grouped them into different categories. According to Kreag (2001) these categories are seven:

- 1) economic;
- 2) environmental;
- 3) social and cultural;
- 4) crowding and congestion;
- 5) services;
- 6) taxes;
- 7) community attitude.

From the economic point of view, tourism creates jobs, both through direct employment within the tourist industry and indirectly in sectors such as retail and transportation (Hassan 2000). Tourism could also provide opportunities for small-scale business enterprises, which is especially important in rural communities, and could generate extra tax revenues, such as airport and hotel taxes, which can be used for schools, housing and hospitals.

Despite these facts, successful tourism relies on establishing a basic infrastructure, such as roads, visitor centres and hotels. Governments usually cover the costs of these services, which have to come out of tax revenues. Jobs created by tourism are often seasonal and poorly paid, yet tourism can push up local property prices and the cost of goods and services (Buhalis, 1999). The generated revenue does not always

benefit the local community, as some of it leaks out to huge international companies, such as hotel chains. Regarding social and cultural benefits, Crouch et al. (2004) state that infrastructure and new leisure amenities improvement, which result from tourism, also benefit the local community. Tourism encourages the preservation of traditional customs, handicrafts and festivals that might otherwise have been allowed to wane, and it creates civic pride. However, tourist behaviour could damage the quality of life of host communities, causing crowding and congestion. Sometimes, interaction with tourists could also lead to loss of traditional culture.

From an environmental perspective, tourism, and particularly its mostly sustainable form, ecotourism, may help implement conservation of wildlife and natural resources, as these are not regarded as assets for tourism. It also helps to generate funding for preserving flora and fauna, through entrance charges and guide fees (Bayer, 1990). Nevertheless, territorial abuse, in terms of tourism businesses and activities, could represent a threat to regional natural and cultural resources, such as water supply, beaches and heritage sites. It also generates air pollution through traffic emissions, soil contamination through waste and sewage production, and increased noise pollution (Kreag 2001).

Tourism often develops and concentrates around specific geographic locations, providing growth yet avoiding sprawl. Historic buildings and grounds, which might otherwise slowly deteriorate, have great appeal for tourism development and could be renovated frequently to suit the industry (LaRocca, 2008). People congregate in these locations and generate congestion and crowding, leading to stress, annoyance and other negative attitudes. In some cases, tourism constructions, especially hotels, may be inappropriate in scale and style with respect to other structures and landscape (Bramwell and Lane, 2013).

Leisure industry creates opportunities for developing new amenities and recreation facilities, which would not otherwise be available in a community. Tourists' expectations lead to services upgrade, by local shops, restaurants, and other commerce operators. Sometimes, traditional services may be forced out or relocated due to competition with tourist interests (Crouch et al., 2004). Supply shortages may occur, temporarily or seasonally. Water, energy, fuel, and other shortages may be experienced with increased pressure on the infrastructures. Increased retail activity from restaurants and tourist shopping will add state and local sales tax revenue.

Lodging tax revenue to the city (or to the state) should increase, since travellers account for virtually all lodging tax receipts. Increased tax burdens to expand infrastructures and public services will be passed on to property owners through increased property taxes (Kreag, 2001).

Tourists' interest and satisfaction for the resources offered by the host communities are sources of local pride. According to Smith (1998), seeing tourists' interest makes local residents more conscious of local

natural and non-natural resources that are often taken for granted. As tourism develops, local residents will appreciate community facilities more. However, tension between residents and tourists can occur (Allen, 1988). In contexts where culture is part of the tourist attractions, over-amplification of cultural traits and creation of other cultural characteristics to satisfy tourist preferences may create a pretentious culture. In some cases residents may experience a sense of exclusion and alienation over planning and development concerns (Gurkan, 1996). They may feel a loss of control over the community's future as outsiders take over establishments and new developments. The local community could feel manipulated and exploited by outsiders, because of the exclusive benefit of those developers or business people. Moreover, hotels built in monolithic cubes or restaurants with standardized franchise designs might clash with local standards and disrupt the aesthetic appearance of the community, damage the peculiar character of the community, and spread sameness (Faulkner, 1997, La Rocca 2003).

2.4 Discussion

Tourism is one of the world's most important industries and one of the fastest growing economic sectors. As a mixed and complex activity (Smith, 1990), tourism comprises the journey to and around a destination, with the purpose of enjoying particular attractions, accommodation, catering and general services. On the one hand, the tourist industry creates job opportunities and develops new amenities and recreation facilities, which would not otherwise be viable in a community. On the other hand, it could produce negative effects on the environmental, economic and socio-cultural spheres of a specific location.

This becomes more evident when tourist activities are not adequately developed and planned. Destinations and tourism-related businesses around the world experienced a meaningful shift in policy profile; government and governance, at all levels, dealing with travel and security issues and with the economic and employment impact of tourism (Bramwell and Lane, 2013). The negative impact of tourism development can gradually compromise the environmental resources on which it depends. Nevertheless, tourism could enhance environmental protection and conservation strategies.

In order to avoid adverse consequences, negative impact needs to be monitored on a continuous basis. If properly planned, tourism can become a positive force for conservation and environmental protection, as well as for economic development. This is not only necessary for the purpose of protecting the well-being of the community, but also for ensuring that the quality and long-term viability of the tourist product at individual destinations is not undermined by adverse reactions of the resident population.

CHAPTER 3

Tourism, destination and perception

3.1 Introduction

The topics of tourist phenomenon and destination images have been included in academic research since the end of the 1990s (Opperman, 1996; Etchner; 1997). The growing interest in destination competitiveness has focused on the definition and description of a destination product, and how the tourist perceives these components. This Chapter explores the tourism phenomenon from a dual perspective. On the one hand, this section discovers the geographic dimension of tourism supply; on the other hand the knowledge of consumer psychology has been recognized as the most important factor in determining the success of a single destination.

In addition, the rapid diffusion of the Information and Communication Technologies (ICTs) currently converts tourism from a labour-intensive industry to an information-intensive one (Buhalis, 2003). As a result, the role of the ICTs and the Web 2.0 in tourism has been instrumental in both commercial and non-commercial activities. In tourism, consumers use the Internet to obtain travel information, share their experiences, connect with people from various destinations or purchase travel-related products (Buhalis, 2003).

In the light of the above premises, this section focuses on three main topics: (1) the current developments in tourism planning and tourist destination, (2) the role and the support of customers' preferences in planning processes and (3) a review of the evolution of the e-Tourism phenomenon.

The chapter is articulated as follows: the first section provides a definition of tourism, which is important for a variety of theoretical and practical reasons, explains several important tourism conceptual models founded in literature, in order to better understand current trends in tourism planning. The following section introduces the definition of travel decision-making process, starting from the concept of tourist preferences, which fostered different destination choices. Then, the paragraph focuses on the e-Tourism developments and explains current changes in knowledge sharing, which may influence both tourism industry structure and current tourism planning approaches.

3.2 Current developments in tourism

The terms tourism and tourists, used to describe the movement of people for leisure, were defined at the beginning of the 19th century (Smith, 1989). Jafari and Ritchie (1981) identified five main components of tourism research: economy, psychology, geography, sociology and anthropology. According to Smith (1991) tourism is a complex activity which comprises three main features (Page and Connell, 2006):

1. the movement of people;
2. the economic sector;
3. a broad system of interacting relationships of people, their needs [sic] to travel outside their communities, and services that attempt to respond to these needs by supplying products.

Moreover, Smith (1991) states that tourists are motivated to seek out individual recreation in new and different contexts in order to alternate periods of work and relaxation. As a leisure activity, the tourist system utilizes all types of resources in host areas. Such resources have been classified by Jafari (1982) into background tourist elements and facility services. Background tourist elements include natural, socio-cultural, and architectural attractions, while facility services represents all facilities serving tourist needs, such as accommodation and specialized amenities, elements of the natural environment, infrastructure and local facilities serving the local population as well as tourists (Jafari, *ibidem*). In this sense, tourism and related activities are combined with territorial factors giving rise to the service use process in which, essentially, the delivery and consumption of tourism are involved simultaneously in a geographical context chosen by the consumers and defined as tourist destination (Peroni, 2007).

In the light of the above premises, several conceptual models, found in the literature, dealt with the role of the psychological characteristics of the individual in terms of needs, perceptions, and motivation; such components are considered important contributors to the understanding of the individual's travel behaviour.

The most common concept to provide a definition of tourism is its relationship with travel provided by Barkat and Medlik (1981). Tourism arises from people's movement and their stay in various destinations. There are two elements in all types of tourism: "the journey" to the destination and "the stay", which include activities at destinations different from the normal residence and work sites. The movement to destinations is of a temporary, short-term nature, with the intention of returning within a few days, weeks or months. The temporal dimension represents a fundamental factor in tourist phenomenon definition, which represents a minimum stay of more than 24 hours or a maximum of one year away from home (WTO, 1991). All tourism includes some travel but not all travel is tourism, while the temporary and short-term nature of most tourist trips distinguishes it from migration (Barkat and Medlik, 1981).

3.2.1 Different tourism models in literature

The tourist system is a framework which embodies the entire tourist experience of travelling. Several models, which defined this system's complexity are traceable in literature. The most accepted model is Leiper's spatial model (1990). Leiper identifies a tourism spatial model as comprising the tourists, the traveller generating region, the tourist destination, the transit routes for tourists travelling between generating and destination areas, and the travel and tourism industry. In this spatial model, transport infrastructures are the key elements of the tourist system, connecting the travellers' region of origin and their final destination. Moreover the model highlights the importance of these elements:

- the tourist;
- the integral relationships in the overall tourist experience;
- the effect of transportation problems on travellers' perceptions;
- the requirement for provision of services;
- the geographic destination.

Considering Leiper's premise, Peroni (2007) defines tourism as the movement of consumption in space, as the result of tourist/consumer choice of spending a portion of their income in a place different from his habitual abode. Therefore, tourism can be considered a spatial (Cooper, 2008) and space consuming (Boccagna, 2010) phenomenon. Space consumption includes not only the use of specific functions such as accommodation and restaurant services, but also a wide range of activities which aim to satisfy consumers' physical and psychological needs (Cooper, 2008). Indeed the movement of travellers from one geographic location to another encloses personal needs related to health, network and social relations system and occupational conditions, which directly impact the whole destination dimension (Franch, 2010).

Cooper (2008) describes tourism as a multidimensional and multifaceted activity, which combines many aspects of life with different economic activities to produce the travel experience. Moreover, he reviews three key aspects of Leiper's spatial model:

1. the tourists;
2. the geographic features;
3. the tourist sector.

Cooper defines tourists as the key actors of the tourism system, because the journey to and from a destination is, firstly, a human experience which will be remembered by many as one of the most important moments of their life, and the travel motivation is the foundation underpinning this experience. Dann (1977) addresses the question of "Why do people travel?" In answering this question, Dann (1981) identifies seven elements which explain the main reasons for travelling:

1. travel is the answer to what is missing and wanted;

2. destination attractiveness (pull) is a response to the desire level of the demand (push). Push motivations are more related to internal or emotional aspects; pull motivations are connected to external, situational, or cognitive aspects (Crompton, 1979; Dann, 1981);
3. travel motivation is the result of individual imaginary;
4. travel motivation depends on the diversity of the demand side (visiting relatives and friends, studying, enjoyment, business and so on);
5. travel motivation depends on the desire to escape from a known to an unknown place (called “wanderlust” in Gray’s theory) and a place which for travellers could present specific comforts and facilities that do not exist in their habitual place of residence (referred in Gray’s theory as “sunlust”) (Gray, 1970);
6. travel motivation and tourist experience are strictly linked to each other;
7. travel motivation is general understanding and viewing capability.

The geographic features referred to tourist destination, which represents the territory affected by the impact of tourism (Leiper, 1990). Franch (2002) defines as pull factors (Crompton, 1979; Dann, 1981) the four elements which produce destination attractiveness. They consist of:

1. natural or non-natural components that lead tourists to a given place;
2. accessibility; an easy way to reach a destination will benefit the same through increased tourist inflow;
3. information points, reception, restaurants, and accommodation system;
4. destination image, which derives from positive travel experiences and generates tourist satisfaction (Urry et al, 2007; Geng-Qing Chi and Qu, 2008).

Finally, the tourist sector is a complex of businesses and organizations, geographically located according to their function, which are involved in the creation of the “tourism product” (Cooper et al 2008). Typically when tourists spend their holidays in a destination, they do not consume the product of only one supplier, but a bundle of services as a whole (Kaspar, 1991). A lot of different service suppliers participate in creating the “tourism experience” (Weiermair, 2004).

In the literature we can identify many authors who have been concerned with the definition of the tourism model; even though few have been proposed. The big issue for planners is both choosing fundamental criteria for preserving natural and socio-cultural capital at local and regional levels, achieving intra and intergenerational equity in the distribution of costs and benefits, and satisfying the needs of tourists (Briassoulis, 2002). However, this kind of information about tourist phenomenon and tourists’ perceptions and opinions is not always properly analysed by planners.

Understanding the tourist phenomenon may help in assessing some of the problems which planners and decision makers need to address for tourism planning implementation. In this perspective, with improved

understanding of travel motivations and tailoring tourist service supply, decision making can be facilitated by emphasizing the strengths of tourist destinations for past and potential tourists. Moreover, understanding the tourists' satisfaction, which depends on factors related to both location and services that the local industry proposes, may offer valuable information in tourism planning at regional and local levels.

3.3 Destination choices and travel motivation

Most studies of tourists' preferences address tourists' destination choices as the key element in the travel decision-making process. According to Dellaert et al. (1998), this element is combined with accommodation or activity choices. On the one hand, the investigation of decision-making processes, mostly conceptual in nature, focuses on the types of decision rules and the decision-making stages that are likely to be adopted by tourists. On the other hand, research in choice factors has been primarily addressed with empirical examinations of critical attributes, used by tourists as criteria for determining their travel alternatives (Crompton, 1979). This section provides a brief explanation of tourists' travel destination choices and their travel motivations. In addition a brief explanation of the main factors that influence costumers' preferences, based on literature review, is provided.

Knowledge of the consumer's psychology is extremely important in determining the success of a destination (Rodriguez del Bosque and San Martin, 2008). In this sense, an exploration of psychological concepts such as attitudes, decision-making processes, emotions, experience and satisfaction is necessary for understanding costumer preferences regarding tourist destination choice. A tourist destination is perceived by tourists as a single entity, but in fact it comprises several stakeholder groups: tourists, business entities operating in the tourism sector, the public sector, the host population, and representatives of non-governmental organizations (Buhalis, 2000).

The destination consists of a well-defined geographical area, such as a country, a region or a city (Hall, 2000) that can be referred to as a product or a brand (Yoon and Uysal, 2005). Many studies on tourists' travel choice distinguish among various approaches to the definition of tourist destination. Van Raaij (1986) defined the travel destination as a product, which is partly given and partly man-made. The given part refers to the natural features of a destination, such as climate, landscapes, beaches, mountains and historic-culture buildings. The man-made part refers to physical features such as hotels, package tours, transportation facilities, sports and recreation facilities, which can be modified to satisfy customers' preferences and their budget.

Ferreira (2011) claims that tourist destinations should be conceived as brands and they should be managed

from a strategic point of view. For Buhalis (2000) destination is a defined geographical region with a political and legislative framework for tourism marketing and planning, and it is understood by the tourists as a unique entity. Destinations thus offer “a package of tourism facilities and services, which like any other consumer product, is composed of a number of multi-dimensional attributes mix of tourism products and services, which are integrated under a brand name” Hu and Ritchie (1993).

Determining the factors that influence tourists’ choice of a destination is essential in developing appropriate marketing strategies. Age, income, gender, personality, education, cost, distance and nationality are factors that affect destination choices (Van Raaij, 1986). According to Kuang Hsu et al. (2009) travel motivation is a dynamic concept that changes from one person to another and from one destination to another. Cooper (2009) pointed out that one popular conceptual model for understanding travel motivation is the push and pull model proposed by Crompton (1979). The push motivations are useful in order to explain the desire for travel while the pull motivations explain the actual choice of destination. Moreover, the Crompton model identifies seven socio-psychological (push) motivations (escape, self-exploration, relaxation, prestige, regression, kinship-enhancement, and social interaction) and two cultural (pull) motivations (novelty and education). Uysal and Jurowski (1994) further developed Crompton’s model and summarizes internal (push) and external (pull) motivators to travel. Internal motivators include desire for escape, rest, relaxation, prestige, health and fitness, adventure, and social interaction. External motivators are based on attractiveness of the destination, including tangible resources (i.e. beaches, cultural attractions and recreational activities), and travellers’ perceptions and expectations (novelty, benefit expectations, and marketing image). In more recent studies, researchers added shopping as a motivational factor in destination choices (Uysal and Jurowski 1994; Cooper, 2008).

3.4 Customers preferences

According to Crouch et al. (2004), consumers’ judgments basically depend on the strength of their beliefs or expectations about the quality of various features or attributes associated with services. Personal preferences, like motivations, may be both intrinsic, reflecting individual likes and dislikes, and extrinsic, or socially conditioned. The weight a given attribute carries is usually related to the relative importance that consumers confer to each attribute. This means that each opinion strictly depends on the tourist’s direct past experiences with other services of analogous nature. Kuang Hsu et al. (2009) argue that tourists’ decisions are complex and multi-faceted in which the choices for different elements are interconnected and evolve in a decision process over time.

Most studies of tourists’ travel choices address tourist destination choice as the key element in travel

decision-making. This process is influenced by a number of psychological (internal) and non psychological (external) variables, and consists of a number of different stages that are marked by specific actions.

In order to meet the target of tourists' expectations, hotels should provide an ample range of quality services, including reception, meals, room service, tennis courts, nearby beach location, swimming pools and gardens, among others. But how can we define *service quality*? Service quality can be considered as a composite measure of various attributes. According to Dubè and Renaghan (1999) it consists not only of tangible attributes but also of intangible or subjective attributes, such as safety or quietness, which are difficult to measure accurately and which are usually studied by linguistic information (Benitez et al., 2007). Lewis and Booms (1983) define service quality as a measure of how well the service matches the customer's expectations.

Benitez et al. (2007, after Berry, 1985) argue the quality perceived by consumers in a service is a function of the magnitude and direction of the gap between expected service and perceived service. Judgments expressed by numbers are easy to interpret, but linguistic information is more difficult to measure through a mathematical function. Linguistic information characterizes subjective knowledge and is usually ignored by analysts when forming mathematical models that represent real world phenomena. However, attributes measuring service quality are characterized by uncertainty, subjectivity, imprecision and ambiguity (Benitez et al., 2007). When consumers make decisions, they usually employ this subjective knowledge and linguistic information.

Beside tourism marketing and planning, tourists are an important target audience for urban planning: in order to take into account tourists' preferences, planners must deeply study the phenomenon of tourism and attempt to understand and internalize tourists' needs and perceptions (Dickey, 2005). An accurate identification of customers' perception is the first step in maintaining the status of a city as a popular travel destination.

3.5 Tourism revolution: the role of Information and communication technologies

As part of the service sector, tourism has, not surprisingly, been associated with developments in new technologies and updated by organizational and structural innovations (Stamboulis and Skayannis, 2003). In the competitive scenario of the tourist sector, any location or business aiming to do better than others, should become a learning industry. Even more, emerging alternative tourism has to engage the element of culture, which is an increasingly important aspect which has to be constantly transformed.

The Information and Communication Technologies (ICTs) have revolutionised the travel industry in the last

decade. The advent of e-Tourism reflects the digitalisation of all processes and value chains in the tourist, travel, hospitality and catering industries. It emerges as a term describing the entire range of applications of the ICTs on tourism and the implications for the tourism value chain (Buhalis and Deimezi, 2004).

The dynamic increase in ICT use changes the structure of the travel and tourism industries. These changes are particularly evident in the way that tourism organisations communicate with their individual and institutional clients and how they manage their distribution function (Buhalis, 1998). These developments present a major opportunity for innovative tourism organisations and destinations to improve their relative position in the international market (O'Connor, 1999). By embracing new and innovative business models and electronic commerce (e-Commerce) they can extend their distribution channel and rapidly expand their value chain.

Therefore e-Tourism is emerging as a way forward for many destinations and organisations around the world. On the one hand, it includes e-Commerce and ICTs for maximising the internal efficiency and effectiveness of tourism organisations. On the other hand, e-Tourism revolutionises all business processes, the entire value chain as well as the strategic relationships of tourism organisations with all their stakeholders' chain (Buhalis and Deimezi, 2004). E-tourism determines the competitiveness of the organisation by taking advantage of intranets for reorganising internal processes, extranets for developing transactions with trusted partners and the Internet for interacting with all its stakeholders and customers. For Buhalis and Jun (2003) the e-tourism concept includes business functions, such as e-commerce, e-marketing as well as e-strategy, e-planning and e-management for all sectors of the tourism industry, including tourism, travel, transport, leisure, hospitality, intermediaries and public sector organisations. Hence, e-tourism bundles together three distinctive disciplines: business management, information systems and management, and tourism.

Destinations and service providers are able to interact directly with customers (UNWTO, 2001; Buhalis, 2003). The global Internet allows consumers to identify, customize and purchase tourism products (Buhalis and O'Connor, 2005). Not only do ICTs empower consumers to identify, customise and purchase tourism products but they also support the globalisation of the industry, by providing effective tools for suppliers to develop, manage and distribute their offerings worldwide (Buhalis, 1998). As a result, a major research field is emerging from this interface, as researchers increasingly seek to understand and communicate the significance of the new technologies (Buhalis, 2008).

Moreover, ICTs can assist the improvement of service quality and contribute to higher guest/traveller satisfaction. Every traveller is different, carrying a distinctive combination of motivations, experiences and desires (Crompton, 1990). Tourists from the major generating countries have become frequent travellers,

are linguistically and technologically skilled and can function in multicultural and demanding environments abroad. The online space for tourism is vast and contains information from different parties, from hotels, airlines and destination marketing organizations, to consumers themselves, such as customer-to-customer exchanges, online forums, and blogs. The quality of information, authoritativeness and trustworthiness of these sources may vary. Without a doubt, the internet has expanded and changed word-of-mouth communication, since consumers can exchange opinions online and their posts have the potential to reach millions of viewers (Mack et al., 2008).

New sophisticated and demanding travellers require interacting with suppliers, so as to satisfy their own specific needs (Buhalis, 2008). The reaction to online inquiries can thus influence customer satisfaction and booking behaviour. As a consequence, response behaviour becomes a crucial factor for the success of tourism enterprises (Pechlaner et al., 2002). Profiling increase has been produced by better personalization and interaction between consumers and tourism businesses (Buhalis, 2008).

Enabling consumers to improve their online profile and include personal details (such as name, geographic location and professional information) that indicate their preference, can support tourism businesses in order to provide better services. Also, understanding how different market segments appreciate different tourism products and services increase the possibilities to put suitable products forward.

Finally, the Internet gives travellers access to transparent and easy to compare information on destinations, holiday packages, travel, lodging and leisure services, as well as about their real time prices and availability. Consumers increasingly utilise commercial and non-commercial Internet sites for planning, searching, booking, purchasing and amending their tourism products (Buhalis, 2003). They can also get travel documents immediately, enabling prospective travellers to book at the last minute. Experienced travellers are empowered by ICTs and use information and booking systems to improve their personal efficiency and competencies. In addition, consumer generated content through review portals such as TripAdvisor.com, multimedia sharing such as Panoramio.com, and blogs, also create accessible content that increases the level of information available on a global basis (Buhalis and Jun 2003).

This enhanced the role of the Internet as information source, with a secondary role as opinion source (Grabner et al., 2012). Combining the commercial, technical, social and psychological aspects of groups of people, the interacting individuals behave as an online community. Wenger et al. (2002) defined a community as a group of individuals who want to interact to develop knowledge, share experience and build up their own identity. The development of a common knowledge base is the driving force of a community. Social, economic and technological aspects are incorporated into the community. In addition, with the social media development, every piece of information can be commented or rated in some way.

Tourists on line communities denote the ever growing trend within the so-called world of Travel 2.0 world (Conrady, 2007). Tourists can have ubiquitous access to a broad range of tourist services and also be the producers and broadcasters of information on destination-based social networks. These capabilities have opened up innovative opportunities for tourists to become themselves users of travel social networks. Consumers are able to obtain valuable information from the online communities, and marketers can address the needs of those communities by targeting them with appropriate messages. Hence, online communities will undoubtedly play a much more important role as a credible information source (Armstrong and Hagel, 1997) in supporting tourists at different phases of travel (Chung and Buhalis, 2008) and decision making in the future.

3.6 Discussion

This section provided an explanation of the tourism phenomena by considering both the geographic dimension and consumer psychology, which are recognized as being extremely important factors in determining the success of a tourist destination.

As a leisure activity, tourism includes the movement of people from one destination to another, taking advantage of natural and non natural resources and facilities and services in host areas. Moreover, tourism includes a broad system of interacting relationships of people, their needs to travel outside their communities and facilities and services, such as elements of the natural environment, infrastructure and facilities serving the local population and as well as tourists, that attempt to respond to these needs by supplying products. The combination of these elements influences tourist choices regarding destination and generate travel alternatives. In the alternative generating process the psychological characteristics in terms of needs, perceptions, and motivation, play an important role: such components are considered important contributors in understanding travel behaviour, which foster the implementation of marketing strategies and decision making processes in tourism planning.

Many sages of the current literature related to tourism demonstrate that the technological revolution experienced through the development of the Internet has dramatically changed the market conditions for the tourism industry. As ICTs have increasingly been influencing consumer behaviour in tourism (Buhalis, 1998), the role of the online communities is becoming twofold. They are gradually becoming more influential both as a reliable information source for travellers and as an emerging marketing channel for marketers (Armstrong & Hagel, 1996; Wenger et al., 2002). They support the interactivity between tourism enterprises and consumers and as a result they reengineer the entire process of developing, managing and marketing tourism products and destinations. On the supply side, the way to promote tourism industry, the

different destinations, or the holiday packages have been totally transformed. Likewise on the demand side: travellers use the Internet to obtain tourist information, to share their experiences and to establish relationships with people from various destinations or to purchase travel related products.

The most significant change with the advent of e-Tourism is the proliferation of low-cost airline companies, which use the Internet as the main distribution mechanism for their direct promotion. In addition, travel agencies use the Internet in order to provide integrated travel solutions and a whole range of value added services, such as destination guides, weather reports and insurance. By adopting dynamic packaging (i.e., the ability to package customised trips based on bundling individual components at a discounted total price), they effectively threaten the role of tour operators and other aggregators. A thorough analysis of the various sectors of the tourism industry demonstrates the key developments and the influence of ICTs and the Internet for their internal organisation, their relationships with partners and the interaction with consumers and stakeholders (La Rocca,2014).

ICTs provide innovative strategic tools for tourism organisations and destinations to improve both their operations and positioning. Hence, the visibility and competitiveness of principals and destinations in the marketplace will increasingly be a function of the technologies and networks utilised to interact with individual and institutional customers. In this context, consumers are able to obtain valuable information from the online community and marketers can address the needs of those communities by targeting them with appropriate messages. Hence, online communities will undoubtedly play a much more important role as a credible information source for supporting decision making in the future.

CHAPTER 4

Tourism in the age of Digital Information

4.1 Introduction

Since the early 1960s, GIS started to be introduced into spatial government and in the planning practice, replacing more traditional analogue data and maps. Nowadays, in the era of ICTs, an unprecedented amount of digital geographic information is made available to planners in order to support spatial analysis, design and decision-making processes. This new trend could foster notable innovations in urban and regional planning methodologies. New developments in urban and regional planning practices may also represent an opportunity of great potential to eventually enrich tourism strategies with a broader, deeper and more pluralist knowledge of the places or destinations.

Opportunities for innovation and development of planning practices emerge from the avalanche of the BD (Miller, 2010) enclosed within geographic information, which Web 2.0 and ICTs have made available to the broader public. First of all, the development of SDI enabled the public to access and reuse available A-GI, according to technology and policy standards. The implementation of the Directive 2007/02/CE, namely INSPIRE, establishing a shared INfrastructure for SPatial InfoRmation in Europe, has led to the development of SDI in Member States and regions.

Secondly, developments in connectivity, geo-browsers and mobile technologies enabled by the Web 2.0, allow citizens acting as volunteer sensors (Goodchild, 2007) to provide GI real-time from the ground up. This information encloses both expert knowledge (from professionals) and experiential knowledge (from local communities), producing opportunities for enhancing the available knowledge base in urban and regional planning (Miller, 2010). The use of VGI is simplifying and fostering participatory processes, becoming a main source of information in planning emergency response, and in local planning for countries where authoritative large scale data sources are absent (Sanvig Knudsen and Kahila, 2012).

Finally, widespread diffusion of social media is fostering the diffusion of geo-referenced multimedia (Sui and Goodchild, 2011), or Social Media related Geographic Information (SMGI), over the global Internet. Users can have ubiquitous access to a broad range of information services (Buhalis, 1999) and also be the producers and broadcasters of personal geo-referenced contents on location-based social networks. These capabilities have overtaken past limits in data communication, and are disclosing innovative opportunities for disseminating and gathering geographic information among millions of users, promoting the media convergence with GIS (Sui and Goodchild, *ibidem*).

According to Toppeta (2010), SMGI should be considered fundamental in improving liveability and sustainability in urban systems. At the same time, ICTs should allow innovative forms of communication, governance and organization for community involvement in evaluating and solving key urban problems (Batty et al., 2012). This type of information should be merged, integrated and used to coordinate traditional infrastructures and services, simplifying the comprehension and analysis of urban complexity. The integration of SMGI with A-GI can disclose innovative analysis opportunities in spatial planning, with regards not only to measures of geographic facts but also to user perceptions and opinions on places, localities and daily/routine events (Campagna et al., 2013). The results of the elicitation of SMGI knowledge and its integration with A-GI could foster the development of new planning approaches informed by the local community's needs and opinions in a bottom-up approach.

4.2 The support of Digital Information in planning

Since the early 1960s, GIS started to be introduced in spatial government and in the planning practice replacing more traditional analogue data and maps. Nowadays in the era of ICTs, an unprecedented amount of digital geographic information is made available to planners in order to support spatial analysis, design and decision-making processes. This new trend could foster notable innovations in urban and regional planning methodologies. New developments in urban and regional planning practices may represent also an opportunity of great potential to eventually enrich tourism strategies with a broader, deeper and more pluralist knowledge of the places or destinations.

Opportunities for innovation and development of planning practices emerge from the avalanche of the BD (Miller, 2010) enclosed within geographic information, which Web 2.0 and ICTs made available to the broader public. First of all, the development of SDI enabled the public access and reuse of available A-GI, according to technology and policy standards. The implementation of the Directive 2007/02/CE, namely INSPIRE, establishing a shared INfrastructure for SPatial InfoRmation in Europe, leads to the development of SDI in Member States and regions.

Secondly, developments in connectivity, geo-browsers and mobile technologies, enabled by the Web 2.0, allow citizens acting as volunteer sensors (Goodchild, 2007), to provide GI real-time in a bottom-up fashion. This information encloses both expert knowledge (from professional) and experiential knowledge (from local communities), producing opportunities for enhancing the available knowledge base in urban and regional planning (Miller, 2010). The use of VGI is easing and fostering participatory processes, becoming a main source of information in planning emergency response, and in local planning for countries where authoritative data sources are absent at large scale (Sanvig Knudsen and Kahila, 2012).

Finally, widespread diffusion of social media is fostering the diffusion of geo-referenced multimedia (Sui and Goodchild, 2011), or Social Media related Geographic Information (SMGI), over the global Internet. Users could have ubiquitous access to a broad range of information services (Buhalis, 1999) and also be the producers and broadcasters of personal geo-referenced contents on location-based social networks. These capabilities have overtaken past limits in data communication, and are disclosing innovative opportunities for disseminating and gathering geographic information among millions of users, promoting the media convergence with GIS (Sui and Goodchild, *ibidem*).

According to Toppeta (2010), SMGI should be considered fundamental to improve liveability and sustainability in the urban systems. At the same time, ICTs should allow innovative forms of communication, governance and organization for the community engagement in evaluating and solving urban key problems (Batty et al., 2012). This type of information should be merged, integrated and used to coordinate traditional infrastructures and services, easing the comprehension and analysis of urban complexity.

The integration of SMGI with A-GI can disclose innovative analysis opportunities in spatial planning, with regards not only to measures of geographic facts but also to user perceptions and opinions on places, localities and daily-routine events (Campagna et al., 2013). The results of the elicitation of SMGI knowledge and its integration with A-GI could foster the development of new planning approaches informed by the local communities' needs and opinions in a bottom-up approach.

4.2.1 Spatial Data Infrastructures and Authoritative Geographic Information

Nowadays, Geographic Information is being collected, processed and used to carry out environment and territorial studies related to hydrology, geology, agriculture and land conservation. The development of Spatial Data Infrastructures (SDI) has enabled the public to access and reuse available Authoritative Geographic Information (A-GI) according to technology and policy standards. This tries to make up for the lack of availability, quality, organisation, accessibility and sharing of spatial information experienced across the various levels of public authority in Europe.

The Directive 2007/2/EC, known as INSPIRE takes measures to address these challenges and leads to the development of SDI in Member States and regions by establishing a shared INfrastructure for SPatial InfoRmation in Europe. SDIs are interoperability infrastructures. Interoperability can be defined as the ability by which different applications that use different languages or concepts can talk to each other. The recent software architecture designed to implement interoperability is Service-Oriented Architecture (SOA). Consequently, SDIs are becoming more and more linked and integrated with systems developed in

the context of e-Government. The wide diffusion of SDIs at regional and local level across European Countries has been leading to an increase in interest by policy-makers in providing evidence of the benefits produced by the investments made (Campagna and Jannuzzi, 2010).

The portal is the most popular and extensively used technology to implement local, regional, national and international level SDIs. There is no consensus on the definition of portal. In the portal content two terms are used in the geo-community: GeoPortal and GIS Portal (Akinci and Comert, 2007). Maguire and Longley (2005) define a geoportal as “a World Wide Web gateway that organizes content and services such as directories, search tools, community information, support resources, data and applications”. Again, Tait (2005) defines a geoportal as “a Web site considered to be an entry point to geographic content on the Web or, more simply, a Web site where geographic content can be discovered”.

SDIs impact may offer beneficial results for public administration, developers and planning practitioners, and is slowly bringing innovation into the planning practices (Campagna and Craglia 2012). According to Campagna and Craglia (2009), in many regions across Europe, the regional SDIs represent a technical platform for the development of regional and local planning processes, by means of supplied data and services. This process is already slowly leading innovation into the planning practices.

4.2.2 Volunteered Geographic Information

In recent years advances in geospatial positioning, Web mapping, cellular communications and wiki-based collaboration technologies have surpassed the original visions of the architects of spatial data infrastructures around the world (Goodchild, 2007; Craglia et al., 2008). As a result of this improvement in technologies, more and more people subconsciously contribute in sharing information on the Internet. At the same time, the scientific community, planners and marketing companies try to create appropriate ways to help users act and provide data on the Internet and to find a way to collect them (Coleman, 2009).

Turner (2006) suggested the use of the term neo-geography to define “geographical techniques and tools used for personal activities or for utilization by a non-expert group of users; not formal or analytical”. According to Goodchild (2007), the term Volunteered Geographic Information (VGI) is employed to designate any user-generated content that has a relation to the surface of the earth. Popular examples are GPS tracks of cars and points of interest such as look-outs, restaurants, coffee bars, etc. There are various VGI applications that allow users to upload and browse information in various media, such as texts, pictures and videos (De Longueville, 2009).

The information is linked, through a spatial reference, to a location on a map. In the following sections, we describe some prominent initiatives and their online applications for uploading and browsing VGI. The proliferation of VGI has enabled many Internet users to contribute to the construction of rich and

increasingly complex spatial datasets (Brown, 2012). This information could provide understanding of a place from actual experience; a type of knowledge that is earned rather than learned. Local knowledge could provide a check and balance on expert and self-interest driven assumptions about planning outcomes (Brown, 2012).

Such perceptions have a spatial, temporal and thematic component. Popular VGI systems like OpenStreetMap and WikiMapia inherit the object-oriented vision of geographic information, implying a certain spatial precision. Depending on the type of VGI that is expressed, the spatial precision might indeed be high (Lin, 2011). Google Maps, the geographic interface to the Google search engine, allows users to create VGI in the form of all-purpose personal maps. Such maps are collections of points, lines or polygons that are associated with media items, for example text, html documents, photos and videos. The contents of these maps can be searched by other users that selected the option search user-created contents (De Longueville, 2009). These examples illustrate how VGI can concern vast amounts of data, and find applications in various domains. In addition, VGI is becoming increasingly ubiquitous, with the possibility to geotag blog posts, or to generate geotagged messages and photos or videos directly from GPS-enabled smart phone.

VGI provides perceptions rather than measurements. VGI participants are human beings interacting with a computer to share their perceptions and acting as sensors (Sui and Goodchild, 2011). This is an important feature to take into account, because VGI participants' perceptions about geography are vague by their own nature (Purves et al, 2011). Fisher (2000) states that "VGI participants live in a world steeped in vagueness where they function effectively, and they think about geography and space as vague concepts. Vagueness is a necessary part of the human experience of geography".

Therefore, it is essential that geographical databases "should use the same vagueness in user interaction". The consistency and quality offered by VGI for research and practices are being discussed, and further efforts and investigations are required to define the reliability of this information (Jennex, 2010). VGI could be processed to elicit useful knowledge in relationship with specific degrees of uncertainty, in order to overcome credibility issues (Spinsanti and Osterman 2013).

Moreover, several hurdles arise in finding suitable practices and procedures to manage the available avalanche of information. Advanced Big Data analysis could represent a suitable solution to extract and manage VGI (Miller, 2009). Citizen-generated information data could give the planning practice valuable insights. On the one hand, quantifiable information helps to inform on-going deliberations regarding design and planning solutions. On the other hand, the VGI collected and visualised throughout the GIS tools, facilitates a shared reflection on a future vision of a city or a region based on the citizens' actual vision (Sanvig Knudsen and Kahila, 2012). VGI has proven useful in many application contexts such as emergency

response, environmental monitoring and spatial planning (Poser and Dransch, 2010).

4.2.3 Social Media related Geographic Information

Social networks are online communities of people who share common interests and activities (Miguens et al, 2008). They provide a user with a collection of various interaction possibilities, ranging from a simple chat, to multiple video conferences, and from the exchange of plain email messages to the participation in blogs and discussion forums.

Consumers have ubiquitous access to a broad range of information services and visit the Internet to look for information and communicate or simply spend time and shop (Buhalis 1998; Chung and Buhalis, 2008). It is increasingly evident that people meet online to express views, share information and often keep online blogs. The degree of interactivity established by the Web 2.0 paradigm enhanced the role of the Internet as an information source, with a secondary role as an opinion source (Grabner et al., 2012).

Combining the commercial, technical, social and psychological aspects of groups of people, the interacting individuals behave as an online community (Buhalis, 1999). Wenger et al. (2002) defined a community as a group of individuals who want to interact in order to develop knowledge, share experience and build up their own identity. The advent of online communities demonstrates the rapid increase of peer-to-peer communication online (Chung and Buhalis, 2008).

The development of a shared knowledge base is the driving force of an online community. Social, economic and technological aspects are incorporated into the community (Fernback; 1999; Gleave, 2009). In addition, with developments in social media, every piece of information can be commented or rated in some way.

Social media employ mobile and web-based technologies to create highly interactive platforms via which individuals and communities share, co-create, discuss, and modify user-generated content (Kiezman, 2011). Social media also offer different ways for management, sharing, and extraction of contents, creating a degree of uncertainty in the processing of this knowledge. In contrast with traditional geographic information, SMGI regards users' perceptions on the Earth's surface related to a specific period of time and requires advanced tools to support real-time monitoring, analysis and decision-making. SMGI platforms can be used both for leisure and for more professional purposes, ideally allowing for the integration and sharing of all the resulting information streams.

This information has been, and still is collected through effective data acquisition techniques such as global positioning systems (GPS), high-resolution remote sensing, location-aware services and surveys, and Internet-based volunteered geographic information (Guo et Mennis, 2009). In addition, SMGI may be

geocoded in different ways, using either the position of the author (if public), or the location of the post (i.e. recorded through a GPS sensor of a mobile device if available), or through toponyms parsing in the text. But the central challenge is how to manage a large amount of data and to find efficient methods to extract useful knowledge from spatial data sets of unprecedentedly large size and complexity.

To address these challenges, spatial data mining and geographic knowledge discovery has emerged as an active research field, focusing on the development of theory, methodology, and practice for the extraction of useful information and knowledge from complex spatial databases (Andrienko and Andrienko, 1999; Miller and Han, 2009; Guo and Mennis, 2009). Spatial data mining and geographic knowledge discovery is an iterative process that involves multiple steps, including data selection, cleaning, pre-processing, and transformation.

These methods are exploratory in nature, more inductive than traditional statistical ones, including clustering, classification, association rule mining, information visualization, and visual analytics (Miller and Han, 2009). Their goal is to integrate and further develop methods in various fields for the analysis of large and complex spatial data.

There are several studies conducted through analysis of SMGI, which embrace numerous fields of interest, such as disaster events response, political events, media events, social studies and urban planning. However, despite the interesting results on elicitation of knowledge, further studies and advancements are required for investigating community perceptions. These address a critical role in the development of local and regional planning, due to the fact that strategies directly affect the citizens' quality of life.

Furthermore, citizens and local communities have a central role, with their needs and opinions, in the interests of smart cities for participation and transparency during the development of the planning process (Campagna, 2014). Hence, the opportunities of SMGI, for supplying a depiction of opinions, needs and perceptions of the local communities in real-time, could represent a valuable source of information. At present, a lack of reliable and user-friendly methods for knowledge extraction from SMGI could prevent the exploitation of the full potential of these sources.

4.3 Current developments in tourism social media

In the last decades, the ICTs have revolutionized the global economy and almost every business. In addition, the evolution of geo-portals and geo-collaborative portals presents numerous opportunities and services for making the trip planning process less complex and time consuming, more efficient and more social and collaborative for travellers and their travel companions (Sigala, 2010).

It is not only businesses that have taken advantage of the digital technology boom (Dippelreiter et al., 2010) but this fast evolution has also enabled consumers to access a wide range of information services and

interact as an online community. An online community is successful only when it attracts a large number of members to reach critical mass (Wang, Yu and Fesenmaier, 2002).

The potential of these communities lies in the possibility of being integrated in the economic value chain for product and service design. Lazar (1998) states that the creation of online communities has to be technically, operationally, strategically and economically planned to meet users' requirements, in order to tap the full potential of the knowledge shared. It is not only social interaction that is of great importance during the process of community building, but community members also want to communicate using a technically sophisticated platform.

Tourism is one of the sectors which has exploited the advantage of advance ICTs and the development of online communities (Buhalis, 1999; Wenger et al., 2002). On the supply side tourism marketing (i.e. the way to promote tourism industry, the different destinations, or the holiday packages) has been totally transformed (Dippelreiter, 2010; La Rocca 2014). It is not surprising to observe that travel and tourism related topics are among the most popular in on-line social networks, (Baggio et al., 2008). Likewise, on the demand side the travellers use the Internet to obtain tourist information, to share their experiences, to establish relationships with people from various destinations or to purchase travel related products.

Customer loyalty depends not only on social interaction but also on the quality of the information provided, such as prices or opening times. In this way, online tourism communities constitute a special position. They focus on information search rather than on social interaction. Furthermore, travel planning means greater demands on the information search (Dippelreiter et al., 2010).

According to Chung and Buhalis (2008), Internet supports i) the pre-travel phase, where all the searches and bookings can take place online; ii) the in-travel phase, through interactive forums and/or blogging while on the road; and iii) the post-travel phase, where people can share experiences, review hotels and destinations, and post photographs and videos from their trips. Travel plans, destinations, hotels reviews and discussions within the tourists' online community denoted the ever-growing trend within the so-called world of Travel 2.0 world (Conrady, 2007).

Different kinds of online tourist communities exist: Dippelreiter et al. (2010) distinguish between long-established online communities, such as virtual tourist with tens of thousands of users, which were established before the millennium, and recently established online communities, such as Wikitravel, TripAdvisor.com, Booking.com and the Yahoo Trip Planner, which employ advanced Web 2.0 principles and technologies.

TripAdvisor.com and Booking.com are among the most popular platforms of the latter kind. They play a significant role in the online tourism market, and can be considered market-driven social media. While on the one hand, these platforms represent an important marketing channel through which destinations and

tourism enterprises can reach and persuade potential tourists (Biassoulis, 2002), on the other hand they assist consumers in posting and sharing their travel-related comments. Travellers' opinions and personal experiences based on the reconstruction of their trips in turn serve as information to others. TripAdvisor.com, with its web and mobile applications, is based on the idea that travellers rely on the reviews of other travellers to plan their trips, or at least take them into consideration before making their final decision. Currently, TripAdvisor.com contains 10 million travel reviews and opinions written by 5 million registered members, and it counts 25 million tourists per month (Miguens et al., 2008).

The Booking.com website, established in 1996, attracts tourists from both the leisure and business sectors worldwide. Booking.com is available in more than 40 languages, and offers over 367.033 properties in 190 countries. From a quick look at TripAdvisor.com and Booking.com, the following general ideas are evident: in both cases, their users autonomously generate information posted with regard to destinations, tourist operators, restaurants and tourists services and facilities. They also feature reviews, comments and ratings on destinations, hotels, attractions, or other tourism related services. Furthermore, different kinds of multimedia posts are supported as well as discussion forums on specific topics. When the location is also available and considering the definition provided by the previous section, all these types of information, as all information derived from forums, discussion blogs or social networks, could be considered VGI.

The goal of online communities is to provide tourism information based on different technologies, such as a forum or a newsletter, which have already been in common use for a relatively long time. Online tourist communities provide a broad range of services to their users. The majority of those services focus on supporting users during the pre-trip phase of the tourist life cycle. The support of the on-site phase, however, is in the beginning. In this situation especially, tourists would need personalized on-trip assistance in the form of information about accommodation, points of interest (e.g., environmental and landscape attractions or gastronomy), weather forecasts, news or safety issues.

Understanding tourists' behaviour is an important target audience for urban and regional planning: in order to take tourists' preferences into account, planners must study the phenomenon of tourism in depth and attempt to understand and internalise tourists' needs and perceptions (Dickey, 2005). An accurate identification of customers' perception is the first step for maintaining the status of a city image as a popular travel destination.

4.4 Discussion

This chapter discusses the recent advances in geographic information. In the age of digital information based on planning processes, considerations highlight the need to use advanced tools to produce, gather

and manage spatial information collected into new digital formats and available to support planning processes.

First of all, the development of SDIs, defined as interoperable infrastructures, enables the public to access and reuse A-GI according to technology and policy standards. In many regions across Europe, the regional SDIs represent technical platforms for the development of regional and local planning processes, by means of supplied data and services. This process is already slowly bringing innovation to the planning practices.

Secondly, developments in connectivity, geo-browsers and mobile technologies, enabled by Web 2.0, allow citizens acting as volunteer sensors, in order to provide GI real-time. This wealth of digital information, or VGI, can be easily collected, analysed, understood and used to support informed decision-making. These opportunities can both enable a trans-active approach (Friedman, 1973) in planning practices and foster the democracy and the sustainability in making plan at urban and regional levels.

Finally, SMGI may also be directly used and integrated with traditional authoritative spatial data layers in GIS environment. In fact, SMGI offers many opportunities of their integration into planning practices as valuable support for analysis, design and decision-making in tourism planning practices at both local and regional levels.

As more and more travellers wish to create their personalised trip itineraries and experiences, the provision of geographical information and services on travel websites is an unavoidable necessity. The current evolution of geo-portals and geo-collaborative portals, that facilitate work groups based on the top of a map, coupled with the enhancement of their functionality with Web 2.0 tools and capabilities, present numerous opportunities and services for making the trip planning process less complex and time consuming.

Currently available tourism platforms, oriented towards data creation, dissemination and collection could provide qualitative and quantitative information to integrate in planning processes. The integration of SMGI with A-GI may offer potentially boundless and affordable sources of information regarding not only geographic facts, but also insights into people perceptions and feelings in space and time. In this sense, the integration of SMGI with A-GI can disclose innovative analysis opportunities in spatial and tourism planning, with regards not only to measures of geographic facts but also to users/tourists perceptions and opinions on places and localities.

However, accessibility to SMGI is very difficult for most people (Lazer et al., 2009). So, new ways for collecting information, managing huge volumes of data, as well as eliciting reliable knowledge for spatial planning should be developed. Moreover, lack of reliable and user-friendly methods for knowledge extraction from SMGI could prevent the exploitation of the full potential of these sources.

CHAPTER 5

The ruling framework and the issue of sustainable tourism in Sardinia

5.1 Introduction

Sardinia is one of the major islands in the Mediterranean Sea, where coastal tourism has been a driving force of the regional economy for decades (CRENOS, 2011). As a matter of fact, these areas have generally been considered areas to be planned and managed in a special way, for the number of activities and the range of land uses found, much higher than those of inland areas, and for the fragility which intrinsically characterise coastlines. As a result, various conflicts of interests, such as those of residents, developers, environmentalists and investors, converge in coastal areas. As a result of this apparent conflict between tourism development in coastal areas and the need to safeguard them, the Regional Executive Committee decided to prepare the Regional Landscape Plan (RLP) together with the Regional Plan of Sustainable Development based on Tourism (RPSDT).

This section provides an explanation of the ruling framework in Sardinia, in terms of landscape and sustainable development based on tourism. In order to evaluate the efficiency of the Regional plan of sustainable tourism both as a landscape preservation plan and with reference to its contribution to sustainability, this chapter aims at pinpointing some key characteristics of sustainable plans by looking at the international literature on the topic, and identifying some principles and recommended actions for a plan aimed at delivering sustainable development and landscape protection.

After an overview of the sustainable tourism paradigm, the chapter focuses on the regional planning framework, concerning the landscape and the coastal safeguard coupled with sustainable tourism development, highlighting benefits, opportunities and weaknesses that still limit planning approach in the region of Sardinia.

5.2 Planning for sustainability

The issue of sustainable development has become very important since the World Commission on Environment and Development defined it in 1987 (WCED; 1987) and especially after the 1992 Earth Summit held in Rio (Murphy and Price, 2005). To date, a large number of international documents have been produced and agreed upon. In several countries the necessity of a balance between environment preservation, economic growth and social equity is increasingly demanding that laws and regulations

should limit human activities, in order to preserve natural and cultural resources (Meppem and Gill, 1997). The most quoted ruling interpretation is the “Brundtland Report” by WCED (1987), which recognises that human resource development in the form of poverty reduction, gender equity, and wealth redistribution was crucial to formulating strategies for environmental conservation, and it also recognised that environmental limits to economic growth in industrialised and industrialising societies existed. Moreover, the report offers recommendations for achieving sustainable development within such societies.

Another important contribution related to sustainability concepts is the Costanza’s (1994), which states that “sustainability entails maintenance of i) a sustainable scale of the economy relative to its ecological life support system, ii) a fair distribution of resources and opportunities between present and future generations, as well as between agents in the current generation, and iii) an efficient allocation of resources that adequately accounts for natural capital”. Again, Hawken (1993) emphasises that sustainability is an economic state where the demands placed upon the environment by people and commerce should be met without reducing the capacity of the environment to provide for future generations.

The planning literature is rich in discussions about rules and approaches, but lacks specific connections with sustainability (Hughes, 1995). According to Shediak and Bone (1998), planning for sustainability requires, first of all, a clear understanding of the concept of the sustainability and operational indicators that may be used in monitoring planning actions over time. Secondly, planning for sustainability involves the use of programmatic approaches and strategies, which support long-term program maintenance. Finally, planning for sustainability emphasises the sense of place and the context. Emphasis on the sense of place and identity could help develop more effective planning strategies and promote greater management of local places (Wheeler, 2013).

In the European planning system ruling framework these statements are notable in the implementation of the 2001/42/EC Directive, concerning the Strategic Environmental Assessment (SEA). This directive has been transposed into law enacted by Decree n° 152/2006, known as the National Environment Code at the Italian national level. Its article 4 requires that environmental considerations be made during the plans and programs preparation phase, followed by their adoption and approval, in order to guarantee the assessment of environmental effects before plan implementation and to promote sustainable development.

In Sardinian ruling framework, the concept of sustainability has been included in both the Regional Landscape Plan (RLP), approved in 2006, according to the Italian law concerning landscape and cultural heritage and the European Landscape Convention, and the Regional Plan for Sustainable Development based on Tourism (RPSDT), approved respecting the Lanzarote principles.

5.3 The issue of sustainability in Sardinia: the regional planning framework

Sardinia, with a territory of almost 25.000 square kilometres (ISTAT, 2011) and a coastline of about 2.400 kilometres (RAS, 2009), is one of the major islands in the Mediterranean Sea. The coastline had always been a resource for the island and has generally been considered an area to be planned and managed in a special way (Taussik, 2001) for both the number of activities and range of land uses, and the fragility and peculiarity which innately characterise shorelines. The population of Sardinia is irregularly distributed and mostly concentrated along the shore as well as main industries and transport infrastructure; furthermore, coastal tourism has been one of the most significant driving forces of the regional economy for decades. As a consequence, Sardinia has experienced an imbalanced development between coastal and inland areas (RAS, 2006). Its economic structure is largely based also on the tertiary sector, and tourism represents both a strategic and a dangerous sector for the economic growth of the region. Indeed, on the one hand, tourists are attracted by nature, environment, and the cultural identity of Sardinia (Hospers, 2006); on the other hand, tourism activities are mostly concentrated in coastal areas during the summer season, increasing the pressure.

Furthermore, along the coastline, private houses for rent can accommodate tourists legally and illegally, contributing considerably to a particular kind of informal economy of the island, which, in planning absence conditions, results in land consumption and strip development (Kay and Alder, 1999) close to the coastline in many parts of the region.

Hence, coastal areas have the twofold role of one of the most vulnerable environmental systems and, at the same time, one of the greatest economic attractor assets of the island. As a result of these activities, the interests of different stakeholders, such as residents, developers, environmentalists and investors, converge in coastal areas and come into conflict (Zoppi and Lai, 2010). In order to safeguard coastal areas and to regulate the tourism sector, the Regional executive committee decided, in 2004, to prepare the RLP together with the RPSDT. Despite this decision, the plans followed two different pathways and the RPSTD was presented for its approval several months after the RLP had been approved.

Sardinia's RLP is the first statutory landscape plan with regional dimension produced in Italy under the new legislation. Its statutory character stems from both National Law (National Code of Cultural Heritage and Landscape), which required that each regional executive committee should approve a landscape plan, and Regional Law n° 8/2004, which required the Sardinian RLP for the coastal areas to be approved within one year of the law 's approval (Zoppi and Lai, 2010). The RLP only affects the coastal area, divided into 27 landscape areas of interest. The plan's priority is the safeguarding of coastal areas from the pressure of conflicting land demands, which made a plan other than municipal master plans from 2003 (Lai, 2008), when Territorial Landscape Plans (TLPs, or Piani Territoriali Paesistici in Italian) were abolished, necessary

for these areas.

Before the RLP, Regional law n° 45/1989 imposed prohibition on building activity in a buffer zone of 300 metres along the coastline, identified as environmentally sensitive, with the exception of urban areas classified as historical centres or surfaces for new development designated as such by local master plans. Then, the RLP extended this building activity constraint to a buffer zone of 2000 metres along the coastline. The main role of the RLP is establishing rules in order to protect the regional landscape, defined by its article 1 as “essential for local development because of nature, history and local culture” (RAS, 2006). The RLP aims at preserving Sardinia’s natural landscape and biodiversity, safeguarding its territorial characteristics and promoting sustainable development.

In this context, the Regional Council identified tourism as one of the strategic sectors able to improve Sardinia’s socio-economic settings. Nevertheless, not all the possible forms of tourism are desirable. The RPSDT identifies the lack of a global strategy in the regional tourism sector and this leads to an incompleteness of its economic potential. The RPSDT represents a starting point for more mindful planning with regards to the various impacts that the tourism phenomenon determines in the other economic sectors, to the population and the regional landscape.

5.3.1 The issue of coastal tourism in Sardinia

The coastline has long been a magnet for tourists, which has raised concerns about sustainable development. These concerns will be given a sharper focus as a result of new approaches to shoreline management. In Sardinia these new approaches are embodied in the RLP and in the RPSDT (RAS, 2006) which, together with the formulation of defence strategies, form the basis of coastal safeguarding. Coastal tourism practitioners need to become familiar with the new approaches to shoreline management, in order to exploit opportunities and to avoid conflicts in planning.

Central to this relationship is the requirement to manage beaches in a sustainable way. This will only be achieved through management strategies that work more closely with natural processes, and are integrated within strategic planning that encompasses the coastal zone. Sustainability is a core component both in the RLP and the RPSDT, with its safeguarding strategies. One of the main drivers in the sustainability principles adoption is the recognition that natural sediment supplies for many beaches are scarce, resulting in widespread erosion (Bird 1985). The management response to this potentially dangerous situation, exacerbated if near-future climate change and sea-level rise projections become reality, may result in a reassessment of how tourism may best be developed (Jennings, 2003).

In Sardinia, coastal resorts have become increasingly popular as tourist destinations; the benefits of the sea

air, sun, water, seafood, beaches, and scenic views were the initial attraction. The advent of the availability of new destinations, more adventurous activities and a desire to observe wildlife (birds, whales, etc.) mean that coastal resorts still attract the greatest percentage of tourists every year (Hospers, 2003). The greatest ecological threat that coastal tourism poses undoubtedly lies in the infrastructure and transport arrangements required to support it, particularly in situations where the numbers of tourists are subject to little control. Physical development of resorts, consumption of fuel by buildings, aircraft, trains, buses, taxis and cars, overuse of water resources, pollution by vehicle emissions, sewage and litter all contribute to substantial, often irreversible, environmental degradation, as well as to dramatic social consequences (Davenport and Davenport, 2006).

Tourist resorts require effective transport connections. Many coastal roads were built simply to connect resorts and for sight-seeing opportunities. Tourist resorts are also generally characterised by extensive car-parking facilities, taking up even more land, particularly in coastal areas.

Exponential growth of the use of yachts, sailing boat and water taxis has fuelled marina and jetty development. Such coastal structures change current systems and often deeply alter the sand supply to natural beaches. In some coastal areas road construction, tourist resorts and car parks have replaced natural habitats with concrete and golf courses, while hotel, marina and street lighting now fringe most of the island systems. Beaches themselves are tramped and occupied by millions of people, while promenades and walkways often replace dune or rocky systems.

In some of Sardinia's coastal areas pursuit of short-term profit has led to an unregulated construction of holiday resorts that - as the industrial complexes before them- hardly blend into the Sardinian landscape. In addition, the second home tourism phenomenon represents a typical element of the Sardinian tourism industry. According to Vagner and Fialova (2012) second home users are visitors who stay many more nights than other types of tourists, use owned, rented or time-shared properties in the place chosen for spending their time off. They come to enjoy a lifestyle that they are already used to and their funds come from their place of origin.

Despite the positive perspectives of tourism for the restructuring of Sardinia, there are also potential negative aspects to further developing this sector. While tourist activities are generating additional money and jobs for the local economy, they may also have adverse social, environmental and cultural effects (Hospers, 2003; CRENOS; 2011). For the local population, working in the tourist sector mostly implies an unstable, seasonal income with the ensuing unstable influences of this economic sector (RPSDT, 2006). As a matter of fact, just as in many other sun and sea resorts, tourism in Sardinia is highly concentrated during the summer season (Paci and Usai, 1999). The concentration of tourism demand in this short period of time

may lead to an imbalance in the use of the island's natural and cultural resources for tourist purposes. If not properly organized, the sun and sea tourism model (Smith, 1999) in Sardinia increases the chance that ecologically sensitive areas on the island are over-used and even damaged. Thus, Sardinia risks harming its natural and cultural resources upon which the economy largely depends. Possible impacts of tourist over-exploitation of the island's ecosystem are waste and soil pollution in areas with little or no capacity to absorb them, which may even result in a loss of biodiversity and wildlife habitats.

Finally, parts of the regional cultural components, which have been revived for the sake of tourism, are not necessarily those that are valued the most in the local communities. Thus, the danger of a gradual commercialization of traditional culture lies in wait. To sum up, tourism in Sardinia may have long term consequences that are not necessarily in the best interests of the local population, nature and culture.

5.4 The Regional Plan of Sustainable Development based on Tourism

Understanding tourists' expenditure dynamics is the central issue in the international tourism arena. Sardinia's tourism industry has been primarily characterised by natural and cultural resources. On the supply side, it is distinguished by a lower-than-average rate of productivity growth (Brau and Cao, 2006). On the demand side, it can experience high rates of revenue growth, thanks to the "terms of trade" and "high demand elasticity to income" role (Lanza and Pigliaru, 1994) effects.

However, in many areas of the region, the tourism industry and its development seem to be in contrast with this vision. In such areas, many efforts have been made for the construction of infrastructures and services in order to make an area attractive as a tourist destination (Paci and Usai, 1999), often negatively affecting the natural resources.

Historically, before the 1960s, Sardinia only disposed of a few holiday resorts. In 1961, however, the North-Eastern coast was exploited by prince Aga Khan, who founded a millionaires' consortium. Afterwards, an international team of architects and planners transformed the beaches and bays along the coast, which was renamed the Costa Smeralda, to a high quality and fashionable holiday landscape for the titled and wealthy (Hospers, 2003). The Costa Smeralda contributed to the subsequent high income tourism and Sardinia's gradual economic development (Fohrer, 2000).

Since the 1970s, the island has attracted a growing number of Italians and foreign tourists, and over the years, tourists have also visited other coastal locations, in particular the island's East coast. Consequently, development of hotel accommodations, camping sites and tourist facilities in this area has taken place at a large scale (Hospers, 2003).

Nowadays, there is growing interest among tourists for Sardinia's natural and cultural aspects rather than

its sun, sea and sand image (Paci, 1999; CRENOS, 2011). This new trend may offer perspectives for Sardinia's inland areas as well, as has already happened especially for the province of Nuoro. It is also notable that industrial heritage is increasingly visited by tourists (CRENOS, 2002). The mines and factories around the South-West area of Sulcis and Iglesiente in particular, have turned out to be popular attractions for day trippers (CRENOS, 2011).

This context may suggest to policy makers and planners new paths for tourism development in Sardinia, rather than the sole Costa Smeralda tourism model. The issue is how to rationally assess these transformations of tourist destinations, in order to satisfy tourists' preferences and orient new market strategies. Both public and private local actors tried to capitalise on the fact that tourists consider Sardinia a combination of sunny holiday destination and inland natural resources (Zoppi and Lai, 2010).

The parties involved in tourism development include a variety of local actors; besides the Regional Council, local partnerships played a strategic role. According to Hospers (2003), these local partnerships are often small scale networks and include informal relationships between villagers, business men and local authorities, as well as more formalised network structures, such as public and private local institutions and socio-cultural cooperatives. This joint action has resulted in growing investments in quality resorts beyond Sardinia's coastline. Furthermore, the local cooperative efforts lead to the development of farm holidays on the many farms Sardinia still has. As a complementary strategy in tourism development, local actors have also promoted the production, distribution and marketing of regional specific agricultural products and traditional handicrafts that are sold as souvenirs to tourists (Renoldi, 2014).

In the light of the above premises, the Regional Council declared the necessity to define a tourism model, different from the "mass tourism" model of the Costa Smeralda and based on strategic choices, in order to achieve sustainable development based on tourism for the long run. This model may be capable of improving the whole Sardinian socio-economic condition, considering that not every possible tourism form is desirable in the territory.

The RPSDT represents a starting point for more mindful planning with regards to the various impacts that the tourism phenomenon determines to the other economic sectors, to the population and the regional landscape. First of all, the plan identifies three major critical points of the Sardinian tourism system:

- 1) the dominance of the "sun and sea model" (Smith, 1999) as a regional tourist product, which causes a twofold presence concentration (RAS; 2006 a) in space and time. As a matter of fact, 90% of tourism presences are mainly located along the coastal area, especially in North-East, North-West and South-East businesses structures of Sardinia, and in conjunction with the summer season, between June and September with a flow rate of around 80% of the regional amount (CRENOS, 2011). According to the RPSTD (2006) one of the main causes of the dominance of the sun and sea model is the inconsistency of

tourist business services. Many structures are mostly opened seasonally and not equipped enough for alternative tourism forms. In addition, along the coastline, private houses for rent can accommodate tourists, both in legally and illegally, contributing considerably to a particular kind of informal economy. This phenomenon forbids proper sizing of tourism services in a specific location;

- 2) the low degree of integration between the regional tourism sector and other productive sectors, such as the food processing industry or handicrafts. The Sardinian tourism system is not capable of integrating income generated by tourism flows with the rest of the economic sectors. According to the RPSDT (2006), one of the main causes lies in the Sardinian productive system: traditional sectors are not able to guarantee quantitative and qualitative standards required by the tourism sector, which often imports raw materials and foreign skills for production processes;
- 3) regional tourism system does not attract foreign tourists, which typically are higher spending oriented and more sensitive to purchasing local products than Italian tourists.

In the light of the above premises and according to the Lanzarote Conference principles (1995), the aims of the RPSTD are the following:

- 1) environmental protection and valorisation of natural resources;
- 2) the promotion and dissemination of environment knowledge and sense of identity;
- 3) the promotion of socio-economic development, mindful of the natural regional landscape.

In order to mitigate the weaknesses of the Sardinian tourist market, the RPSTD identifies different strategic actions, which directly affect tourism business facilities, tourism demand, and second house market simultaneously. These actions need to embrace two interrelated elements of sustainable development based on tourism: guarantee tourism activities for the future, ensuring environmental safeguard conditions, and create the possibility for local communities and the environmental context of absorbing and benefitting from the impacts of tourism in a sustainable way.

The success of tourism businesses is fundamental for host communities, which could profit by this sector. This requires supporting enterprises, competitiveness, and ensuring long-term viability, which needs satisfied tourists who return and recommend visiting that location to others. Delivering an experience that meets or exceeds expectations requires an emphasis on the quality of every component of the visitor's experience: mechanisms for checking, identifying and improving it, attention to value for money and the overall competitiveness of the destination and regular feedback from tourists (RAS, 2006 b).

One of the key actions expressed by the RPSDT is maintaining effective market access and regional tourism promotion. Enterprises must be able to preserve operative ways of directly, or through intermediaries, communicate with markets. For small, individual enterprises, this is often a significant challenge, which can be simplified through partnership work and developing strategies at destination level. Most opportunities

include the adoption of new market access forms and the use of information and communication technologies (RAS, 2006 b; Riganti, 2007). The priority of many tourism destinations is the promotion of a destination as a brand, the safeguarding of natural territorial features and the possibility of guaranteeing a high quality tourist experience.

Moreover, the natural environment's attractiveness and the general level of amenity and maintenance are fundamental to the viability of tourism enterprises (Pulina and Biagi, 2006). In terms of economic benefits, it is more important to integrate tourism within other economic sectors so as to avoid over-dependency on it, rather than allowing tourism to provide a consistent and reliable income source (RAS, 2006 b).

Finally, tourism projects that directly engage local communities during planning and implementation stages are much more likely to be successful in delivering local benefits and to be sustained over time (Zoppi, 2012). However, policies in this issue are not just about engagement through consultation processes, but also about empowering communities to influence decisions about the developments and activities that will affect their future, while thus enabling the needs of neighbouring communities to be taken into account (Sautter and Leisen, 1999; Waligo and al., 2013).

5.5 Some critical aspects of the RPSDT

As described above, the RPSDT is the first regional plan approved in compliance with RLP in Sardinia, in order to preserve the regional natural landscape and to promote sustainable development based on tourism. Nevertheless, very little research exists on it.

The plan identifies the reasons of the seasonality of Sardinia's tourism model. On one hand, many business services are mostly seasonal and not equipped for alternative tourism forms. On the other hand, the low degree of integration between tourism and other regional economic sectors, such as the food processing industry or handicrafts, lead to the incapability of guaranteeing the quantitative and qualitative standards required by the tourism business sector. Consequently, Sardinia has little aptitude to attract foreign tourists, who are more spending-oriented than Italians.

In light of these premises, the RPSDT identifies the lack of a global strategy for the development of Sardinia's tourism sector, which produces a partially implemented business. Nevertheless, the spatial dimension, as defined by Peroni (2007) and Cooper (2008) and expressed in Chapter 3, is not properly considered. Moreover, good planning processes need engaging local communities and recipients at their implementation (Zoppi, 2012; Wates, 2014); thus, it is much more likely to be successful in delivering local benefits and to be sustained over time. In the RPSDT lack of stakeholder involvement is notable, as much as

a careful analysis of tourist behaviour. Several conceptual models deal with the role of the psychological characteristics of the tourists, in terms of needs, perceptions, and motivation (Baker and Crompton, 2000); such components are considered important contributors to both the understanding of the travellers' behaviour (Dann, 2010) and the support of tourism planning approaches.

In the era of DI, this data, available on forums and reviews, is generated by users/consumers and may provide relevant knowledge for planning practices. This new trend could foster notable innovations in urban and regional planning methodologies (Zin et al., 2013; Campagna, 2014). Moreover, the integration of this information with traditional authoritative data sources may also represent an opportunity of great potential to eventually enrich tourism strategies with a broader, deeper and more multifaceted understanding of a place or of tourist destination.

5.6 Discussion

This chapter proposes a discussion on Sardinia's ruling framework, in terms of sustainability, landscape safeguard and sustainable development based on tourism. After an overview of international literature on sustainable tourism and planning for sustainability, the chapter pinpointed some key characteristics of the RPSTD, identifying some of its principles and recommended actions, which aim at landscape and coastal safeguarding, coupled with sustainable development based on tourism at regional level.

In Sardinia, coastal tourism is one of the principal driving forces of the regional economy. As a matter of fact, Sardinia's coastal areas have generally been considered as areas to be planned and managed in a special way for the fragility and peculiarity which intrinsically characterise them as well as for the number of activities and possible land uses, higher than those of inland areas. As a result of these activities, various conflicts of interests arise in coastal areas.

Because of this relationship between one of the key sectors of Sardinian economy and the need to safeguard coastal areas, the RPSDT has been prepared together with the RLP by the Regional Council. The plan represents a starting point for planning with more attention towards the impacts of the tourism phenomenon on the other economic sectors, the population and the regional landscape. Not all of the possible tourism forms are appropriate. The RPSDT identifies the lack of a global strategy for developing the tourism sector in Sardinia, which leads to a partially implemented business.

Nevertheless the spatial dimension, as defined by Peroni (2007) and Cooper (2008), is not properly considered. Moreover, in reaching good planning process, it is necessary to directly engage local communities and recipients in plan implementation. In the Regional plan for sustainable development

based on tourism, lack of stakeholder involvement is notable as much as a careful analysis of tourists' behaviour. These analyses could be considered as important contributors to both understanding of the individual's travel behaviour and supporting tourism planning approaches with this kind of information.

CHAPTER 6

Multidimensional analyses of tourism Social Media related Geographic Information

6.1 Introduction

The methodological approach builds on a preliminary exploratory analysis of social network contents of Sardinia, searching for the most popular destination, the relationships between service quality and location and the spatial distribution of tourists' preferences at regional and local levels. Leiper's conceptual model (1990), reviewed by Cooper (2008), represents the fundamental starting point, and can be summarized by the equation "*Appreciation and criticisms = Location + service quality*", already explained in Chapter 3. In order to explain each variable of the equation, the purpose of this research is to use geographic information data, in particular both Authoritative Geographic Information (A-GI) and Social Media related Geographic Information (SMGI). Combined A-GI and SMGI data are used to express location, while service quality is investigated through the SMGI support.

The goals of the methodological approach proposed in this thesis are the following:

- i) evaluating regional tourism supply distribution and location of interest;
- ii) identifying spatial patterns of tourists' preferences, including clusters of positive and negative judgments;
- iii) evaluating patterns and singular spots of interest;
- iv) finding a properly spatially calibrated model to analyse spatial non-stationarity (Fotheringham et al., 2003), in order to express the impact of spatial variation in the relationships among dependent variable (tourists' preferences) and socio-economic explanatory variables.

The analysis framework is provided for two scales (regional and local levels) and two dimensions (services quality and location) using both A-GI and SMGI. First of all, analysis on the regional scale is implemented to describe spatial patterns of tourists' preferences and to identify locations of interest; the latter may include clusters of positive or negative preferences, or individual spots of interest. Afterwards, at the local level (i.e. within the single cluster or spot of interest) further analyses were developed aiming at understanding the possible reasons behind the detected patterns and singularities, with the assumption that they may help explain success or failure factors with regards to destinations and service features.

At regional and local levels, an investigation method is adopted, including descriptive spatial analysis and spatial statistics techniques coupled with explanatory SMGI analyses, encompassing Spatial-Temporal

Textual analysis, which can be defined as the textual analysis constrained by space and time boundaries (STTx; Campagna, 2014).

Operationally, the study was carried out according to the following workflow:

1. data collection and geocoding; data was extracted from Booking.com and TripAdvisor.com, geocoded and integrated in a geodatabase for analyses;
2. regional preferences dynamics analysis; data was analysed for the entire region at the municipal unit of analysis with spatial analysis, spatial statistics, and Spatial-temporal textual analysis (STTx; Campagna, 2014) in order to detect clusters and hot/cold-spots;
3. local preferences dynamics analysis; data is integrated with authoritative information from the regional SDI and other official open data sources, in order to find explanatory hints on the tourist preferences dynamic and to get deeper insights on the relationships between these preferences, the local territorial features and the quality of the industry services in selected destinations;
4. geographically weighted regression, to investigate how the detected patterns changes spatially within a particular place. This cartographic approach may hinder the exploration of spatial non-stationarity by inadequately illustrating the spatial distribution of the sign, magnitude, and significance of the influence of each explanatory variable on the dependent variable.

The last three steps are carried on iteratively on the relevant clusters and spots of interest as in the examples reported in the remainder of this section.

6.2 Data collection and geocoding

In the first step of the methodology, a database is created by extracting data from TripAdvisor.com and Booking.com, in the period between May 2012 and May 2013. Through these applications customers can book, rank and review hotels, flights and restaurants (or Tourism Services, TS). The focus of the portals is to filter contents based on rankings derived from other users' ratings. Thus, rankings are split into several categories, such as value/price, rooms, location, cleanliness and sleep quality. Available rating categories, however, are determined by the type of reviewed item. The reviews are enriched by the possibility of adding multimedia elements, or travel maps of previous trips, or taking part in discussion forums. Thanks to the availability of the services location, they can thus be considered SMGI (Campagna, 2014).

Now the central challenge is how to manage this vast amount of data and to find efficient methods to extract useful knowledge from spatial data sets of unprecedentedly large size and complexity. To address these challenges, spatial data mining and geographic knowledge discovery has emerged as an active research field, focusing on the development of theory, methodology, and practice for the extraction of useful information and knowledge from complex spatial databases. These disciplines involve multiple steps,

including data selection, cleaning, pre-processing, and transformation (Andrienko and Andrienko, 1999; Miller and Han, 2009).

Thus, the study requires the adoption of a mixed methods approach, in which quantitative and qualitative information is collected in a database for analyses. The quantitative information concerns the scores of tourists' evaluation criteria, while qualitative information includes customers' textual descriptive reviews. With reference to the quantitative analysis it should be noted that in TripAdvisor.com a rating scale consists of five ordinal values (or stars), ranging from "terrible" to "excellent". A separate mandatory overall rating summarises the total customer satisfaction. In Booking.com a rating scale consists of numerical integer ordinal values, ranging from 1 to 10 (i.e. the higher the better). Besides quantitative assessment, in both platforms, a text box records qualitative natural language reviews. The title is a concise short text formulation of the assessment, while the comment is a long text field.

In order to spatially analyse the location of the tourism business patterns, geocoding is performed on the extracted addresses, providing the exact location of the tourism operators. A point's location is found automatically for around the 80% of the items, while due to a variety of reasons, approximately 20% of the geocoding required manual editing.

After the data collection and the geocoding, two geodatabases were created including Tourism Lodging Service (TLS) records extracted from both TripAdvisor.com and Booking.com.

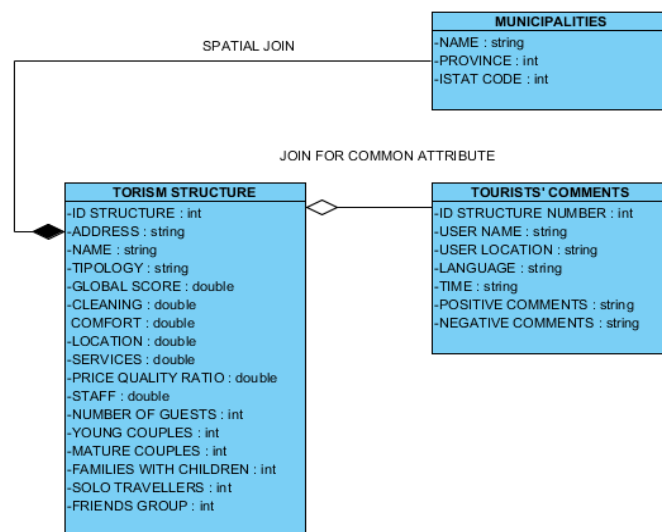


Figure 1: General database structure

For each TLS, the database includes a score record which is the average of six main attributes:

1. location, which is related to the geographic position of the structure;
2. services, referring to all transport facilities, shopping areas, bars and restaurants;
3. price/quality ratio, referring to structure cleanliness, staff kindness and all types of comforts offered by the operators;

4. staff (kindness);
5. room cleanliness;
6. comfort, related to all facilities and services that hotels provide for their customers.

It should be noted that the attributes Location and Services explain the territorial features of the destination, while the others express the perceived quality of the TLS supply. Figure 1 illustrates the general database structure.

6.2 Spatial analyses of tourism preferences

After the preliminary descriptive analysis of the preferences dataset, the second step of the methodology is the application of spatial analysis of tourism preferences to explore spatial patterns of positive tourists' judgments at the regional level. The application of spatial analytical techniques allows the exploration of the spatial dynamics of tourists' perception and their relationships with different variables.

Thus, the data model allows the investigation of the spatial patterns of tourist preferences on territorial and tourism industry features at the local level across the whole region. The analysis starts by mapping the Tourist Positive Preferences Incidence (TPPI, i.e. the ratio between the positive scores and the TLS by municipality) in Sardinia.

Visualising this type of information on a map and interpreting derived results is difficult and at times illegible. This issue of representation has been overcome by using the Hot Spot Analysis (tool of ArcGIS 10.1 version). The Hot Spot Analysis allows us to calculate the Getis-Ord G_i^* statistic for each feature in a dataset (Getis and Ord, 1992) by looking at each feature in the same neighbourhood.

The resultant z-scores and p-values give some clues of where features with either high or low values cluster spatially. A feature with a high value could be considered meaningful but may not be statistically significant if not surrounded by other high value features. In fact, only a feature with a high value surrounded by other features with high values will create a statistically significant hot spot (Ord and Getis, 1995).

The local sum for a feature and its neighbours is compared proportionally to the sum of all features; when the local sum is very different from the expected local sum, and that difference is too large to be the result of random chance, a statistically significant z-score results. In this specific case study, a statistically significant positive score indicates that the more a place is appreciated, the more the phenomenon is considered hot.

Applying a threshold distance ensures each feature has at least one neighbour, and this is important. For the purpose of this study the Incremental Spatial Autocorrelation by Distance (ISAD) was used. The ISAD calculates spatial autocorrelation for a series of distance increments, measures the intensity of spatial clustering for each distance and reports, for each distance increment, the associated Moran's Index

(Moran, 1948), Expected Index, Variance, z-score and p-value.

The cluster intensity is determined by the returned z-score. As the distance increases, so does the z-score, indicating intensification of clustering. At some particular distance the z-score generally peaks. The ISAD has been calculated at the regional scale considering each located hotel (points). For multi-points, the centroid is computed using the weighted mean centre of all feature parts. The weighting for point features is 1.

Figure 2 shows that in this case more than one statistically significant peak is present, the first one has a distance value of 22883.58 metres and the second one, which is the max pick, has a distance value of 33575.96 metres: this means that clustering is pronounced at each of those distances. Thus, to perform the analysis, the first peak distance was selected, which is the first statistically significant peak encountered that best reflects the question scale. The resulted distance value was used to identify clusters and spots of successful destinations through the preference patterns.

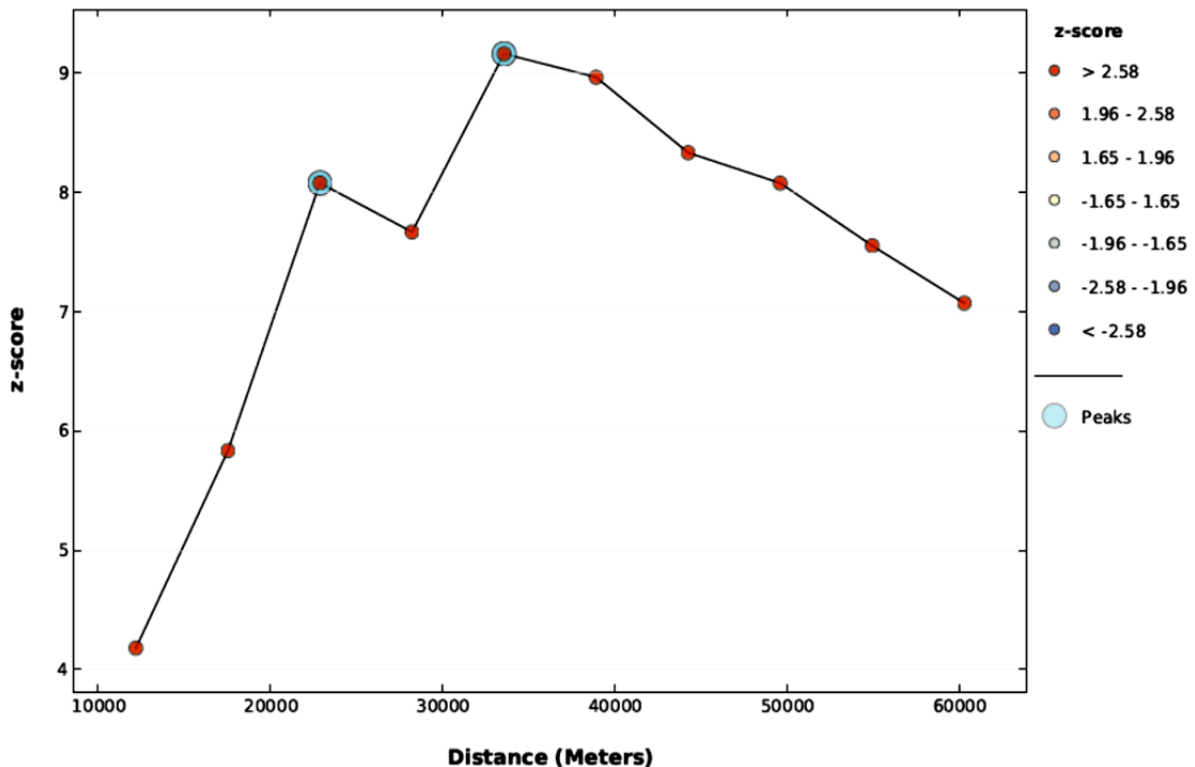


Figure 2: Incremental spatial autocorrelation by distance at regional level

6.3 SMGI analytics of destinations

After the analysis of tourism dynamics at the regional level, identifying clusters and spots of successful destinations through the preference patterns, the methodology adopted for this study shifted to the local scale for further analysis, aimed at finding explanatory answers for the phenomena under observation. The

shift from the regional to the local scale was also conducted relying on spatial analysis and spatial statistics techniques on an integrated SMGI/A-GI data database. The analyses at the local scale are intended to investigate the success factors within the single destination in order to extract useful information to be used for further planning in the same or other destinations.

As case studies for illustrating the methodological steps, four tourist destinations were chosen as the regional analyses demonstrated their highly successful performances. The municipalities studied were the following:

- Alghero, which is recognised as a best-selling destination by various types of tourists;
- Arzachena, where part of the Costa Smeralda district is located. This area is noteworthy for the high quality and fashionable holiday landscape; it is easily reached both by sea and air thanks to its strategic position;
- Cagliari, which is the capital of Sardinia, located in the South of the region. It is nationally and internationally well connected thanks to the airport and the marina;
- Dorgali, a coastal municipality located in the Nuoro province. Thanks to its strategic position, it can be considered a “bridge” between the Costa Smeralda district (which represents the historical tourism area) and the Ogliastra district (considered a novelty in terms of tourism destination).

Thus, for each of these locations, the questions one should answer were “Why does tourists’ interest concentrate in this destination?” and “What are the most meaningful features of the destination which attract the tourists’ attention?” In order to answer these questions, summarising the reviews by neighbourhoods, the maps below show the spatial clusters of preferences. Moreover the aim of this step is to understand not only where people go but also what people think, by analysing the review contents. The effective way of investigating why tourists prefer certain areas or destinations rather than others may be by the STTx on their reviews.

The analysis is carried out using the tourist comments’ database, which collected data regarding users’ origin, language used, time comment and the textual judgment, positive and negative. Overall, for Sardinia, more than 880.000 reviews were extracted.

The textual analysis, using Tag cloud, led to the discovery of knowledge enclosed in this vast amount of text comments. Tag cloud is essentially a visual representation of labels (tags) or keywords contained in different word strings. Generally, this representation is presented with a weighted word list in alphabetical order, where the larger font is attributed to the most repeated words (Kaser, 2007). Text analytics techniques allow the visualisation of relevant posts on the map (Berry and Kogan, 2010) not only by keyword but also by time, in order to discover the derived underlying knowledge, especially when the

amount of information grows rapidly.

6.4 Geographically Weighted Regression analysis

Spatial statistics analysis allows us to quantify spatial patterns of tourists' preferences, model spatial relationship and explain the factors behind observed spatial patterns, both at the regional and local level.

As explained before, using hot spot analysis should help answer questions as:

- 1) *Which are the most popular tourism destinations?*
- 2) *What attracts tourists' attention and what do they appreciate/disregard?*

The next logical question is why:

- 3) *Why do tourists choose those destinations?*

In this step of the methodology the study is supported by the integration of SMGI data with other A-GI data coming from the regional SDI.

The aim is twofold: on one hand, the study is performed to discover why tourists prefer a destination rather than another at the regional scale, and on the other hand, to investigate quantitatively why TPPI rate affected certain areas and what factors contribute to its higher value. The Geographic Weighted Regression (GWR) is used for both modelling the preferences phenomenon and testing the reliability of the hypothesis derived from textual analysis, in order to make appropriate decisions in terms of policy.

It was assumed that the model parameter estimates may vary across the study area and thus differ from ordinary regression models that produce one single estimating equation (Fotheringham et al., 2003, p 9). More in detail, in this context the GWR has been adopted to locate zones with homogeneous TPPI rates within urban areas: zones of urban areas with homogeneous environmental, structural and positional variables have been defined, excluding variables connected to specificity of property. From the technical perspective, the GWR provides a local model of the tourists' preference, which represents the dependent variable, by fitting a regression equation to every feature in the dataset.

6.4.1 Spatial Autocorrelation

The need to take into account elements that are strongly related to the good location, but not measurable even with the use of proxy variables, necessarily involves the use of spatial analysis techniques that are able to process the location variable.

The concept of "spatial autocorrelation" is central in this step of the methodology: geo-referenced observations are not generally independent of one another especially if they are close in distance to each

another (Getis, 2007). Cliff and Ord (1973) state that with regards to a single variable certain spatial units are related positively or unrelated to other spatial units and that there is dependence between spatial units.

According to Fotheringham (2009) the basis of spatial autocorrelation is spatial dependency, and the basis for local statistics is spatial non-stationarity; these two properties of spatial processes are not necessarily linked. Stationarity is defined as the spatial processes represented by explanatory variables behaving the same everywhere (Fotheringham, 1998). In addition, Fotheringham (2009) states that “the essence of spatial autocorrelation is that of spatial dependency: the situation whereby observations drawn from different locations are not independent of each other, with observations at locations nearer to each other being more similar (positive spatial autocorrelation) or less similar (negative spatial autocorrelation) than observations at locations farther apart”.

The description of the relationship between the degree of similarity between observations and the distance separating them is the key element in measuring spatial autocorrelation. Therefore, description of spatial dependency could define a spatial weighting function that relates the similarity of observations to the distance they are apart (Goovaerts, 2000). Spatial autocorrelation is a measure of the strength and direction of this relationship (Mennis, 2006).

The conventional regression equation can be expressed as:

$$(1) y_i = \beta_0 + \sum_{k=1}^n \beta_k x_{ik} + \varepsilon_i$$

where y_i is the estimated value of the dependent variable for observation i , β_0 is the intercept, β_k is the parameter estimate for variable k (regression coefficient), x_{ik} is the value of the k^{th} variable for i , and ε_i is the residual, i.e., the part of dependent variable not explained in the model (Fotheringham et al., 1998). Each explanatory variable is associated with a regression coefficient describing the strength and the sign of that variable’s relationship to the dependent variable. Instead of calibrating a single regression equation, GWR generates a separate regression equation for each observation. Each equation is calibrated using a different weighting of the observations, contained in the data set (Fotheringham, 2003).

The assumption is that observations near one another have a greater influence on each other’s parameter estimates than observations farther apart. The weight assigned to each observation is based on a distance function centred on observation i . In the case of areal data, the distance between observations is calculated as the distance between polygon centroids (Mennis, 2006).

Because the regression equation is calibrated for each observation independently, a separate parameter estimate (t -value) and best fit are calculated for each observation (Mennis, 2006; Manganelli et al., 2014).

These values can thus be mapped, allowing the analyst to visually interpret the spatial distribution of the nature and strength of the relationships among explanatory and dependent variables. It is possible to have positive or negative relationships between dependent and independent variables: according to the kind of relationship, a sign (+/–) is associated with the coefficients (Cliff and Ord, 1972). *R-Squared*, which quantifies model performance, is also derived from the regression equation. The value of R-squared ranges from 0 to 100 percent (Charlton and Fotheringham, 2009).

In order to best model the TPPI phenomenon, it is fundamental to define all factors which may influence the analyses. The central point is to find the main variables in phenomenon modelling, defining the dependent variable and identifying the possible independent variables. It is also important, before analysing data with the GWR, to test the possible independent variables to adopt with the *Ordinary Least Squares* (OLS) (Anselin et al., 1996). The OLS estimated for the coefficients in the initial model can be expressed as:

$$(2) \quad b = (X' MX) - X' My$$

$$(3) \quad M = I - Z (Z' Z) - Z' \text{ (Anselin, 1988).}$$

The OLS is an important diagnostic test to identify statistically significant explanatory variables, so they can later be used to develop the best model.

In this study, the OLS should answer the question “Which explanatory variables are meaningful in conditioning tourists’ choices?” The OLS is necessary to calculate a coefficient for each candidate explanatory variable and to reveal the probability, indicated as p-value, that this coefficient is actually zero. When the p-value is smaller than 0.05, the associated explanatory variables could be considered important within the model.

All explanatory variables must include different aspects that could describe the phenomenon and be independent from each other. Thus, for each variable it is necessary to measure possible redundancy; in the OLS the Variance inflation factor (VIF) indicates the measure of redundancy and could help determine which variables may be excluded from the model. Generally, a VIF value above 7.5 could be problematic (Mennis, 2006).

Furthermore, two key measures of the OLS, R-Squared (or adjusted R-Squared) and Akaike information criterion (AIC) (Akaike, 1973), are significant in understanding if the variables assumed in the analysis are meaningful. R-Squared results are generally included between 0 and 1. A better predictive performance has been highlighted by values close to 1. A low AIC value indicates a good measure of model performance (Akaike, 1973).

Finally, an additional test of model performance is the *Moran Index I*, which deals with residuals (Anselin et

al., 1996). It is fundamental to analyse that spatial dependence does not occur in residuals, verifying a random spatial distribution (Fotheringham, 2002). The Moran test concerning the spatial autocorrelation of a variable X , which takes values over a finite number of spatial units $i, i=1, \dots, N$, is defined as follows:

$$(4) I = \frac{N}{S} \frac{\sum_{ij} W_{ij} (x_i - \bar{x})(x_j - \bar{x})}{\sum_{ij} (x_i - \bar{x})^2}$$

The Moran Index I (Moran, 1948) is a global measure of spatial autocorrelation and its values can be included between -1 and 1 : if the Moran Index I is close to zero, data are randomly distributed, if the term is higher than zero, autocorrelation is positive, otherwise it is negative.

Model residuals may be plotted as a map that more explicitly reveals particular patterns of spatial autocorrelation, e.g. or non-stationary of spatial autocorrelation, and in particular if some variable is missing. If the p -value of the test is 5 or 10% lower, a spatially-lagged dependent variable should be added to the set of covariates in order to make the model unbiased, since it is very possible that the values of the dependent variable are spatially auto-correlated.

6.5 Discussion

This chapter discusses the methodological approach adopted in the thesis, which provides a novel and integrated A-GI/SMGI method. Considering Cooper's statement "*Appreciation and criticisms = Location + service quality*", in order to explain each variable of this equation, the method builds on the GI analytics model. A set of spatial analysis and statistics techniques are used at different geographic scales (regional and local) to describe and visualise the spatial distribution of tourists' preferences. The goals of the methodological approach are to evaluate the regional tourism supply distribution and the location of interest, detect significant patterns of tourist preferences and singular spots of interest, evaluate them and develop a properly spatially calibrated model to assess the influence of tourist preferences on the distribution of other socio-economic variables from regional SDI.

This kind of approach could give empirical contributions to the evaluation of social media data using spatial analysis tools in tourism literature. The first one is related to the use of exploratory spatial analysis as a method to visualise and interpret visitors' perception based scores. In addition, the integration of SMGI with A-GI can disclose innovative analysis opportunities in spatial planning, with regards not only to measures of geographic facts but also to tourists' perceptions and opinions on places, localities or tourism destinations.

The literature on tourist services distribution highlights several issues and debates, but often the spatial

dimension of the tourist's subjective perception is omitted so far. The measure of this spatial dimension and its representation may open new opportunities for planners as well as new research challenges, in order to use authoritative and social media related GI for pluralist and customer-oriented policy-making in tourism planning. In this sense the approach integrates SMGI with a more complex territorial model, relying on further official spatial data coming from regional SDI. Thus, the GWR may be able to assess the influence of tourist preferences on the distribution of selected environmental and socio-cultural variables.

CHAPTER 7

The case study and the analysis of results

7.1 Introduction

This chapter sets out the findings from the qualitative and quantitative research carried out in order to identify spatial patterns of tourists' preferences, including clusters of negative preferences, and to obtain more detailed information about singular spots of interest.

After the explanation of the logical framework, Section 7.1 presents a first set of findings from the TripAdvisor.com and Booking.com data collection and geocoding. In this step of the methodology, the study required the adoption of a mixed methods approach, in which quantitative and qualitative information is collected in a database for analysis. The quantitative information concerns the scores of tourists' evaluation criteria, while qualitative information includes customers' textual descriptive reviews.

Section 7.2 discusses results of the application of spatial analyses of tourist preferences to explore spatial patterns of positive tourists' judgments at the regional level. The application of spatial analytical techniques allows the exploration of the spatial dynamics of tourists' perception and their relationships with different variables. After the analysis of tourism dynamics at the regional level, the methodology shifted to the local scale for further analyses, aimed at finding explanatory answers for the phenomena under observation, as explained in section 7.3.

The last section quantitatively illustrates outcomes from the geographically weighted regression, which is used to model spatial relationships and explain the factors behind observed spatial patterns, both at the regional and local level.

7.1.1 The logical framework

The methodological approach allows exploration of tourists' preferences regarding destination and tourism industry and services, as represented by numerical judgments and textual reviews collected from TripAdvisor.com and Booking.com. A traditional method for collecting information about such preferences, performed via ad-hoc surveys, can be expensive and time consuming. For this reason, an alternative approach has been used, by which tourists' preferences concerning location and services are discovered by processing and analysing online social media data.

The underlying assumption is that this kind of study and its provided methods and tools could be used

successfully in urban and regional planning as much as in tourism planning, for in both cases they take into account a multifaceted customer-oriented view on strategic development issues.

In order to analyse the relationship between tourist demand, tourism industry supply and destinations, a two scale-two dimension analysis framework is provided, integrating A-GI and SMGI. The investigation is carried out as follows.

First of all, after the data is collected, geocoding and creation of a geodatabase for analyses has been carried out, regional distribution of tourist industry supply and locations of interest are evaluated. Secondly, analyses at the regional scale are implemented to describe spatial patterns of tourists' preferences and to identify locations of interest; the latter may include clusters of positive preferences, or individual spots of interest. Data was analysed for the entire region at the municipal unit of analysis with spatial analytics techniques. This analysis starts by mapping the incidence of tourists' positive preferences and applying a threshold distance (or *Incremental Spatial Autocorrelation Distance*, ISAD) between each spatial unit. Hot spot analysis aids in visualising this type of information in a map and interpreting derived results. Moreover, textual analysis using Tag cloud led to the discovery of knowledge enclosed in the vast amount of text comments related to each single cluster of interests.

Then, at local level, i.e. within the single spot of interest, further analyses combining hot spot and textual analysis techniques were developed, aimed at understanding the possible reasons behind the detected patterns and singularities. The SMGI data are integrated with the A-GI and other official open data sources, in order to find explanatory clues on the dynamics of tourist preferences and to get a deeper insight on the relationships among these local territorial features and industry service quality in selected destinations. Findings may help explain success factors with regards to destinations and services quality.

Outcomes of the previous step suggest taking into account elements that are strongly related to a good location, which could be measurable using spatial analysis techniques that are able to process the location variable. Thus, the Geographically Weighted Regression (GWR) quantifies the relationships between tourist preferences and other selected socio-economic variables, which differ from location to another. The GWR is used for both modelling the preferences phenomenon and testing the reliability of the hypothesis, which comes from the Textual analysis, in order to make appropriate decision in terms of tourism policy.

7.2 Data collection and geocoding

In this step of the study, a database was created extracting data from TripAdvisor.com and Booking.com in the period between May 2012 and May 2013. Geocoding was performed on the extracted addresses, providing the exact location of tourism operators, in order to spatially analyse the location of tourism business patterns in Sardinia. Point locations are found automatically for around 80% of the items, and

approximately 20% of the geocoding required manual editing.

After the data collection and the geocoding, two geodatabases were created, including 2100 TLS records extracted from TripAdvisor.com and 1900 TLS records extracted from Booking.com. Both databases contained a representative sample of different types of lodging services. A unified database of 992 records was used as a working set. The records provide the lodging service name, category, location, and related quantitative score. It should be noted that the lodging service category includes not only hotels, but also other types of accommodation such as resorts, Bed and Breakfasts or farm holiday facilities. The 992 record dataset includes only and all of the TLS featuring in both sources for which all data was available, and can be considered a representative sample. As a matter of fact, the sample represents 1/5 of the TLS institutional database, excluding private accommodation. (Elaboration taken from Provincial Authority, made by Regional Statistic Service in 2011).

The main issue was to manage this vast amount of information. Thus, the study required the adoption of a mixed methods approach in which quantitative and qualitative information was collected in a database for analysis. The quantitative information concerns the scores of tourists' evaluation criteria, while the qualitative information includes their textual descriptive reviews.

7.1.1 Spatial distribution of Tourism Lodging Service

Concerning the quantitative analysis it should be noted that in TripAdvisor.com the rating scale consists of five ordinal values (or stars), ranging from 'terrible' to 'excellent'. A separate mandatory overall rating summarizes the total customer satisfaction. In Booking.com a rating scale consists of numerical integer ordinal values, ranging from 1 to 10 (i.e. the higher the better). Besides quantitative assessment, in both platforms, a text box record allows users to write qualitative natural language reviews. The title is a concise short text formulation of the assessment, while the comment is a long text field.

The 992 record dataset also includes the tourist presence featuring in both sources, for which all data was available and was considered a representative sample. Figure 3 shows the tourists' spatial distribution. The emergence of destinations not generally considered classic tourist destinations, such as the Sulcis-Iglesiente, the Ogliastra and the Nuorese areas, is clearly noticeable from the map.

Figure 4 shows the spatial distribution of the customer reviews on the TLS in Sardinia, divided into five main categories: farm holidays (6%), Bed and Breakfasts (15.7%), hotels (42%), private accommodations (29%), residences and resorts (7.3%) (of total numbers of operators).

The analysis results by provinces revealed that three provinces emerge as important tourist destinations in

the tourists' perception: Olbia-Tempio (27,8%) Sassari (24%) and Cagliari (20,6%). The other four provinces (Nuoro 8,6%, Oristano 7,3%, Ogliastra 5%; Carbonia-Iglesias 4%) are well represented by tourism businesses; whilst the province of Medio Campidano is only represented by 3% of tourist enterprises.

In addition, analysis of the significance of tourist appreciation in coastal and inland areas in Sardinia revealed that 92% of tourism reviews sample concerns TLS (917) in the coastal areas, while only less than 8% of popular tourism businesses are found inland. Nevertheless, the provinces of Nuoro and Medio Campidano together provide notable inland popular TLS with almost 13% of the total number of reviewed tourism businesses. This may mean that tourists visit these areas to discover a less popular side of the island, which is characterised by its landscape, cultural heritage and traditions. However, in terms of number of tourists, this kind of tourism still does not compete with massive preferences for tourism along the coastal area.

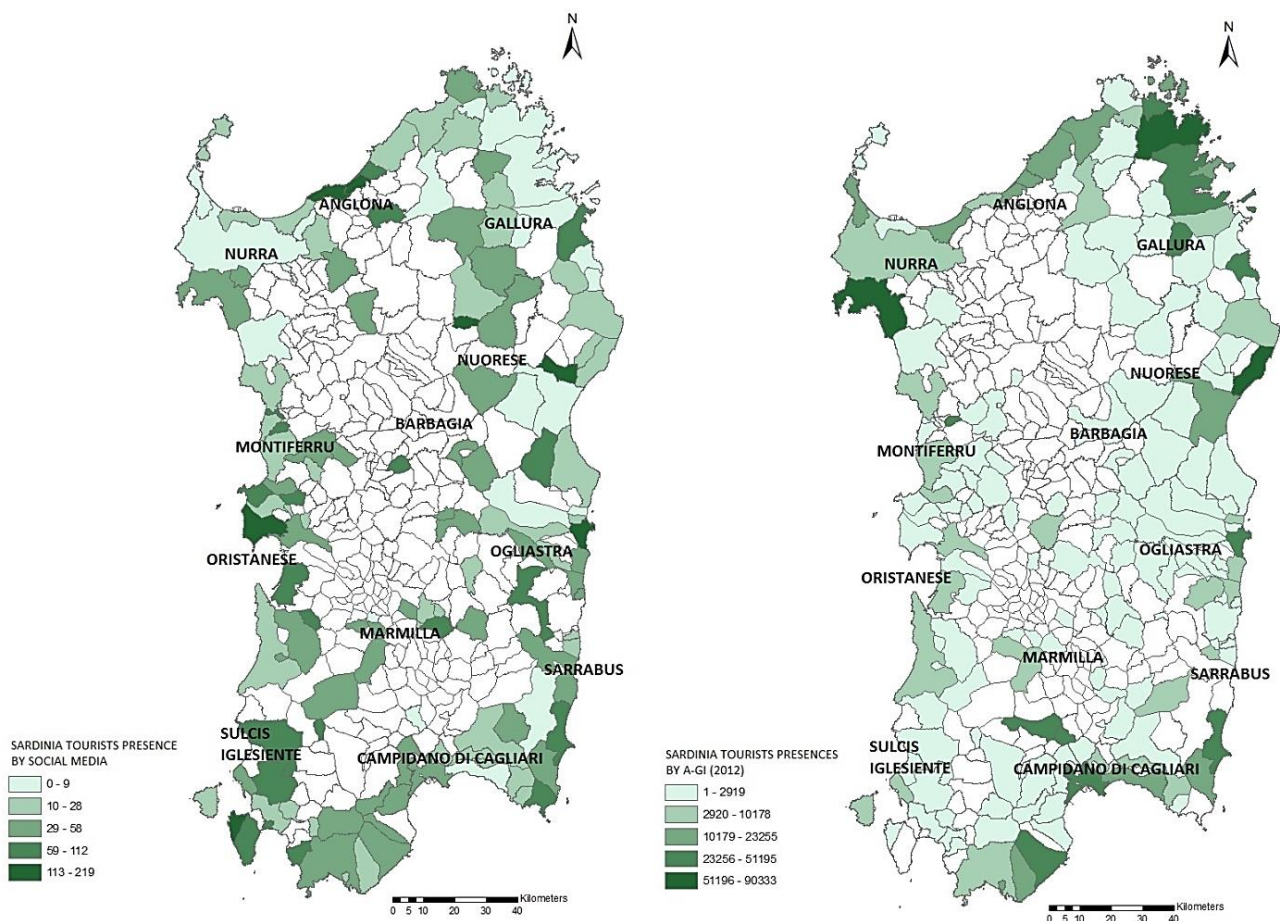


Figure 3: Tourists presence distribution by municipality from SM data (left) and A-GI data (right)

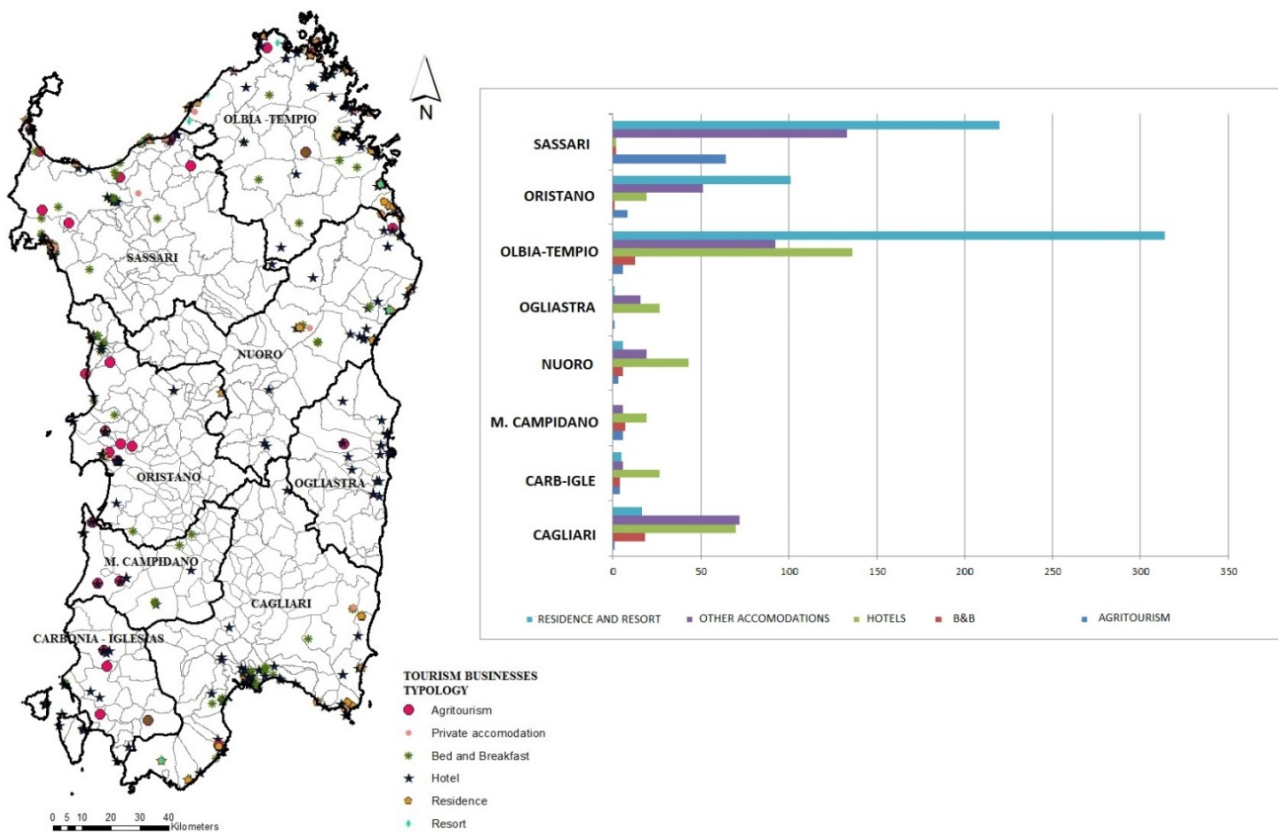


Figure 4: Distribution of tourism businesses typology by provinces

7.1.2 Spatial distribution of user comments

Preference sets and destination attributes can be matched to specific psychographic profiles of tourists (Kozac, 2002). Each destination offers a variety of products and services to attract tourists, and each tourist has the opportunity to choose from a set of destinations. Different factors may have an influence on destination choice, i.e. age, income, personality, cost, distance and nationality (Crompton, 1992).

In light of the above premises, the aim of this analysis is to understand the relationship between tourist destinations and tourist typologies from different nationalities. These findings are important for destination management to learn the profile of its customers and implement effective positioning and planning strategies.

A database of over 880.000 records, concerning tourists' comments, was used as an informative database. The records contain tourist user name, typology, nationality, and related textual review. It should be noted that the tourist typology included six main categories: families with older children, families with young children, groups of friends, solo travellers, mature couples and young couples.

Figure 5 displays where the user comments come from. The map shows a worldwide origin coverage of tourists who travelled to Sardinia, stayed at one location, and wrote the review. Evidence shows that most

of the comments came from Italian regions. 41.87% of the tourists came from Italy and 58.13% from a foreign country. Most of the Italian tourists came from central and northern regions; more than half of them come from four main regions: Lombardy (28.1%), Lazio (25.7%), Tuscany (18.2%) and Piedmont (13.3%). Regarding the origins of foreign tourists, more than 10.9% were from France, followed by Germany (6.84%) and the United Kingdom (5.04%). These three countries represented almost 22% of the foreign tourists.

Apart from the French, who traditionally provide a high percentage of foreign tourism in Italy, the British and Swiss presence is probably related to the low-cost flights linking London to Alghero and Cagliari to Paris, Frankfurt. and Geneva. However, growing interest in discovering Sardinia's landscapes by tourists from other countries, such as South America and the United States, is also noteworthy.

The analysis of tourist nationality also shows that tourists from Spain, Sweden, Norway and Ireland stayed in the macro area of Alghero, probably because of the direct flight connections to and from these countries. Tourists from France and Germany stayed in Cagliari. In addition, people from Russia, Eastern Europe (even if they constitute a very small amount), Belgium and the Netherlands prefer Cagliari as a tourist destination. Russian tourists in particular prefer the Cagliari area as their destination. It is probable that the introduction of the Cagliari-Russia flight route represents a further and more interesting development for both the presence of Russian people and the Cagliari-Elmas airport. Providing this direct connection, Cagliari could reach a large pool of potential customers, distinguishing itself from Olbia and Alghero airports, which do not handle any connections with any Russian airport. In addition, examining the tourist data from Russia, Russian people who choose Sardinia as their holiday destination tend to be concentrated in the Costa Smeralda and in the province of Cagliari (in Villasimius, Pula and Domus de Maria destination).

Finally, tourists from the United Kingdom show equal preference for the North and South of the island.

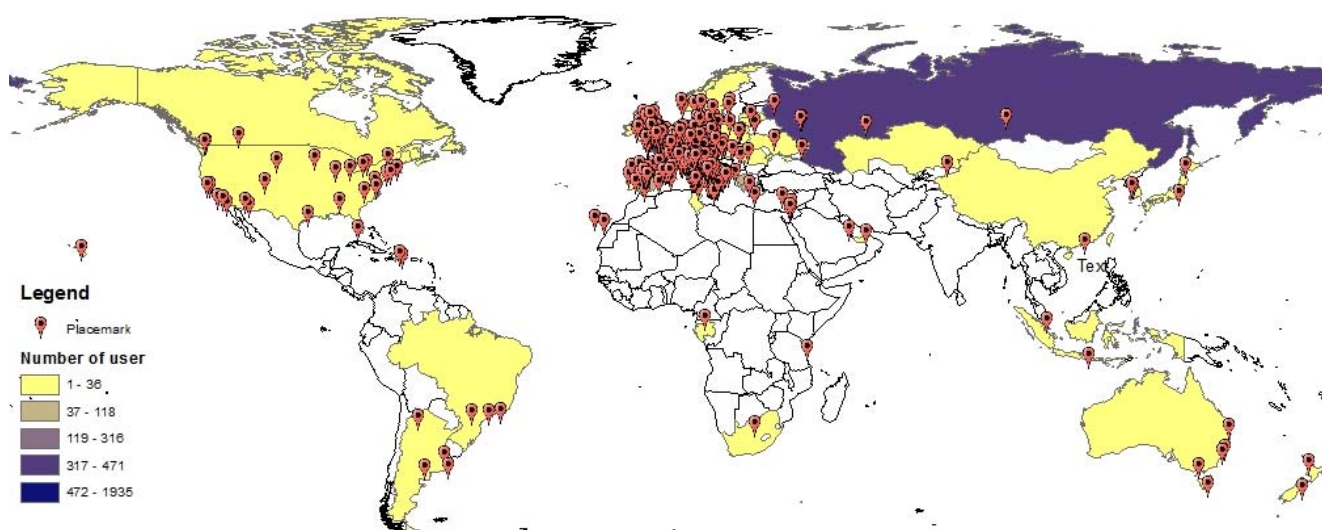


Figure 5: Spatial distribution of user comments

Analysing the spatial patterns of TLS typology together with the semantic of their reviews may offer interesting clues to characterise different destinations for tourism planning purposes. For example, it can be noted from the analysis that Cagliari TLS supply is characterised by a strong dominance of Bed and Breakfasts, while for Alghero and Olbia, which are also major coastal city tourism centres, hotels and residences are more popular among tourists.

7.2 Spatial analyses of tourism preferences

After the preliminary descriptive analyses of the preferences dataset, the second step of the methodology consists in the application of spatial analyses of tourist preferences to explore spatial patterns of positive judgments at the regional level. The application of spatial analytical techniques allows the exploration of the spatial dynamics of tourists' perception and their relationships with other territorial variables. For each TLS the database includes a score record, which is the average of six main attributes:

1. location, which is related to the geographic position of the structure;
2. services, referring to all transport facilities, shopping areas, bars and restaurants;
3. price/quality ratio, referring to structure clearness, staff kindness and all types of comforts offered by the operators;
4. staff (kindness);
5. room cleanliness;
6. comfort, referring to all facilities and services that hotels provide for their customers.

The attributes "location" and "services" explain the territorial features of the destination, while others express the perceived quality of the TLS supply. Thus the data model allows the investigation of preference spatial patterns on territorial and tourism industry features at the local level across the whole region.

7.2.1 Clusters of tourists' preferences

The following analyses show examples explaining which favourite destinations are both globally and by the two perspectives. The analysis starts by mapping the Tourist Positive Preferences Incidence (TPPI, i.e. the ratio between the positive scores expressed and the TLS by municipality) in Sardinia. Figure 6 shows the distribution of the TPPI (left). The TPPI shows an overall high spatial concentration in the North-East of Sardinia. The Costa Smeralda district is the only area where the global tourism preferences fulfil overall tourists' expectations. Looking at individual municipalities, the analysis shows that Alghero has the highest TPPI rating. The other two municipalities with a high TPPI are Cagliari and Olbia.

The purpose of this map is to identify surfaces already affected by the phenomenon, but also potential

development areas. It is notable that most of the municipalities located in the coastal area attracted the attention of the participants, while the mostly inland area represented a cold spot. The presence of three major clusters representing the spatial distribution of the TPPI within Sardinia is also noteworthy.

The first cluster is located in the Nurra district and includes the municipalities of Sassari, Stintino and Alghero. The presence of this cluster is probably due to the city of Alghero, unique municipality which preserves its Catalan tradition. The second cluster is in the Cagliari metropolitan area. This is one of the Sardinia economy point, and due to its strategic location has become one of the most popular tourism destinations.

Finally, the last cluster covers a large part of the Gallura district and, with the coastal municipalities of Baronia and the Supramonte districts, creates a linkage with the Ogliastra district, a recent popular area as tourism destination. The Gallura area represents the ancient tourism area because of the Costa Smeralda, which started to be recognised by the foreign market in the sixties thanks to Prince Aga Khan and his massive investment in this area. The Costa Smeralda has always aimed at an élite type of tourism; this should be the reason why international tourism starts to increase.

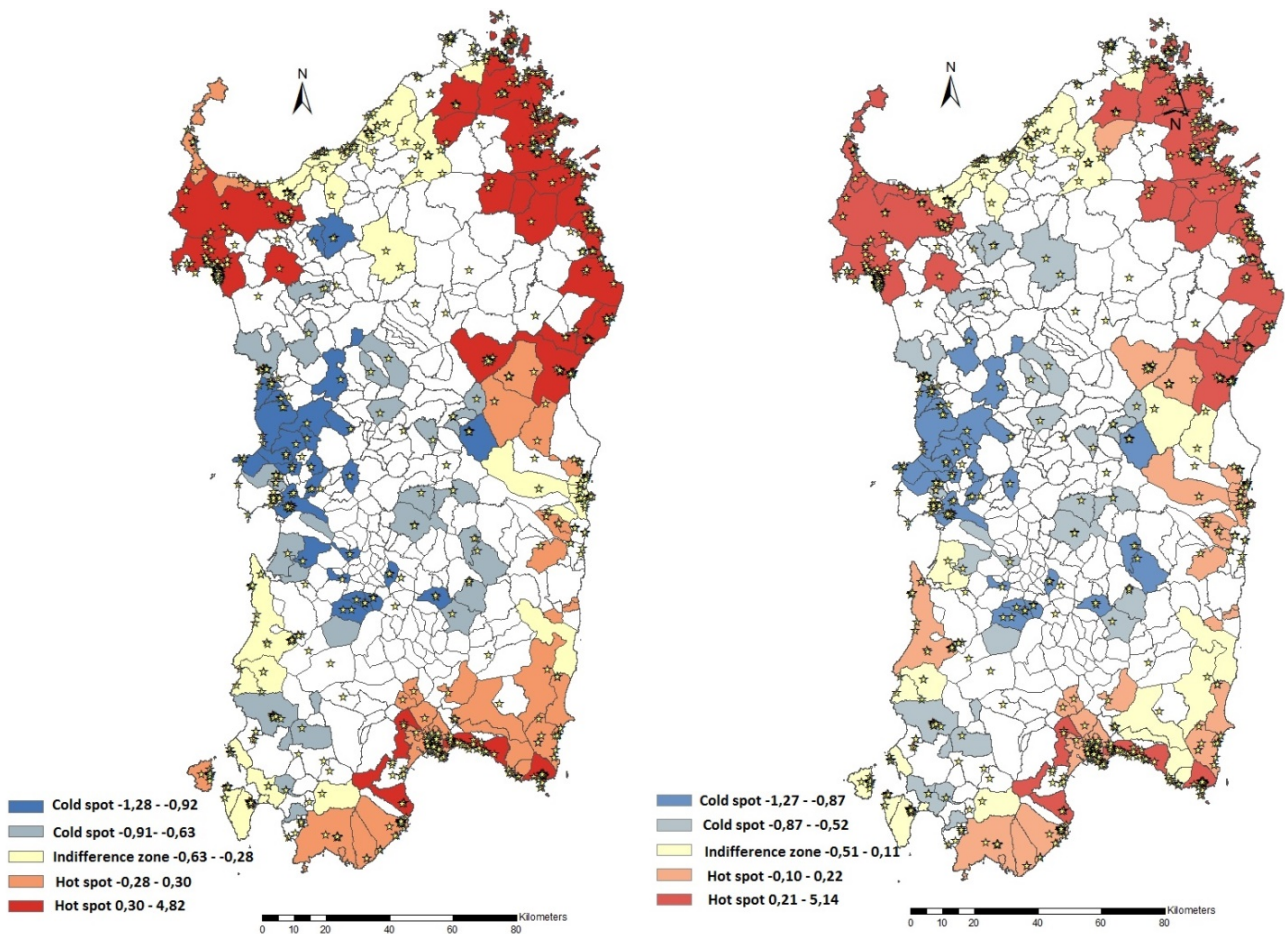


Figure 6: Cluster of TPPI (left) and negative judgements (right)

The spatial continuity between the old tourism areas and the young ones is worth noting. Also in Figure 6, the map on the right shows the pattern of the negative judgments. The analysis of the preferences also allows detecting the areas by typology of users. The map in Figure 7 shows the results for location preference distribution (left) and services preferences distribution (right).

The textual analysis of tourist reviews also indicates a high level of satisfaction with the destination and the services. According to the tag cloud results, the majority of the words in the posts refer to spatial features and tourism structures, such as locations, hotels and beaches, and are related to TLS located in the Costa Smeralda area, Alghero and overall the south area. Other frequent words, such as restaurant and typical food indicate a high level of satisfaction with both the destination leisure site and territorial traditions. These words are enclosed within a minor detected pattern located in the Marmilla district as shown in Figure 7. Thus, the main reason for tourists to visit Sardinia seems to be related to both its natural attractions, which include landscape features such as beaches, and the presence of a unique cultural heritage and local traditions. This determines different overall TLS models for the destinations. The analysis of the content of the reviews for the different models may help get better insight on the success factors of the different models, and provide useful clues for choosing the more sustainable tourism development model for other underdeveloped destinations.

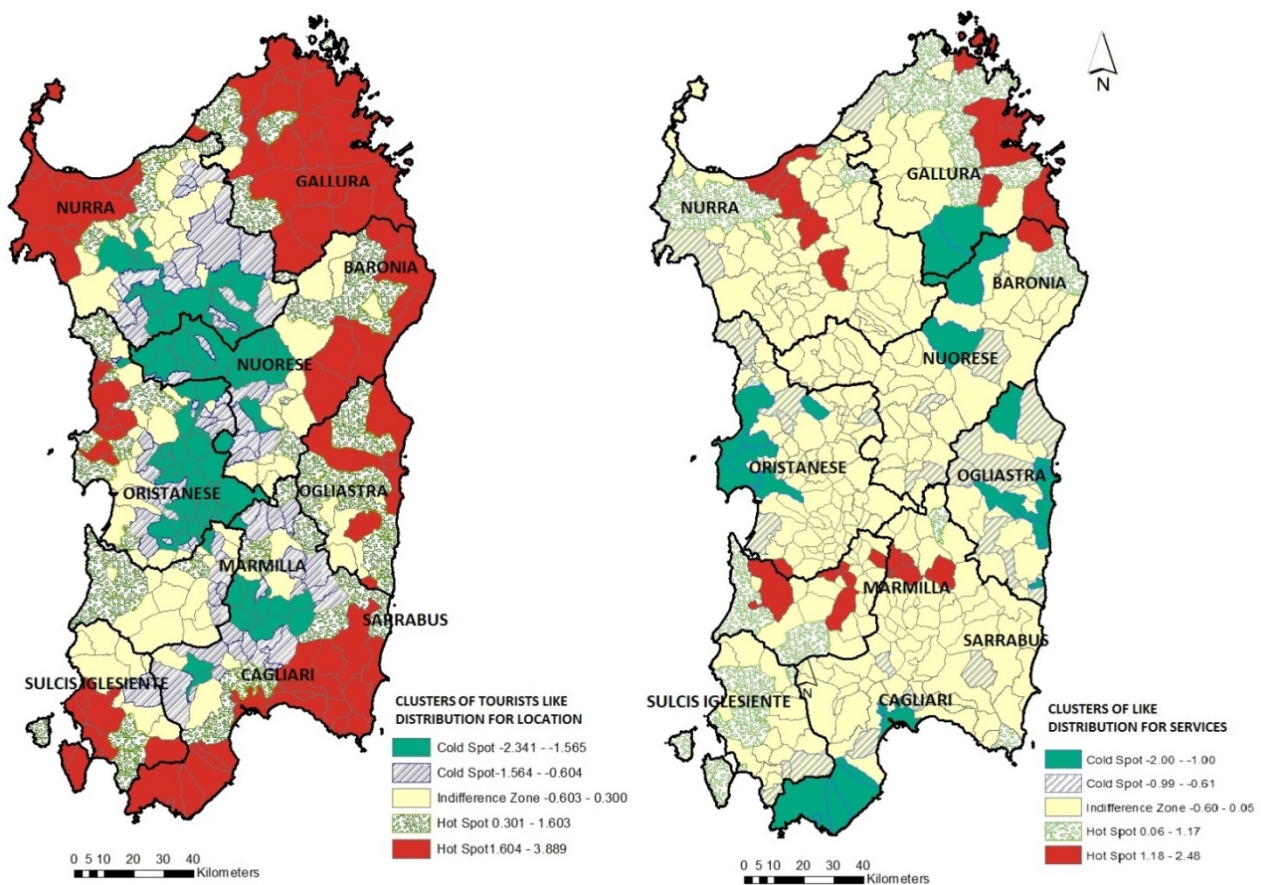


Figure 7: Location preference (left) distribution and services preferences distribution (right).

7.2.2 Preferences by tourists' typology

Jafari (1989) argued that focusing on the tourists themselves and their typological forms helps explain why people are attracted to a specific destination. One of the better-known tourist typologies is that developed by Cohen (1974), who was the first to propose a tourist typology based on sociological theory. He suggested that different tourists fall into four different categories: the organized mass tourist, the individual mass tourist, the explorer and the drifter. This categorization depends on their preferences toward the experience of novelty and strangeness/familiarity (Keng and Li Cheng, 1999).

Organised mass of tourists are highly dependent on institutional facilities of the tourism system. They are characterised by all inclusive and full package holidays. Their itinerary is set in advance and all their stopovers are well prepared and guided. Familiarity is at a maximum, novelty at a minimum.

Individual mass of tourist are defined as the least adventurous type. They use the institutional facilities of the tourism system (scheduled flights, centralised bookings, transfers) to arrange as much as possible before leaving home; perhaps visiting the same sights as mass tourists but on their own terms.

Explorer tourists are defined as people who arrange their trip alone; they try to get off the beaten track as much as possible, but they nevertheless look for comfortable accommodations and reliable means of transportation. They try to associate with the people they visit and to speak their language.

Drifters are tourists who seek novelty at all costs. They try to avoid any contact with other tourists because novelty is their ultimate goal. This type of tourist has no fixed itinerary or timetable; they are almost completely immersed in the host culture. Cohen's typology, however, does not allow for variable tourist behaviour over time.

In the sample analysed the qualitative data were clustered into six tourist categories:

1. families with young children;
2. families with older children;
3. mature couples;
4. young couples,
5. groups of friends;
6. solo traveller.

Each cluster is characterized by the preferences identified by participants for their choice of destination, the types of facilities they like, and the views they expressed about the business structure. The exploratory analysis of the dataset was conducted through both the observation of tourists' spatial distribution in Sardinia and the tag cloud analysis of textual contents. The goal of the analysis was the investigation of

perceptions and opinions of tourist typologies about the different destinations, in the light of both their spatial distribution and the topics emerging from the textual analysis of reviews contents. All together these analyses are able to cover different scales of spatial planning.

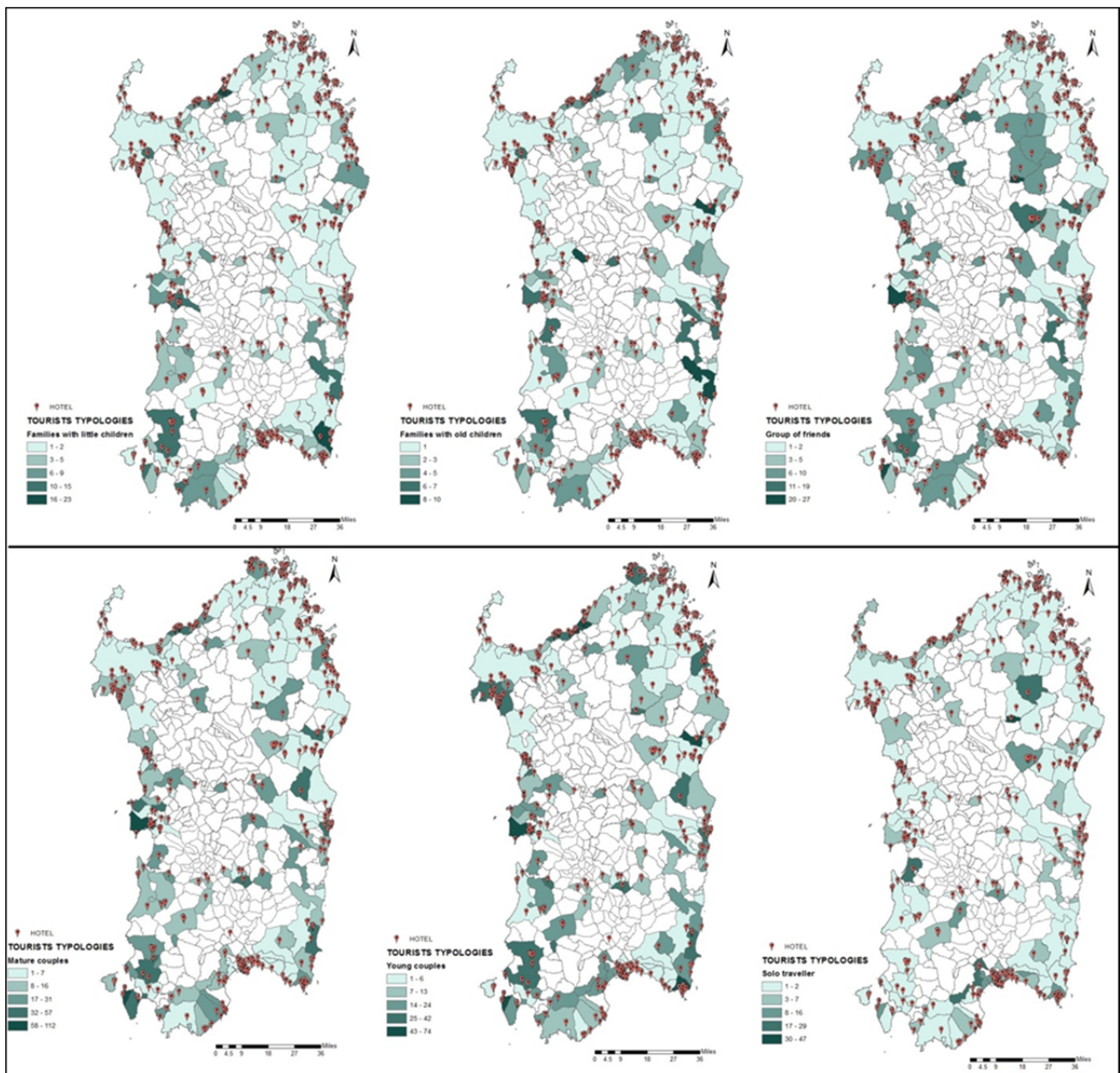


Figure 8: Distribution of different tourists' typology

Figure 8 shows the results of the tourists' spatial distribution by tourist typology. Results indicate that the categories "families with young children" and "families with older children" have the same distribution and appreciate the same locations: they are mostly located in the coastal areas, both in the South West of Sardinia, in destinations such as Cabras, Arbus, Bugerru, Iglesias and Teulada, and in the south-East, especially in Villasimius, Castiadas and Ogliastra. The category "group of friends" appreciates both the coastal and inland areas: in fact, an interesting preference cluster appears in Nuoro, in the inner Gallura

district and in Ogliastra. “mature couples” and “young couples” categories opt for both coastal and mountain holiday solutions: their presence affect the Sinis, the Sulcis Iglesiente and the Nuorese areas. The tourist destinations of Cabras, Calasetta and Castelsardo demonstrated its highly successful performance for mature couples, while Alghero, Cabras, Santa Teresa di Gallura were the most popular destinations for young couples. Finally, the “solo traveller” category was located in the metropolitan area of Cagliari and in the Nuorese.

The dataset shows a uniform spatial distribution over the Sardinian coastal areas, and, by doing so, fosters opportunities for a general comprehension of user contents and trends at the regional scale. Another effective way to investigate why different tourist typologies prefer certain areas or destinations rather than others may be given by the STTx analysis on their reviews. The aim is to understand not only where different tourist typologies travel to, but also what they think about their destinations by analysing the reviews content. The textual analysis was also conducted on the textual review of each TLS to discover the most frequent words in the dataset. The tag-cloud is the visualization of word frequency in a weighted list and in graphical form, and is suitable for depicting the topicalities of a text and recognizing possible underlying information.

The textual analysis searched for the 15 words used the most on comments associated with each TLS and divided them into categories, to investigate potential dissimilarities in content and to improve the understanding of detected words. The resulting tag cloud shows different words for the considered textual contents, and allows the researcher to identify the actual preferences for each typology of tourist. Moreover, a semantic analysis leads toward the identification of an underlying set of common categories. Thus, the words have been classified accordingly. Most of the words belong to four main categories, according to Leiper’s model (1990) revised by Cooper (2009): (1) geographic location, (2) services, (3) accessibility, (4) natural components.

In the first category are words referring to spatial position (i.e. location) or physical places (city) of destinations, while in the second category are words related to services or business facilities. The third category includes words related to accessibility (i.e. main roads), and the last category words relative to natural (i.e. landscape) and non natural components, such as historical buildings or the city centre. The 15 words used the most, divided by category, are listed in the figures and tables below.

CATEGORY	WORDS [frequency]
Geographic location	location [1481]; environment [458]; area [208]
Services	room [934]; stuff [801]; breakfast [699]; hotel [478]; quality [364]; price [361]; food [314]; restaurants [224]
Accessibility	
Natural and no natural components	sea [445]; city centre [325]; beach [313]

Table 1: Top 15 words used by young couples divided by category

CATEGORY	WORDS [frequency]
Geographic location	location [1480]; view [458]; area [208]
Services	stuff [800]; food [699]; cleanliness [511]; hotel [478]; quality [361]; relax [314]; garden [279]; restaurants [224]
Accessibility	parking [137]
Natural and no natural components	beach [548]; sea [445]; shopping [364]

Table 2: Top 15 words used by mature couples divided by category

CATEGORY	WORDS [frequency]
Geographic location	location [576]; view [334]; nature [112]
Services	stuff [377]; hotel [232]; quality [207]; price [186]; cleanliness [181]; kitchen [165]; apartment [129]; swimmingpool [118]
Accessibility	proximity [147]
Natural and no natural components	sea [2153]; beach [265]; city centre [108]

Table 3: Top 15 words used by families with old children divided by category

CATEGORY	WORDS [frequency]
Geographic location	location [1758]
Services	stuff [1121]; room [991]; breakfast [616]; swimmingpool [574]; cleanliness [552]; price [427]; restaurant [279]; animation [222]
Accessibility	proximity [269]; parking [216]
Natural and no natural components	beach [1000]; sea [736]; shopping [515]; city centre [367]

Table 4: Top 15 words used by families with little children divided by category

CATEGORY	WORDS [frequency]
Geographic location	location [1214]; village [376]; environment [341]; view [212]
Services	stuff [649]; breakfast [649]; rooms [539]; price [443]; B&B [169]; bathroom [129]
Accessibility	proximity [164]; excursion [114]
Natural and no natural components	nature [426]; beach [375]; sea [332]

Table 5: Top 15 words used by group of friends divided by category

CATEGORY	WORDS [frequency]
Geographic location	location [1110]; city [376]; environment [341]; view [212]
Services	stuff [721]; quality [400]; welcome [277]; food [250]; furniture [240]; comfort [197]; restoration [145]
Accessibility	parking [118]
Natural and no natural components	green [320]; sea [291]; beach [191];

Table 6: Top 15 words used by solo travellers divided by category

The textual analysis identifies several words that are used in comment reviews of TLS by category and express perceptions of users regarding geographic features, services and physical places of the territory, introducing opportunities for further analysis support.

For all categories except families with older children, the results indicate a high level of satisfaction for the geographic location. Families with young children appreciate the quality of the supply of services; in fact frequent words are “hotel”, “room”, “staff” and “restaurants”. Mature couples and families with young children express their preference for “shopping” facilities and physical features such as “city centre”. Outcomes of the textual analysis also indicate higher levels of satisfaction with natural components, which include “beaches”, and the presence of a typical cultural heritage (i.e. the word city centre). These features generate a positive tourism location image, which is the most influential psychological factor at play when tourists decide where to travel to. Another interesting result is the presence of the word “excursion”: in fact groups of friends appreciate exploring different places besides the accommodation.

Analysing results highlights the strong relation with the push and pull model by Crompton (1979). The push motivations fostered desire for travel while the pull motivations describe the choice of destination. Here, it is evident that external motivators based on attractiveness of the destination, including tangible resources (i.e. beaches, cultural attractions and recreational activities) lead all tourist categories to visit Sardinia. Internal motivators, which include desire for relaxation, adventure and social interaction, determinate the success of Sardinia as a holiday destination for mature couples and young couples. Shopping is also a motivational characteristic of the destination in tourists’ opinion. This phenomenon raises interesting questions on SMGI and on opportunities for analysis, and will be further investigated in future studies.

7.2.3 The Geographically weighted regression at the regional level

The aims of this methodological step are to discover why tourists prefer one destination over another at the regional level and quantitatively investigate what factors contribute to increase the TPPI rate at the local level. In this sense regression analysis is used for both modelling preferences phenomenon and testing the reliability of the hypothesis suggested by clues in textual analysis, in order to make appropriate decisions in terms of policy.

For the purpose of this study, the candidate explanatory variables refer to Cooper’s model (2008) as described in Chapter 3. The model describes tourism as a multidimensional and multifaceted activity that involves three key aspects of Leiper’s spatial model (1990): the tourist, the geographic features and the tourism sector. The geographic features could be recognised as four elements which lead people to travel and produce destination attractiveness. In this sense each destination can be viewed as a uniquely complex

product of the tourism industry which includes, among other factors, climate, infrastructure and superstructure, services, and natural and cultural attributes. Each destination offers a combination of tourism products and services; more specifically, these are:

1. natural or non-natural components;
2. location accessibility;
3. information, reception, restaurants and accommodation system;
4. city image.

In the initial model the dependent variable was the tourists' preferences, while the candidate explanatory variables derived from the regional SDI spatial data themes and try to better figure out the previous Cooper's points, in order to detect them first at regional, then at local level. Preliminary results and elaborations of statistical tests suggested excluding some explanatory variables from the model, because they were not statistically significant. Other tests suggested the aggregation of certain parameters. Ancillary natural protected areas (defined by RLP) were combined with regional and national parks. Finally the explanatory variables included in the model are six:

1. number of historical buildings;
2. number of restaurants and facilities;
3. number of natural sites;
4. hectares of natural protected areas;
5. distance from the main transport nodes;
6. proximity to the historical city centre.

These candidate variables were tested using OLS in order to understand to which measure they are reliable. According to Hutcheson (2011), it is useful to have an indication of how well the model fits the data, in addition to the model parameters and confidence intervals for β . Model fit could be determined by comparing the observed scores of Y (the values of Y from the sample of data) with the expected values of Y* (the values of Y predicted by the regression equation). The difference between these two values, the residual, indicates how well the model predicts each data point.

OLS results are shown in Table 7. The probability column indicates p-values lower than 0.05: this means that the explanatory variables are statistically significant. In fact, a low p-value reflects low probabilities and suggests that the coefficient is important in the model with a value that is significantly different from zero. In the table below, the variables *number of natural sites*, *number of restaurants*, *distance to the main transport nodes* and *proximity to the city centre* have an asterisk next to the associated coefficient: this indicates the high degree of influence that these variables (geographic features) have in explaining the

spatial distribution of tourists preference.

Summary of OLS Results - Model Variables								
Model Variables	Coefficient	StdError	t-Statistic	Probability	Robust_SE	Robust_t	Robust_Pr	VIF
Intercept	0.064704	0.014205	4.554872	0.000009*	0.012873	5.026385	0.000001*	
Number of historical buildings	0.005672	0.061873	0.091663	0.00927	0.067961	1.083453	0.0933523	1.119285
Number of natural sites	0.378727	0.158622	2.387615	0.017446*	0.246257	1.537936	0.124932	1.013391
Number of restaurants and facilities	0.992989	0.155302	1.537936	0.000000*	0.38367	2.588133	0.010023*	1.161983
Hectares of natural protected areas	0.035132	0.038551	0.911295	0.036272	0.023187	1.515138	0.0130605	1.03592
Distance to the main transport nodes	0.735901	0.059372	12.394731	0.000000*	0.063917	11.513442	0.000000*	1.439516
Proximity to the historical city centre.	0.744069	0.043142	17.247172	0.000000*	0.039492	18.841044	0.000000*	1.527757

Table 7: OLS test results

Each coefficient reflects the expected change in the dependent variable for every 1 unit change in the associated explanatory variable, keeping all other variables constant. In this specific case, for example, a 0.005 increase in number of historical buildings could influence the positive tourism judgment, keeping all other explanatory variables constant. The sign of the explanatory variable coefficient indicates a positive relationship: this means that in modelling positive tourists' preferences at the regional level, this value tends to increase as the number of historical buildings, restaurants, natural sites, and hectares of natural protected areas increase, and as distance of the single TLS to the main transport nodes and to the historical city centre decrease.

Furthermore, the measure of adjusted R-Squared and AIC are significant in understanding whether the variables assumed in the analysis are meaningful. R-Squared results are generally included between 0 and 1. In this analysis R-Squared is 0.756, which represent a good model performance because it is close to 1; the AIC value is -146,295. Table 7 also shows the measure of redundancy among explanatory variables. In this case VIF values are close to 1, in the range of 1.01 - 1.52. These are lower than 7.5 and indicate that variables are independent of each other and comprise different aspects that could describe the tourists' preferences phenomenon.

OLS results were useful for spatial distribution of residuals. A first assessment can be made looking at location standardised residual values (Figure 9): it is noticeable that residuals have a random distribution. This regression residual map shows the under and over predicted values of the initial model. In detail, the red areas represent locations where the actual values are greater than the model estimated; by contrast the blue areas represent locations where actual values are lower than the model estimated.

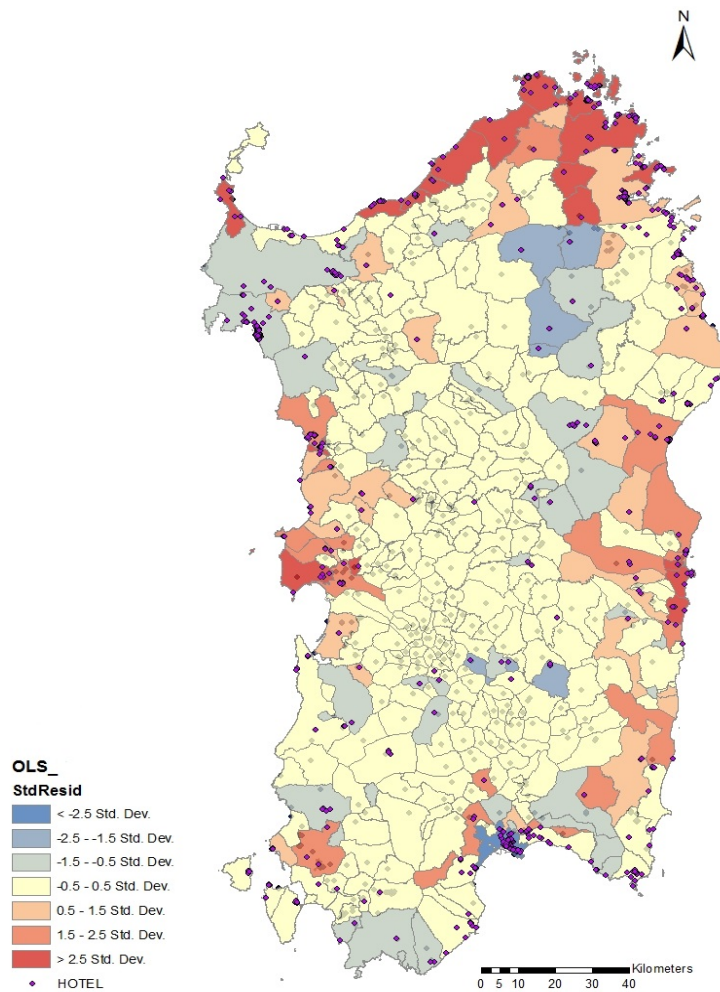


Figure 9: Spatial distribution of standardised residual values

After analysis of the residual distribution at the regional level, identifying clusters of under and over predicted values of the initial global model, the methodology adopted for this study shifted to the local scale for further analyses aimed at finding explanatory answers for the phenomena under observation. Thanks to the visual spatial distribution of standardised residual values, it became evident that previously missed candidate variables were needed to improve the model at the local scale.

The analyses at the local scale were intended to investigate how the spatial interest of the participants is quantitatively influenced by the explanatory variables. Referring to the four tourism destination object of analysis in the previous step, the map shows that for Alghero and Cagliari the TPPI phenomenon is partially explained, while for Dorgali and Arzachena the model reflects an over valuation of explanatory variables or success factors within the single destination. After these preliminary results the model could be considered a good candidate for GWR analysis.

From GWR, many different TPPI functions ensue for each geographical location of initial data, obtaining different coefficients of explanatory variables functions as well. These coefficients represent the marginal

contribution that each selected variable provides to tourists preference explanation. Including only intrinsic features in the function, allows us to say that values of the coefficient related to the area reflect effects of localisation and services. TPPI values were used as input data in calculating spatial autocorrelation, in order to understand if residuals were auto-correlated or not. Spatial autocorrelation was calculated for Alghero, Cagliari, Arzachena and Dorgali, adopting the Moran scatter plot, and considering normalised positive judgements as abscissa and spatial weighted normalised positive judgements as ordinate. In the graph, the Moran Index corresponds to the direction coefficient of linear regression, which represents the scatter plot. Positive autocorrelation corresponds to spatial clusters in the upper right and lower left quadrants.

7.3 SMGI analytics at the local level

After the analysis of tourism dynamics at the regional level, identifying clusters and spots of successful destinations through the preference patterns, the methodology adopted for this study shifted to the local scale for further analyses aimed at finding explanatory answers for the phenomena under observation. The shift from the regional to the local scale was also conducted relying on spatial analysis and spatial statistics techniques on an integrated SMGI/A-GI data database. Thus, the questions one should answer were:

1. *Why does tourists' interest concentrate in this destination?*
2. *What exactly in the destination attracts the tourists' attention?*
3. *Why do tourists choose this destination?*

The aim is twofold: on one hand, the study is performed to discover why tourists prefer one destination rather than another at the regional scale (qualitative analysis), while on the other hand to investigate quantitatively why tourists' preferences are located in these areas and what factors contribute to higher TPPI rates. Operationally, this step was carried out according to the following workflow:

1. spatial analyses of tourism preferences at local level;
2. STTx on textual reviews;
3. geographically weighted regression.

Four tourist destinations were chosen because the local level analyses demonstrated their highly successful performance. The municipalities studied were the following:

- Alghero, which has been recognised as a best-selling destination by different tourists typologies;
- Arzachena, where a part of the Costa Smeralda area is located. This area is noteworthy for the high quality and fashionable holiday landscape; it is easily reached both by sea and air thanks to its strategic position;
- Cagliari, the capital of Sardinia, located in the South of the region. It is nationally and internationally

well connected thanks to the airport and the marina;

- Dorgali, a coastal municipality located in the province of Nuoro. Thanks to its strategic position, it can be considered as a “bridge” between the Costa Smeralda area (which represents the historical tourism area) and the Ogliastra area (considered as a novelty in terms of tourism destination). The following sections explain results for each of these locations

7.3.1 Case study 1: Alghero

The first case study, which illustrates the steps of the methodology, is the destination of Alghero that was chosen because the regional analyses demonstrated its highly successful performance. The analyses at the local scale were intended to investigate the success factors within this destination in order to extract useful clues to use for further planning in the same or other destinations.

Alghero has been recognized as a best-selling destination by different tourists’ typologies, especially “young couples”. Thus, the questions to answer were “Why does young couples’ interest concentrate in Alghero?” and “What exactly in Alghero attracts the tourists’ attention?” In order to answer these questions the map in Figure 10, summarising the review by neighbourhoods, shows the spatial clusters of preferences: the historical city centre of Alghero attracted the main attention of the tourists, while the modern residential districts in the outskirts represents a cold spot in this case. However the most interesting question arising from this analysis may be why certain coastal areas are not considered by the tourists and the answer may give useful suggestions to planners and decision-makers for further analysis.

Another effective way to investigate why tourists appear to prefer certain areas or destinations to others may be given by the STTx analysis on their reviews. The aim is to understand not only where people go but also what they think, investigating the content of the reviews. The analysis was carried out using the tourist comment database, which collected data regarding tourist user origin, language used, time comment and the textual judgment (positive and negative). Overall, for Sardinia, over 880.000 reviews were extracted in five different languages (Italian, Spanish, English, French and Portuguese), of which 1050 in English related to Alghero. Table 8 shows the tag cloud of the English comments dataset spatially constrained by the preference hot-spots in Alghero.

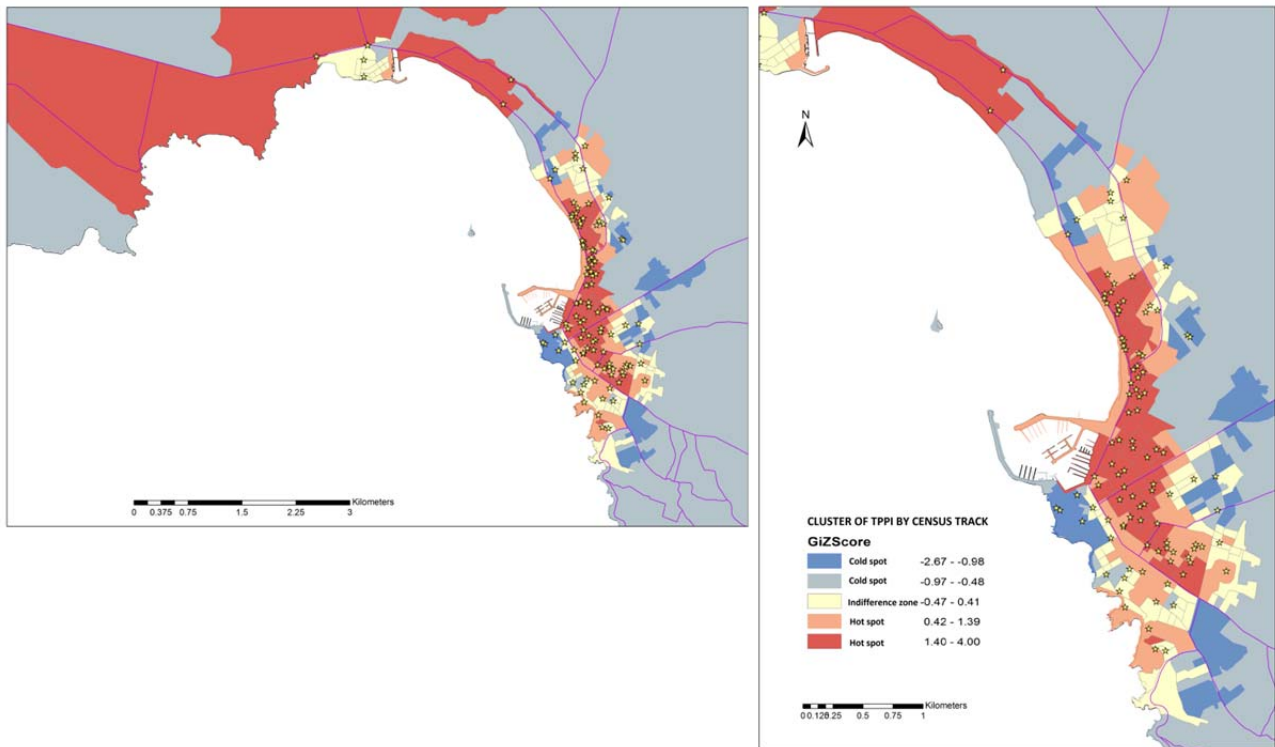


Figure 10: Significant patterns in Alghero municipality

CATEGORY	WORDS [frequency]
Geographic location	location [1010]; town [476]
Services	staff [890]; restaurant [643]; room [459]; hotel [469]; pool [230]; food [180]
Accessibility	mapped [250]; harbour [237]; proximity [164]; walking [146]
Natural and no natural components	city centre [426]; beach [378]; old city [132]

Table 8: Top 15 words related to Alghero divided by category

The majority of the words in the posts refer to spatial or physical aspects of Alghero, such as “location”, “beach”, “town”, “old city” and “city centre”. Other frequent words are related to tourism structures, such as “hotel”, “staff”, “room” and “pool”. Textual analysis results also indicate higher levels of satisfaction with location, facilities and services, and a high level of satisfaction with the destination leisure sites, such as typical “restaurants” and typical “food”. In addition, the results expressed a high level of satisfaction with the supply of accommodation, the cleanliness of structures and the kindness of the employed staff.

According to the results, the main reason tourists visit Alghero seems to be related to both its natural attractions, which include natural sites such as beaches, and the presence of a unique cultural heritage. These facts generate a positive tourism location image, which is the most influential psychological factor at play when tourists decide where to travel. People with doubts regarding their travel destination, will probably choose one with a good image.

This kind of research can be supported by the integration of SMGI data with other A-GI on demographic,

land use, transport facilities or socio-economic data coming from the regional SDI. In this sense, one interesting research question is whether spatial statistic methods such as regression analysis can be used to understand whether the spatial interest of the participant is influenced by environmental or socio-cultural variables. Regression analysis allows us to model spatial relationship and explain the factors behind observed spatial patterns and to investigate quantitatively how the spatial interest of the participant is influenced by environmental and socio-cultural dependent variables.

The spatial distribution of TPPI was first determinate by means of statistical tools. The model is built on a data sample of 131 items, related to TLS and their associated TPPI, spatially joined with the 471 census tracts in Alghero, which represent the analysis unit. This preliminary analysis provides an initial idea of the emergence of spatial patterns that may be due to spatial autocorrelation.

MORAN'S TEST FOR ALGHERO										
ORDER	OBS	R^2	CONST A	STD ERR A	T-STAT A	P-VALUE B	SLOPE B	STD ERR B	T-STAT B	P-VALUE B
1	471	0.0244	0.0161	0.0221	0.729	0.466	0.0758	0.0221	3.42	0.00067
2	471	0.0393	0.0106	0.0151	0.703	0.482	0.0664	0.0151	4.38	1.46E-05
3	471	0.0118	0.00366	0.0118	0.309	0.758	0.0281	0.0119	2.37	0.0182
4	471	0.00907	0.000454	0.00954	0.0476	0.962	-0.0198	0.00955	-2.07	0.0388
5	471	0.00349	0.00437	0.00839	0.52	0.603	-0.0108	0.0084	-1.28	0.201

Table 9: Moran's test results for Alghero

Univariate local Moran's Index indicates a spatial dependency on positive preference of census track. Results are quite meaningful for the second order of queen contiguity rather the use of a threshold distance of 1500 meters: adjusted R-squared is less than 40 percent. Table 9 shows the results of the Moran test. The coefficient of the dependent variable (*p-value b*) is less than 5 percent (0.0000146).

The value of Moran's Index is 0.066. Since most points fall within the upper right quadrant (Figure 12) there is a positive spatial correlation in the TPPI. Thus, an analysis of spatial dependency and its significance has been developed through the LISA. With this method it is possible to highlight homogeneous areas where spatial dependency is stronger and statistically significant.

The results of Local indicator of spatial autocorrelation (LISA) and significance map are reported in Figure 13. The cluster map classifies Alghero census track according to association patterns, while the significance map shows the level of significance with a p-value of the corresponding spatial dependence attribute. The cluster map shows areas with high TPPI that are surrounded by similar areas in red. Blue clusters represent less appreciated areas surrounded by other areas with low TPPI.

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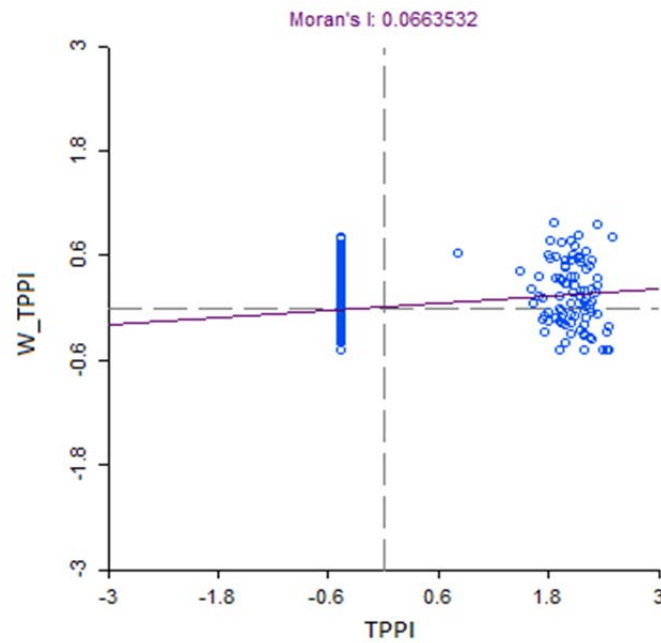


Figure 11: Univariate local Moran scatterplot for Alghero TPPI

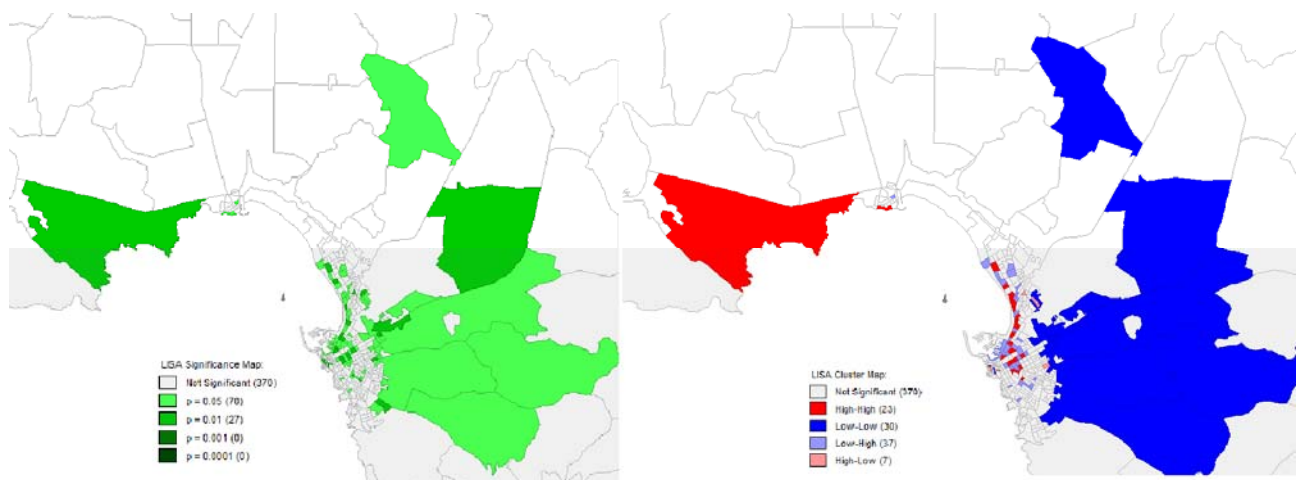


Figure 12: Significance level map (left) and LISA cluster map (right) for Alghero

Secondly, the statistical correlation between TPPI and other socio-economic variables was investigated. A measure of a series of independent variables, useful to describe quantitative geographic features, was associated to each census tract. For this specific location, results and elaborations of statistical tests suggested including other variables in the initial model. Finally, the explanatory variables included in the model were eight:

1. number of historical buildings;

2. number of restaurants and facilities;
3. number of natural sites;
4. hectares of natural protected areas;
5. distance from the main transport nodes;
6. proximity to the historical city centre.
7. distance from the most popular beach;
8. beach accessibility.

TPPI is related to location-related, socio-economic, tourism attractiveness and facilities determinants. In terms of location-related, considered the distance from the main transport nodes, the distance to the most popular beach, the natural protected areas and the proximity to the city centre were taken into consideration, as these are frequently cited as important factors for land development (Crompton, 1979; Leiper, 1990; Cooper, 2008; Geng-Qing Chi and Qu, 2008). Beach accessibility is another characteristic related to the physical location; accessibility takes into account the location of attractive areas in terms of proximity and potential interaction or activities close to them.

The candidate variables indicated so far were tested using OLS in order to understand in which measure they are reliable and results recommended excluding some variables from the model. More specifically, a high measure of redundancy, with a VIF value close to 42, between the variables “distance to the most popular beach” and “accessibility to the beach” suggest excluding the second one. New OLS results are explained in Table 10.

Summary of OLS Results - Model Variables								
Model Variables	Coefficient	StdError	t-Statistic	Probability	Robust_SE	Robust_t	Robust_Pr	VIF
Intercept	-0.005597	0.007728	-0.724191	0.469308	0.006398	-0.874846	0.382098	
Proximity to the historical city centre.	-0.00069	0.009993	-0.069044	0.94497	0.008735	-0.078981	0.937067	1.557954
Number of restaurants and facilities	0.016391	0.009444	1.735579	0.043311*	0.00881	1.860573	0.063439	1.540233
Number of historical buildings	0.086089	0.037498	2.295859	0.022116*	0.057513	1.496868	0.135123	1.116001
Distance to the most popular beach	0.762524	0.077594	9.827131	0.000000*	0.089	8.567687	0.000000*	1.011064
Hectares of natural protected areas	0.003704	0.101279	9.910268	0.000000*	0.499156	2.010801	0.044918*	1.538393
Number of natural sites	-0.000692	0.032374	-0.02136	0.98296	0.015671	-0.044127	0.964811	1.067426
Distance to the main transport nodes	0.468393	0.12778	3.665628	0.000287*	0.639631	0.732287	0.464357	1.693789

Table 10: OLS test results for Alghero

The probability column indicates *p-values* smaller than 0.05 except for the variable proximity to the historical city centre: this means that the other explanatory variables are statistically significant and their coefficients are important in the model.

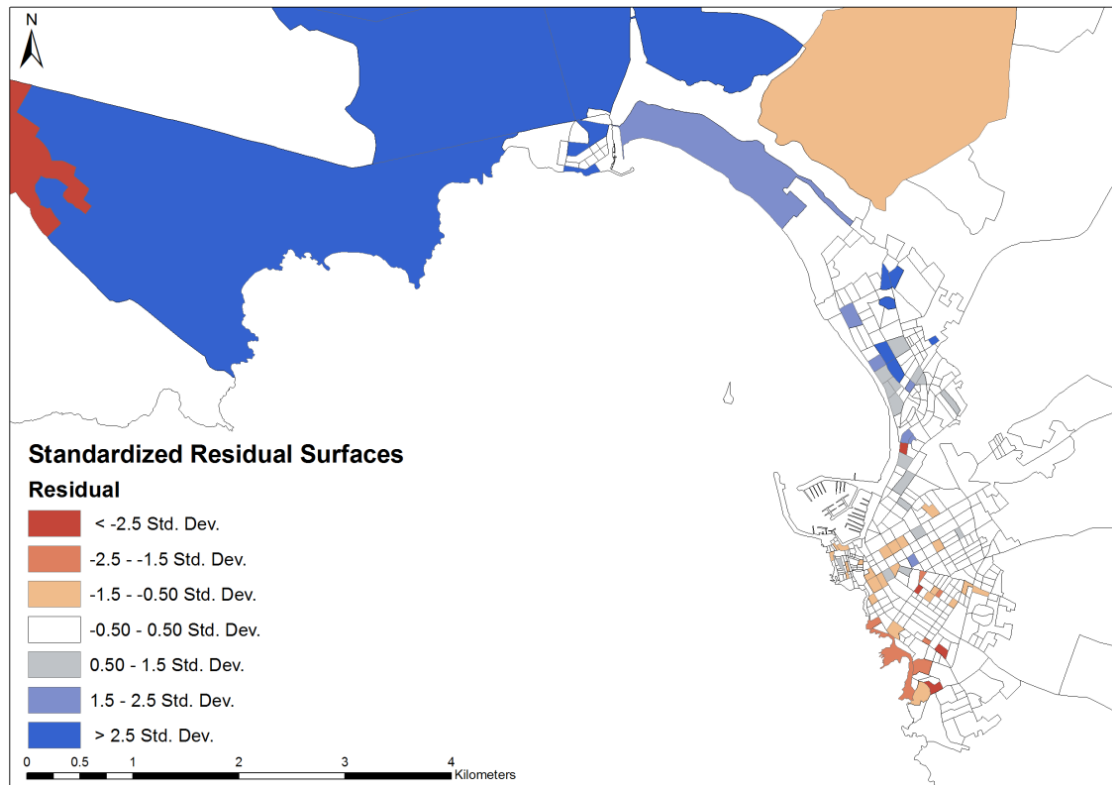


Figure 13: GWR feature class output with rendered residuals

The model performed using OLS is meaningful for applying GWR in order to explore local variation among the variables. If the value of a TPPI referring to a spatial unit (which is the census tracts for Alghero case study) is correlated to the values it takes in the closest spatial units, then the variable is characterised by spatial autocorrelation.

Spatial autocorrelation in spatial regressions produces biases in the model estimates. This issue can be addressed by adding a spatially-lagged dependent variable to the set of covariates (Anselin, 1988). The presence of autocorrelation of the dependent variable of a model, which is the TPPI value, is detected through the Moran's test, explained above. Both the 131 TLS in the sample and the geographic candidate variables were spatially joined with the relative census track. This made it possible to develop a geographic dataset, to calculate the value of each variable for each spatial unit, and to analyse their spatial distributions.

The map of the residual values is classified with the standard deviation method. As it is possible to note, for the majority of tracts, the values of the standardized residuals are in a range between -1.5 and 1.5; few census parcels show standardized residual values higher than 1.5 or smaller than -1.5. Not surprisingly, many of the census tracts are placed in the city centre, where the presence of historical buildings coupled with typical restaurants and leisure is more significant.

The results concerning the goodness of fit of the regression are significant: R-squared is very high, 0.943992, which indicates that the GWR model explains more than a 94% of the variance of the positive tourists' preferences at the local level. The GWR model coefficients of the variables show the relationships between the dependent variable and each explanatory variable. The coefficients of the variables related to location are almost always significant (with p values less than 5 %) and show positive sign. The variables "hectares of natural protected areas" and "number of natural sites" are not significant, for the p value is higher than 10 %, while the variable "number of restaurants", related to service quality, shows a significant coefficient (with p value = 0.0167321) and positive sign. Table 11 shows the coefficient value for each considered variable.

Variable	Coefficient	Std:Error	z-value	p-value
W_N_TPPI	0.058552	0.035614	1.644075	0.100161
CONSTANT	-0.012852	0.008821	-1.457048	0.145103
N_H_BUILD	0.753521	0.076918	9.796376	0.000000
DIST_BEACH	1.015170	0.100169	10.134590	0.000000
N_RESTAUR	0.089016	0.037206	2.392542	0.016732
H_NATURAL	0.005126	0.032138	0.159486	0.873286
D_AIRPORT	0.448991	0.126307	3.554754	0.000378
PROX_C_CENTRE	-0.005772	0.010428	-0.005536	0.005799

Table 11: Results of the GWR model: influence of each explanatory variable on dependent variable (normalized tourist's preference)

Overall, findings suggest that the spatial interest of the participants is quantitatively influenced by the chosen explanatory variables. The selected variables give a more or less significant contribution to tourists' preference explanation through a coefficient. The inclusion of only intrinsic features in the function allows us to say that the values of the coefficients relating to the area reflect positive effects of geographic position and facilities supply to the tourists preferences spatial patterns disposition.

7.3.2 Case study 2: Cagliari

The second case study to test the methodology at the local level is Cagliari, the capital of Sardinia located in the South of the region. It is nationally and internationally well connected thanks to the airport and the marina. Cagliari has the most important airport in the island in terms of traffic and size. In fact, it handles about 50% of Sardinia's air traffic and can serve up to 4 million passengers per year (Benedetti et al., 2012).

The SMGI analytics in Cagliari are intended to investigate the success factors within this destination in order to extract useful clues to be used for further planning in the same or other destinations. The location of each TLS could immediately allow to detect where the attention of the tourists who visited Cagliari was focused; thus, it is possible to answer questions such as what areas, places, or artefacts in the city attract the user's attention.

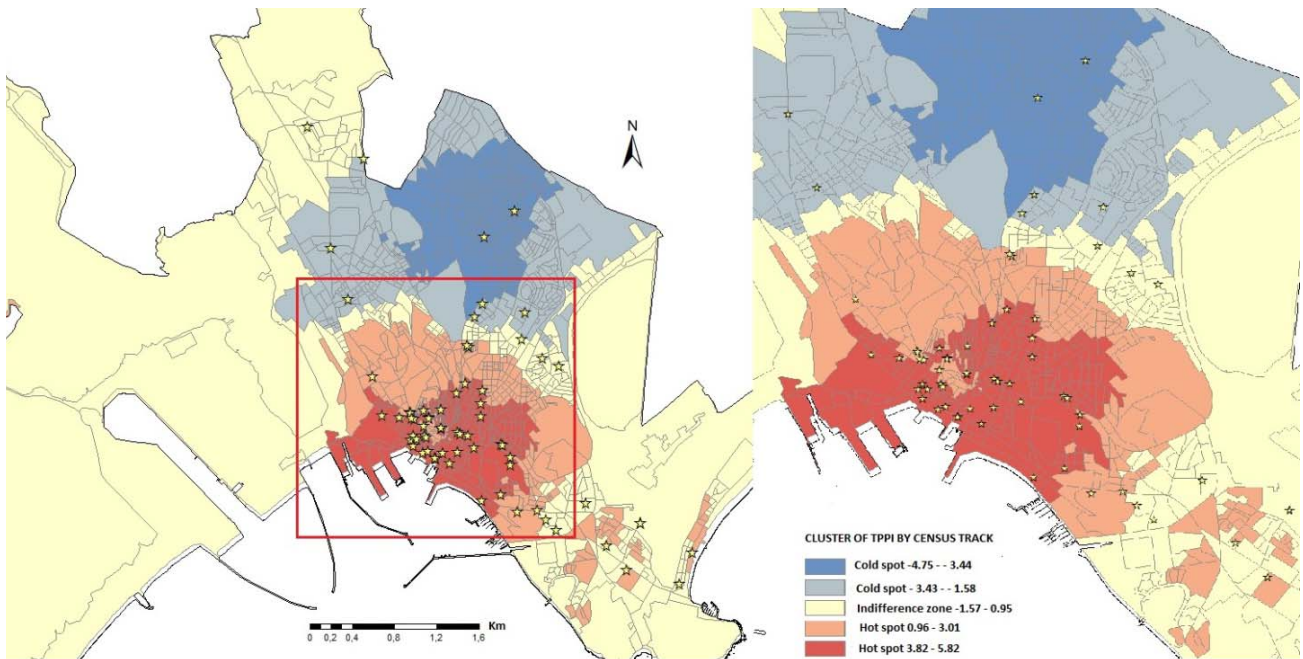


Figure 14: Significant patterns in Cagliari municipality

Spatial clusters of preferences are detected by hot-spot analysis. Firstly, a threshold distance of 1700 meters was calculated and the spots by census track summarised: the map in Figure 14 shows the spatial distribution of TPPI: red areas, located in the city centre, indicate surfaces affected by high concentration of TPPI phenomenon (hot spot), while blue areas represent locations where the phenomenon is less intense (cold spot). Not surprisingly Cagliari's city centre attracted the main attention of the tourists, while the mostly residential Pirri district represents a cold spot.

The next step was to focus on the reviews content in order to understand not only the "where" but "what" tourists think about Cagliari. Hundreds of textual reviews only located into detected spatial pattern were investigated by STTx analysis. The possibility of analysing tourist preferences may help investigate the move in general spatial interest pattern in order to detect possible useful clues to be used for further planning in terms of tourism development at local scale.

Very interesting results have been obtained applying textual analysis to local subsets of data obtained by selecting high TPPI values by location. Here the tag cloud (Table 12) clearly shows the focus of the majority of the words in the posts refers to spatial or physical aspects of the city such as "centre", "city", "location" and "Church". The results include keywords related to both leisure sites such as "restaurant", "shopping" and "dinner" and services such as "stuff" and "room".

Additionally, outcomes indicate a high level of satisfaction with place accessibility: words as "minutes", "proximity" and "feet" could be related to the services' spatial localisation, natural resources or monuments. In this sense the possibility of tourists to effortlessly move from a place to another and to

affect the same area of interest generate a positive tourist destination image. In addition, different sectors within the local community could benefit to different degrees from the presence of tourists. Business sectors are more likely to hold favourable views of tourism because of the economic benefits that the industry is perceived to bring.

Nevertheless, local residents could have negative views, especially where their lives are affected by the noise, overcrowding and overuse of facilities. This is not the kind of information we usually find in land use planning documents, but its potential for support design and decision-making may be highly valuable.

CATEGORY	WORDS [frequency]
Geographic location	location [1214]; centre [476]; view [212]
Services	stuff [649]; breakfast [564]; shopping [539]; restaurant [443]; room [358]; dinner [169]
Accessibility	minutes [450]; proximity [164]; feet [146]
Natural and no natural components	city [526]; beach [375]; Church [132]

Table 12: Top 15 words related to Cagliari divided by category

As in the case of Alghero, this research was carried out with the integration of SMGI data with other A-GI land use, transport facilities and socio-economic data from the regional SDI. Regression analysis was applied to model spatial relationship in Cagliari, to explain the factors behind observed spatial patterns and to investigate quantitatively how the spatial interest of the participants is influenced by environmental and socio-cultural dependent variables. In this case, the model was built on a sample of 150 data points related to TLS and their associated TPPI and spatially distributed into the 1359 analysis unit (census tracts).

Then, computation of the Univariate local Moran's Index indicates a spatial dependency on positive preference of census track. The results obtained for the second order of queen contiguity are quite meaningful with respect to results obtained using a 2500 meters spatial autocorrelation distance: adjusted R-squared is less than 40 percent. Table 13 shows the results of the Moran test. The coefficient of the dependent variable is less than 5 percent (*p-value* $b = 0.000000010$).

The value of Moran's Index is 0.024 and the graph is shown in Figure 15. Also, if the majority of the points do not fall within the upper right quadrant there is a possibility of positive spatial correlation in the TPPI. Thus, an analysis of spatial dependency and its significance was developed through the LISA. With this method it is possible to highlight homogeneous areas where spatial dependency is stronger and statistically significant.

MORAN'S TEST FOR CAGLIARI										
ORDER	OBS	R^2	CONST A	STD ERR A	T-STAT A	P-VALUE B	SLOPE B	STD ERR B	T-STAT B	P-VALUE B
1	1359	0.000497	0.0698	0.0167	4.18	3.11E-05	0.0137	0.0167	0.821	0.412
2	1359	0.248	-0.00217	0.0122	-0.177	0.859	0.259	0.0122	21.2	0.000000010
3	1359	3.57E-05	0.0223	0.00647	3.45	0.000587	-0.0014	0.00647	-0.22	0.826
4	1359	0.0025	0.0126	0.0049	2.57	0.0104	0.00904	0.0049	1.84	0.0656
5	1359	0.00379	0.00448	0.00367	1.22	0.223	0.00835	0.00367	2.27	0.0232

Table 13: Moran's test results for Cagliari

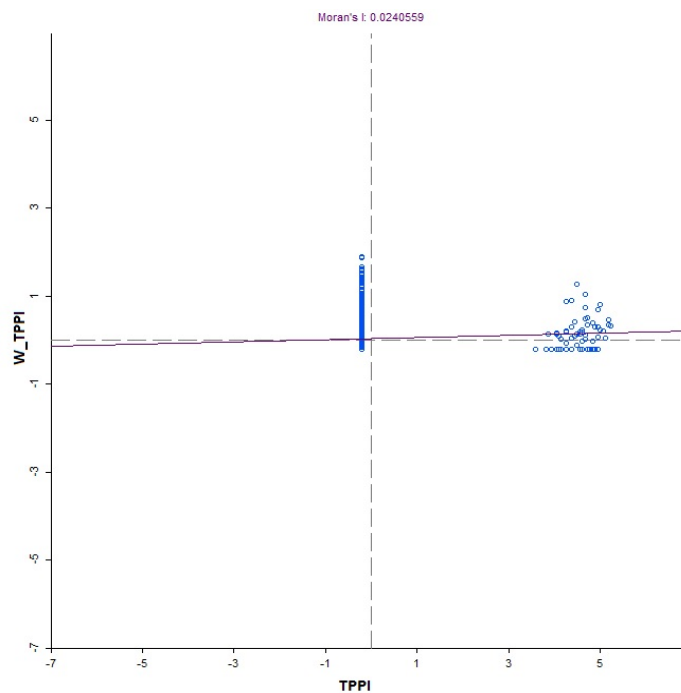


Figure15: Univariate local Moran scatterplot for Cagliari TPPI

Results of LISA and significance map are reported in the Figure 16. The cluster map classifies Cagliari census tracts according to association patterns, while significance map shows the level of significance with a p-value of the corresponding spatial dependence attribute. The cluster map shows in red colour areas with high TPPI that are surrounded by similar areas and are mostly located within the city centre. Blue clusters represent less appreciated areas surrounded by other areas with low TPPI. From the map is evident areas affected by spatial dependency are mostly located into the city centre and are comprised within clusters of high concentration of TPPI phenomenon, showed in previous Figure 15.

The second step of SMGI analytics has been carried on in order to investigate the statistical correlation between TPPI and other socio-economic dependent variables. Each spatial unit was spatially joined with the measure of a series of independent variables, useful to describe quantitative geographic features.

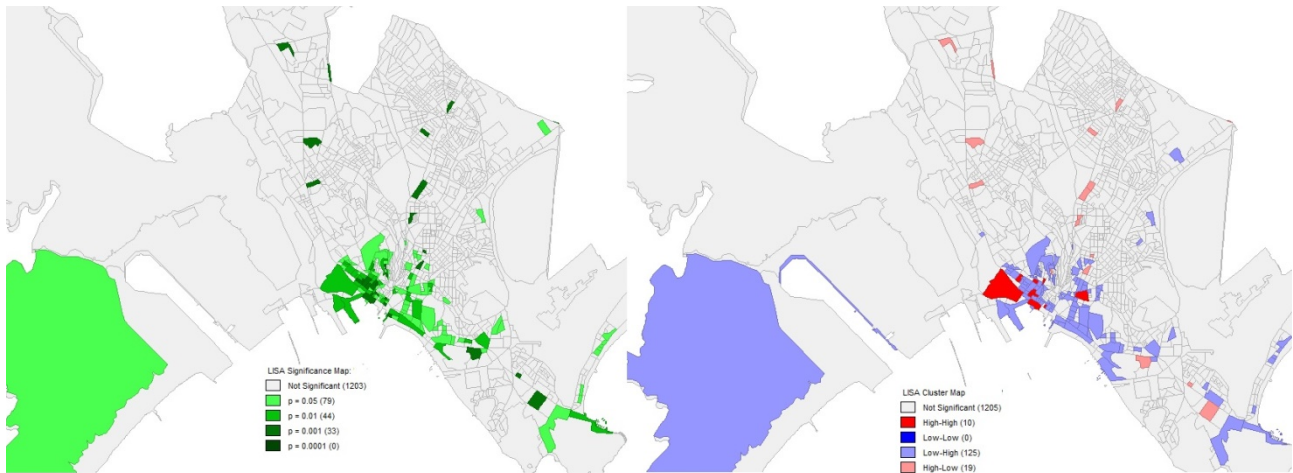


Figure 16: Significance level map (left) and LISA cluster map for Cagliari (right)

For the location of Cagliari results and elaborations of statistical tests suggested to include seven explanatory variables in the regression model:

1. number of historical buildings;
2. number of restaurants and facilities;
3. hectares of natural protected areas;
4. distance from the main transport nodes;
5. proximity to the historical city centre.
6. distance from the most popular beach;
7. beach accessibility.

Also in this case, in terms of location-related, has been considered the distance from the main transport nodes (in this case the airport Cagliari-Elmas), the distance to the most popular beach, the hectares natural protected areas and the proximity to the city centre. These candidate variables were tested using OLS in order to understand to which measure they are reliable and to evaluate redundancy between them, which suggested excluding the variable “accessibility to the beach”. The final OLS results are reported in the table below.

The probability column indicates *p-values* smaller than 0.05 for the three variables: “proximity to the historical city centre”, “distance to the airport” and “distance to the most popular beach”: these explanatory variables are statistically significant and their coefficients are important into the model.

Summary of OLS Results - Model Variables								
Model Variables	Coefficient	StdError	t-Statistic	Probability	Robust_SE	Robust_t	Robust_Pr	VIF
Intercept	-0.008531	0.008649	-0.986345	0.324128	0.008806	-0.968797	0.332806	
Number of restaurants and facilities	0.006653	0.025574	0.260143	0.794797	0.028469	0.233696	0.815258	1.122366
Number of historical buildings	-0.010649	0.026647	-0.399623	0.689513	0.060673	-0.175511	0.860696	1.041045
Hectares of natural protected areas	0.012339	0.008202	1.50441	0.132724	0.007924	1.557051	0.119707	1.05655
Distance to the airport	0.578417	0.029378	19.688733	0.000000*	0.073268	7.894583	0.000000*	5.307851
Distance to the most popular beach	0.495034	0.030486	16.2383	0.000000*	0.096062	5.153253	0.000001*	5.284658
Proximity to the historical city centre.	0.391427	0.015738	24.87135	0.000000*	0.091839	4.262084	0.000026*	2.011389

Table 14: OLS test results for Cagliari

The results concerning the goodness of fit of the regression are significant: R-squared is very high, 0.856, which indicates that the GWR model explains more than a 85% of the variance of the positive tourists' preferences in Cagliari. The coefficients that were created to display the spatial patterns shown in Cagliari demonstrate the relationship between the dependent variable and each explanatory variable (Table 14). Moreover, the map of residual (Figure 17) indicates a residuals' random distribution, which means that they are not spatially correlated.

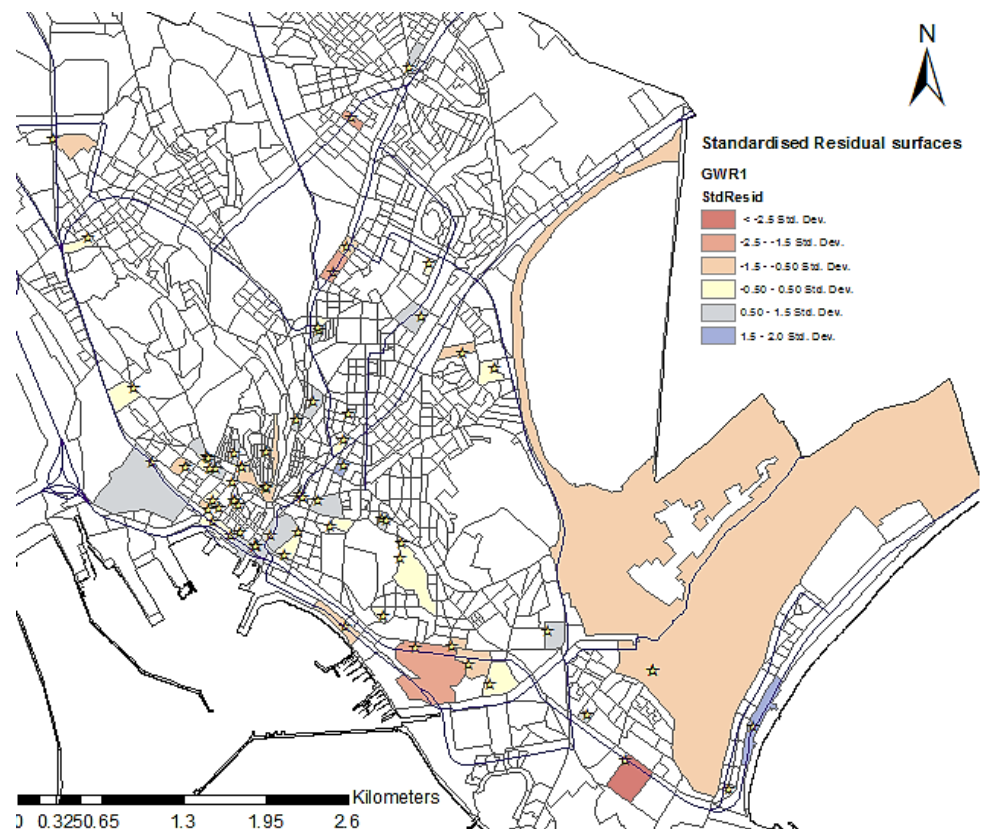


Figure 17: GWR feature class output with rendered residuals

Variable	Coefficient	Std:Error	z-value	p-value
W_N_TPPI	0.0662904	0.0306595	2.162143	0.0306071
CONSTANT	0.0030834	0.010238	0.3011506	0.7632998
N_RESTAUR	-0.039035	0.0299971	-1.301306	0.1931503
PROX_C_CENTRE	0.4747516	0.0585060	8.114574	0.0000000
N_H_BUILD	-0.0273241	0.0313221	-0.8723397	0.3830122
H_NATURAL	0.0027261	0.0096194	0.2833977	0.0776872
D_AIRPORT	0.7660687	0.0339702	22.55116	0.0000000
D_BEACH	0.5470476	0.0382759	14.29221	0.0000000

Table 15: Results of the GWR model: influence of each explanatory variable on dependent variable (normalized tourists' preference)

The coefficient of the variables related to the location (“distance from the most famous beach”, “proximity to the city centre” and “distance from the airport”) are significant (p value less than 5 %) and show the positive sign. The variables “hectares of natural protected areas” and “number of historical buildings” are not significant for p value greater than 10%, while the variable “number of restaurants”, representing service quality, shows a significant coefficient with p value = - 0.0390357 and the negative sign. Overall, these findings suggest that the spatial interest of the participant is quantitatively influenced by almost all explanatory variables. Findings reveal that attributes related to the geographic position together with the services supply give a significant contribution to the TPPI explanation in Cagliari. The inclusion of only intrinsic features in the function, allows to say that the values of the coefficients relating to the area reflect positive effects of and facilities supply to the tourists preferences spatial patterns disposition.

7.3.3 Case study 3: Arzachena

The third case study regards Arzachena, located in the North-East of the region within headquarter of the Costa Smeralda district. This tourism destination is noteworthy for the high quality and fashionable holiday landscape; it is easily reached both by sea and air thanks to its proximity to Olbia international airport. Since the 1970s this area has attracted a growing number of Italian and foreign tourists because of its exclusive beaches. Thereupon an international team of architects and planners transformed the beaches and bays along the coast in a fashionable tourism destination, which contributed to subsequent high income tourism.

Arzachena is one of the destinations appreciated by different tourist categories; for this reason, the aim of the study is to answer the following questions: “Why does tourists’ interest concentrate in Arzachena?” and “What exactly in Arzachena attracts the tourists’ attention?” Figure 19 shows the spatial clusters of preferences: not surprisingly, the coastal area attracted the main attention of the tourists and represents a hot spot, while the city centre represents a cold spot. In order to investigate why tourists appear to prefer coastal areas rather than other areas in Arzachena and to understand not only where but also what people

think, the analysis on their reviews content was carried out using STTx.

The analysis was accomplished extracting from the tourist comment database records related to Arzachena users. Table 16 shows the tag cloud of the latter comments dataset, spatially constrained by the preference hot-spots. The majority of the words in the posts refer to spatial and physical aspects of Arzachena, such as position, beaches, countryside and city coast. Outcome also indicates specific locations such as Porto Cervo and Costa Smeralda, where most of Arzachena’s famous beaches are located. Textual analysis results also indicate a high level of satisfaction with services, such as “hotel”, “room” and “pool” and the destination leisure sites, such as typical “restaurants” and typical “food”. In addition, outcomes expressed a high level of satisfaction with the supply of accommodation, the cleanliness of structures and the kindness of the employed staff.

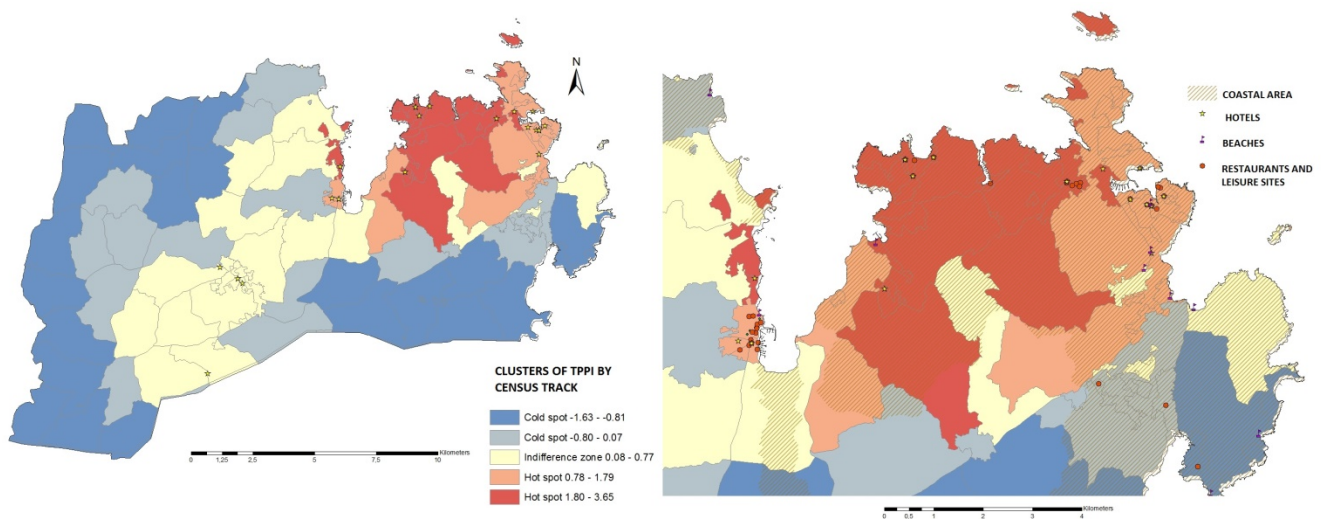


Figure 18: Significant patterns in Arzachena municipality

CATEGORY	WORDS [frequency]
Geographic location	position [1010]; Costa Smeralda [789]; scenary [450];
Services	staff [590]; restaurant [543]; room [450]; hotel [369]; pool [330]; food [280]
Accessibility	Porto cervo [561]; central [342]; proximity [222]
Natural and no natural components	beaches [678]; countryside [486]; coast [232]

Table 16: Top 15 words related to Arzachena divided by category

According to the results, the main reason for tourists to visit Arzachena seems to be related to both its natural attractions, which include natural sites and famous beaches, and business facilities. In addition, this tourism destination is noteworthy for the high quality and fashionable holiday landscape. These facts generate a positive tourism location image, which is the most influential psychological factor at play when

tourists decide where to travel.

These preliminary analyses were supported by the integration of SMGI data with other A-GI on land use, transport facilities and other data coming from the regional SDI. Regression analysis was applied to model spatial relationship in Arzachena to explain the factors behind observed spatial patterns, and to investigate quantitatively how the spatial interest of the participant is influenced by environmental and socio-cultural dependent variables. In this case the model is built on a sample of 62 data points related to TLS and their associated TPPI, and spatially distributed into the 151 analysis unit.

The computation of the Univariate local Moran’s Index analysis indicates a spatial dependency on positive preference of analysis unit. The results obtained for the first order of queen contiguity are quite meaningful with respect to results obtained using a 1700 meters spatial autocorrelation distance: adjusted R-squared is less than 60 percent. Table 17 shows the results of the Moran’s test. The coefficient of the dependent variable (p-value b) is less than 5 percent (0.00444).

MORAN'S TEST FOR ARZACHENA										
ORDER	OBS	R^2	CONST A	STD ERR A	T-STAT A	P-VALUE B	SLOPE B	STD ERR B	T-STAT B	P-VALUE B
1	151	0.0531	0.00902	0.0438	0.206	0.837	0.127	0.044	2.89	0.00444
2	151	8.94E-05	0.0765	0.0395	1.94	0.0543	-0.0046	-0.0396	-0.115	0.908
3	151	7.95E-05	-0.0115	0.0199	-0.578	0.564	-0.0022	0.02	-0.109	0.913
4	151	0.000654	-0.015	0.0163	-0.919	0.36	-0.0051	0.0164	-0.312	0.755
5	151	0.00489	-0.00892	0.0182	-0.491	0.624	-0.0156	0.0182	-0.855	0.394

Table 17: Moran’s test results for Arzachena

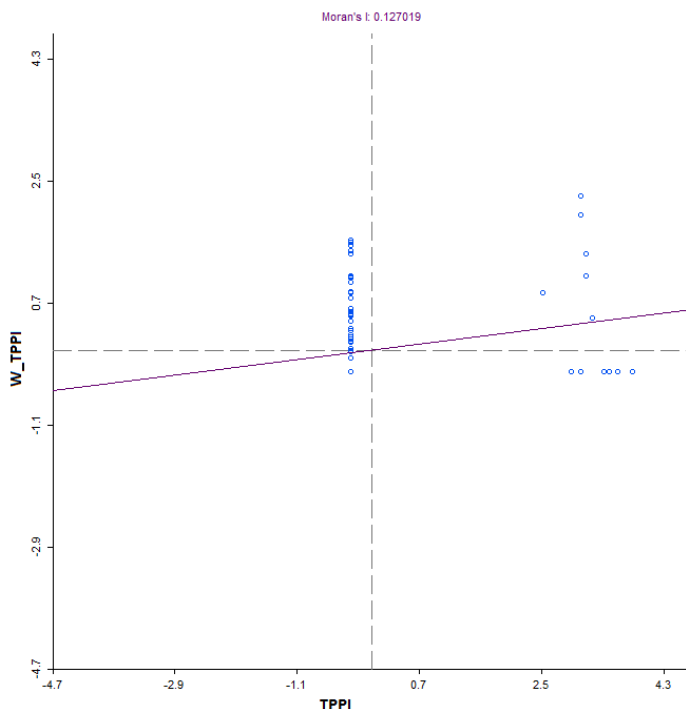


Figure 19: Univariate local Moran scatterplot for Arzachena TPPI

The value of Moran’s Index is 0.127 and the graph is shown in Figure 19. Also, if the majority of the points do not fall within the upper right quadrant there is a possibility of positive spatial correlation in the TPPI. Thus, an analysis of spatial dependency and its significance was developed through the LISA. With this method it is possible to highlight homogeneous areas where spatial dependency is stronger and statistically significant. Results of LISA and significance map are reported in the Figure 20.

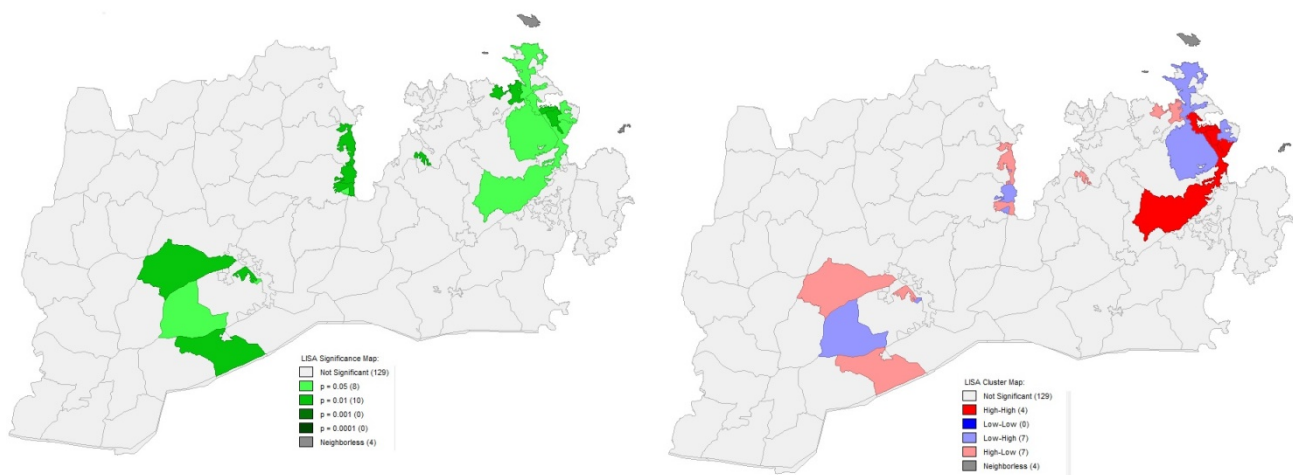


Figure 20: Significance level map (left) and LISA cluster map for Arzachena (right)

The cluster map classifies Arzachena census track according to association patterns, while significance map shows the level of significance with a p-value of the corresponding spatial dependence attribute. The cluster map shows in red colour areas with high TPPI that are surrounded by similar areas and are mostly located within coastal areas. Blue clusters represent less appreciated areas surrounded by other areas with low TPPI. From the map it is evident that areas affected by spatial dependency are mostly located in the Porto Cervo area and are comprised within clusters of high concentration of TPPI phenomenon, as shown in Figure 20.

The second step of SMGI analytics was carried on in order to investigate the statistical correlation between TPPI and other socio-economic dependent variables. Each spatial unit was spatially joined with the measure of a series of independent variables, useful for describing quantitative geographic features. For the location of Arzachena, results and elaborations of statistical tests suggested including five explanatory variables in the regression model:

1. number of restaurants and facilities;
2. hectares of natural protected areas;
3. distance from the main transport nodes;
4. proximity to the historical city centre.
5. distance from the most popular beach.

In terms of location-related, in this case, the distance from the main transport nodes (in this case Olbia airport), the distance to the most popular beach, the hectares of natural protected areas and the proximity to the city centre were taken into consideration. These candidate variables were tested using OLS in order

to understand to which measure they are reliable and to evaluate redundancy presence between them. The final OLS results are reported in the table below.

Summary of OLS Results - Model Variables								
Model Variables	Coefficient	StdError	t-Statistic	Probability	Robust_SE	Robust_t	Robust_Pr	VIF
Intercept	0.021114	0.026117	0.80845	0.420147	0.020021	1.054597	0.293357	
Number of historical buildings	-0.036004	0.093151	-0.38651	0.699696	0.020042	-1.796436	0.074511	1.828352
Number of restaurants and facilities	0.966094	0.15315	6.308145	0.000000*	0.346702	2.786527	0.006040*	1.476282
Hectares of natural protected areas	0.013396	0.040491	0.330848	0.000000*	0.021484	0.623547	0.533905	1.350301
Distance to the airport	-0.060638	0.180294	-0.336331	0.741246	0.407494	-0.148808	0.881905	1.248911
Distance to the most popular beach	0.617966	0.224885	2.747915	0.000338	0.492601	1.254496	0.211683	1.196022

Table 18: OLS test results for Arzachena

Not surprisingly, the probability column indicates p-values smaller than 0.05 for the three variables: “distance from the most popular beach”, “number of restaurants and facilities” and “hectares of natural areas”: these explanatory variables are statistically significant and their coefficients are important in the model. The model performed using OLS is meaningful for applying GWR in order to explore local variation among these variables. The assumption is that if the value of a TPPI with reference to a spatial unit, which is the census tracts for Arzachena, is correlated to the values it takes in the closest spatial units, the variable is characterized by spatial autocorrelation.

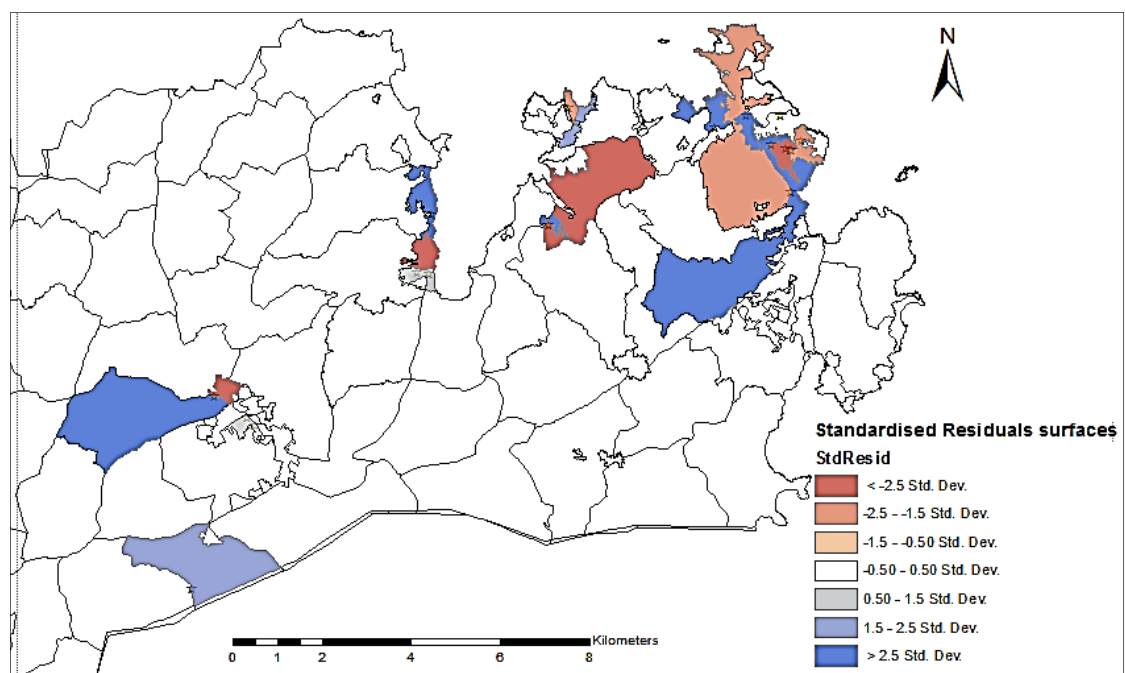


Figure 21: GWR feature class output with rendered residuals

Both the 151 TLS in the sample and the geographic candidate variables were spatially joined with the relative census track and normalised. This made it possible to develop a geographic dataset, to calculate the value of each variable for each spatial unit, and to analyse their spatial distributions. The results

concerning the goodness of fit of the regression are significant: R-squared is 0.548774, which indicates that the GWR model explains more than a 54% of the variance of the positive tourists' preferences in Arzachena. The coefficients created to display the spatial patterns shown in the Arzachena municipality, demonstrate the relationship between the dependent variable and each explanatory variable.

Variable	Coefficient	Std. Error	z-value	p-value
W_N_TPPI	-0.0176138	0.1210853	-0.1454668	0.8843423
CONSTANT	0.0220371	0.026222	0.8404726	0.4006434
N_RESTAUR	0.9649052	0.1503042	6.419681	0.0000000
H_NATURAL	0.0146524	0.0401850	0.3646251	0.715391
D_AIRPORT	-0.0595484	0.176921	-0.336582	0.7364322
D_BEACH	0.6168258	0.2205443	2.796834	0.0051607
N_H_BUILD	-0.0368514	0.0913515	-0.4034023	0.6866524

Table 19: Results of the GWR model: influence of each explanatory variable on dependent variable (normalized tourists' preference)

The outcomes of the regression model are quite significant for the description of the spatial distribution of tourists' preferences. Figure 21 shows a random distribution of the residuals. The coefficient of the variables related to "distance from the most popular beach" and to the presence of tourist leisure sites are almost significant (p value less than 5 %) and show the positive sign. The other variables seem to not be significant because of p value greater than 10 percent. Overall, these findings suggest that the spatial interest of the participant is quantitatively influenced by two of the chosen explanatory variables. Inclusion of only intrinsic features in the function, allows us to say that the values of the coefficients relating to the area reflect positive effects of geographic position and facilities supply to the tourists preferences spatial patterns disposition.

These results confirm that this tourism destination has become a brand, and is noteworthy to tourists for the high quality, the fashionable holiday landscape and its exclusive beaches. This means that the main reason for tourists to visit Arzachena is related to both its natural attractions, which include beautiful beaches, and the presence of a unique business service industry. These facts generate a positive tourism location image.

7.3.4 Case study 4: Dorgali

The last case study chosen in order to perform tourism destination preferences analysis at the local level was Dorgali, a coastal municipality located in the province of Nuoro. Thanks to its strategic position, it can be considered a "bridge" between the most ancient and famous tourism area of Costa Smeralda and the Ogliastra area, which is considered a novelty in terms of tourism destination.

Dorgali is one of the destinations appreciated by different tourist categories, especially by groups of friends: for this reason, the aim of the study was to understand why tourists' interest concentrates in this location and what in Dorgali attracts their attention. Analysis of positive preferences was carried out: Figure 22 shows the most significant spatial clusters: both the coastal and the inland areas attracted the main attention of the tourists and represent a hot spot, while the natural peripheral area represents a cold spot. This is the only case where positive preferences are equally distributed in villages along the coastal area and within the city centre. At this point, the study focused on the why tourists appreciate Dorgali as a destination, in order to investigate not only where people go but also what they think. Thus, the analysis on tourists' reviews content was carried out using STTx.

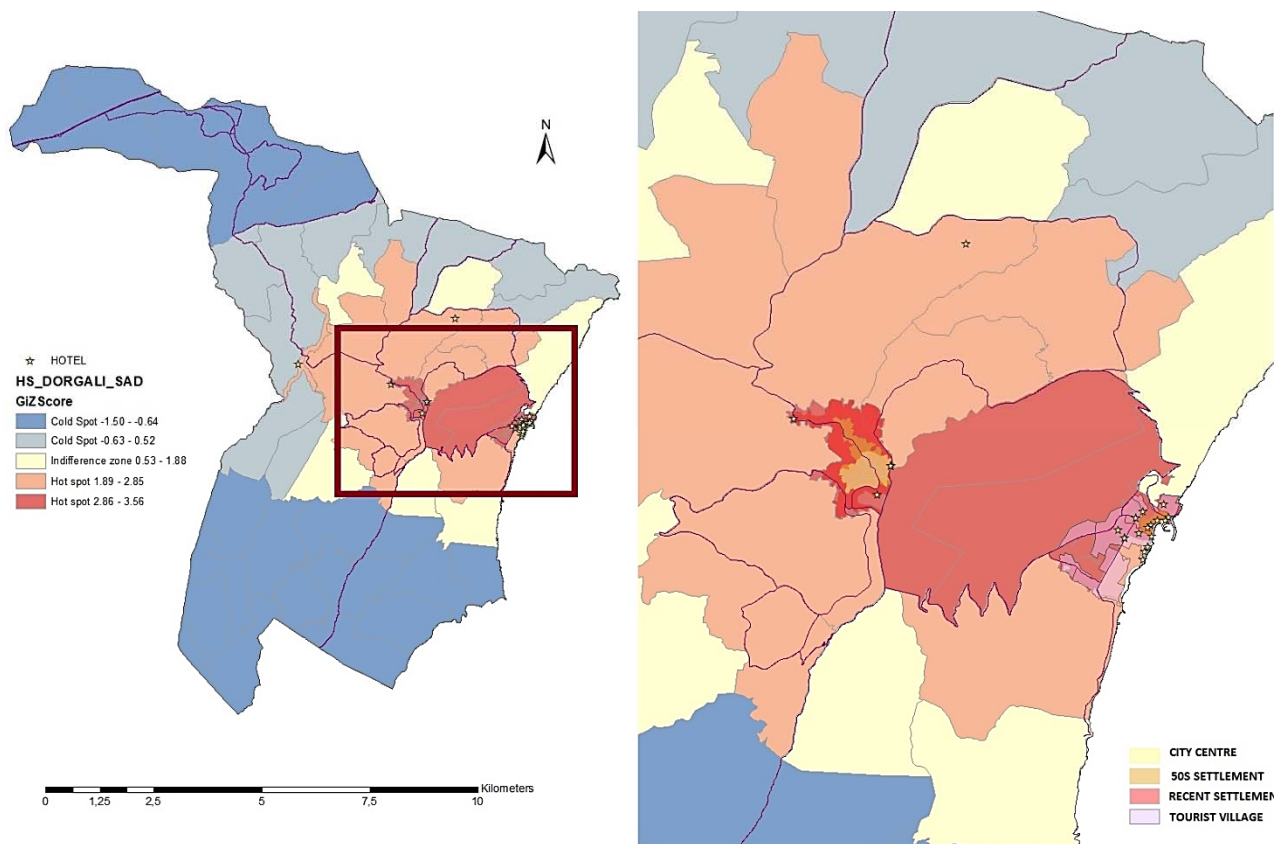


Figure 22: Significant patterns in Dorgali municipality

1120 Comments related to Dorgali user has been extracted from the tourist comment database. Table 19 shows the tag cloud of the latter comments dataset, spatially constrained by the preference hot-spots. The majority of the words in the posts refer to spatial and physical aspects of Dorgali, such as position, mountain and nature. Other words indicate specific geographic locations such as Gennargentu and Cala Gonone, where the touristic village and most of the famous beaches are located. Textual analysis results also indicate a high level of satisfaction with services, such as “room” and “pool” and the destination leisure

sites, such as typical “restaurants” and typical “food”. In addition, outcomes expressed a high level of satisfaction with the natural components, such as “nat park” and “nature”.

CATEGORY	WORDS [frequency]
Geographic location	location [670]; landscape [432]; Gennargentu [245]
Services	staff [390]; restaurant [353]; room [450]; food [280]; wine [128]
Accessibility	Cala Gonone [321]; parking [90]; walk [83]
Natural and no natural components	mountain [478]; coast [391]; nat park [262]; nature [232]

Table 20: Top 15 words related to Dorgali divided by category

According to the results, the main reason for tourists to visit Dorgali seems to be related to both its natural attractions, which include natural sites and famous beaches, and services and leisure sites. These facts generate a positive tourism location image, which is the most influential psychological factor at play when tourists decide where to travel.

Results of qualitative analyses were supported by the integration of SMGI data, with other A-GI data coming from the regional SDI. Regression analysis was applied to model spatial relationship in Dorgali, to explain the factors behind observed spatial patterns and to investigate quantitatively how the spatial interest of the participant is influenced by other territorial dependent variables. In this case the model was built on a sample of 50 data points, related to TLS and their associated TPPI, spatially distributed in the 103 analysis unit.

Univariate local Moran’s Index indicates the spatial dependency on positive preference of analysis unit. The results obtained using a 4000 meter spatial autocorrelation distance was quite significant: adjusted R-squared is higher than the 60 percent (0.0639) and the coefficient of the dependent variable (p-value b) is less than 5 percent (0.00996). Also if the majority of the points do not fall within the upper right quadrant, there is a possibility of positive spatial correlation in the TPPI. Thus, an analysis of spatial dependency and its significance was developed through the LISA, in order to highlight homogeneous areas where spatial dependency is stronger and statistically significant. Results of LISA and the significance map are reported in the Figure 23.

The cluster map classifies Dorgali census track according to association patterns, while the significance map shows the level of significance with a *p-value* of the corresponding spatial dependence attribute. The cluster map shows, in red, areas with high TPPI that are surrounded by similar areas and are located both in coastal and inland areas. Blue clusters, which are located close the city centre, represent less appreciated areas surrounded by other areas with low TPPI. It is evident from the map that areas affected by spatial dependency are mostly located in the Cala Gonone area and are comprised within clusters of high

concentration of TPPI phenomenon, showed in Figure 23.

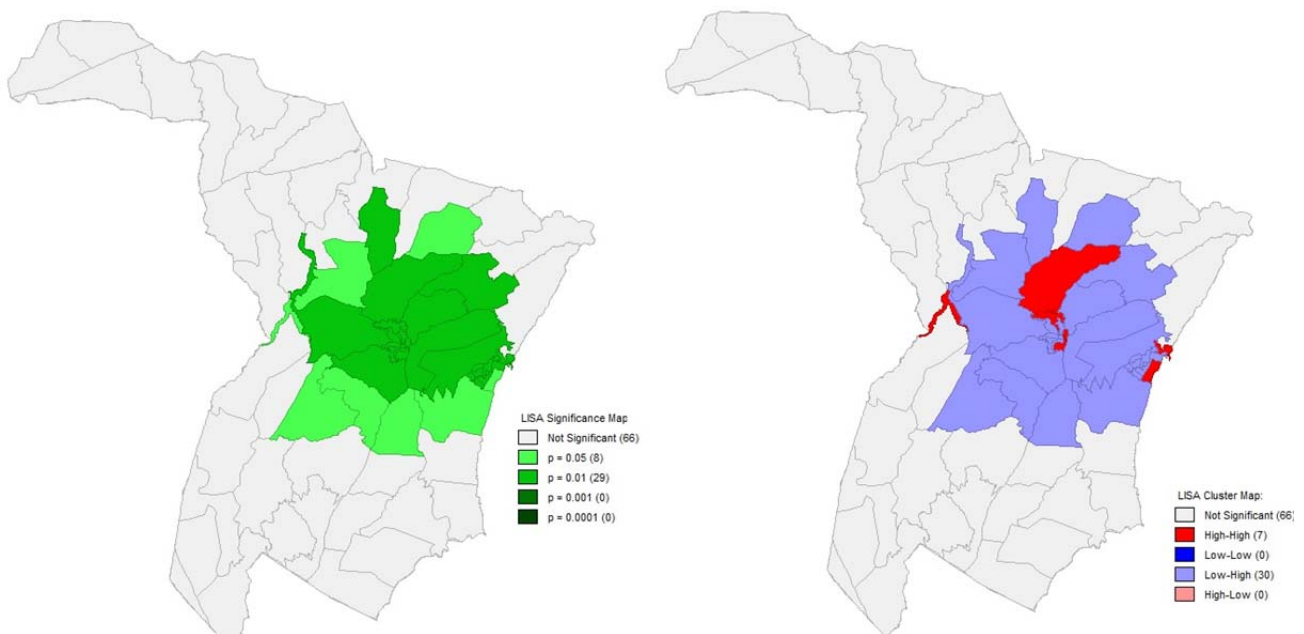


Figure 23: Significance level map (left) and LISA cluster map for Dorgali (right)

The second step of SMGI analytics was carried out in order to investigate the statistical correlation between TPPI and other socio-economic dependent variables. Each spatial unit was spatially joined with the measure of a series of independent variables, useful for describing quantitative geographic features. For the location of Dorgali, results and elaborations of statistical tests suggested including five explanatory variables in the regression model:

1. hectares of natural protected areas;
2. number of natural sites;
3. number of restaurants and facilities;
4. distance from the most popular beach;
5. proximity to the historical city centre.

This candidate variables illustrated have been tested using OLS in order to understand to which measure they are reliable and to evaluate the presence of redundancy between them. Final OLS results are reported in the table below. The probability column indicates the p-values smaller than 0.05 for the three variables: “distance from the most popular beach”, “number of restaurants and facilities” and “proximity to the city centre”: these explanatory variables are statistically significant and their coefficients are important into the model.

Summary of OLS Results - Model Variables								
Model Variables	Coefficient	StdError	t-Statistic	Probability	Robust SE	Robust t	Robust Pr	VIF
Intercept	-0.006701	0.39867	-0.691224	0.491073	0.004904	-1.366496	0.174948	
Hectares of natural protected areas	0.031224	0.031952	0.977234	0.330878	0.02119	1.473554	0.143847	1.011013
Number of natural sites	0.003533	0.023627	0.149548	0.881428	0.004072	0.867683	0.387702	1.019558
Number of restaurants and facilities	0.708706	0.062856	11.275101	0.000000*	0.199903	3.545244	0.000612*	1.297934
Distance to the most popular beach	0.742592	0.058611	12.669937	0.000000*	0.177763	4.177429	0.000068*	1.568493
Proximity to the city centre	0.39867	0.048394	8.237984	0.000000*	0.182584	2.183486	0.031406*	1.501804

Table 21: OLS test results for Dorgali

The model performed using OLS is meaningful for applying GWR in order to explore local variation among these variables. The assumption is that if the value of a TPPI with reference to a spatial unit, which is the census tracts for Dorgali, is correlated to the values it takes in the closest spatial units, the variable is characterized by spatial autocorrelation.

The TLS in the sample and the geographic candidate variables were spatially joined with the relative census track. This made it possible to develop a geographic dataset, to calculate the value of each variable for each spatial unit, and to analyse their spatial distributions. The results concerning the goodness of fit of the regression are significant: R-squared is 0.909797, which indicates that the GWR model explains more than 90% of the variance of the positive tourists' preferences in Dorgali. The coefficient created to display the spatial patterns shown in Dorgali demonstrates the relationship between the dependent variable and each explanatory variable.

The outcomes of the regression model are quite significant for the description of the spatial distribution of tourists' preferences. Figure 24 shows a random distribution of the residuals. The coefficient of the variables related to "distance from the most popular beach", "distance from the city centre" and to the presence of tourist leisure site "number of restaurants" are almost significant (*p value* less than 5 %) and show positive sign. The other variables seem to not be significant because of *p value* greater than 10 percent.

Variable	Coefficient	Std. Error	z-value	p-value
W_N_TPPI	-0.0539054	0.0986619	-0.5463654	0.5848147
CONSTANT	-0.0027276	0.0118066	-0.2310284	0.8172928
N_NATURAL	0.0304291	0.0309631	0.9827561	0.3257275
H_AREANAT	0.0013027	0.023295	0.055922	0.9554031
N_RESTAUR	0.7129614	0.0613093	11.62892	0.0000000
DIST_BEACH	0.7440368	0.0568721	13.08263	0.0000000
D_C_CENTER	0.4018013	0.0471795	8.516438	0.0000000

Table 22: Results of the GWR model: influence of each explanatory variable on dependent variable (normalized tourists' preference)

Overall, these findings suggest that the spatial interest of the participant is quantitatively influenced by two

of the chosen explanatory variables. Inclusion of only intrinsic features in the function, allows us to say that the values of the coefficients relating to the area reflect positive effects of geographic position and facilities supply to the tourist preferences spatial patterns disposition. The results confirm that the main reason tourists visit Dorgali is related to both its natural attractions, which include beautiful beaches, and the presence of a good tourism industry. These facts generate a positive tourism location image.

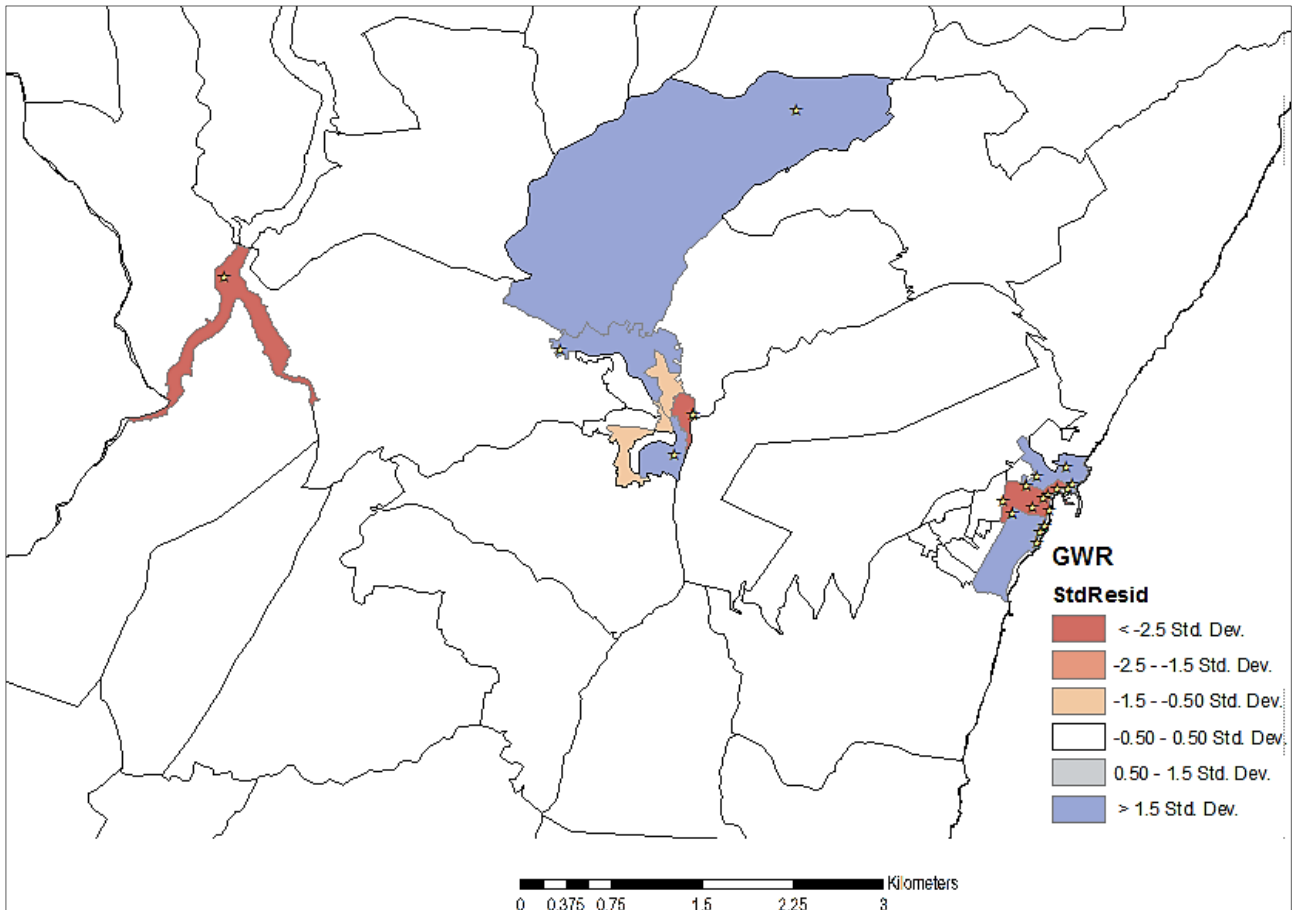


Figure 24: GWR feature class output with rendered residuals

7.4 Discussion

The study demonstrates the opportunities of SMGI as support for analysis in tourism planning. The bi-dimensional analysis framework presented in this section was used to explore tourists' preferences on destination and tourism industry and services, as represented by processing and analysing online social media data. The method integrates A-GI and SMGI in a novel and reliable model. Leiper's model (1990) represents the fundamental starting point in analysing the relationships between tourist demand, tourism industries supply, and destinations.

Geocoding and the creation of a geodatabase for analyses were undertaken to investigate the regional

distribution of tourism industry supply and location of interest. Secondly, analyses at the regional and local scales were implemented in order to describe tourists' preferences spatial patterns and to identify locations of interest; the latter may include clusters of positive preferences, or individual spots of interest. Hot spot analysis was useful for visualising this type of information on a map and interpreting derived results. Moreover, textual analysis using Tag cloud led to discovering the vast amount of knowledge enclosed in the text comments related to each single cluster of interests. Outcomes suggest taking into account those elements that are strongly related to a good location, which could be measured by spatial analysis techniques that are able to process the location variable. Thus, the geographic weighted regression analysis was used for both modelling preferences and to test the reliability of the hypothesis derived from qualitative analysis, in order to make appropriate decision in terms of policy.

Findings reveal that the success of tourist destination is closely dependent not only on the quality of the tourism industry offer but also on the territorial setting of the destinations, including the natural, cultural and the physical character of the places, as well as infrastructure and services. The results provide insights on Sardinian tourism dynamics which would not be available through other data sources traditionally used in spatial or tourism planning. Thus, this kind of study and its provided methods and tools could be used successfully in urban and regional planning as well as in tourist planning, for in both cases they contribute to taking into account a multifaceted customer oriented view on strategic development issues.

CHAPTER 8

Conclusion

This Chapter aims at summarizing key concepts and main findings, and providing final considerations and recommendations based on the study. The chapter is organized as follows: the first paragraph recalls the main concepts of the thesis in order to highlight the key issues that the study analyses, the second paragraph examines the implications of the research questions as defined in the introduction. Moreover, possible future research developments are explained. Finally, concluding remarks of the study are provided.

8.1 Summary of the key concepts

The logical framework of this thesis is designed from the analysis of the characteristics of sustainable development based on tourism, and from important main concern issues which sustainability is likely to contribute to (see Chapter 2). On one hand, the tourism industry may create job opportunities and introduce new amenities and recreation facilities that would not have otherwise been available. On the other hand, it may generate negative environmental impacts on tourist destinations. This becomes more evident when tourist activity is not adequately developed and planned.

After an analysis of the most significant models related to tourism, the discussion refers to a spatial assessment of tourists' preferences and understands the dynamics of tourists' choices (see Chapter 3).

Tourists experience new contexts in order to maximise relax and comforts. The combination of natural and artificial elements, transport and leisure sites influences tourists' choice for a destination and generates travel alternatives. In this process the psychological characteristics, influenced by needs, perceptions, and motivation, play an important role in understanding travel behaviour and tourists' expectations.

This knowledge is very important both in determining the success of a destination and implementing tourism planning processes. In fact, understanding tourists' perceptions may help in assessing issues which planners and decision makers need to address. Nevertheless, tourists' perceptions have not been properly analysed by planners yet. The analysis of tourists' perceptions coupled with the use of plans and strategies, which emphasise the sense of place and identity, may help in developing more effective planning strategies for sustainable development based on tourism, in order to reach goals related to services quality,

preserving the natural resources, cultural heritage and life quality of the host communities.

In the Digital Information age, planning processes also need to be supported by advanced tools to generate, collect and manage spatial information. Nowadays, an unprecedented wealth of digital geographic information, stored by new digital formats, is made available to planners to support design, spatial analysis and decision-making. This trend could foster notable innovations in urban and regional planning methodologies, including tourism planning.

The development of the SDIs gave the public access and reuse of A-GI according to technologies and policy standards. In many regions across Europe, the regional SDIs represent a technical platform for the development of regional and local planning processes, by means of supplied data and services (see Chapter 4, pp 30-33). Developments in connectivity, geo-browsers and mobile technologies, enabled by Web 2.0, allow citizens to operate as volunteer sensors to provide real-time GI. This wealth of digital information, defined VGI, can be easily collected, analysed, understood, and used to support informed decision-making. These opportunities can both enable an inclusive approach in planning practices and foster the democracy and the sustainability in making sustainable plan at urban and regional level.

Furthermore, a widespread diffusion of social media is fostering the diffusion of geo-referenced multimedia, or SMGI, over the global Internet. Users can easily access information and be the producers of personal geo-referenced contents on location-based social networks as well. These capabilities have surpassed previous limits in data communication, and are uncovering innovative opportunities for disseminating and gathering geographic information among worldwide users, fostering the media convergence with GIS environment.

The integration of SMGI and A-GI can disclose innovative analytical opportunities in spatial planning, with regards not only to geographic facts measurement but also to users/tourists perceptions and opinions on places, locations or tourism destinations.

In Sardinia, the tourist sector is one of the major driving forces of the regional economy. It mostly relates to coastal zones, generally considered as areas to be carefully planned for the number of activities and land uses as well as for their fragility and peculiarity. The regional tourist sector has been identified by the RPSDT as one of the strategic sectors capable of improving the regional socio-economic conditions. However, not all the possible tourism forms are desirable due to their irreversible environmental consequences (see Chapter 5). The RPSDT focuses on the inter-relationship between the production and the consumption of tourist supply, analysing only the economic perspective and, by doing so, recognises the lack of a global strategy of sustainable development based on tourism. Nevertheless, the geographic perspective is not properly considered by the plan, since it does not analyse the spatial dimension of the

tourist enterprise and its relationship with travel motivations and tourists' behaviour.

In RPSDT, a lack of stakeholders' involvement is evident as much as a careful analysis of tourists' behaviour. Several models concerning tourism planning deal with the role of the psychological characteristics of tourists, in terms of needs, perceptions, and motivation. Such components are important contributors to both the understanding of the individuals' travel behaviour, and to tourism related planning policies.

In order to address these issues, an alternative approach, based on the analysis of tourists' preferences for location and services, through public available social media data generated by users/customers', has been adopted. This represents the main novelty of the study and provides relevant knowledge for consecutive analyses aiming at demonstrate how SMGI may be directly used and integrated with traditional A-GI in GIS environment, enabling integration of this information in urban and regional planning practices. Being aware of the limits of the current tourism planning practices in Sardinia, the thesis intends to elaborate an alternative solution with respect to the practical and theoretical issues in order to solve the issues identified in the chapters related to the literature review and in the data analysis.

8.2 Main findings

The review of existent studies demonstrates that tourism industry is a mixed and complex activity (Smith, 1990), which comprises the travel to and around a destination, with the purpose of enjoying particular attractions, accommodation, catering and general services of a host area.

Starting from Leiper's model (1990), the methodology described in this thesis builds on an analysis framework which integrates A-GI and SMGI in a novel and robust model. A set of spatial analysis and statistics techniques is used at different geographic scales (regional, local) to describe and visualise the spatial distribution of tourists' preferences concerning services and tourists destinations and to detect significant patterns and singular spots of interest. The findings provide insights with reference to Sardinian tourists' preferences dynamics, which are not available through other data sources traditionally used in tourism planning.

The results reveal the dominance of a tourism model mostly located in coastal areas and largely constructed as a sun and sea experience, which in the last 50 years has transformed Sardinia into a well-known tourism destination. Another key aspect is the tourist enterprise, which leads to different tourism models from one location to another. As a matter of fact, tourist preferences are spatially distributed in five main categories of tourism lodging services: agritourisms, Bed and Breakfasts, hotels, private accommodations, residences and resorts, all mostly located in the provinces of Olbia-Tempio, Sassari and

Cagliari. The TLS sample does not consider camping sites because this category is not reviewed by Booking.com.

Dominance of a TLS category in such areas denoted a particular tourism model. Cagliari TLS supply is characterized by a strong dominance of Bed and Breakfasts, while for Alghero and Olbia, which are also major coastal city tourism centres, hotels and residences are more popular among tourists. Nevertheless the inland province of Nuoro is well represented by tourism enterprise, especially by agritourisms and Bed and Breakfasts. These locations have emerged as important destinations by tourists' perceptions and demonstrate that tourists also visit inland areas to discover a less popular side of the island, which is characterized by its nature, cultural heritage and traditions. However, in terms of number of tourists this kind of tourism still does not compete with the massive preference for tourism along the coastal area.

Different factors influence destination choices such as age, income, personality, distance and nationality. The analysis of the relationship between tourist destination and tourist typologies, from different nationalities, offers important findings in customers profiling, contributing to implement effective positioning and planning strategies for each destination. Findings of user nationality analysis demonstrated that most of them come from central and northern Italian regions, such as Lombardy, Lazio and Tuscany, while foreign tourists mostly come from France, Germany and the United Kingdom. These tourists' presences may be related to low-cost flights availability, linking London to Alghero and Cagliari to Paris and Frankfurt. For the same reason, the Alghero macro area is affected by Spanish tourists.

In addition, a dominance of Russian tourists affected the province of Cagliari, due to the introduction of a Cagliari-Russia fly route, which may represents a further and more interesting development for both the presence of Russian people and the Cagliari airport. This tourist typology is more spending oriented than European and appreciate areas such as Costa Smeralda (North-East of Sardinia), Villasimius and Pula (South of Sardinia). These areas were characterised by a unique Sardinia tourism model and involved developing products such as luxurious resorts, golf courses and fashionable residence, which often attracted high spend tourists. This development aimed at exclusive and up market audience.

Tourists' preferences dynamics analysis, using hot spot combined with textual analysis, allow one to understand the most popular destination and the reasons behind tourists' choices. Regional spatial patterns detected areas already affected by the preferences' clusters visualised, as well as potential development zones. Hot spot maps showed the presence of three major clusters representing the spatial distribution of the Tourist Positive Preferences Incidence and confirmed results of tourists' typology distribution. The first cluster is located in the Nurra district and includes the municipalities of Sassari, Stintino and Alghero. The presence of this cluster is probably due to the city of Alghero, unique municipality

which preserved its Catalan tradition. The second cluster is located in the metropolitan area of Cagliari and the last cluster includes the Costa Smeralda district, which appears as the only area where the global tourism preferences fulfil overall tourists' expectations.

Textual analysis reviews also indicate a high level of satisfaction with the destination and the tourist services. According to the analysis results, the majority of the words in the posts refers to spatial features and tourism structures, such as locations, hotel and beaches and are related to TLS located in the Costa Smeralda area and Alghero. Other frequent words, such as restaurant and typical food, indicate a high level of satisfaction with both destination leisure site and territorial traditions. These are located mostly within inland areas such as the Marmilla district. Thus, the main reason for tourists to visit Sardinia is related to both its natural attractions, which include landscape features, such as beaches, and the presence of a unique cultural heritage and local traditions. This determines different overall TLS models for the destinations.

The analysis of the content of the reviews for the different models provided insights of the success factors of the different models, and gave useful hints for the choice of the more sustainable tourism development model for other, underdeveloped destinations. Textual analysis was also useful in discovering preferences for location and services by tourist typology. Families with old children, families with young children, mature couples, young couples, solo travellers and groups of friends are the six main tourists categories detected. Tag cloud results explain a high level of satisfaction for the geographic location for all categories. Families with young children mostly appreciate the quality of the services supply, expressed by frequent words such as "hotel", "room", "staff" and "restaurants". Mature couples and families with young children express their preference for "shopping" facilities and physical feature such as "city centre".

Outcomes of the textual analysis also indicate higher levels of satisfaction with natural components, which include "beaches", and the presence of a typical cultural heritage or the historic city centre. These features generate a positive tourism location image, which is one of the most influential psychological factors at play in the destination choice making process. Another interesting result is the presence of the word "excursion", expressed by the category group of friends. This represent active tourist behaviour, oriented towards exploring different places apart from the accommodation.

Results suggest a strong relation with the push and pull model by Crompton (1979). The push motivations fostered travel desire while the pull motivations describe destination choice. Here, it is evident that external motivators based on the destination attractiveness, including tangible resources (i.e. beaches, cultural attractions and recreational activities) lead all tourist categories to visit Sardinia. Internal motivators, including desire for relaxation, adventure and social interaction, determinate the success of

Sardinia as a holiday destination for young couples and groups of friends' categories. In addition, shopping emerged as a motivational characteristic of the destination in tourists' opinion.

This phenomenon raises interesting questions on SMGI and on opportunities for analysis, and will be further investigated in future studies. Moreover, the preferences of different tourist typologies regarding a destination are located not only within the coastal areas but also in inland municipalities, and this represent one of the most Typical products of this type include hiking in natural areas, agro-tourism facilities and improved accessibility at small historic sites. interesting insight textual analyses. These results suggest developing alternative tourism products that may be provided on a scale and may draw on unique features, such as a destination's history, culture or ecology. Typical products of this type include hiking in natural areas, agro-tourism facilities and improved accessibility to small historic sites.

However, Sardinian inland municipalities have a great deal to offer by way of sustainable management compared to traditional tourism destination. Urban environments have more existing infrastructure to support tourism growth, where rural tourism must contend with lack of infrastructure and environmental impacts. Additionally, the main Sardinian coastal cities are the major gateways to other areas and destinations. In this sense policies for improving the environmental performance of existing infrastructure and products are necessary at regional and local level.

Lastly, the study was also supported by the integration of SMGI data with other A-GI on land use, transport facilities and socio-economic data coming from the regional SDI. Specifically, the Geographically Weighted Regression (GWR) analysis method was applied to investigate quantitatively if and how much the spatial interests of the participant are influenced by environmental and socio-cultural dependent variables. It was assumed that the model parameter estimates may vary across the study area and thus differ from ordinary regression models that produce one single estimating equation (Fotheringham et al. 2003, p 9). The aim was to investigate the relationships between preference patterns and variables which represent physical characteristics of a specific location in order to understand which of these would contribute to the single destination success.

Thus, regression analysis is used for both modelling preferences phenomenon and testing the reliability of the hypothesis raised by clues in the textual analysis, in order to make appropriate decision in terms of policy. The candidate explanatory variables, already discussed in Chapter 7, are referred to Cooper's model (2008) (see Chapter 3). The model describes tourism as a multidimensional and multifaceted activity that involves three key aspects of Leiper's spatial model (1990): the tourist, the geographical features and the tourism sector. The geographical features can be recognised as four elements which lead people to travel and produce destinations' attractiveness. In this sense each destination can be viewed as a complex

product of the tourist industry which includes, among other factors, climate, infrastructure and superstructure, services, and natural and cultural attributes. Each destination offers a combination of tourist products and services, natural or artificial components such as site accessibility, restaurants, accommodation and city image.

Overall, GWR related findings suggest that the success of tourist destinations is closely dependent not only on qualitative supply of the tourist industry but also on the territorial setting of the destinations, including natural, cultural and the physical character of the places, as well as infrastructure and services. The variables used in the model give a more or less significant contribution to tourists' preference explanation through a coefficient. The inclusion of only intrinsic features in the function, allows one to say that the values of the coefficients related to the area reflect positive effects related to geographic position and facilities supply to the tourists preferences spatial patterns disposition.

This kind of study and its provided methods and tools could be used successfully in urban and regional planning as well as in tourist planning, for in both cases they contribute to take into account a multifaceted customer oriented view on strategic development issues. The lesson learnt from this kind of analyses may be used in tourism planning at the regional and local level, in order to export success factor to less developed areas, or to correct failure factors. Moreover, many findings from this case study may be directly applicable to other contexts with different geographic characteristics. Adopting SMGI/A-GI integrated model may assist in identifying specific attributes and their corresponding levels for successful tourism planning model at regional and local level.

8.3 Concluding remarks

The insights obtained through this novel and integrated approach offer interesting challenges towards the development of more specific analysis, concerning people spatial and thematic perception of places. Spatial analyses and techniques are provided to demonstrate how SMGI may be directly used and integrated with traditional authoritative spatial data layers in GIS environment.

Firstly, the results of analysis carried out by coupling SMGI and A-GI from open SDI show the potential in terms of provision of a novel kind of information which may add value to traditional planning knowledge bases, informing decision-making by multifaceted community. As a matter of facts, SMGI may disclose opportunities for further analysis scenarios in urban and regional planning, and may offer useful suggestions for sustainable development based on tourism strategies. In an integrated planning support framework, SMGI analytics might help to understand tourists' observations, preferences, interests, feelings, or needs, and possibly affect decision-making dynamics and urban and regional planning processes with

customer oriented strategies.

Moreover, the SMGI potentialities to generate useful knowledge for urban and regional planning, might foster citizens', or tourists' in this specific case, dialogue about places and events giving the opportunity of being heard, further facilitating the integration of experiential and multifaceted information and professional knowledge. Thus, the knowledge from SMGI, if competently addressed, might be used to support analysis, design and decision-making in tourism planning at differ scales, fostering public participation in processes about the current and future development of destinations.

Secondly, the thesis demonstrates the opportunities of SMGI as support for analysis in tourism planning. In this case both tourist preferences on destinations and tourism industry services were analysed from the spatial perspective through the review judgments collected by the social media platforms TripAdvisor and Booking.com. Results show which are the most popular destinations or areas and what tourists appreciate or disregard in Sardinia. A set of spatial analysis and statistics techniques were used at different geographic scales (regional, local) to describe and visualise the spatial distribution of tourist preferences and to detect patterns and hot-spots. The findings provide insights on the Sardinian tourism dynamics which are not available through other data sources traditionally used in spatial or tourism planning.

Finally, considering stakeholders' involvement, user preferences knowledge in supporting the tourism planning processes could represent a significant implication for future research in the field of social sciences and tourism management. Indeed, the analysis of the Sardinian case study emphasises the importance of the stakeholders (users or tourists) within the inclusive processes. For instance, their behaviour can reinforce or discourage the existing power relations. As a result, the question concerns how tourists and the political and planning processes are linked. In other words, what the social implications of tourist behaviour over the planning or political processes are. In this field, the thesis provides different implications for theories concerning the theme of participation and in relation to further studies in other research areas. Nevertheless, other considerations in users' perception, considering for example local communities perceptions, already demonstrate challenging and stimulating research opportunities which may eventually bring innovation to tourism planning, design and decision-making.

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List of abbreviation and acronyms

A-GI	Authoritative-Geographic Information
AIC	Akaike Information Criterion
BD	Big Data
DI	Digital Information
GI	Geographic Information
GIS	Geographic Information Systems
GWR	Geographically Weighted Regression
ICTs	Information and Communication Technologies
INSPIRE	INfrastructure for SPatial InfoRmation in Europe
ISAD	Incremental Spatial Autocorrelation by Distance
OLS	Ordinary Least Squares
RLP	Regional Landscape Plan
RPSDT	Regional Plan for Sustainable Development based on Tourism
SDI	Spatial Data Infrastructure
SEA	Strategic Environment Assessment
SMGI	Social Media related Geographic Information
SN	Social Networks
STTx	Spatial-Temporal Textual analysis

TLS	Tourism Lodging Services
TPPI	Tourism Positive Preferences Incidence
VGI	Volunteered Geographic Information
VIF	Variance Inflation Factor

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