

ANALYSIS OF TERRITORIAL IMPACT OF THIRD TOURIST BOOM IN CANARY ISLANDS (SPAIN) THROUGH THE APPLICATION OF A GEOGRAPHIC INFORMATION SYSTEM (GIS)

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Tourism is an activity that occurs where it is consumed (Antón, 1998). Tourism development involves adapting a place for tourist use, thus, the production, sale and consumption of tourism goods and services transforms the territorial system on a territorial-tourism system (Vera, 1997). This territorial-tourism system has some unique characteristics that distinguish them from other territorial systems. Tourism development depends on the territorial system that transforms, so it generates a close relationship of dependency that requires an analysis of its territorial dimension.

In this sense, the territory is a resource, a support and a determinant of tourism development (Vera *et.al.*, 2011; Beas, 2012). For this reason, the territorial dimension is key to understanding such a complex activity such as tourism. Along with the economic dimension or socio-cultural, the territorial dimension of tourism is another important pillar that can provide key to planning and management of tourism knowledge.

The Technologies of the Geographic Information (TGI) incorporated a new way of conceptualizing the territory, supported by tools for the treatment of spatial information in digital format.

Within the TGI, the Geographic Information Systems (GIS) focus on the acquisition and processing of information in digital format territorial reference (Bosque, 1999; Gutierrez, 2000). Although there is no single definition, in short, the GIS can be defined as the combination of hardware, software, data, techniques, procedures and users. This can acquire, store, edit, analyze, and publish geographic information. Thus, they can address complex problems of territorial character. Is multidisciplinary and its use by professionals from different disciplines develops constantly evolving capacities.

Furthermore, the TGI have some limitations related to their computer character (Dobson, 1983, 1993). The abstraction of reality through models of computer data is limited to quantifiable spatial variables. So, discard a-spatial or qualitative variables are difficult to quantify (Capel, 2003, 2005, 2009). In this sense, far from discarding this technology,

TGI, within the paradigm of quantitative geography, allow obtaining knowledge through systematic measurement of quantitative variables (Tapiador, 2006). This knowledge can be combined with that obtained from other approaches and methods, achieving better answers to complex territorial questions. Therefore, although the use of TGI in science is feasible in relation to the theoretical and methodological basis of the approach used for rigorous analysis, not everything that takes place in a TGI can be considered science (García, 2013).

The background on the use of GIS in the analysis of the territorial dimension of tourism in Spain and Canary develop from the second half of the nineties of the twentieth century. In this sense, the experience of the use of GIS in tourism analysis have been developed from the national government (Lobo *et al*, 1999), some regions (Jurado *et al*, 1999; Sánchez *et al.*, 2000) as well as from some centers and research groups (Pérez, 1997; Mejias, 1997; Mejias *et al*, 1995; Instituto Universitario de Geografía, 2001; Simancas *coord*, 2006; Simancas, Horcajada y García, 2009). These studies have laid some groundwork on which much remains to be done.

In order to analyze the impacts of the Canary third tourist boom, through a multidisciplinary research project, we have implemented a GIS as a basis for obtaining knowledge on the territorial dimension of tourism and territorial impact. In this sense, the implementation of a GIS requires a rigorous, coherent and orderly process (Tomlinson, 2007). Thus, consideration was given to the phase diagram proposed by Buzai, Baxendale and Cruz (2009):

Step 1. Conceptual: The research depends on the researcher (discipline, values, interests, aspirations, etc..). The choice of the problem is conditioned by decisions of the investigator. For this reason, the choice of the problem and its analysis has some subjectivity (Del Rosario, 2008).

The territory is constituted by different thematic variables with a particular behavior. This behavior can be modeled in a GIS by abstraction of measurable variables. By choosing appropriate thematic variables is possible to analyze the territorial dimension of tourism and their territorial impact.

The problem statement focuses on the development of tourism in the Canary Islands. This development has been uneven, bearing phases of growth and decline related to socio-economic, political and territorial context. Several authors have recognized a new phase of growth in the late twentieth century and early twenty one (Rullán, 1999, 2005, 2010; Blázquez y Murray, 2010; González Pérez, 2010; Hernández, 2010; Simancas, 2010; Simancas y García, 2010; Simancas, García, Dorta y Falero, 2011; García, 2013). This growth phase has finished in the year 2007 - 2008, entering a new phase of decline.

At this time various authors discuss the effects of this phase of economic growth has had on tourism. From the territorial point of view, the questions focus on knowing the entity and intensity of the processes of growth and transformation of the tourist areas and the impact it could have on the territorial-tourism system.

Step 2. Methodological-conceptualization: In this phase the theoretical and methodological background on this subject are collected. With this, we check the suitability and relevance of our analysis to make a new contribution to the debate. In this sense, this third phase of tourism growth and its spatial effects had not yet been analyzed in depth. In the open debate on the territorial dimension and impact having were following unanswered questions: How

much they have grown urban-tourist areas? What infrastructure has been built in the third cycle of tourism growth? Has increased the tourist accommodation offer? What area has occupied the entertainment offer? What dimension has the residential area? Etc.

The problem statement allowed us to limit the temporary space (1998-2008), the territorial (islands of Tenerife, Gran Canaria, Fuerteventura y Lanzarote), the targets (measure the territorial impact of urban growth in tourist areas of the Canary Islands), the research questions, the preliminary answers (hypotheses), the thematic variables to take into account (the tourist accommodation offer, the complementary leisure offer, the residential use, public space, etc.) and processes to develop in the GIS to validate or reject the hypothesis. So the “operational model” was obtained.

Step 3. Methodological-technical: With the operational model was implemented the GIS. The thematic variables become cartographic layers for further spatial analysis. Using different data models (vector or raster), is synthesized building a graph database. Through systematic answers to many questions measurements were obtained.

First, to characterize the spatial context of the Canary Islands the following thematic variables were used: a) land use, b) distribution of the population and demographics, c) land use and d) changes in the land uses.

Second, the tourist areas were delineated. To do the following thematic variables were used: a) the divisions made by the land use plans of the tourism, b) the delineation of urbanized land within these divisions, and c) the location of the tourism infrastructure in these urban areas.

Third, the analysis of the tourism infrastructure was conducted through the localization, the cartographic delimitation and characterization of each of the buildings. Thus, it was possible to analyze the new constructions, changes in building types, the area occupied, etc.

Fourth, the growth and transformation of the tourist areas was delimited. Was quantified and characterized the urbanization process through infrastructures built recently.

This will be analyzed taking into account the tourism policy developed by the regional government (growth control, renovation, increased quality, etc.), evaluating whether the objectives of tourism policy have been met in its territorial aspects.

Step 4. Rating and theoretical elaboration: Once implemented the GIS, are proceeded to data analyze. Thus, through the study of the thematic variables individually (the tourist accommodation offer), or by combining it with other variables (the tourism infrastructure in relation to urban growth), the hypotheses could be verified.

The results were integrated with those obtained by other disciplines using other approaches and methods. Thus, the explanatory model combines the results obtained from spatial analysis through GIS, the results of the economic analysis of the growth cycle, the legal analysis of tourism policy, the results of the sociological analysis of stakeholders, the architectural analysis of building typologies, etc.

The results show a mixed tourism policy influenced by the housing sector. The tourist areas in the Canary Islands occupy 1,8% of its surface. In this last phase has grown 29,4 km² (a growth rate of 56%). The renewal of the tourist infrastructure has been limited, while the construction of new infrastructure (hotels, golf courses, marinas, theme parks, etc.) has been the most significant.

Tourism infrastructure explain part of the territorial growth (9,5 km²). The residential use has extended this last phase of economic growth (9,8 km²) with increasing the resident population in tourist areas (10,2% of the population of the Canary Islands in 2009). With all this shows that the policy of containment of the growth of the tourist accommodation offer has diverted towards residential construction. With this, the policy of containment of tourism growth has diverted towards residential construction.

The quality has been understood in square meters and stars, building bigger tourist facilities, while residential use has grown in parallel. With this, tourism policy has not achieved all its objectives, having significant territorial impacts.

Step 5. Knowledge transfer: Returned results, these are disseminated and transferred to enrich the theoretical and methodological background on this subject.

In conclusion it is shown that the analysis of the territorial dimension of tourism provides a key knowledge for planning and management. In this sense, with the implementation of a GIS and the use of this scheme of work, you get a reliable basis of territorial information. As a result, it is possible to obtain key data to construct explanatory models of territorial processes by systematically measuring territorial variables. The knowledge gained can be key in the planning and management of tourism, thereby improving efficiency.