

SPATIAL ANALYSIS OF COUNTY DIVISIONS IN LOW DEMOGRAPHIC DENSITY TERRITORIES: THE CASE OF EXTREMADURA

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1. INTRODUCTION

Territorial planning, an optimal organization of resources, as well as a proper and equitable accessibility is essential for the European Union, even more in rural areas because of their demographic and socio-economic differences compared to urban ones. It has been a concern for decades and reflected in several documents such as the Single European Act (1986), European Spatial Development Perspective (ESDP) from 1999, the European Commission's Third Cohesion Report (2004) titled "A New Partnership for Cohesion", the Community Strategic Guidelines on Rural Areas (2006) and the European Territorial Agenda 2020 (2011).

Taking into account the regional diversity between rural and urban areas, all the documents highlight the need to promote and strengthen the economic and social cohesion of rural areas through a decentralized, polycentric and balanced urban network that guarantees collaboration and integration between both spaces, which articulates a functional and territorial unit (EUROPEAN COMMISSION, 1998).

Therefore, a regionalization in which the rural world is inserted in a more extensive territorial planning strategy is necessary. This could be possible with the design of a network of cities that supplies all the necessary goods and services to the rural space on its hinterland. Thanks to this, an urban-rural cooperation that fixes the population in the most disadvantaged municipalities could be possible (OECD, 2013).

The objective of this paper is to analyze the partnerships that currently exist in Extremadura taking into account their delimitations and functions (educational, healthy, agrarian, judicial and tourist districts, commercial areas and rural partnerships such as LAGs and Associations of municipalities), whether overlaps exist in delimitations, as well as what towns could be act as a county town, thanks to its public facilities and services, in a new territorial reorganization.

The interest of analyzing Extremadura lies in the fact that it is a predominantly rural region with a GDP (Gross Domestic Product) below 75% of the European average and with serious demographic and economic problems.

2. METHODOLOGY

In order to diagnose the territory of Extremadura a set of variables that represents it geographically has been collected. Afterwards, various spatial analysis have been carried out:

a) Geometric Intersection analysis.

First, the boundaries of the analyzed partnerships have been established, as well as the location of county towns where the resources are managed. Then, through the Geometric Intersection analysis, shapes with boundaries have been superimposed on a GIS. A double typology has been obtained: on the one hand, areas where there are duplications, and on the

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other hand, areas where they do not exist. Through this it can be seen in which areas overlaps occur and where there is no an adequate territorial planning.

b) Principal Component Analysis.

In order to extract the municipalities of Extremadura that could act as county towns in the partnerships the Principal Component Analysis (PCA) has been used. PCA is a multivariate analysis which offers the possibility of explaining cause-effect relationships between the variables chosen. Moreover, it is a causal and explanatory method of variables that involves external factors (URIEL, 1995) and allows identifying latent dimensions on a set of variables and the reduction of the vector space, which is defined by a broad set of original variables, to a smaller number of factors independent of each other, which are ordered by explanatory power (PALLARÉS *et al.*, 2004).

c) Territorial accessibility

Once the possible county towns have been established (municipalities that have weights greater than 0.3 in Component 1 of the PCA, which is the factor that defines the urban functions) several analysis have been carried out. These are:

- *Absolute accessibility.* It calculates the average of the impedances that separate each municipality with respect to the county towns through the network by the path with minimum impedance and considering the factorial weights of each municipality in Component 1 as a weighting factor.
- *Relative accessibility.* It neutralizes the effect of geographical location and its objective is to highlight the effects of the infrastructural offer on accessibility, since it reflects the rodeo indexes relating the real and ideal impedances.
- *Minimum access times.* The calculation of the minimum time of each locality to the nearest county town shows an ideal model in which the population always approaches the nearest one without taking into account its urban functions nor the competition with more distant ones.

A shape with “routes” has been obtained. In it, the minimum time that it takes from each municipality to the county towns appears. Then, for the cartographic representation of the information, the Index Distance Weight (IDW) interpolation method has been used, as well as in the previous cases.

- *Gravitational attraction.* This index allows to determine the area of gravitational influence of each center of economic activity and the power of attraction that they exert on the rest of municipalities of the region.

3. RESULTS AND CONCLUSIONS

In Extremadura, as in other rural regions, an adequate and effective territorial organization has been sought for decades. The purpose is to provide the rural population with all the services and facilities to have a good quality of life.

Through various partnerships and territorial delimitations, equality in accessing services for the entire population of Extremadura has been pursued. However, in this work, after several analyzes, it can be observed how there is no a single comarcalization and distribution of services and equipment around the main towns with greater urban functions. The public administrations have managed the resources according to the needs that were emerging, generating duplications and conflicts (Figure 1), so that 45% of the population has to move to other towns to have their needs met.

Subsequently, since the PCA, 14 new county towns have been selected. If they bring together the services and equipment, they could be the basis for the development of a new comarcalization in Extremadura, since they are the towns with the best demographic, economic, commercial and leisure activities.

However, the results obtained in the accessibility analyzes (Figure 2) show that the new county towns are not yet enough, since there is a group of municipalities, which are located in border areas, that are poorly communicated with the nearest county towns (45 minutes). These

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villages are located in La Siberia, Villuercas, la Serena and Campiña Sur, in the east of Extremadura, Hurdes and Sierra de Gata to the north and Sierra de San Pedro and Valle del Alagón on the border with Portugal.

Another problem is that the current county towns do not meet the needs of the population in their areas of influence because they have little economic activity and, consequently, they get low rates of gravitational attraction. This demonstrates that the decentralization of certain public services is not enough to generate economic development and population growth in the more rural areas.

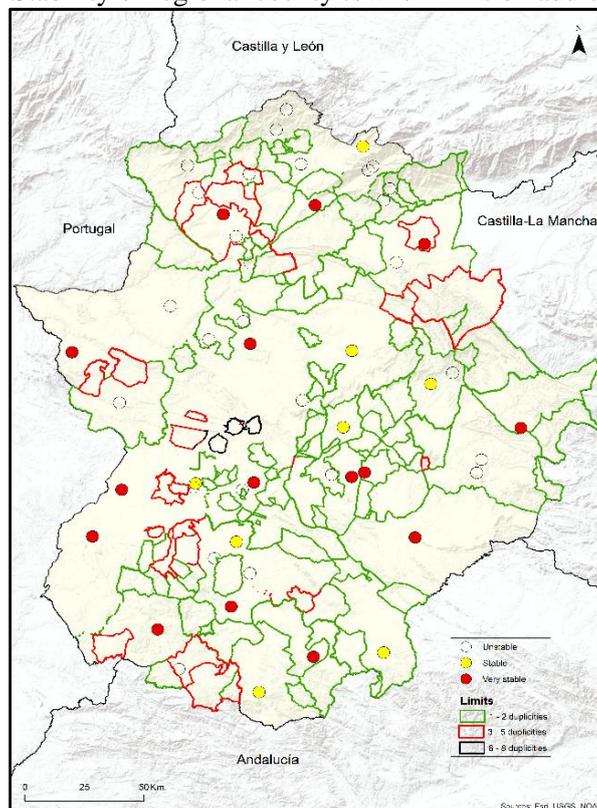
In this work, we propose to design a new territorial planning taking into account that:

- There are county towns with educational and health services that cannot be moved and to access to them from some very disadvantage villages is very difficult. For this reason, improving the transport infrastructure is necessary.
- More economic activity is needed in the weakest areas. The Public Administration could encourage new activities in emerging sectors related to good natural resources that Extremadura has. For example, new activities as agri-food companies, renewable energies, the expansion of irrigated areas or promotion of tourist activities. For this, there are initiatives like LEADER with economic support from the EAFRD.

In the light of the results obtained, it can be said that there is a pressing problem in the territorial organization of the public facilities in Extremadura. There are many partnerships that imply a high economic cost and the most ruralized population must to move to several county towns depending on the public service that they need.

In this way, the administrations should join their interests and propose a single more sustainable and effective territorial organization in which, aside from the 14 municipalities indicated in this work, more activity has to be granted to others located in border areas with less economic development.

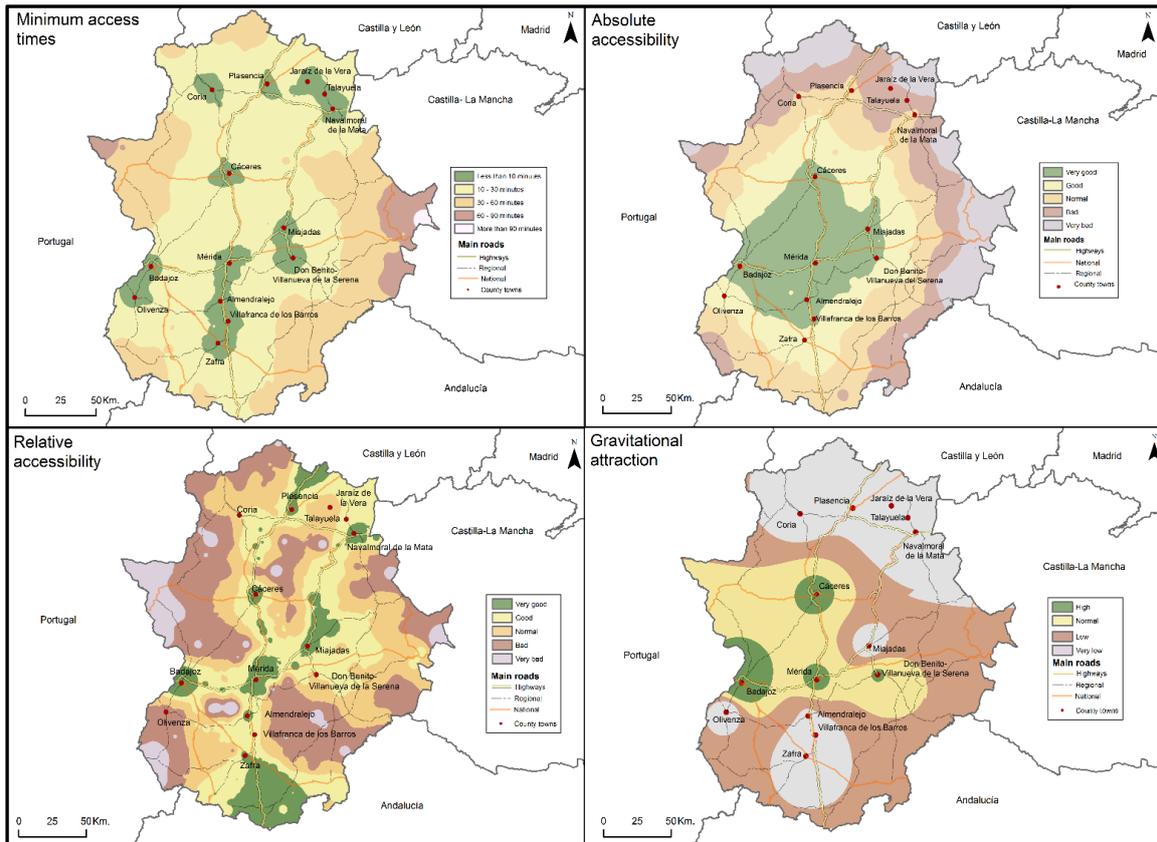
FIGURE 1
Stability of regional county towns in Extremadura



Source: authors.

It is clear that the most important thing is to comply with applicable laws, not only to respect what is legal, but also morally and socially fair, since the entire population of Extremadura has the right to basic quality services regardless of their economic, cultural and social situation. The public administration must opt for a new design formed by urban-rural partnerships well-endowed with urban functions as well as with an adequate communication between county towns and its hinterlands. This would allow daily interaction between urban and rural municipalities.

FIGURE 2
Accessibility analysis



Source: Authors.

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