

# VARIABLES, INDICATORS AND METHODS FOR THE ANALYSIS OF TERRITORIAL COHESION: DIFFICULTIES AND CHALLENGES IN LOW DENSITY AREAS

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## 1. Introduction

At the 21<sup>st</sup> Congress of Spanish Geographers (2009), Professor Florencio Zoido pointed out that identifying and proposing structures and systems for territorial cohesion was a complex task, and he added "the most complex task at the moment is creating a clear and shared policy with regards to the territorial cohesion structures and systems that should be used at a regional and county level; in particular because it is at these levels where the lack of Spanish land planning lies." He then suggested that all planning instruments should consider territorial cohesion in three main spheres: settlement systems, all population centres; a relational system, the necessary infrastructure for all types of flow; and a patrimonial system which groups together all spaces and areas of a natural or cultural value (Zoido, 2010: 92, 96 and 97).

The *Green Paper on Territorial Cohesion. Turning Diversity into Strength [Libro verde sobre la cohesión territorial. Convertir la diversidad en un punto fuerte]* (2008) defines territorial cohesion as the guarantee for the harmonious development of territories and the possibility for inhabitants to make the most of said territories' inherent characteristics, that is, "a means to transform diversity into an asset that may contribute to the sustainable development of the European Union as a whole" (EC, 2008: 1). The purpose is to instil a generalised polycentrism to counteract the effects of an unbalanced development so as to favour the periphery of the twenty-seven. The policy of *territorial cohesion* proposes a *harmonious, balanced, sustainable and polycentric development* in order to solve the territorial and urban imbalance existing in the States of the Union; a polycentrism that is more than the morphology of all urban systems, that is, a decentralised territorial structure (Faludi, 2005).

In this context, territorial development is to contribute necessarily to territorial cohesion, both at a social and a political level, sustained by the appreciation and respect

of territorial diversity, and based both on the natural formation of a specific geographical area and on its economic-productive and sociocultural characteristics. It is focused, therefore, in supplying internal coherence from a territorial point of view, a way of applying solidarity not only to citizens but also to European places and territories (Davoudi et al., 2009: 203 and 205). That is, it incorporates a "territorial coherence to public action" which has not been favoured by economic and social cohesion at a local, state or Community level (SGPDT, 2009: 5).

The *Forum of experts on cohesion, diversity and territorial development [Foro de expertos sobre la cohesión, la diversidad y el desarrollo territorial]* presented in Seville (Observatory of Territorial Development of Andalusia, ODTA in Spanish, 2009) the definition of the concepts of territorial development and cohesion, and highlighted that "cohesion would be the beginning for any public procedure aimed at territorial development", which would contain three essential elements: physical articulation, territorial fairness and a feeling of identity and of belonging to a territory. According to this point of view, the idea of cohesion not only includes issues of inter-territorial fairness or solidarity but also goals relating to environmental protection and sustainability, and the integration/coordination mechanisms of the various regional policies of territorial impact.

The European Union has identified regions as referential territories and, in relation to said regions, territorial cohesion is presented to us as a driving notion which shall be approached by means of indicators such as the physical articulation through transport networks, a fair access to equipment and services, a balanced economic development, the better use of territorial capital, divisive tendencies, etc. According to Farinós (2005) "the concept of territorial cohesion is closer to the broadest notion of territorial development", an issue linked to territorial cohesion understood as the search for a more harmonious and balanced development for the territory of the Union, a principle aimed at territorial development, whose most appropriate scope is the sub-regional level, or more precisely, the urban-rural polycentrism (Fernández, et al., 2009b).

Finally, the *Conclusions from the 5<sup>th</sup> report on economic, social and territorial cohesion: the future of the cohesion policy [Conclusiones del V informe sobre cohesión política, social y territorial: el futuro de la política de cohesión]* from the European Commission (2010) state that "territorial cohesion also means dealing with the links between urban and rural areas, in relation to the access to infrastructures and affordable

and quality services, and the problems in regions with high concentrations of socially-excluded communities". At the same time it asks the following question: how can cohesion policy take more into account the important role of urban areas and territories with particular geographical characteristics during the development processes, as well as the emergence of macro-regional strategies? (EC, 2010: 9 and 10).

## **2. The study of territorial cohesion indicators**

The selection of a valid system of territorial cohesion indicators poses serious difficulties from a theoretical and methodological point of view, as the *Green Paper* itself supports the follow-up and evaluation of cohesion policies, whose design is conditioned by the use of synthetic indexes that must necessarily be representative of said process.

### **2.1. Methods of empirical application of the concept of cohesion**

From a theoretical point of view, the indicators chosen must necessarily cater for the multi-disciplinary nature of territorial cohesion. The guidelines for territorial development set forth by the European Spatial Development Perspective (ESPD) are polycentrism, rural and urban integrations, the promotion of transport and communications and the efficient management of cultural and natural resources. These concepts are key reference points to outline potential indicators; additionally, they offer a solid theoretical framework. It is recommended that the application of the above-mentioned be dependent on the economic, social and environmental situation of each of the European territories (EU, 1999: 21), that is, that they be understood from a comprehensive and sustainable perspective. The majorities of all current studies on territorial development have this type of systemic approaches, and develop, in a more or less detailed way, each of the environmental, economic and social considerations that affect territorial systems. The mutual inter-relation of these three areas (environmental, economic and social) is operatively understood through three spheres or components (ESPON, 2006b):

- *Territorial Efficiency* (Te): understood in relation to natural resources and their use. It includes aspects such as energy, competitiveness of the internal production system, internal connectivity and territorial accessibility. It combines environmental and economic aspects.

- *Territorial Quality* (Tq): both of the various aspects of life, and also employment and access to general or specific services. In general we speak about the standard of living throughout the territory. Social and environmental aspects are included.
- *Territorial Identity* (Ti): it might be identified as the "social capital" of the territory, the ability to share a common idea in relation to the future, the local *know-how* and the competitive and differential advantages of each territory. It incorporates economic and social factors.

From a methodological point of view, it is necessary to implement measuring systems with an operative aim, which might allow, as it has been stated before, for a follow-up and an evaluation of the policies of territorial cohesion. Territory, as a complex system, gives rise to the articulation of analytical proposals which usually form a series of indicators that try to characterise said complexity. In this sense, a multivariant analysis is the one most commonly used, linking the latter with the three cohesion spheres described above. These proposals are related with the line developed by the ESPON network through many of their projects, which in turn stem from the results obtained by Project 3.1 on tools for the application of ETS (ESPO, 2005). The general goal of the analytical tools package is to develop the ETI (Evaluation of Territorial Impact) process, acting as a link between the political arena (more related to ETS) and the technical arena (related to ESPON). Some specific results stemming from these projects already highlight a deficient development of the suggested methodology (ESPO, 2006a) and some issues derived essentially from the availability of data and their heterogeneous characteristics.

The TEQUILA<sup>1</sup> model can be summarised as an analytical package based on the principles of territorial cohesion, developed under the framework of ESPON project 3.2 (2006b), and seen in various scientific applications by Roberto Camagni (2006 and 2009). It is a multi-level analysis that uses different cohesion criteria (Efficiency, Quality, Identity) and sub-criteria as starting points, all of these *weighted* and implemented in a uniform manner through different quantitative and qualitative indicators, following a layered structure. Likewise, and in order to obtain an optimal inter-relation among the same cohesion areas, the proposal by Golobic and Marot

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<sup>1</sup> Acronym for *Territorial Efficiency Quality Identity Layered Assessment*

(2011) confronts the methodological issue by building a three-dimensional matrix that merges political measures, territorial goals and the various territorial units.

All the procedural proposals are multivariant and have the same goal, albeit with slightly different methodological "architectures". In any case, in our opinion, the key is not too much in the design but in the information necessary to see them through. At this point, the key element is the figure of the indicator as a basic unit element that contributes with information and the necessary knowledge to obtain the goals proposed by the method.

## 2.2 Application of territorial cohesion at various levels

At a European level, the diagnosis stems from the excessive concentration of economic and population potential in certain areas, the imbalance between urban and rural areas, the peripheral nature of the latter, the environmental unsustainability of the former and the general tendency towards expansive and diffuse urbanism. Faced with these general processes, it has been ascertained that territorial cohesion would be the spatial pillar of the concept of sustainability (Camagni, 2009: 343).

Among the already mentioned ESPON perspectives we can find the aforementioned applications by Camagni (2009) and Golobic and Marot (2011). Both are representative of the Territorial Impact Assessment (or Evaluation). The work by Camagni is applied to the European transport policy. Here he tries to evaluate the levels of cohesion that result from its application from nine regional indicators linked to their respective sub-criteria, related with the pillars of cohesion. In turn, Golobic and Marot (2011) use the same theoretical articulation of the concept of cohesion, developing a differentiated procedure for the evaluation of the Slovenian energy policy in order to link it with their territorial development. These indicators are collected, additionally, for a time series, which is responsible for the evolutionary image.

In Spain, all projects on cohesion and territorial development carried out show a methodological pattern characterised by a synthetic index *Z* stemming from the analysis of information variables related to sustainable development springs, and from this point, they use techniques that either simplify information (Analysis of Main Components) or outline groups of territories with similar behaviour from the analysis of *clusters*.

One of the most interesting projects is the *Second Report on Territorial Development of Andalusia [Segundo informe sobre desarrollo territorial de Andalucía]* by Florencio Zoido and Inmaculada Caravaca. This project used 27 information

variables articulated in three blocks of general content: natural environment and development; economic activities; and social welfare. From the relationship between these three general blocks and the three development dimensions (availability, decline and dynamism) arose nine intermediate integration indexes which then were used in a *cluster* analysis to propose a typological characterisation of the territorial development of Andalusia (Pedregal, Torres and Zoido, 2006). Other proposals arise from the efforts of some regional governments with relatively advanced territorial strategies. The *Territorial Strategy of Navarra* (TEN) shows a series of indicators for the follow-up of territorial evolution in Navarra, in a clear relation with the development guidelines mentioned by ETS. Said indicators were *strategic*: competitiveness, social cohesion and territorial sustainability; and *territorial*: polycentrism, access to infrastructures and knowledge and management of natural and cultural patrimony, creating a synthetic indicator for each of them (Floral Community of Navarra [Comunidad Floral de Navarra], 2001).

In the Basque Country there is a project called *Green Paper on Local and Regional Development in the Basque Country* [*Libro verde del desarrollo local y regional en el País Vasco*], supported by the Treasury and Public Administration Department of the Basque Government (Basque Government, 2009). Using a System of Municipal Information of this Autonomous Community (UDALMAP), a panel of municipal sustainability indicators is designed, as well as one for infrastructures and equipment. The first ones are structured in three areas: economy/competitiveness, social cohesion and quality of life and environment and mobility, working on 23 specific areas. On the other hand, the infrastructure and equipment panel allows for their identification and location through ortophotos and street maps, and is divided into seven categories: education, social services, health, culture, transport, institutions and others, for a total of 44 information layers. Then they create a selection of indicators for the analysis of territorial cohesion in the municipalities of the Basque Country (Table 1). Unlike other studies, a synthetic index is not obtained for these three groups of indicators; instead there is a detailed analysis of the behaviour of each of these variables.

**Table 1: Territorial Cohesion Indicators in the Basque Country**

Economic indicators
- Gross national income per capita
- GDP per capita
- Employment rate
- Population's level of education
Social cohesion and quality of life indicators
- Population's evolution
- Ageing rate
- Immigration
- People in unfavourable economic situation
- Retail commerce density
- Housing: comfort and equipment
- Safety
Mobility indicators
- Public transport
- Access to communication networks and equipment

Source: *Green paper on local and regional development in the Basque Country* (2009)

In conclusion, the various territorial proposals that deal with cohesion correspond to general approaches that condition sustainability, either increasing or reducing the number of indicators according to the particular characteristics of the territory in question.

### 2.3. Selection of indicators: difficulties and measurement of variables

A more detailed study of the variables used shows the strategic character of many of them, in relation to present and future challenges in the European Union, such as gradual population ageing, the effects of globalisation on economic activities, etc. Therefore, we think that an appropriate selection of indicators should have the ability, inexcusably, to characterise the main obstacles, competitiveness and territorial potential.

Some of the most applied and most meaningful indicator groups are the ones related with employment and unemployment, which can be described in a general or specific manner from the study of age gaps. Their behaviour is closely linked to others such as social welfare, socio-economic dynamism, purchasing power and demographic dynamics. With regards to the latter, variables that refer to structure and population characteristics are highlighted, especially the ageing rate, the study of migrations and the cultural and educational characteristics of the population, either through the level of

illiteracy or the percentage of the population with higher studies that might be key when discovering the social capital. The logical interrelation of variables allows for the potential of the latter to be determined by the accessibility to transport networks, highlighting in all studies consulted the references related to, among others, the existing number of motorway kilometres, dual carriageways and railways.

We should not leave aside other economic indicators that might help us detect the most significant territorial imbalances, nor the ones referring to the patrimonial system, both natural and cultural. All these would help not only to evaluate the level of preservation and to reassert the feeling of identity, but also as a potential factor of economic diversification once we focus on them.

To summarise, the suitability of a valid system of cohesion indicators would be based not only in the efficacy of the *ad hoc* diagnosis of the territories, but also on the ability of the variables and criteria used to be applied universally, especially in territories with specific characteristics where cohesion is more difficult to obtain. This is one of the most important challenges faced by the cohesion process. That is, how to respond to major imbalances such as low population density, the weakness of urban and communication systems, and the lack of operative capacity of some land planning policies; issues discovered, among other European regions, in Castilla-La Mancha.

### **3. The case of Castilla-La Mancha: advancing in the measurement of territorial cohesion**

Castilla-La Mancha is one of seventeen Autonomous Communities in Spain, with 79,461km<sup>2</sup> and 2,098,373 inhabitants (2010), being the region with lowest population density in Spain (26.4 inhabitants/km<sup>2</sup> and 92.9 inhabitants/km<sup>2</sup>, respectively). This region separates the capital, Madrid, from two important areas from a socio-economic point of view: Andalusia, to the south, and Valencian Community, to the east. Measuring the territorial cohesion of this area is important due to its linking role at the centre of the peninsula (Martinez, 2010), despite the explicit weakness of its urban network and, in general, of its territorial structure. Internally it presents important geographical differences between the central area dominated by the plains, where the most important centres are located, and the mountainous rim of the periphery, with low density and an ageing population (Pillet, 2007; Santos, 2008).

Research teams led by Ricardo Méndez (Méndez et al., 2006) from the Spanish High Council of Scientific Research [Consejo Superior de Investigaciones Científicas



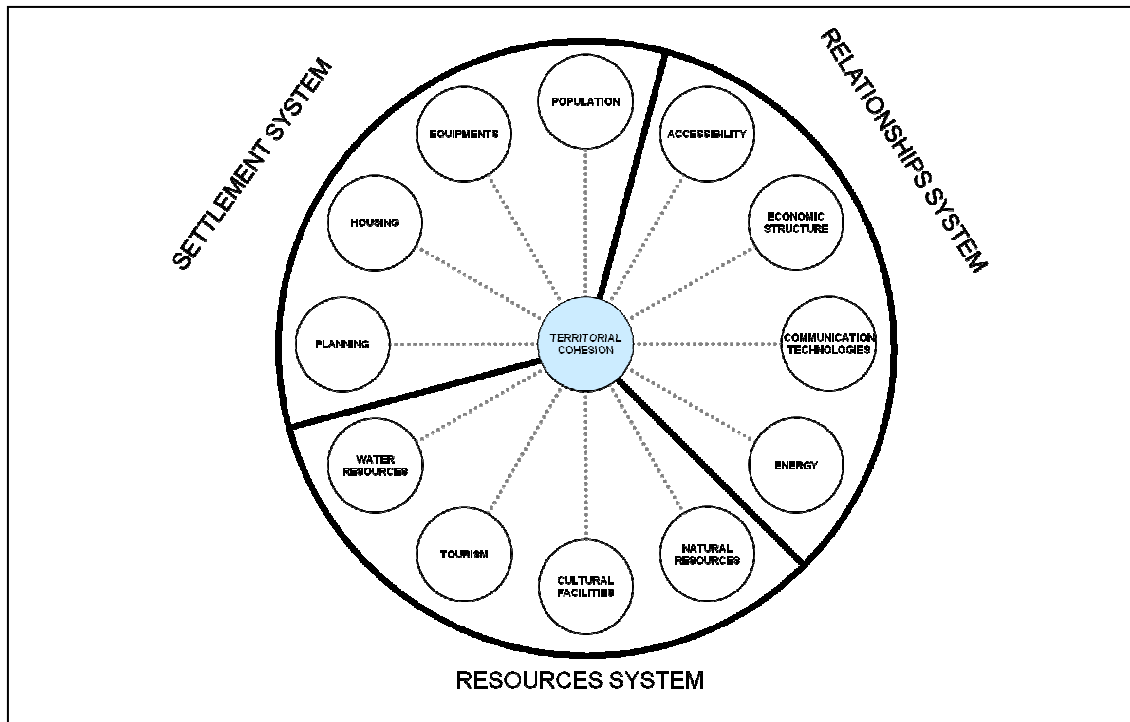
español] and Félix Pillet (Pillet et al., 2010) from the Department of Geography and Land Planning of the University of Castilla-La Mancha [Departamento de Geografía y Ordenación del Territorio de la Universidad de Castilla-La Mancha] have individually dealt with the measurement and interpretation of the development processes and territorial cohesion of Castilla-La Mancha. The first team has focused on the role of the main urban centres of the region, whereas the second team, of which the authors of this text are part, has chosen to identify and define the Functional Urban Areas (FUA) of all the region through the use of Related Population statistics in relation to centres with certain structure capacity, offering as a result a regional map composed by ten functional areas (Pillet et al., 2010).

At the end of 2010, the Board of Communities of Castilla-La Mancha revealed the *Project of Land Planning "Territorial Strategy Castilla-La Mancha"* [Plan de Ordenación Territorial "Estrategia Territorial Castilla-La Mancha"] (POT-ET-CLM) to contribute to, among others, territorial cohesion by defining a System of Territorial Information of Indicators (Junta de Comunidades de Castilla-La Mancha, 2010). Its methodological integration in our work is interesting in order to value the degree of territorial cohesion within the region and its various functional areas, using the UFA concept as a coherent territorial scope from the point of view of the settlement system and economic relations. At the same time, the suitably developed group of POT-ET-CLM indicators shall allow us to measure the degree of internal coherence in each UFA. These groups of indicators, as we can see in Picture 1, are organised in three groups summarising the cohesion concept. These are: settlements (where we find indicators related with population, equipment, etc.), relations (accessibility, economic structure, communication technologies, etc.) and patrimony (natural spaces, cultural resources, tourism, etc.), and they are all part of a territorial model and of each of the elements forming them.

This model, refined and one that precisely defines all indicators, can be used as a basis for the analysis of territorial cohesion in Castilla-La Mancha, and as a work proposal for other regions of low demographic density. It would mean selecting a group of universally accepted indicators for any level of analysis, and connecting them to strategic points defined from the political point of view in Land Planning. According to this idea, our line of work would be aimed at discovering the differences existing in terms of territorial cohesion among the Functional Urban Areas of the region,

concluding with an operative diagnosis to obtain the desired territorial model for each geographical area, and therefore improving their own cohesion.

**Picture 1. Major areas and themes of territorial cohesion**



Source: Own elaboration as per the work by Zoido, et al. (2010) and the Board of Communities of Castilla-La Mancha (2010)

Finally, after our experience in the application of the European Spatial Development Perspective from a series of sources for the analysis of polycentrism (Pillet et al., 2007) we have restricted the Functional Urban Areas in a low density region such as Castilla-La Mancha (Pillet et al., 2007). From this proposal, our goal has been to conceptually analyse the idea of territorial cohesion so as to jointly investigate, in future studies, the various experiences related to cohesion and territorial development indicators which shall be applied in Castilla-La Mancha.

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