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Mobility patterns and characterisation of functional urban areas in low-density regions: Castilla-La Mancha (Spain)

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MOBILITY PATTERNS AND CHARACTERISATION OF FUNCTIONAL URBAN AREAS IN LOW-DENSITY REGIONS: CASTILLA-LA MANCHA (SPAIN)

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ABSTRACT

The spatial research of labour markets has been often carried out from a local perspective, analysing their characteristics in the urban and metropolises frameworks. The spatial structures have been increasing their complexity because of several reasons, amongst them stand out mobility and employment in our society. The application of the European Spatial Development Perspective (ESDP) and its proposal of polycentric structures set out a scheme which allows a wider approach to the labour market research, both the scale perspective and factors analysed.

The paper focuses in the structure of relations in Castilla-La Mancha starting from the ESPD premises. This is a central region of Spain described as a large territory with low density population, small and medium cities normally distant between them but with certain proximity to outer metropolitan areas, mainly Madrid.

The mobility patterns are being analyzed in the region, giving priority to those for working purposes. By them the functional urban areas (FUA) are being detected and their main characteristics are, and therefore approaching to a better understanding of the labour markets in a regional scale. The analysis is completed including the relationship between transport and functional areas.

To success in these purposes different data sources has been used, highlighting the “linked population”, a statistical parameter gather by Spanish Census which quantifies population flows between municipalities for three different reasons: work, secondary dwelling and education. By analysing them and in combination with accessibility and connectivity studies we are in a position for a better understanding of the structure of this mobility patterns and commuting in a regional and sub-regional scope, and the interaction between urban functional areas.

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1. INTRODUCTION.

This paper analyses the functional structure of labour markets in low-density regions of the European Union. The scope of the study is the Spanish region of Castilla-La Mancha (80,000 km² and 2,081,313 inhabitants in 2009). It uses the documents that govern *European Spatial Development Perspective* (ESDP, 1999) for its application to a specific area. In a spatial setting like modern-day Europe and an economic and social situation like the present, the spatial structures that we found are necessarily complex. Within this complexity, policies must find allow space for operational application that lets the necessary objectives of territorial equilibrium and sustainability move forward.

With this general framework, we have outlined the problems surrounding areas of reduced demographic density. The processes associated with the economies of urban agglomeration and diffusion have been generating some territorial divergence, in which sparsely populated regions have been gradually increasing their dependence on cities and service hubs in the more densely populated areas. Among other considerations, job markets have undergone modifications to their relational and hierarchical structures, particularly in the territorial areas of which we make mention.

The article was drawn up by the DETER research team at the Department of Geography and Spatial Planning at the University of Castilla-La Mancha (Spain). Over the last three years, it has worked on applying the concepts that govern *European Spatial Development Perspective* in these types of weakly populated regions.

It starts with a reference to the ESDP and the European Territorial Agenda (2004), analysing their essential operative concepts and the main considerations developed later in the framework of applied work to then set forth the general aspects about the characteristics of the area of study and the methodology employed. The second part details the main results obtained. It presents the regional structure of Castilla-La Mancha through the layout of transport and communications, unravelling the resulting urban functionality using the established interrelations. These two aspects let us identify and characterise the job markets in this region to finish by providing several brief conclusions about the situation in question.

2. THE ESDP AND THE EUROPEAN TERRITORIAL AGENDA. THEORY AND APPLICATION.

Using the results obtained in the article published by this research group (Pillet et al, 2007) about the sources for ESDP application in Castilla-La Mancha, we start the present analysis based on the idea that the European Union has always implicitly shown political interest in regional planning and cohesion, even in periods with greater economic concerns. Since the publication of the ESDP in 1999 and the policy on territorial cohesion that followed from it, the territorial objectives of the European Union have been more explicit in several ideas. Supervised and guided by the *European Spatial Planning Observation Network* (ESPON) since 2003, this cohesion policy proposes the execution of *balanced, harmonious, sustainable and polycentric development* to resolve spatial imbalances in member states; a polycentrism that goes beyond the morphology of urban systems or, in other words, a decentralised spatial structure. The origin of the ESDP proposal was the functional creation of local territorial administrative units in the sixties, as well as studies about commercial areas and their socioeconomic influence. To connect the ESDP to tradition (functional region), this European proposal was well received throughout the geography, as it made it possible to develop a new flexible regional geography.

The ESDP is proposing spatial development based on polycentrism, in networks of cities and in urban-rural relations, with the aim of obtaining spatial cohesion, that is, the political commitment to territories over sectors. From this viewpoint, polycentrism becomes an emblematic concept that can unify different issues: spatial development, spatial zoning and spatial planning. These are all part of strategic planning, where taking the functions of the regions into consideration is stressed. From the theoretical framework, polycentrism is defined from urban hubs with more than 15,000 inhabitants equipped with different facilities and services that can attract population and organise a FUA (Functional Urban Area), whose population will be greater than 50,000 inhabitants.

Added to this is the *European Territorial Agenda*, driven forward in Rotterdam in 2004 and endorsed by a final document in Leipzig in 2007 by EU ministers responsible for spatial policies, trying to establish the spatial cohesion process that was started by ESDP. In a setting prior to the present economic crisis, the promotion of polycentric

development was outlined, in which the spatial integration of places where people live is an important issue (EU, 2007a).

2.1. The case of regions with low demographic density (functional areas in small and mid-sized cities).

The general discourse of European Spatial Strategy must be effectively shaped for different spaces in the EU. They have been developing dynamics that generate their heterogeneous configuration, the reason why there is no general formula that can be applied to obtain the common objective of spatial cohesion. In this sub-section, we will reflect on the specific considerations made in strategic literature with respect to low demographic density spaces in the EU and how to draw up cohesion and structuring policies in these territories, which are probably the same ones with the greatest convergence problems.

ESPON, created in 2003 and based on European initiative INTERREG III, specified the system's structure. It would be organised –from the top down- starting with the pentagon or *Global Integration Zone*, which the *Metropolitan European Growth Area* would join and, lastly, the *Functional Urban Area* (FUA). A total of 64 MEGAs and 1594 FUAs have been counted in the European Union. Although the FUAs' centres should be municipalities with more than 15,000 inhabitants, it advises that they are not characterised by size alone but, above all, by the function they exercise, accessibility and the ability to organise flows around them, in which these urban centres will establish functional areas that must be larger than 50,000 inhabitants. All of these approaches can be modified, as they are merely guiding and flexible determinations and, as stated, each territory will need measures in line with their characteristics and territorial organisation.

The accord or *European Constitution* that was approved in October 2004 detailed the meaning of the ESDP, by bringing together the classical economic and social cohesion that has made the European Union an example to follow, *territorial cohesion* (article I-3). This new and interesting proposal aims to provide diffusion and apply strategies connected to polycentrism to counteract the effects of unbalanced development with the objective of favouring the EU periphery.

In application of the case in Spain, we could cite references like the *Estrategia Territorial de Navarra* [*Territorial Strategy of Navarra*] (2005) and publications like *Ordenación del territorio y desarrollo territorial* [*Territorial Planning and Territorial*

Development] (Farinós and Romero, 2004) and the manifesto *Por una nueva cultura del territorio*” [*For a new Culture in Territories*] (misc. authors, 2006) in which, from an interdisciplinary analysis, the contribution of some geographers stands out. Due to making reference to the new paradigm of territoriality, in general the works focused on Spain advocate a territorial system structured on the global-local relationship that must take territorial cooperation into account, as well as the importance of innovative cities in rural regions.

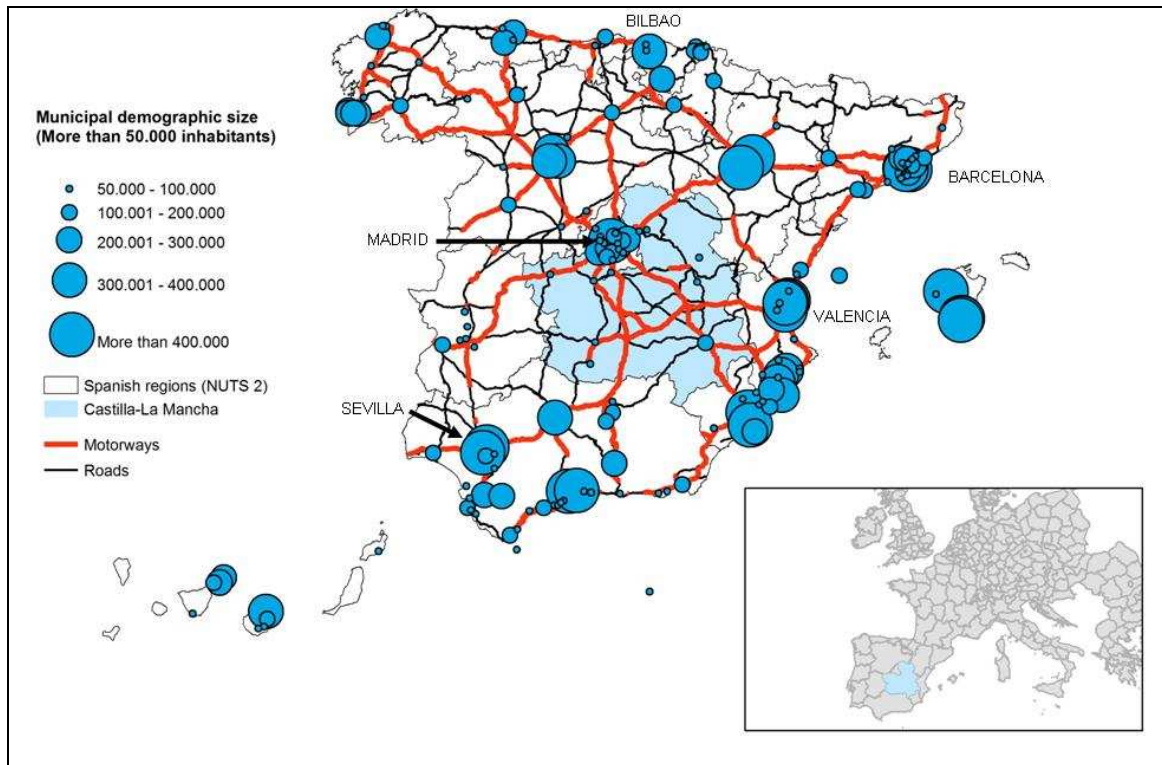
Some experiences connected to territorial approaches that have surpassed purely-sectoral intervention plans have offered interesting results. One of them is the application of programmes inspired by the LEADER philosophy or focus, arising from the community initiative bearing the same name that has been applied in Spain in three stages. This experience is also closely linked to a regional work scale, working in network, inter-sectoral tasks and coordination, topics that are very appropriate for also handling the application of polycentrism. From this experience, which was broadly diffused and applied in rural regions of Spain, much knowledge was obtained. The first noteworthy one is the exclusion of large municipalities (cities), a circumstance that the LEADER method fell into by preventing each territory from exceeding 100,000 inhabitants. Indeed, these exclusions damaged territorial cohesion, while also cutting off some areas. This has prevented working lines from being developed that are orientated on urban-rural relations and their spatial effects. Nonetheless, a positive point that must be pointed out is that it was used to integrate and learn about rural settings from urban environments, while also generating the need to understand both territorial realities as complementary and interrelated areas.

In order to carry out the new territorial policy considered in the ESDP, territories must be delimited where there are spatial action programmes and plans, as well as establishing the relationship in place between locations in a polycentric system. Associating the spatial structure with the new polycentric territorial model, as it strengthens the urban network and the decentralised territorial system, we would contribute in a large degree to structuring the territory in low density population areas through the selection and empowerment of service centres and infrastructures, as well as their neighbouring areas that they cover, being more ruralised and with worse levels of facilities and services.

In recent years, although the Spanish urban network has been reorganised and its structuring capacity increased, the Spanish urban system still suffers from little

hierarchical structure. An analysis of the distribution of Spanish urban regions clearly reflects this imbalance and weak hierarchies (Figure 1).

Figure 1. Urban areas in Spain (More than 10,000 inhabitants) and the position of Castilla-La Mancha.



Source: Spanish National Statistics Institute, 2009. Own elaboration.

The latest factors pointed out among the spatial challenges of the European Territorial Agenda are demographic change (particularly aging) and the configuration of job markets with regard to internal and external migratory results as a relevant process in territorial equilibrium. This same document, in the section on action priorities, states the need to smoothly develop the urban system under a new urban-rural partnership. Thus, the role of low-density population spaces unanimously stands out for obtaining territorial objectives in the EU. Not in vain, the progressive demographic concentration in metropolitan areas and their diffusion processes have generated -as an opposite effect- a progressive dismantling in lower density spatial environments, ranked today according to their connection capacity to the main transport routes integrated in large metropolises (TRB, 1998).

The case analysed here -Castilla-La Mancha- has the ideal characteristics to analyse the polycentric structures in sparsely populated areas to a good degree affected by high degrees of aging. In parallel, it lets us delve deeper into knowledge of the organisation of functional urban areas in these types of territories. Below, we will halt our analysis of the urban centres featuring in this polycentrism and their ability to exercise influence on neighbouring territories to move onto, in the next chapter, an analysis of the status of FUAs. We will focus on the application of the ESDP in regions with urban structures characterised by imbalance, the fruit of an unequal urban planning process.

3. ANALYSIS PROPOSAL: CASTILLA-LA MANCHA.

This discourse on spatial cohesion and European convergence must necessarily be applied to territories. The economic and social setting present inertias that tend towards the opposite, to accentuating differences, to emphasising the effect of agglomeration economies and to increasing the differences between spaces, which today are growing apart due to their leadership depending on their presence and role in the system.

The participation of different territories in economic dynamics is of vital importance. For this reason, the structure of the job markets will be essential in understanding spatial relationships that develop in the space. We believe that job relations are what largely shape the way in which different territorial spheres participate in economic development processes. Furthermore, the territorial structure of employment is what potentially generates the greatest demand for mobility and, consequently, its analysis will help us to understand the territories and the regions.

Castilla-La Mancha, a Spanish autonomous community (code ES42 in NUTS 2), arising from the new administrative structure with the 1978 Spanish Constitution, will be the region on which we centre our analysis. This region, like the rest of the Spanish autonomous communities, arose after implementing a new organisational structure at the beginning of the 80s in the 20th century. This structure granted growing political importance to the intermediate stage between the nation and the local or municipal administration or, in other words, regions. By way of example, in the shaping of job markets, its impact is most noteworthy due to being able to execute numerous important competences in society and in territories.

3.1. Territorial characteristics of the scope of application.

Castilla-La Mancha is a region located in inland Spain, between the regions of Madrid in the centre, Andalusia in the south and Valencia in the east. Its geographic extension represents 14% of the nation, but only 4% of the country's total population. The autonomous community is divided into five provinces (Toledo ES425, Albacete ES421, Ciudad Real ES422, Guadalajara ES424 and Cuenca ES423) with different structures and dynamics, yet a common trend: all of them have a somewhat close relationship with urban areas outside the region and weakly interrelate with each other. This is partly due to the reduced general demographic density of the region (24 inhabitants per km²) one of the lowest in the nation. Despite positive demographic changes in recent years, the growth is distributed unequally in the territories, with the population decreasing in the most rural and peripheral areas and growth concentrated close to the border with the Community of Madrid and around the provincial capitals (Pillet et al, 2010). According to analyses (Santos, 2008), the last population census revealed that 752 of the 919 municipalities of Castilla-La Mancha were deemed rural by the INE (Spanish Statistics Institute) due to having less than 2000 inhabitants. Of this latter group, 76% lost population in the last intercensal, with the percentage dropping to 67% if all regional municipalities are taken into consideration. These figures contrast with the overall positive evolution in the region (1,755,053 in 2001 and 2,081,313 in 2009) and confirm the dissymmetry in the distribution of the population. Aging problems must be added to this, which worsen as the size of the municipalities reduces, with the percentage of elderly over 65 years of age reaching 38% of the regional total, with figures rising higher in outlying mountain areas (44.4% in the province of Guadalajara). One could say that the overall demographic boom, which particularly occurs in more urbanised areas, cannot hide the duality and specific problems of rural regions and that these characteristics have a negative impact on the sparse structuring of the territory, where the urban hierarchy is also conditioned by areas of large renown outside the region.

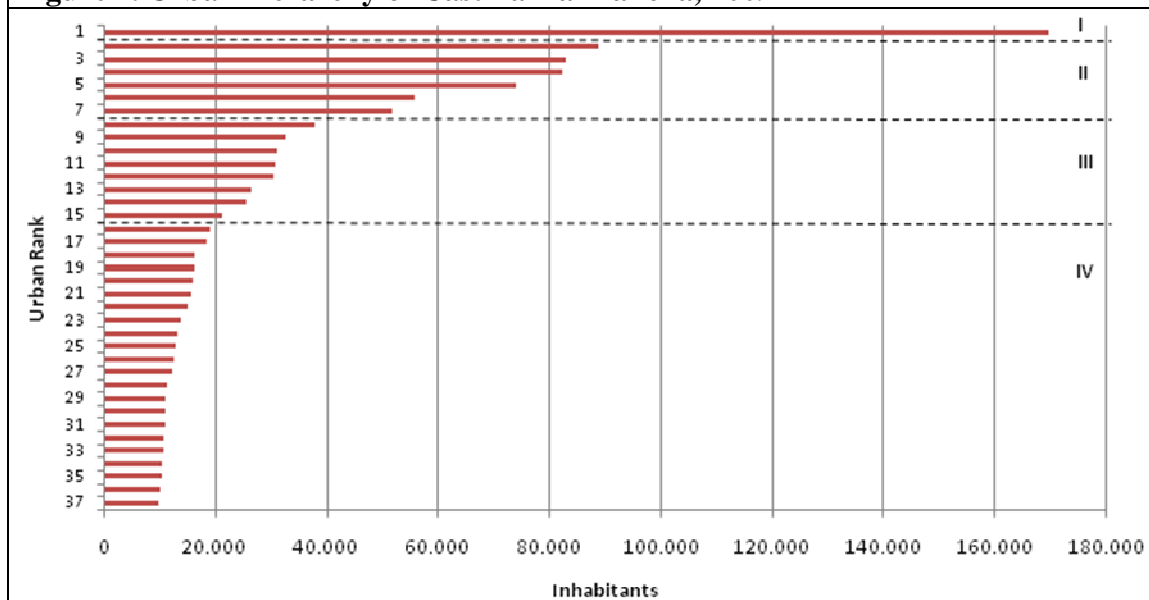
Table 1 and its accompanying figure, with more updated data, reflect the settlement structure in which the important weight of rural hubs can be appreciated (80%), with respect to urban hubs (4%), owing to the deep dichotomy established between regions in the plains and the mountains. With this, this is an important repercussion that the demographic data have on the dual organisation of the territory. The plains (Vega del Tajo and La Mancha) have been settlement sites of a series of small and medium-sized

cities that have either appeared in the outlying areas of the metropolis of Madrid and organised through industrial corridors or have been established from their role as a support of the radial communication networks that, moving out from Madrid, crossed the region to connect Andalusia in the south and the Valencia region in the east. Do not forget other small-sized places with important production specialisation, which are distributed over the most central part of the region and that presently have economic growth, well-being, sustainability and participation indicators, as well as incorporation with the knowledge society that are higher than expected in terms of size, accessibility to large activity or economic specialisation centres (Méndez et al, 2006: 91). The figure with this table shows the weak hierarchical structure mentioned, as only 7 cities have more than 40,000 inhabitants and 18 do not reach 20,000 inhabitants.

Table 1. Settlement of Castilla-La Mancha, 2009

	Amount	%
Urban municipalities (inhabitants)	1,133,611	56.8
no.	37	4.0
Intermediate municipalities (inhabitants)	631,877	31.6
no.	158	17.2
Rural municipalities (inhabitants)	315,825	15.8
no.	724	78.8
TOTAL (inhabitants)	2,081,313	100.0
no.	919	100.0

Figure 2. Urban hierarchy of Castilla-La Mancha, 2009



Source: INE (Spanish Statistics Institute). Own elaboration.

Two thoughts are pertinent with this structure: The great significance of the Madrid metropolitan area in the regional bordering areas and, secondly, that the possible territorial articulation will be done through a demographic duality and an urban structure in which there is no single governing hub able to organise the territory, with medium mountain regions with strong depopulation processes, in a territory with clear lacks in its communications network. This is because the regional road network between capitals and the main urban cores has different degrees of planning and execution (Martínez, 2010).

3.2. Methodological working proposal and data sources.

The main limitation that we find when performing an in-depth analysis of the functional structures of territorial areas, such as the one proposed, is the availability of enough relevant information to allow us to establish the suitable connections. After reviewing the most appropriate sources to carry out this objective and evaluate their possibilities, it was concluded that the idea of *connected population* extracted from the 2001 *Censo Oficial de Población* [Official Population Census] was well suited for starting the analysis of the territorial structures and polycentrism in Castilla-La Mancha. The information gathered includes three connection options for people with different municipalities than that of their residency: due to *studies*, *second homes* or *employment reasons*.

In the latter case, a work connection, relationships are established between the municipality of residence and of work, clearly reflecting forced mobility and, consequently, establishing the limits of the labour markets. Other positive aspect would be the lack of territorial restrictions since, unlike other statistics, movements are counted between all Spanish hubs. However, their frequency is a limitation, once every 10 years, having to wait until 2011 to see possible changes.

Similarly, for the analysis of territorial labour-related relations, there are other local sources of information. In some cases, these let particular features be analysed more in depth although, conversely, they are not homogenised or systematised for the entire region, which does not lead to understanding the structure from our analysis scale as a whole. The outlook that concerns us could be considered less social and labour and more territorial, due to being oriented on delimiting flows and areas of urban influence, with the aim of incorporating the entire region. Thus, in this analysis, precedence is given to the overall interpretation of the source and, even though it has been applied to

each type of connection (labour, studies and second residency), even cartographically, it seemed timely to present the initial results succinctly after applying several criteria and weightings that are explained below.

In order to obtain these objectives, we established two areas of research with different methodological proposals that are later integrated into the conclusions: The analysis of the region's transport structure and the analysis of spatial labour-based relations in municipalities with central functions independently of their demographic size (Pillet et al, 2007: 635). For the present article, we also employed the results of the research project performed by Martínez (2010) when analysing the regional transport and communications structures.

After systematising the available data, they were added to a geo-referenced database, working with them via GIS software (Geographic Information System) to graphically depict the origins and destinations of the population with the aim of detecting the main flow attraction nodes. The complete source was worked with or, in other words, with the three components integrated (work, studies and second residence); in parallel upholding the disaggregated information structure to not lose all the interpretive capacity the data can offer us. The resulting base lets us relate each forced mobility flow to some of the functional centres and sub-centres identified, highlighting the importance of interprovincial connections and the generation of some initial areas of influence to take into account in successive analysis phases.

After the population flows were established and after obtaining a homogeneous database that was suitably configured in the software, we wanted to consider the real annual growth by municipalities for the period comprised between the last *Censo Oficial de Población* [Official Population Census] (2001) and the last *Padrón Municipal de Habitantes* [Municipal Register of Inhabitants] (2009), the main sources of demographic statistics in Spain. The objective here was to not lose sight of the more dynamic areas and those with greater demographic regression. We are not ready to delimit and, subsequently, characterise and study the polycentric structure of functional relationships in the overall region. By order of application, the criteria employed are:

- In case of triple overlap (work, studies and second residence) for more than one destination centre, the methodology assigns the municipality of origin automatically to the functional area of the destination municipality. This is the

most frequent case and caused the immediate assignment of 60% of the cases analysed. As the first criterion, this allowed municipalities connected to others to be defined solely and exclusively, a frequent situation in the outlying regions of the most important urban hubs where areas of strong functional interrelations are being consolidated.

- If there is not full agreement in destinations or, conversely, two city hubs of similar weight share ranking in the destination, *work* was given priority as the defining component. We believe that the functional area is more completely shaped by establishing a direct connection with the labour market. This second criterion, used to complete practically all cases, was established after verifying a frequent problem within provincial structures based on the trend of each hub to preferentially connect to its provincial capital. In the majority of cases, when analysing only the *work* variable, we could establish a link with another centre, which also revealed greater proximity than the first-order connection. This last issue is important, as we believe that the functional structure is also based on the proximity factor, the reason why we preferentially weight *work* in the analysis of connected population.
- Lastly, we found several examples of municipalities with no known assignment (lack of data) or with specific problems. There, we applied an analysis of the specific cases, turning to other sources (territorial aggregations, association with surrounding towns, etc.) to throw light on whether the municipality belongs to one area or another. This latter case was preferably applied to areas with very low demographic density, basically in provinces of Cuenca and Guadalajara where hubs are frequently found with no connection flow relationships and, therefore, the delimitation of functional areas had to be adapted to this circumstance.

Lastly, in the territory in question, Castilla-La Mancha, the few experiences with territorial development were taken into consideration: geographic local administrative units, communities and territories in which the LEADER Community Initiative has been applied or conceptual programmes or the like. Consequently, the absence of urban hubs of more than 15,000 inhabitants in different territories and sites in the region is seen while, in other spaces, they multiple. Faced with this situation that is in tune with the demographic dissymmetry noticed (Santos, 2008), it seemed suitable to speak of

centres, with more than 15,000 inhabitants, and *sub-centres*, when there were less inhabitants. Secondly, and as advised by the ESDP, since these centres and, in our case, sub-centres must not only be set apart by the number of inhabitants, but above all by the function exercised, accessibility and the ability to organise flows in its surroundings, those population hubs had to be taken into consideration that, independently of their demographic size, had the following facilities that are capable of attracting population: secondary schools, courts, hospitals, rural agricultural offices, government offices, shopping centres, etc. And lastly, the most recent statistical information must be considered to learn about the population movements and flows from different municipalities to others.

Finally, it is worth pointing out that the application of these criteria in each of the municipalities of Castilla-La Mancha has let us associate them functionally with one of a higher level (centre or sub-centre), making it possible to define areas of influence surrounding the necessary governing hubs. Remember that the scope of application of this methodology is all 919 municipalities in the region, covering its total area of some 80.000 km².

4. MAIN RESULTS: LABOUR MARKET AND FUNCTIONAL URBAN AREAS IN CASTILLA-LA MANCHA.

This section sets forth and contains comments on the main results obtained when applying the methodology above. The first section is on transport in Castilla-La Mancha, as we believe that their configuration helps us to understand and interpret the results obtained from the analysis of labour flows and, therefore, is a key element when defining job markets.

4.1. The communications model

In this section, we follow a good part of the conclusions obtained in the research project done by Martínez (2010), also added as a parallel line to the principal research done by this group. Its objective was to find out, characterise and evaluate the essential features of the region's transport system, thus being able to link results with the main line of research.

The communications structure in Spain is still highly influence by the network of centre-periphery infrastructures designed for the efficient connection of Madrid with the

most dynamic urban peripheries in Spain (primarily Barcelona, Bilbao, Valencia and Seville), where the intermediate spaces merited little or no attention. In Castilla-La Mancha, the situation is basically conditioned by two effects: The first, the inland links with respect to the radial axes, which generate corridor-type territorial structures and, the second, the dominant role of Madrid, as a centre and origin of this structure that dominates the region's territorial relations and that are organised along these corridors. This role is not only the consequence of the communications structure, but must also be attributed to the hierarchy that the capital itself has generated in different territorial models, which took place in Spain until the advent of democracy in 1978, with the approval of the present constitution in force. As mentioned, it created the autonomous communities and granted them important roles in the structuring and organisation of the Spanish space, among other significant powers that have progressively grown until shaping the present model of the Spanish 'State of the Autonomous Regions'.

With respect to the issue in question here, autonomous governments have tried to gradually subdue the radial structure of communications. They have been supported by the Spanish central government, which deemed the radial network as finished in the last decade and has now established the transversality of the network as a priority objective. A fruit of this change in direction of the national strategy and the introduction of the regional scale in planning infrastructures has been the modification of this extreme radial structure for a gradual transversality, whose most noteworthy features are:

- Increased connectivity in the capitals of each province, at times strengthening provisional hierarchies
- Progressive concentration of the network in regional city centres, which gradually increases their differences with regard to the peripheries that are more rural
- Strengthening of the differences in the network hierarchy, both on roads and the railway. Conventional roads and the conventional railway lose relevancy in the communications structure

The result of all this has been an internal rebalancing that has never questioned Madrid's role in the regional system. In fact, there are eight large-capacity thoroughfares originating in Madrid and penetrating regions to different degrees, organising the main road transport network in this area, further characterised by the lack

of transversal roads that do exist in Madrid. Improvements to infrastructures and the insertion of new corridors do not replace either the general network structure or the trend acquired, or the important economic and political role that Madrid holds. Therefore, what was verified was an increase in the dissemination of sprawl processes in the Madrid metropolitan area due to these improvements. The increase in motorisation indexes and urban sprawl are phenomena that can be noticed in Castilla-La Mancha as an effect of Madrid's urban sprawl.

Moreover, the large investment made in high speed rail has transferred to the region, copying the same radial model, making it impossible for cities in the region at this time to establish communications between each other without going through Madrid. This accents the functional dependence of provincial areas, perhaps not only in Madrid but also with other urbanising hubs on the eastern peninsula, such as Valencia and Alicante. Along with this, from an inland viewpoint, urban-rural differences have increased, with provincial hierarchies strengthening, which are weakly interrelated.

In summary, attempts to complete the regional communications network have still not managed to break free from a structure that is not adequate for moving towards territorial connections and good organisation. This situation is therefore not favourable for the application of regional planning and structuring policies that split from the duality between the more populated areas on the plains, where infrastructures tend to be concentrated, and outlying and mountainous areas, quite unpopulated and with important shortages in these issues.

4.2. The functional urban structure

If all the aspects that we have listed are taken into account and applied to Castilla-La Mancha, we can obtain an initial mapping of centres and sub-centres (Pillet et al, 2007), where all the flows are depicted that are established using the ties stemming from connected population. The location of the municipalities with higher populations in the centre and in the areas surrounding Madrid is very obvious, as well as the intensity of flow. And conversely, particularly in peripheries, this is weaker. The result, already published (Pillet et al, 2010) schematizes the structure of polycentrism in the region with a work-related mobility predominance (Figure 3 will show part of this result, pointing out labour market structure).

To analyse the map resulting from polycentrism in greater detail, three issues were taken into account: The demographic difference between centres and sub-centres (2009), the greater or lesser intensity of flows according to the connected population with respect to a centre (2001) and, thirdly, the real annual growth in recent years (2001-2009). The aim is to try to clarify the demographic change of these structures over time, as the source employed has not been updated since the 2001 Census.

As a result, a total of 19 municipalities were obtained with more than 15,000 inhabitants in the last municipal census in 2008. However, their uneven locations present their absence in the regional periphery as an initial result. This circumstance made it necessary to consider a further 12 municipalities whose population varies between 15,000 and 3000 inhabitants, all with facilities favouring population flows, although to a lesser degree (Table 2).

Like in other cases, medium and small-sized urban hubs comply with the function of district leaders, taking on a clearly leading role as potentially rebalancing city centres, although at a regional scale here.

If we firstly focus on those that exceed the established threshold, urban centres with more than 15,000 inhabitants, Albacete leads as the most populated city, located in the far southeast and the only hub that roundly exceeds 100,000 inhabitants. Following and with more than 50,000 inhabitants are Talavera de la Reina, Guadalajara, Toledo, Ciudad Real, Cuenca and Puertollano. We added a series of hubs to these such as Tomelloso, Alcázar de San Juan, Valdepeñas, Azuqueca de Henares, Hellín, Villarrobledo, Almansa and Illescas (the last is the only one that was under 15,000 in 2001), as well as Manzanares, Daimiel, La Solana and La Roda.

If we take a look now at real annual growth in the 2001 to 2009 period, its diversity is seen, although two municipalities stand out above the rest: Illescas (6.63 %) and Azuqueca de Henares (5.62 %). With more than two percent, there are Tomelloso (2.88 %), Guadalajara (2.48 %), Toledo (2.38 %), Cuenca (2.34 %), Talavera de la Reina (2.17 %), Villarrobledo (2.09 %), Alcázar de San Juan and Valdepeñas (2.01 %). A third level contains Ciudad Real (1.89 %), Hellín (1.71 %), Albacete (1.63 %), Almansa (1.20 %) and, lastly, Puertollano (0.93 %), Manzanares (0.86 %) and La Roda (0.61 %), to conclude with Daimiel and La Solana (0.52 %). With regard to hubs with less than 15,000 inhabitants, standing out are: Ocaña (4.48 %), Tarancón (3.39 %) and Torrijos (2.98 %), where all three are located in the regional periphery subjected to influence

from Madrid. The first conclusion we can draw with respect to urban centres is that while those bordering the Community of Madrid have the greatest growth rates, those with the least dynamism are located in the south and the regional peripheries.

Table 2. Demographic change in main municipalities in Castilla-La Mancha

Municipalities above 15,000 inhabitants	2001 population	2009 population	Annual Growth Rate % (2001-09)
Albacete	148,934	169,716	1.63
Talavera de la Reina	75,369	88,856	2.17
Guadalajara	68,248	83,039	2.48
Toledo	68,382	82,291	2.38
Ciudad Real	63,251	74,014	1.89
Cuenca	46,341	55,866	2.34
Puertollano	48,086	51,842	0.93
Tomelloso	30,654	38,095	2.88
Hellín	27,553	30,976	1.71
Azuqueca de Henares	20,673	32,744	5.62
Alcázar de San Juan	26,403	30,675	2.01
Valdepeñas	26,269	31,147	2.01
Villarrobledo	22,725	26,642	2.09
Almansa	23,531	25,727	1.2
Illescas	11,948	21,264	6.63
Manzanares	17,917	19,186	0.86
Daimiel	17,095	18,527	0.52
La Solana	15,047	16,511	0.52
La Roda	13,959	16,060	0.61
Less than 15,000 inhabitants			
Tarancón	11,786	15,651	3.39
Torrijos	10,281	13,117	2.98
Sonseca	10,018	11,265	1.56
Quintanar de la Orden	9,779	12,736	1.77
Ocaña	6,441	9,468	4.48
San Clemente	6,346	7,093	1.52
Almadén	6,830	6,243	-1.18
Motilla del Palancar	5,102	6,167	2.27
Villanueva de los Infantes	5,735	6,050	0.29
Sigüenza	4,724	5,044	0.85
Casas-Ibañez	4,162	4,724	1.66
Molina de Aragón	3,314	3,671	1.44

Source: INE, 2001 and 2009, Own Elaboration

4.3. Formation of the labour markets

Applying the above, we can now tackle the structure that labour markets have in this territory. Figure 3 schematises and condenses the most relevant information obtained, which is clearly not the only information, given that the spatial data structure built in the GIS admits more results.

From the distribution of centres and sub-centres, of demographic growth, of the analysis of connected population flows and of the layout of the transport network, we can obtain the configuration of the main functional areas with regard to labour mobility

(commuting), also obtaining an initial approach to the polycentric structure of Castilla-La Mancha.

The organisation of labour mobility reveals the important influence exercised by the largest demographic urban hubs in their most immediate geographic environment, corresponding to the provincial capitals in most cases. The importance that the road network has is also revealed when these flows are established and developed, representing basic elements in regional spatial structuring.

Figure 3 shows the 10 delimited functional urban areas (Pillet et al, 2010), basically comprised of an urban centre with some functional importance and a specific demographic range and territories with variable sizes and characteristics located nearby that can be defined as the area in which inter-territorial relations are very strong, with regard to essentially labour connections tied to having services and facilities.

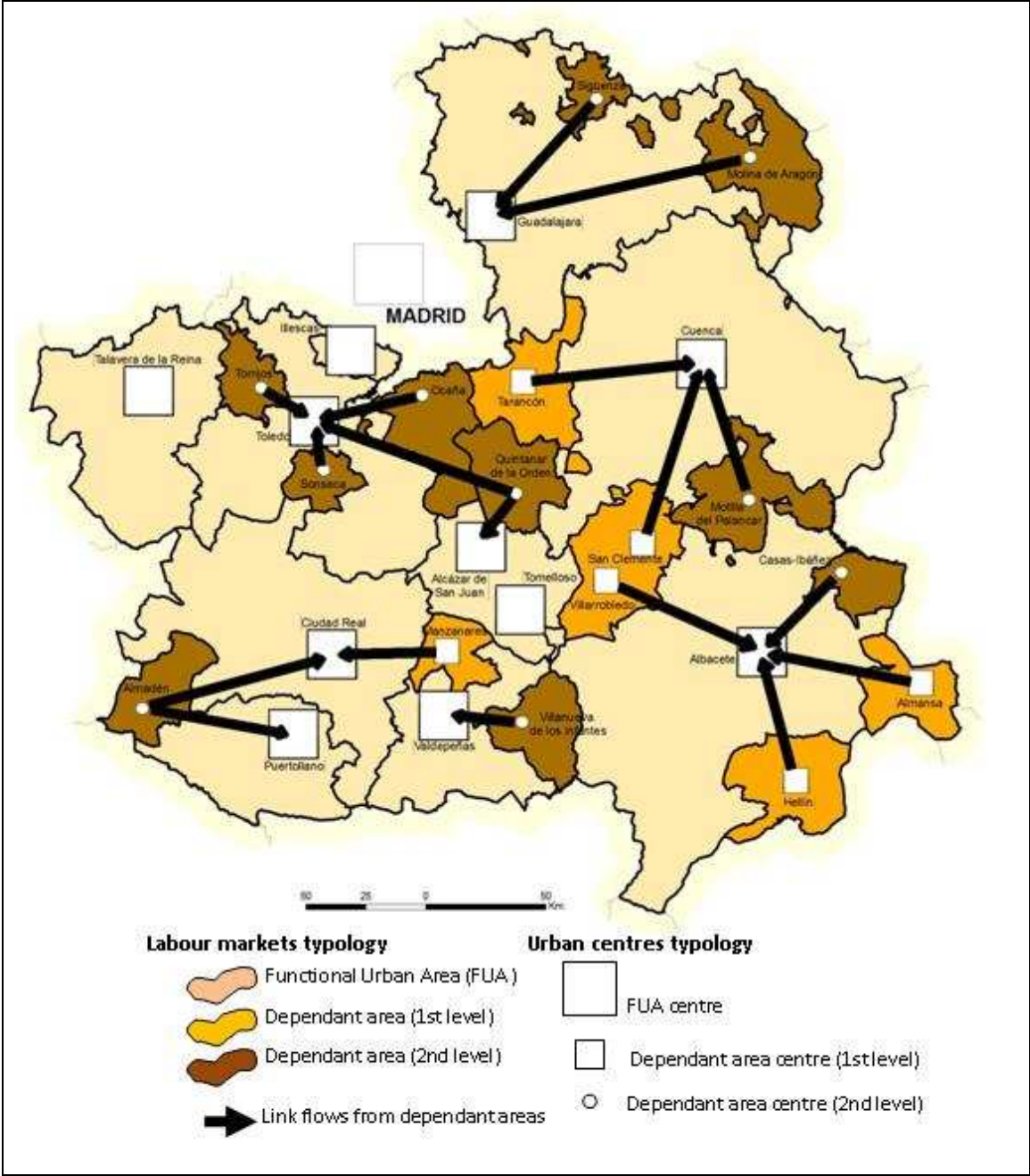
The characteristics of these FUAs are also very different. Some have perfectly delimited centres and areas of influence, as is the case in Talavera, Illescas and Alcázar-Tomelloso (where the latter is the only bicephalous one). Other cases show greater complexity due to having a variable number of secondary urban centres, different from the main centre of the FUA, but dependent on it. The number of these dependent areas and the complexity of the FUA are variable and are not directly related either to its size or its demographic importance.

Based on these indicators, the FUAs stand out that have a regional capital as an urban centre. In this regard, Toledo have four dependent areas; Albacete and Cuenca have three each and one shared dependent area; Guadalajara has two and Ciudad Real has one dependent area; where Puertollano and Valdepeñas have urban areas of influence with a simple structure, one main centre and only one dependent area inland.

By way of conclusion, we can say that there are a total of 10 main functional urban areas, of which seven have some type of functional structure of varying complexity, and 15 dependent areas. Internal regional movements are organised around them, with the flows towards cities with political-administrative functions and some services being noteworthy. This number is not far from the 21 geographic districts delimited in the region by geographers Miguel Panadero and Félix Pillet, or the 30 groups designed for the application of rural development policies with a LEADER focus. This means that the scale around which commuting and mobility flows are organised that are associated

with other variables like the consumption of different-level goods and services is not far from the district dimension.

Figure 3. Functional urban areas in Castilla-La Mancha and their dependant areas.



Source: Modified from Pillet et al. 2010.

5. CONCLUSIONS

From the open and flexible approach arising from the European Territorial Strategy, the new urban spatial organisation model advises implementing a balanced and polycentric urban system starting from hubs with over 15,000 inhabitants and enough competences in the region, to be able to organise a FUA (Functional Urban Area) that must surpass 50,000 inhabitants. In short, this is polycentrism that complements and profiles the traditional model of provincial capitals and small and medium-sized cities with centrality functions in the surrounding rural setting. From the viewpoint of ESDP and the new territorial development focus proposed, these are profiled as the urban hubs that must be strengthened. The role they have as service distributors and functional leaders at the level of labour and mobility markets is strengthened by their identification at a district scale. In spaces with low population densities, which are our focus, they seem to be key to proper structuring.

Taking into account these principles, as well as changes that could occur in upcoming years to the road, motorway and high speed train networks, a total of 10 Functional Urban Areas (FUAs) were identified, starting from flows that offer the connected population presented for the first time on the 2001 Population Census and taking into account the population growth between the *Censo Oficial de Población* [Official Population Census] (2001) and the last *Padrón Municipal de Habitantes* [Municipal Inhabitants Census] (2008). However, due to the fact of being an autonomous community with an extremely low population density and sparsely developed, particularly in the periphery, a total of 15 dependent areas were also delimited, 5 with urban centres greater than 15,000 inhabitants, which we call first level, and 10 others, or sub-centres, which we call second level. In this way, while 8 FUAs control all dependent areas, the 2 remaining ones do not (Talavera de la Reina and Illescas).

With the 10 FUAs presented, we can classify them into three large groups according to their nature and location: FUAs located in the periphery of Madrid, FUAs of the remaining provincial capitals and FUAs connected to small and medium-sized cities. In short, very dynamic, based on their demographic growth. The majority are in contact with the Community of Madrid, while those with lower or negative growths are located in the west and peripheries. Furthermore, this analysis must be flexible as the AVE (high-speed train), the new roads and toll motorways can cause changes that are not foreseeable now, but will have to be considered later.

To finish, it must be pointed out that we expect the results presented herein are taken into account in the future Territorial Strategy for Castilla-La Mancha (partly designed by the regional government). Since we are in the century of cities, we believe the commitment to polycentrism and its corresponding functional urban areas to be particularly relevant as key issues in territorial development and territorial cohesion.

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