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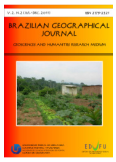

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Globalization, knowledge based activities and new spatial inequalities in Madrid (Spain)

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ABSTRACT

The metropolitan region of Madrid has undergone significant changes in the last two decades, establishing it as the main global city with command functions in Southern Europe. This has resulted in a rapid increase in its rates of production and consumption, and the size of its immigrant population, with the processes of low-density suburbanisation and rurbanisation becoming more common. But this trend has been accompanied by significant social and environmental costs, an abrupt standstill since 2008 and the deepening of socio-spatial inequalities within. The progressive growth of the knowledge –based activities is a good indicator of this type of essentially contradictory process which signals the integration of metropolis into global capitalism and the associated territorial forms.

PALAVRAS-CHAVES:
Globalização
Região metropolitana
Atividades intensivas em conhecimento
Madri

RESUMO – **GLOBALIZAÇÃO, ECONOMÍA DO CONHECIMENTO E NOVAS DESIGUALDADES TERRITORIAIS EM MADRID (ESPANHA).** A região metropolitana de Madri tem vivido nas ultimas décadas importantes transformações que a colocaram como a principal cidade global com funções de comando da Europa Meridional, em que se traduz em um rápido aumento de seus indicadores de produção de consumo e seu volume de população imigrante, se generalizando nos processos de suburbanização e rururbanização de baixa densidade. Mas essa tendência tem sido acompanhada por seus importantes custos sociais e ambientais, uma brusca deteorização desde 2008 e o aprofundamento das desigualdades socioespaciais em seu interior. A progressiva expansão das atividades intensivas em conhecimento resulta um bom indicador deste tipo de processos essencialmente contraditórios que marcam a integração das metrópoles no capitalismo global e as novas formas territoriais associadas.

Palabras-claves:
Globalización
Región metropolitana
Actividades intensivas en conocimiento
Madrid.

Resumen – GLOBALIZACIÓN, ECONOMÍA DEL CONOCIMIENTO Y NUEVAS DESIGUALDADES TERRITORIALES EN MADRID (ESPAÑA). La región metropolitana de Madrid ha vivido en las dos últimas décadas importantes transformaciones que la consolidaron como principal ciudad global con funciones de comando de la Europa meridional, lo que se tradujo en un rápido aumento de sus indicadores de producción o consumo y su volumen de población inmigrante, generalizándose los procesos de suburbanización y rururbanización de baja densidad. Pero esa tendencia se ha visto acompañada por importantes costes sociales y ambientales, una brusca detención desde 2008 y la profundización de las desigualdades socioespaciales en su interior. La progresiva expansión de la actividades intensivas en conocimiento resulta un buen exponente de este tipo de procesos esencialmente contradictorios que marcan la integración de las metrópolis en el capitalismo global y las nuevas formas territoriales asociadas

1 Introduction

Since the start of the globalisation process Madrid has become a leading metropolis within the European Union. The size of its population and the recovery of demographic dynamism associated with immigration, in addition to the rapid economic growth over more than a decade which increased the number of people employed and the average level of income of its residents, were some of the most widely-used indicators to confirm that success. At the same time, the concentration of headquarters of major firms and of knowledge-intensive business services gave it a prominent position in the *global cities network*, also increasing its business environment rating and its capacity to attract investment and talent. This process of growth was accompanied by another even more evident process of expansion of the urban area, until it reached the size of a megacity or a metropolitan region. As opposed to the compact city model characterised by Mediterranean Europe, over the last two decades *urban sprawl* has been accompanied by the growth of low-density residential areas along an increasingly dense transport network which has become an indispensable ally to real estate strategies. The simultaneous dispersion of business and jobs, which had relocated to new areas of activity contributed to the transformation from a traditionally mononuclear area to a polycentric one, while urbanisation went beyond the administrative borders of the Autonomous Community of Madrid reaching the neighbouring regions.

However, this metamorphosis, associated with its conversion to a global city, has also been characterised by severe contradictions. This can be considered a counterpoint which is inherent to the logic of the system, favoured by a group of local agents who generally gave priority to economic growth. Only on specific occasions and places was consideration given to the reorientation of urban planning and regional policies in order to mitigate some of the social and environmental costs which had arisen, with no strategy being defined for the metropolitan territory as a whole.

From a temporal perspective, after more than a decade of an almost limitless urban explosion, Madrid has been suffering a profound crisis since 2008 which also questions its previous growth model. In socio-economic terms, the expansion of financial capital and certain services which were linked to more highly-qualified work, combined with the spectacular increase in construction associated with the *real estate bubble*, were countered by an intense process of deindustrialisation, in addition to an increase in precarious jobs and secondary labour market. In terms of land, the gradual elimination of restrictions to the location of development brought about a new spatial division of labour and a redistribution of the social and occupational groups. This altered the inherited dividing lines between central and peripheral areas and between different spaces of the agglomeration, in a general context of growing segmentation.

Based on this argument, the first part of the article will analyse some of the demographic, socio-economic and territorial changes which identify what has occurred in Madrid, briefly discussing some interpretative key points which have been adapted to this article's aim of offering an overview. In the second part, the attention will focus on the so-called *knowledge-based activities,* which seems to have become a vital element of the current debate on competitiveness and the quality of metropolitan life in official documents. Some brief remarks about the current importance of activities, and their selective distribution patterns inside the megacity o enable us to reflect on some of the features which best define its recent development and the new accompanying forms of inequality. These are a constant challenge to describe and understand in urban research. Although there are different functional delimitations, here we have chosen to identify the metropolitan agglomeration as the territory within the administrative region, a total of eight thousand square kilometres in area, the most widely used in recent bibliography.

2 Madrid: A winner metropolitan region in globalization?

The metropolitan region of Madrid has experienced a constant demographic growth in the last two decades, with the 4.9 million inhabitants in the census of 1991 rising to 6.5 million at the beginning of 2010, representing an increase of 30.5%. That figure, which is above the national average, means that 13.7% of the population living in Spain is currently concentrated there. This is much higher than the agglomeration of Barcelona which, with fewer than five million inhabitants, is the second biggest in the country, with Madrid being the third largest city in the European Union.

In a society characterised by low birth rates, where there has been relatively little interregional migration for decades, a large proportion of that growth is due to the arrival of a significant number of foreign immigrants. These have been attracted by a growing job market and now constitutes an especially important element of the new human geography of the agglomeration. Although the official data somewhat underestimate their actual presence, the 60,163 foreigners counted in 1991 became 282,870 in the year 2000, and they exceeded one million (1,118,991) in 2010, equalling 17.3% of the total population (3.2% in 2000). This included a particularly high presence of Romanians (222,528) and Ecuadorians (116,629), but also a significant number of Moroccans (91,022), Colombians (68,915), Peruvians (59,844) Bolivians (48,411), Chinese (45,710) Dominicans (35,392) and Bulgarians (33,539), who now share a multicultural territory (OBSERVATORIO DE LA INMIGRACIÓN, 2010).

However, although Madrid's capacity to attract new people has been maintained over time, modifying the origins and characteristics of the residents in its territory, the increase in housing construction during those years has been much greater. Housing becoming an apparently secure and profitable form of investment, with intense real estate speculation which was stimulated by an abundance of cheap credit following the introduction of the Euro. This made it possible for the annual construction of less than 30,000 homes at the beginning of the last decade of the last century to increase to more than 50,000 between 2004 and 2007, reaching 63,468 in 2005. In less than two decades the number of family homes in the metropolitan region increased from 1.9 million to 2.9 million, representing a cumulative annual rate which almost doubled the corresponding population rate, with an estimate of almost 100,000 empty homes in 2008.

The conversion of Madrid into a good example of a *growth machine* (MOLOTCH, 1976) is inseparable from the intensely dynamic nature of its economy since the middle of the nineteen nineties until 2008, with the competitive strategies of private and public operators combining in a context of globalisation which favoured the processes of metropolitan concentration. Both in quantitative and qualitative terms, the progress which occurred during this long period of expansion placed Madrid amongst the most successful metropolitan regions in the European Union (OECD, 2007). Several indicators can summarise the main dimensions of this process.

Thus, the gross domestic product (GDP) of Madrid in constant prices increased by 61.5% between 1995 and 2010 until it reached 25,768 million Euros, while metropolitan employment increased from 2.1 to almost 3.5 million between 1995-2008 (+69.7%), only to fall again from that date onwards. The counterpoint to the argument for the growing efficiency and competitiveness of metropolitan economies was practically stagnant productivity, with both indicators evolving almost identically due to the high levels of construction work and labour-intensive services which had little added value. Consequentially, the high level of unemployment in 1995 (20.5%), after the recession which the Spanish economy experienced at the beginning of that decade, fell quickly to an annual average of 6.3% in 2007, despite the significant increase in the active population due to the progressive incorporation of women and, above all, the high contingent of immigrants. The simultaneous increase in the average income per inhabitant to 18,175 Euros in 2008, 17.8% above the average for the country as a whole, also resulted in an increase in the consumption of all kinds of goods, both public and private, which was also supported by the heavy indebtedness of businesses and families.

During those years what proved to be of even greater significance was Madrid becoming established as the main command and control centre in Southern Europe, as has been demonstrated by the numerous studies by the *Globalisation and World Cities* (GaWC) network. In a recent publication (TAYLOR et al. eds., 2011), the analysis of the locations of the headquarters of the 2000 biggest transnational companies ranked Madrid tenth in the world and third in Europe. That position is very similar to the one resulting from a calculation of its connectivity index according to the number and range of establishments belonging to the 175 biggest knowledge-intensive business services firms (11th position) or the 75 biggest financial entities (10th place), which represents a significant qualitative leap in a decade [21].

That consolidation as a business centre, in addition to the constant growth in international tourism, meant that the 32.9 million passengers arriving at Barajas in 2000 increased to 48.3 million in 2009, rising from 20th to 11th place on the list of the world's biggest airports according to the annual reports of *Airports Council International*. Finally, the *European Cities Monitor* report, which identifies the highest rated cities on the continent for locating a business on the basis of various quantitative and qualitative criteria, put Madrid in eighth place in 2010, compared to the 17th place it occupied in 1990 (CUSHMAN &WAKEFIELD, 2010).

In short, a medium term perspective places the metropolitan region of Madrid amongst the *winners* in the process of economic-financial globalisation, which has been accompanied by an equally profound and sudden change to its internal structure and the external borders of the metropolitan territory (MÉNDEZ, 2007),

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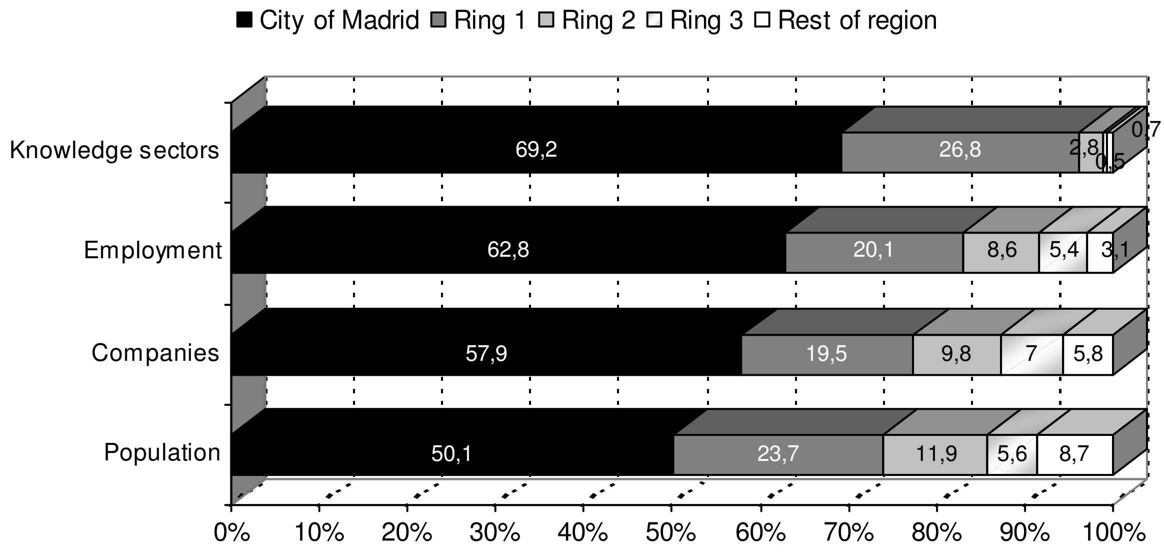
[1] In the ranking of international connectivity led by London, the city of Buenos Aires for example, occupies the 16th position, São Paulo the 21st, the City of Mexico the 24th and Santiago de Chile the 41st.

similar to great urban agglomerations in others regions (SILVEIRA, 2007; DE MATTOS, 2011). There are three transformations over recent years which can be highlighted from this perspective.

Firstly, the pace of the expansion of the *urban sprawl* has intensified. This has coincided with a change in the type of settlement which has evolved into a more dispersed population, having traditionally been concentrated and highly dense, as is characteristic of Mediterranean Europe. Supported by heavy public investment in all kinds of infrastructure, the *urban sprawl* was first consolidated in the suburban periphery of the northwest, the areas with the highest environmental quality and levels of income. But in the last two decades, low-density houses or apartments in dispersed urbanisations have spread to the metropolis. In addition to causing a rapid increase in the *artificiallized* land, this intermittent spatial growth has resulted in a notable increase in forced mobility and private transport, which became more widely-used than public transport for the first time since the beginning of the last decade (GUTIÉRREZ PUEBLA; GARCÍA PALOMARES, 2007).

When explaining this trend it is impossible to deny the influence of demand resulting from the growth of the middle classes and an increase in smaller family units which require new homes in areas which are less congested than those which are characteristic of central urban areas, at lower prices. But *urban sprawl* is also closely linked to the deregulation of urban planning which occurred at the same time, making it possible to develop any land which was not explicitly protected and made private developers the main urban planners, while the public sector paid a large proportion of the costs for infrastructure and machinery which arise from this growth model. Thus, on the periphery of the city of Madrid and the other towns of the metropolitan region, numerous urbanisations appeared, some of which were gated, mixed with industrial estates, business parks, logistic parks, science and technology parks or leisure parks. This gave rise to a landscape which was often disorganised or, to be more precise, organised on the basis of numerous individual logics/interests and uncoordinated local government strategies due to the lack of willingness of regional government to regulate.

This dispersal of the population and economic activities at ever increasing distances from the city of Madrid can be summarised by adding the information from successive metropolitan rings which are ten kilometres in width. The first two, though, are incorporated into what is known as the Functional Metropolitan Ring, which is where most of the growth rates have been concentrated in recent decades (figure 1).



Source: National Statistics Institute. *Continuous Register of Inhabitants;* Community of Madrid. *Directory of Units of Economic Activity.*

Figure 1. Percentage of population and economic activities by metropolitan rings, 2009.

Half of the metropolitan population is still concentrated in the city of Madrid, in addition to 58% of the businesses and almost 63% of all employment. This is a good illustration of the inertia associated with a strongly monocentric agglomeration until less than half a century ago and of the externalities which are still associated with physical proximity more than the existence of other kinds of proximity (organisational, cultural...) which are also favourable to interrelations. Just in the case of industrial and logistical activities, the need for cheap land which is used less intensively has favoured a movement towards the surrounding towns for several decades, with a radius no greater than 20 kilometres in the case of activities linked to the population's consumption and leisure, while a fifth of all industrial jobs are located beyond that distance. On the other hand, activities more closely linked to the function of centrality such as finance and business services keep almost three quarters of their employees living in the capital, despite the recent processes of dispersion towards nearby business parks, which represent less than a quarter of all these jobs.

Despite this process occurring a lot more recently than in other megacities, the improvement of transport and communications, in addition to the provision of business areas which are increasing in size, diversification and quality, has contributed to a growing transfer of industrial companies and services to those towns where the strategies of property developers have combined with local policies aimed at attracting new investment and employment. Thus, Madrid is evolving towards a polycentric metropolitan region, with a series of sub-centres located on the high-capacity arterial roads, which are the focus of an increasing number of daily journeys and have additional specialisations. This is the case of Alcobendas and San Sebastián de los Reyes in the northern zone, Alcalá de Henares, Coslada and Torrejón de Ardoz in the eastern zone, Getafe, Alcorcón, Leganés, Móstoles and Fuenlabrada in the southern area, while Pozuelo de Alarcón and Las Rozas fulfil this role in the western zone, as a whole concentrating 21.5% of all employment (GALLO; GARRIDO; VIVAR, 2010).

Finally, although for the purposes of this research the metropolitan region of Madrid has been identified as the territory contained in its Autonomous Community, for which there is an abundance of information as well as having the same regulatory framework and homogenous policies, it is without doubt that the functional region goes beyond these borders, especially in the south and east (the provinces of Toledo and Guadalajara), and is present within these neighbouring provinces. This influence is twofold: on the one hand, the relocation of industrial and logistic companies seeking lower costs, (land and property, wages, taxes) and less environmental restrictions resulted in a transfer of jobs, accompanied on the other hand by people, who firstly settled temporarily in the property developments constructed for second homes, in which there was then a rapid increase of permanent occupation; at the same time, both these new rururban residents and a part of the old rural population have moved to more central towns in the metropolitan agglomeration to work or consume, which generates dense networks of daily connections whose radius is increasing. While the metropolitan limits are always debatable, one cannot dispute the dynamism, complexity, connectivity and heterogeneity characterised by these growing metropolitan peripheries which have undergone transformations qualified as *dramatic* (AGUILAR coord., 2006, p. 5).

In short, in the metropolitan territory of Madrid two spatial logics have co-existed which may appear contradictory but they complement one another to varying degrees. On the one hand, the gradual concentration of people, companies and facilities or infrastructure in conjunction with a simultaneous centralisation of governing functions which generate greater added value have made it possible for Madrid to improve your insertion in the european urban system and the spanish subsystem. On the other hand, a selective decentralisation, which began decades ago and has accelerated in the last two, has accentuated its polycentric and disperse nature, although the legacies of a strongly concentrated settlement and the externalities originating from centrality make this trend relatively moderate in comparison with other megacities. But this very growth process has also been characterised by significant contradictions which, having been visible for some time, are becoming more evident now.

3 Madrid: a vulnerable territory with growing contrasts.

The type of growth which is characteristic of this global Madrid has been accompanied by various contradictions and profound contrasts that culminated in the crisis which began in 2008 and which continues three years later. We can, therefore, talk of a “crisis before the crisis”, due to the “contradictory consequences of a specific social and urban model” (OBSERVATORIO METROPOLITANO, 2009, p. 13), of which we will now summarise some of its most representative features.

On the one hand, during the years of strong economic growth, much of the increase in employment that was recorded occurred in the more precarious segments of labour market, associated with the development of secondary-market employment, and therefore the temporary employment rate (% of temporary contracts from the total) was at 24.4% at the end of 2007, before the beginning of the crisis. That situation was more pronounced amongst women, young people and workers with the least education, but it spread to the more highly qualified groups until it became structural, affecting mostly immigrants. In a study carried out in 2007 on a wide selection of the four nationalities with the highest presence in Madrid, it was possible to see that during their first year of residence only 6.3% stated that they had a fixed-term contract, 34.6% had temporary contracts and 38.4% worked without contracts, in the informal sector. When the research was carried out, the situation had evolved and 39.2% had fixed-term contracts, but the total amount in the other two situations (41.9%) was even greater, regardless of their level of education (MÉNDEZ, 2008).

At the same time, in a metropolitan territory which is increasingly large and unstructured, the interrelation between residency, work, consumption, leisure and social interaction of its residents is spreading out, causing the consequent increase in daily mobility. Metropolitan public transport underwent constant growth during these years (underground, local trains, inter-city and intra-city buses), and gradual integration after the creation of the *Regional Transport Consortium* and the construction of large hubs or multimodal interchanges, which mostly benefited the central city and the towns close to the two firsts rings, where the number of potential users (immigrants, the elderly...) was also greater. But the dispersed, low-density urbanisation, in addition to the mobility patterns of medium and high income groups, caused a much higher increase in the amount of journeys in private vehicles. The result was that, as recorded in the 2001 Census, during that year 45% of residents travelled to work in a private vehicle, compared to 42.5% on public transport, with the rest travelling on foot or using other means, an imbalance which has become more pronounced since then.

One of the essential characteristics of the evolution of Madrid during those years was the spectacular development of the real estate sector, which became one of the economy´s driving forces, at the cost of causing significant imbalances which increased its vulnerability. Thus, for example, the construction sector represented 7.2% of the GDP in 1995, but it reached 10.6% in 2007, employing almost 12% of workers in the metropolitan region, clearly signalling its hypertrophy, in contrast with the deindustrialisation which was happening at the same time. At the same time, during the years when the growth in real estate was at its strongest (1998-2006) 404,563 homes were built here and their price increased by an average of 16.8% per year in constant prices, making them inaccessible to large sections of the population and provoking heavy mortgage indebtedness in view of the weakness of the rental market. This speculative process was sustained by real estate becoming a *secure* investment, rather than family demand. This attracted a large amount of capital, also from abroad, in addition to cheap and easy credit due to the complicity between the financial sector and the real estate groups. It also had the direct support of numerous local governments, who increased their revenue with construction permits, in addition to the indirect support of central and regional governments (relaxing of restrictions on land, tax relief...), who were more interested in their multiplier effect on the economy in the short term than lessening their impact.

The international financial crisis triggered in the middle of 2008 brought about an abrupt standstill to the process, when the cheap credit which had sustained it disappeared. The deterioration of the situation was particularly serious in urban areas which, like Madrid, had based much of its growth on activities with low productivity and unqualified work in construction and consumer services, neglecting an industry which was in gradual decline and with advanced services which, by themselves, were incapable of stopping the process. This marked the end of the expansion period, which some believed to be inexhaustible, and there are some employment indicators of this new phase which reflect the gravity of the situation.

For example, between the last quarters of 2007 and 2010 employment in the metropolitan region fell by 175,400 workers, while the unemployed increased by 332,600 (209.400 to 542.000), due to the increase in the active population, with an unemployment rate which rose from 6.4% to 15.8% according to the *Active Population Survey*. As is always the case when the economic cycle enters a recession, this increase in unemployment, above all, affected the under twenty-fives, whose unemployment rate is more than double the average, and immigrants (23%), while it was less significant for women, with the loss of employment being concentrated in construction and industry sectors.

The metamorphosis of the metropolitan region during the last two decades was completed with an intensification of territorial specialisation and segmentation, both in socio-economic and functional terms, creating a heterogeneous patchwork in which each piece appears to be joined to the rest via several flow networks. This trend, which is inherent to the system's logic, has become more pronounced in recent years because of the significant predominance of the neoliberal paradigm, while the Administration deserted its regulatory role to a large extent in the interest of the development and support of these processes, replacing planning with an increase in sectoral or partial projects lacking an overall perspective.

If we consider the spatial distribution of the different social groups, the high price of housing –associated with other factors such as the quality of the surroundings and their accessibility- accentuated its status as the main factor considered when selecting where to live, given the general principle that some live where they want, while others where they can. Within a framework of unequal competition, the decisions on where to settle by these different groups accumulated over time, as suggested by the notion of *path dependence*, also affecting the image of the area and its valuation (MARTIN; SIMMIE, 2008). Within the metropolitan region that principle was reflected by a concentration of the population with the highest income in certain towns which are located to the north (average disposable income of 19,203 Euros) and the west (23,125 Euros) of the capital. That level of income decreases the further the distance, above all, in the direction of the towns to the south and east of the agglomeration, which continue to house people with lower incomes, with the lowest levels in the peripheral municipalities (average income per inhabitant of around 13,000 Euros).

Within the city of Madrid (average income of 19,390 Euros), the contrast between the neighbourhoods in the northeast and southeast has not simply remained the same, it has actually become more pronounced. But the change of scale presents greater complexity, due to the settlement of a large number of immigrants and groups with little income in certain run-down areas in the centre or nearby, which have low quality housing built at least a century ago to house the immigrants who were arriving from other regions of Spain in those days (Lavapiés, Usera, Tetuán, Puente de Vallecas...) and whose descendants have gradually been replaced. On the other hand, other areas close to the central business district or in the historic centre have undergone processes of gentrification and the settlement of what Florida (2005) called the *creative class*, who were attracted by the cultural environment and the urban amenities.

Similar contrasts are observed when considering the distribution of the different activities, both in terms of the centre-periphery and the northwest-southeast divide. Therefore, industrial and logistic activities are still mainly located in an arch which is wrapped around the east and south of the city of Madrid and the nearby towns, with the highest growth rates from the last decade being located at more than 30 kilometres from the capital, and even in the bordering regions of Castilla-La Mancha (Sagra and Valle del Henares). The counterpoint to this is the distribution of advanced services –and, to a large extent, of the financial and insurance sector- which have remained in the city of Madrid, more specifically in its highest valued areas, between the Paseo de la Castellana and Barajas airport, moving slowly towards the nearby towns of the northwest sector.

With this outline designed to offer an overall perspective, these have been some of the trends which have made it possible to describe and understand the key elements of the path taken by Madrid within the framework of globalisation. But only when we focus our attention on areas, sectors or specific problems do we obtain an in-depth perspective of the sense of those transformations, which were then of multi-scalar dimensions. With that objective, the analysis of the characteristics, recent evolution and distribution of employment in the so-called knowledge-based activities can be a good illustration of the growth and conversion of Madrid into a global city, of the limitations and costs of that process, as well as the new spatial inequalities which have arisen and require new indicators to identify and act on them.

4 The knowledge-based activities: relevance to Madrid and new spatial division of labour

The large European metropolitan regions currently face growing competition arising from the current context of globalisation and the process of regional integration to which, in cases such as Madrid, the crisis of the previous growth model can be added. It is, therefore, especially important to develop an economy which more intensely generates and uses knowledge, which is associated with greater efforts to innovate, more highly-qualified and stable jobs and a smaller environmental impact, which also has less risk of being relocated, giving rise to what some authors define as *knowledge-based cities* (WINDEN; BERG; POL, 2007).

The gradual inclusion of the knowledge economy in current research agendas, despite the concept originally being discussed several decades ago, attempts to identify its current importance, recent dynamism, location patterns and the effects on the metropolitan structure of those activities with the most knowledge content, but also more highly qualified occupations with greater higher education demands, irrespective of their sector, as well as the most efficient forms of governance to develop them. These studies justify their current interest in the possibility of using the presence of *knowledge workers* (STEHR, 2002) because it is an especially relevant indicator of the new forms of hierarchisation and inequality within urban systems (SCOTT, 2009). In addition, because it provides a global overview of the metropolitan economies, it would complement the traditional sectoral or functional divisions.

The first way to approach the map of the *knowledge economy* in Madrid is to identify the presence of an economic structure for those activities which make more intensive use of that resource. In literature from recent years and in the classifications made by various international institutions, this normally includes four kinds of activity. Firstly, there are the *high tech* industries (pharmaceutical¬biotechnologies, electronic, information technologies, aeronautical&aerospatial, scientific instruments...) and a whole series of knowledge-intensive business services, in addition to finance and insurance, education and health. But the biggest development in recent years lies in the inclusion of those activities which provide cultural goods and services, and are often protected by intellectual property laws. These include some which have a long tradition (publication of books, music and audio-visual production, archives, libraries and museums, artistic activities), in addition to others relating to new digital technologies (multimedia and infographic products, videogames, etc.).

The metropolitan region of Madrid is identified as the location of the biggest concentration of knowledge-intensive activities in Spain. The combination of externalities associated with agglomeration, the accumulation of public investment originating from its status as a capital (universities, research centres, museums and other cultural facilities...), the presence of highly qualified human resources or the existence of dynamic business *clusters* are some of the key elements which were the source of the competitive advantage which resulted in its growth in recent decades (figure 2).

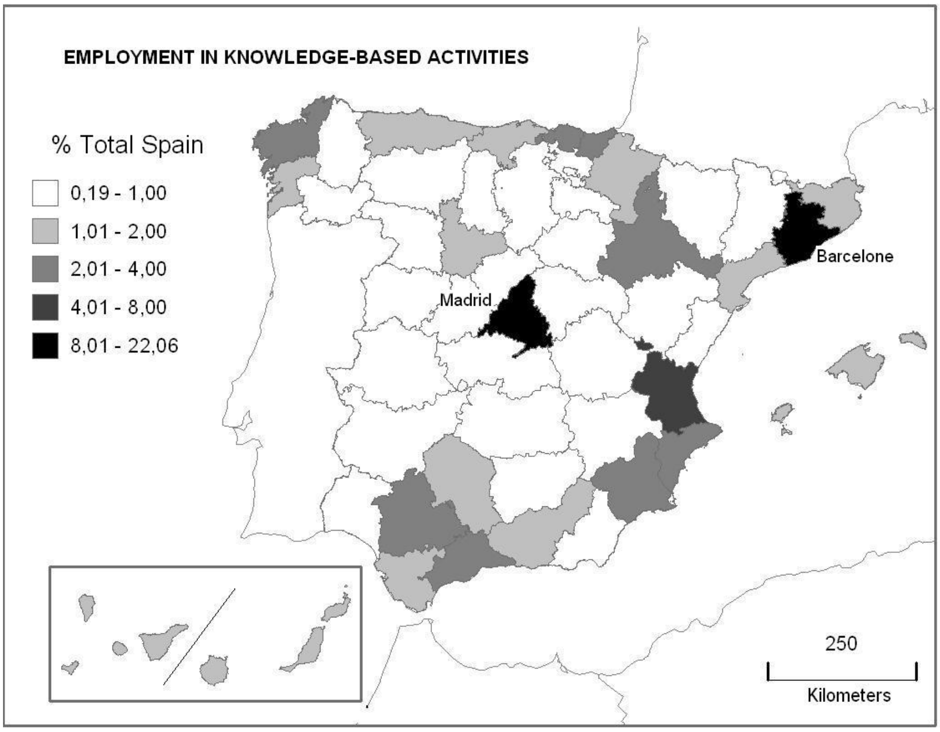
According to data from the *General Treasury of the Social Security* from 2009, the combination of all knowledge-intensive activities here equals a total of 41,043 companies and 859,655 jobs. This latter figure is equivalent to 23.5% of the total number existing in Spain, much higher than Barcelona (15.9%), which is the country's second agglomeration. As a percentage of the total employment in the metropolitan region, it is worth highlighting that this now equals 30.5%, totalling 33.5% in the case of the city of Madrid, while in the rest of the agglomeration this falls to 25.4% (table 1). These are, therefore, not marginal activities, as they already have a prominent presence.

Advanced services represent almost half of that employment (348,295), followed at a distance by education, health and the finance and insurance sector, which as a whole total a number which is slightly higher than the above figure (386,417). In a more modest position are the cultural industries and services, which total 88,312 jobs, while *high tech* industries have less than half that figure (36,361). In short, services represent the essence of the knowledge economy in Madrid, but while those of a public nature linked to education and health constitute less than a third, the knowledge-intensive business services and those linked to the world of finance are already very predominant, as is to be expected given their international position.

Table 1. Knowledge-based activitiesin the metropolitan region of Madrid, 2009.

Activities	Companies	% total	Jobs	% total
High tech industries	511	0.2	36,631	1.3
Finance and insurance	2357	1.0	112,358	4.0
Advanced business services	22,146	9.1	348,295	12.4
Education	5585	2.3	140,070	5.0
Health	5213	2.1	133,989	4.7
Cultural industries and services	5231	2.12	88,312	3.1
Total Knowledge Economy	41,043	16.9	859,655	30.5
Other economic activities	201,900	83.1	1,957,989	69.5
TOTAL	242,943	100	2,817,644	100

Source: General Treasury of the Social Security.

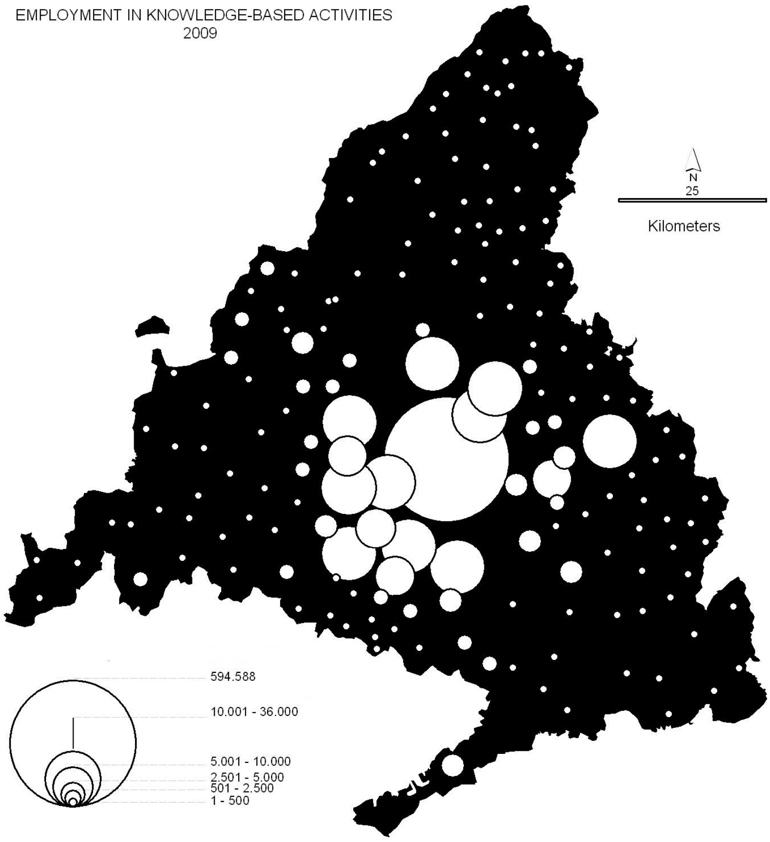


Source: General Treasury of the Social Security.

Figure 2. Employment in knowledge-based activities by Spanish provinces, 2009.

This is, therefore, a very heterogeneous group, which have performed differently, but less favourably than would be expected when considering the supposed competitive advantages originating from the urban scale. Therefore, between 2000 and 2006 employment in the knowledge economy sectors increased by 28.8%, in line with a strongly expansive phase. Although that figure was slightly lower than the average for the metropolitan economy as a whole (29.7%). However, with the arrival of the subsequent profound crisis, these activities were not only incapable of maintaining that growth, but between 2006 and 2009 they lost jobs at a rate which was far higher (-19.9%) than those recorded for the regional production system as a whole (-5.3%) due, above all, to the strong slump in a section of the advanced services (-39.5%) which is heavily linked to financial capital and, to a lesser extent, the high tech industries (-13.2%). It is, therefore, open to debate whether the knowledge economy will tend to grow without policies to stimulate it, and the strong inertia which is still restraining its consolidation in Madrid is evident.

The emergence of this knowledge economy has also contributed significantly to the transformation of the inherited territorial organisation models. The location strategies used by the companies which form part of this group of sectors and are based on specific location factors, have become increasingly important as a means of stimulating certain areas of the agglomeration which are particularly attractive to these businesses, while their withdrawal from others is one of the main causes of their decline. In that sense, the distribution of employment displays significant regularities and notable contrasts which make it possible to perform a critical review of some of the predominant ideas about the new metropolitan forms of this stage of capitalist development (figure 3).



Source: General Treasury of the Social Security.

Figure 3. Employment in knowledge-based activities in the metropolitan region of Madrid, 2009.

The first characteristic to highlight is the high territorial concentration still displayed by these activities when they are analysed as a whole. Although there has been spatial dispersion of industry, logistics and large shopping centres in Madrid for decades, the industries included in the knowledge economy are much more concentrated, with the attraction of the central city barely faltering, despite the increase in external diseconomies in this high-density area. A total of 70.2% of the companies and 69.2% of the jobs are still located in the capital, with a particular concentration around the central business district and the neighbourhoods towards the north and the airport which are gradually extending the perimeter of that area, but this has barely resulted in any replacement of those with new suburban sub-centres of any significance.

As such, without denying the trend towards more dispersed and polycentric models, the influence of the inherited urban models cannot be ignored, with the consequent definition of different spatial trajectories. For agglomerations such as Madrid with a strongly monocentric tradition, the existence of land available for new developments in the capital and, above all, the symbolic value which is still bestowed on these central areas, act as an intangible resource which prevents most of these companies from moving –in particular their head offices or headquarters- to suburban, and to an even greater extent, rururban areas. The same can be said of university, scientific and cultural institutions.

The presence of the agglomeration effect becomes more pronounced if we consider that, if the ten largest towns with the greatest number of jobs are added to the city of Madrid, as a whole they represent 89.5% of the total, with the other 10% being spread over the other municipalities in the region. In turn, the use of metropolitan rings with a radius of 10 kilometres (figure 1) makes it possible to see that the towns in the first ring (up to 10 km) make up 26.8% of the population, with less than 2.8% concentrated in the second and an insignificant amount in the rest. It is also clear that their relative importance decreases in proportion to their distance, although this is less pronounced: if in the capital the knowledge economy represents a third of all employment, in the first ring this falls to 28.3%, remaining at 15% in the following three and then decreasing in the furthest one.

Among the small group of towns which have a substantial number of jobs in these activities, it is worth noting those located in the metropolitan sectors with the highest social and environmental ratings, which thirty years ago were predominantly residential but which now also have new business areas, university campuses, financial areas, etc. This is the case of Alcobendas, Tres Cantos and San Sebastián de los Reyes, in the north, or Las Rozas, Pozuelo de Alarcón and Boadilla del Monte, in the west. Despite the traditional northwest-southeast divide still being present here, albeit in new ways, it is also important to highlight the importance which the knowledge economy has in three towns of the south which were old industrial centres (Getafe) and residence of low income social groups (Leganés and Móstoles), where local governments provided the most stimulation for the regeneration process which included developing new technology and service areas, and attracting public universities, which was also the case in Alcalá de Henares.

The final point to highlight is the presence of location patterns which differ greatly according to the type of activity, demonstrating the persistence of concentration dynamics in specific areas, not only because they accumulate specific factors which attract businesses, but also because of the existence of multiple interrelations between the companies from the same *cluster*. The *high tech* industries have now left the capital, but they are concentrated in its radial axes, with there still being an especially high presence in the south. On the other hand, advanced services and higher education have a larger presence in the western suburban strip, which is also the location of the highest levels of income. In turn, financial and insurance activities and, to an extent, those relating to health, have offered the greatest resistance to leaving the city of Madrid, with these starting to decentralise part of their work centres and relocating them to neighbouring towns. The cultural sector has the most complex distribution, due to the variety of activities this encompasses and the importance which public polices developed by local governments have had in some cases for the promotion and development of cultural facilities, due to the presence of important cultural icons in the capital.

5 Conclusions

As recalled by CAPEL (2009, p. 10), "it is widely recognised that the big cities are areas of innovation, industrial development and of the concentration of specialised services. They have the greatest number of jobs, especially those which are most knowledge-intensive". The process of globalisation has increased this tendency towards the centralisation of the power of a small number of large urban hierarchical agglomerations which, at the same time, occupy more and more land until it is difficult to determine where their boundaries are, and what has happened in Madrid is consistent with these tendencies.

Between the mid nineteen nineties and the final of the last decade an intense period of growth occurred here, assisted by factors of a structural nature which were favourable for agglomeration, but also because of state investment in large communication infrastructures, the attracting of huge sums of foreign investment and a process of real estate and financial speculation which was supported by the regional government and numerous local governments, and which benefited indirectly from that dynamism. The rise of *growth coalitions* composed by public and private actors was the local key of intense socioeconomic and territorial changes experienced. That process had several important negative consequences, such as massive land consumption, an increase in forced mobility, enlarged social and spatial segmentation, of which the best illustration was the growth of *new servants* linked to unstable and poorly paid jobs, who were mainly located in the southern and eastern peripheries of the metropolis, but also in some areas of the city centre of Madrid.

But this type of trend, which is very common to numerous megacities and goes beyond the historical legacies which are specific to each case, define their profiles better when they are accompanied by others from new, or at least little-known perspectives. In that sense, the development of the knowledge-based activities in Madrid, an attribute which seems inherent to the global cities, makes it possible to add another dimension which has barely been explored. Thus, for example, it makes it possible to observe that these activities have been seriously affected by the impact of the current crisis. Finally, despite these activities often being based on the use of intangible resources, which mainly move around information and knowledge, they still have a strong tendency to concentrate in the central city or, at least, in the nearby towns located in the most highly valued areas of the agglomeration. Beyond the traditional factors for selecting a location, the influence exerted by the symbolic capital associated with certain central areas, the close relationships and the local strategies for development suggest the need to pursue other research topics in order to better understand the emergent and segmented metropolitan economic geography.

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