Regional concentration of Knowledge-intensive services in Europe

Fernando Merino (*) **and Luis Rubalcaba** (**)

(*) Universidad Carlos III, Madrid.
C/ Madrid, 126
28903 Getafe
Tel: 91 624 86 39
Fax: 91 624 96 07
e-mail: fernando.merino @uc3m.es

(**) Universidad de Alcalá, Servilab y RESER.
Plaza de la Victoria 2
28802 Alcalá de Henares (Madrid)
Tel. y fax: 918855213
e-mail: luis.rubalcaba@uah.es

Abstract

Knowledge-intensive services can be seen as a reason for the expansion in regional economies that have specific features. Their spatial concentration patterns are different from other sectors' and related to the most outstanding aspects of regional development. There are several factors that explain the concentration or de-centralisation of services, although the recent trends towards services offshoring could suggest a higher weight of de-centralisation through the use of ICT. The results analysed at a European level show that the geographical location of knowledge-intensive services is still linked to advanced regions with a high international profile, but this concentration does not make them stand out against other sectors, they may even be less visible, irrespective of the statistical indices used. However, important differences exist depending on the country analysed.

Keywords: Knowledge-intensive services, geographical concentration.

Introduction

Over the last few years, an important growth has been registered in the economy of knowledge-intensive services (KIS). Over time, those services, formerly marginally grouped together under the heading "other services", have gradually shown themselves to be one of the main economic activities. Their growth has been connected to the following: a higher importance given to intangible aspects of production and distribution, changes in productive systems, the emergence of new information and communication technologies, the role of human capital in economic growth and, in summary, the consolidation of a knowledge-based society. This society develops parallel to the services economy, whose pre-eminence in the advanced economies is indisputable. Recently, the globalisation phenomenon has added a new element to the growth and location of services. For example, the fact that services are beginning to experience considerable offshoring processes, opens the way for advantageous new competitive operations.

At a regional level, the KIS have shown a higher concentration capacity in certain countries, regions, cities and even districts within the cities. An adequate amount of KIS within a geographical space implies a certain maturity in its local and regional development and serves as a catalyst for all other economic activities. Nowadays, the high regional concentration of advanced services is used to justify support policies, particularly in regions lacking them, but also in those with an abundant supply. At the present time, services relocation adds an interest to this issue: the incorporation of technologies allows an improved dynamism at a regional scale. However, the thesis on regional concentration of KIS has been verified just partially: in Europe, most of the

existing works on this subject matter are presented as descriptive treatments at a local or national level, or comparing the results obtained from several countries based on different information and data sources (such as those included in the works by Illeris, 1996 or Wood, 2002). Fortunately, the data recently produced by the European Commission allows an analysis at a European level, as well as the application of some of the concentration indices most frequently contrasted in international literature. The KIS do not necessarily need to be more concentrated than other activities, and the current trends towards a new location pattern could promote an increased de-centralisation that could be registered statistically.

In this context, the paper intends to provide two main contributions to the existing literature: Firstly, an analytical framework is presented in order to understand the KIS locational patterns with several plausible justifications regarding the current globalisation challenge. Although existing literature has considered the factors that may shape the optimal location of economic activities (Porter, 1990, Krugman, 1991; see Armstrong and Taylor, 2000 or Polèse, M., 1994 for a wider survey), we recognise the need for a theoretical framework where the specificities of KIS (being inputs for other activities, the fast evolution of its tradeability, its dependence on a supply of a high-skilled workforce, etc.) were specifically considered. Besides, the fact that ICT are reshaping dramatically many of KIS activities supposes that we must consider that the currently observed situation can be a transition state from an equilibrium characterised by the need to be geographically relatively close to the user-client to another one where geographical proximity becomes less relevant. Secondly, we analyse whether KIS exhibit a different pattern of geographical concentration than other economic activities. These results provide the first insight on the locational patterns, basically from a macro-economic perspective. Finally, some policy implications are envisaged.

The paper is organised as follows: The next section delimits which activities are considered business services and which ones are knowledge-intensive services; the second section discusses the theoretical framework for the study of knowledge-intensive services location and which factors of the existing literature on economic geography should be re-considered for this kind of activities in the current global context. Next, we present the concentration that knowledge-intensive services exhibit in Europe, thanks to a recently provided database of the European Commission which provides a European perspective. The increasing integration of KIS markets provides another element of interest in this European approach due to the fact that users of many of these activities (as software-related, financial advisory and assistance, etc.) do not only search for providers in their closest market, but anywhere given the almost non-existent transportation costs that the use of ICT allows. The last section summarises the conclusions and presents some policy implications.

1.- KIS definition and role in regional development

A prior conceptual remark must be made concerning the definition of KIS. The existing definitions of KIS are varied: sometimes, they refer to the group of knowledge-intensive business services (KIBS) related to computer services, R&D services and management consultancy. In fact, this narrow definition can be broadened to include telecommunications, financial, transport or professional services. The most frequent definition is in keeping with the widest range. KIS have been defined as those activities including "many forms of technical, including computer, and management consultancy and diverse types of specialist—for example, in financial management, marketing and advertising, staff recruitment and development, property acquisition and management, trade promotion or distribution logistics" (Wood, 2002). They are comprised of all main production services, namely all market services, except for retailing, hotel and catering

and personal and social services. Sometimes, a broader definition is used, including education and cultural services, since these generate basic knowledge. We will use two definitions of KIS in this work: the broadest one already mentioned, and a more restricted one connected to KIBS: computer services, R&D services and communication services.

Table 1. Main concepts generally used in business to businesses services

Economic activities	Business services	Producer services	Business-related services	Knowledge-intensive services KIS	Knowledge-intensive business services KIBS
Information and communication services (computer services, R&D, communications)	X	X	X	X	X
Professional business services (technical services, marketing and market research, selection of personnel and training services, accountancy and auditing, management consultancy, legal services, etc.)	X	X	X	X	X(**)
Operative business services (facility management, cleaning, security, billing, catering, etc.)	X	X	X	X(**)	
Communication services		X	X	X(**)	
Transport		X	X	X(**)	
Financial services		X	X	X(**)	
Distributive trades: wholesale and retailing		X(*)	X		
Energy		X(*)	X		
Other services used by enterprises (business travel-hotels, health, social services, etc.)		X(*)			
Final consumer knowledge-intensive services (education, cultural, health services)		X(*)		X(**)	

Notes: (*) Depending on different approaches and subcategories; (**) Sometimes included as wider concept of KIS or KIBS

KIBS are probably the most significant demonstration of structural change. The structural change of advanced economies is a fact representing the change of productive forms based on goods economy into production forms where services, intangibles included, acquired a great importance, also within the manufacturing production. Not all kinds of services have developed equally: traditional services such as trade, hotel and catering or transport have grown, although in proportions similar to those of the economies as a whole. The highest annual growth rates between 1979 and 2002, not

only regarding employment, but also added value, correspond to computer, telecommunications and business-related professional services: between the annual 4% and 7% for the European Union (EU15) according to the National Accountancy statistics. Within other sectors, only some personal services have reached a similar growth.

In Europe, KIS (excluding social or public services) have increased by 30% their relative participation in the economy, until reaching 33% as to employment and 35% as to added value. In the United States, the percentages corresponding to the year 2002 were higher (37% and 39%, respectively) and they were higher than the European ones in 1979. In both areas, KIBS have doubled their weight in economy (in the EU15, they represent 3.5% of total employment and 5.2% of added value in 2002).

Despite the high figures, the main interest of KIS and KIBS is not based on what they represent themselves, but on the effects they have on the economies in which they are used. The peculiarity of KIS lies in the role they play in the generation and diffusion of localised knowledge (Antonelli, 1998, 1999) and on their capacity to generate, facilitate or adopt technological, organisational, social or other kinds of innovation. KIBS, in turn, represent the most advanced part of business services and at the same time of the producer services, characterised by being intermediate inputs contributing to the improvement of the competitiveness of the companies using them (Rubalcaba, 1999). The contribution that business services make to economic growth seems to be demonstrated more robustly in advanced economies (Rubalcaba and Kox, 2006). This point is supported by diverse views: a macroeconomic viewpoint, through the intersectorial integration of KIBS (Windrum and Tomlinson, 1999), their importance within the endogenous growth models (Guerrieri et alt., 2003) and their implications for the relative growths in productivity and employment (O'Mahony van Ark, 2003); and a

microeconomic viewpoint through the improvements in competitiveness of companies through innovation, the emergence of new methods of scale or field economies and the increasing integration of their markets within the globalisation context (OECD, 2005).

KIBS have been predominantly responsible for breaking the old myths concerning services (little productive, little innovative); broken myths when KIS have showed their effects on productivity gains in other sectors (Outlon, 2001, Kox, 2004) or on innovation (Gallouj, 2002, Andersen et alt, 2000, Miles, 2003). Unlike other business services, the most important effects of KIS are indirect (Wood, 2001) and they are produced as a transfer of knowledge, integration between knowledge stocks and competence, adaptation of knowledge to business needs and knowledge production. All this demonstrate that KIBS are not just elements of sectorial concentration or decentralisation, but they become functional components of regional or urban development (Duranton and Puga, 2005; Rubalcaba and Garrido, 2006; Camacho, 2006).

From a spatial perspective, the traditional concept establishes that there are some basic and some induced sectors. The first ones include the traditional industries, while the latter are comprised of most business services. Basic sectors are supposed to be those attracting induced sectors, which are also very sensitive to distance and require a close proximity. This type of explanations gives rise to a hierarchy of central locations. However, this model contains serious problems (Jayet, 1994): borders are very diffuse between basic and induced sectors, and furthermore, there are basic sectors which could use the existence of supply of the induced sectors as their location criterion. Moreover, business services could act as basic sectors when the effects of distance are reduced (and therefore supply a geographically extensive market) and the effects of scale are increased. This is compatible with the fact that the location of business services is, to a

large extent, in line with pre-existent urban and regional hierarchies and they contribute to reinforce the same. Many works have explained the geographical concentration of business services (such as those carried out by Illeris, 1996, or more recently, those by Bryson, Daniels and Warf, 2004 and Rubalcaba and Merino, 2005). After an analysis of the related literature, it is difficult to state that services are mere followers of the manufacturing industry, according to the neoindustrial theses, but they would rather be a "principle determining the urban hierarchy of metropolis", according to Gadrey (1992).

Besides, the role of business-related services in regional and urban development[1] is well recognised. Among them, KIS operate as the "brains of industry" which may provide a competitive advantage to those firms and regions which have easy access to them. Then, the development of a regional supply of business-related services (in particular those related to advanced services facilitating innovation in SMEs) is seen as a necessary element for the catching-up process of the less developed regions.

2. KIS location.

The subject of location of the economic activity is a field well documented in literature. We may summarise it by saying that the main forces that explain the economic geography are based on the existence of externalities from other producers (Marshall), the transportation costs and the existence of scale economies.

[1] For example, the EU Communication COM(2003) on the competitiveness of business-related services and their contribution to the performance of the European enterprises states that the provision and use of business-related services is limited in less developed regions and candidate countries, mainly affecting SME and convergence processes.

Obviously, business services are not out of this rationale, and most of the empirical evidence that the literature reports (mainly in the 90s), shows that business services are concentrated in certain areas, cities, regions or countries: Marshall, Damesick and Wood (1987), Coffey and Polèse (1987), Hansen (1990), Bailly, Coffey, Paelinck and Polèse (1992), Moulaert and Gallouj (1993), Senn (1993), Baró and Soy (1993), Marshall and Wood (1995), Cuadrado and Rubalcaba (1993), Moulaert and Gallouj (1993), Daniels (1993), Cuadrado and Del Río (1993), Bonamy and May (1994), Esparza and Krmenec (1994), Illeris (1994, 1996 and Phillipe, 1993), Rubalcaba (1999), Wood (Ed, 2002), among others. Most of these works are mainly regional-oriented while others also deal with urban implications, in similar directions as the ones undertaken in the recognised works provided by Sassen's chapter (1991) on producer services or by the Castells' discussion (1989) about the dialectics between the centralisation and decentralisation of services. Recent works state the uneven patterns regarding the geographical location of business services (Shearmur and Alverge, 2002) displaying unequal combinations of concentration and dispersal.

Given the high heterogeneity of the economic activities covered under the name of "business services", it is not surprising that the importance of each of the underlying factors may vary notably among the different services. This difference across services has been stated in empirical literature. So, we may see that for some activities geographical proximity is more relevant (as concerning professional services such as lawyers, bookkeeping, etc.), while others are more easily adaptable to distance (computer, R&D). The logical reasons for one behaviour or the other have been justified according to several parameters. Bonamy and Valery (1994) explained location depending on the interaction between the internal and external activities of the company: some activities focus on the "guarantee" of supply (a high specialisation and

a low need for coordination), and some other activities being more organic, integrated and requiring coordination, focus on the "amount" of the demand. According to Esparza and Kremenec (1994) the difference depends on the commodification processes and on the market structures. Illeris (1994) shows the differences between low-specialised services, where the hierarchy of central locations was maintained, and those where the need of physical proximity disappeared (back-office services – billing, call centres services– and specialised services of infrequent use –R&D, advanced consultancy–).

In any case, we may say that for all this high array of activities, the explanation of the location pattern may be the one that classical literature has signalled for any economic activity. However, there is a series of factors that, although they have been traditionally recognised in the literature regarding economic geography, acquires a special importance when the activities of advanced business services are the subject of study within a context such as the present one. A lower importance of the distance derived from an intensive use of the ICT in many activities has turned the output of these companies into a tradeable good. This implies the reduction of the weight of demand localisation as an explanatory factor of its location in favour of the importance of the existence of inputs (mainly labour force) or the external economies generated by other companies performing the same type of activity. Obviously, from these changes it is not deduced that the location pattern must be necessarily different, but that one of the factors explaining the location has partly lost its importance and, therefore the location pattern can be different.

It is worth mentioning some of the consequences arising from the market size, highlighted by the International Trade models, since business services must be increasingly considered as tradeable goods. To the extent that, in a specific region, there is a higher level of activity in sectors which are users of business services, the market

size will be higher, and thus it could concentrate the production of business services (Behrens, 2005).

On the other hand, we must not forget that many models explaining the location of certain activities are based on the provision of production factors in each given region or with a limited mobility. However, in the case of KIS, and particularly in the case of KIBS, the primary production factor is the high-skilled jobs, whose mobility, although not complete, must be considered much higher than the one of other traditional production factors such as productive facilities or capital components, or even the low-skilled jobs. But moreover, factors such as the free mobility of workers within the EU, the possibilities of performing a part of the working time at a distance (telecommuting) or the internal and external migratory movements modifying the provision of this factor in each of the regions, force the reconsideration of the importance of this factor in the determining of a location pattern of business services within the EU.

Distance always plays an important role in the business advice (Bennet *et al.* (2001)), but the measurement scales are undertaking a change. For business services, globalisation and the need to compete in world markets characterises the actual situation. Not so many years ago, professional services only faced competition from other firms located in the same geographical area, where the rest of the firms were the only possible clients. However, this is no longer the situation for most of the business services providers. The latest changes do not only arise from the existence of a larger set of competitors, but also from the rapid change in the economic, institutional and sociological framework where the economic activity is developed. Obviously, all these factors suppose an increase in the risk that firms may deal with, especially for those firms that, no more than two or three decades ago, were oblivious to this factor. A possible strategy to deal with the larger uncertainty that these firms face may be to try to

follow the leaders, and find where the major economic activity is located. So, geographical concentration may arise as a consequence of the increasing risk. Needless to say, certain geographical decentralisation strategies may be used to reduce risks and uncertainty, in the same way as manufacturing firms serve different geographical markets in order to reduce the overall risk. In this sense, a certain division of labour and feasible working distance through ICT enables decentralisation strategies to take place. It may occur mainly in those activities whose production can be standardised as well as if they are intensive users of ICT. Then, trends towards decentralisation would dominate to the concentration impulses as a reaction to a more competitive and uncertain environment.

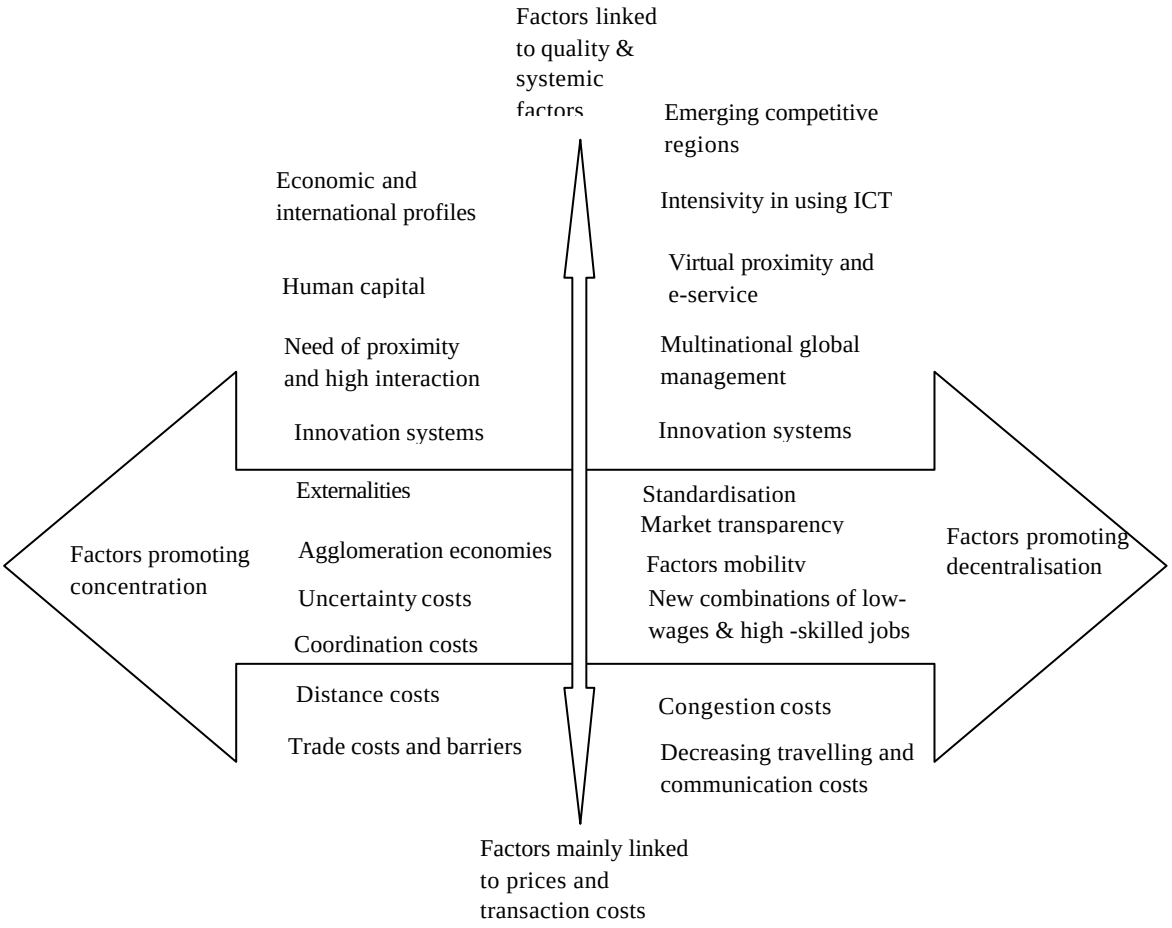
To sum up, the geographical concentration of KIBS as such can only be explained by a wide array of factors, acting in a different way according to the specific content of every single activity. However, common trends do exist such as those indicating their remarkable contribution to the establishment of new economic hierarchies and new central places in the global economy (Daniels, 1993, Bryson *et al.*, 2004). For example, the presence of human resources, clients and information do matter as locational factors; the appropriately skilled human resources have been widely recognised as a major factor behind KIS concentration (Illeris, 1996, Coeffey and Sheamur, 1996). The roles of qualifications and skills have been recently recognised as elements behind global sourcing and the offshoring of services (Van Welsum, 2005). The role of income and population has also been associated to the KIS location at a EU scale.

Moreover, it must be noted that some characteristics of the world economy have increased competition and, consequently, the search for the most adequate strategies to manage business. For example, globalisation processes push activities to move

according to new strategies where location is of importance. As competition increases, risk of a non-optimal location increases in the new globalised market. The opportunities created by globalisation and recent trends towards global sourcing in services open up new scenarios where uncertainty and vulnerability are the natural contexts in which many enterprises work (Giarini, 2002).

In any case, the location of KIS is more complex because of the interactions taking place between industry, economic structures and the presence of multinationals, among others. Figure 1 summarises the main explanatory factors promoting geographical concentration and decentralisation in KIS.

Figure 1. Factors behind KIS concentration and decentralisation



Among the items appearing in this diagram, it is worth highlighting the presence of the innovative environment acting in opposite directions. The incorporation of ICT is reflected in the e-service or in the integral management systems that accentuate pressure towards a higher decentralisation. In turn, the existence of innovative systems could be orientated towards ways of concentration, not fully due to the knowledge spillovers that could be generated, whether or not being an agglomeration factor depending on its technological intensity (Krugman, 1991), but rather due to its integration into regional innovation systems or in the so-called learning regions (Cooke, 1992, Cooke et alt., 2003). The relationship between KIS and innovation systems has been empirically corroborated by Makun and MacPherson (1997), Muller and Zenker (1998) and Wood (2002). This latter work makes a comparison between 9 European countries and identifies the highest and most varied and flexible concentration of KIS in North European countries, while there is a higher relative concentration in countries of the South caused by the influence of multinationals, governments and a certain delay in the innovative systems of these regions.

3. New evidence regarding the concentration of KIS at EU level.

As stated at the beginning of this work, besides outlining the main theoretical arguments to justify the location pattern of knowledge-intensive services within the current context, we also present the results achieved from the geographical distribution of these activities in Europe. It is well known, these activities cover a large part of the production and employment in most of the European Countries, but little is known about their location at EU scale. Besides, the renewed interest in regionally-based policies and the relevance that business services activities have on the overall growth of a region require a better knowledge of the actual situation.

In order to continue with the empirical analysis, we first present the database, to continue displaying some descriptive results on those regions which are more specialised in knowledge-intensive services. The section finishes with various measurements of geographical concentration in order to provide a more complete analysis than the presentation of those regions most/least dedicated to these activities.

The database used is the one compiled by the European Commission when preparing its Third Report on Cohesion. It is mainly based on official statistics (Regio) and it was developed by DGRegion and Eurostat. The database includes a breakdown of employment by type of activity that includes KIS in the wider concept previously described. The data also contain information about KIBS following the narrowest definitions also presented before. Data are available at national level and at NUTS1 and NUTS2 levels. NUTS is the official classification of regions adopted by the European Union and modified in June 2003. The equivalences of different levels of NUTS classification are based on geographical criteria and not so much on the scale of administrative or political borders.[2]

In order to provide a first approach to the KIS location across the EU we present the regions which are most specialised (in terms of employment) in these activities (table 2). Also, we include the specialisation index on KIBS in order to provide a reference for comparison. The value of the Specialisation Index for a region i in sector s

[2] At NUTS level 1 for Belgium 'Gewesten/Régions', for Germany '*Länder*', for Portugal 'Continente', Região dos Açores and Região da Madeira, and for United Kingdom Scotland, Wales, Northern Ireland and the Government Office Regions of England. At NUTS level 2 for Belgium 'Provincies/Provinces', for Germany 'Regierungsbezirke', for Greece 'periferies', for Spain 'comunidades y ciudades autónomas', for France 'régions', for Ireland 'regions', for Italy 'regioni', for the Netherlands 'provincies' and for Austria '*Länder*'. At NUTS level 3 for Belgium 'arrondissementen/arrondissements', for Denmark 'Amtskommuner', for Germany 'Kreise/kreisfreie Städte', for Greece 'nomoi', for Spain 'provincias', for France 'départements', for Ireland 'regional authority regions', for Italy 'provincie', for Sweden 'län' and for Finland 'maakunnat/landskapen'.

defined as SI(s)i=xi,s / Xi where xi,s captures the employment in sector s in region i, and Xi measures the total employment in that region.

As shown in table 2, most specialised regions in KIS (both in NUTS1 and NUTS2 breakdown level) present very high per capita income. They are located in Nordic countries, the UK and Holland. Meanwhile, Mediterranean regions are the least specialised in KIS. In general terms, the rank in KIS is quite similar to the one in KIBS, although for KIBS some regions which house the capital of their respective countries (as Ile-de-France) or which have a highly innovative environment (as Oxfordshire in UK) increase their positions.

Table 2. Most specialised European regions in knowledge-intensive services

Country	KIS	KIBS	Rank	NUTS1	KIS	KIBS	NUTS2	KIS	KIBS
Sverige	47.1	5.2	1	Åland	56	5.9	Inner London	59.1	5.1
Danmark	44	4.7	2	Stockholm	54.8	8.8	Outer London	50.4	6.9
United Kingdom	40.8	4.5	3	London	53.6	6.2	*Uusimaa (Suuralue)*	46.5	7.9
Suomi/Finland	39.2	4.7	4	Reg.Bruxelles-Cap..	49.7	5.7	Surrey, East & West Sussex	46	5.9
Nederland	38.8	3.7	5	Övre Norrland	48.2	3.6	Utrecht	45.2	5.8
Luxembourg	38.1	2.2	6	MellerstaNorrland	47.8	4.6	Brabant Wallon	44.8	4.3
Belgique-België	37.8	4.2	7	Île de France	46.8	7.8	Wien	44.5	7
France	35.5	4.1	8	Sydsverige	45.5	5	Noord-Holland	44.1	3.9
Ireland	33.4	4.3	9	Västsverige	45.5	4.6	Berkshire, Bucks & Oxfordshire	43.8	8.5
Deutschland	31.8	3.3	10	Berlin	45.1	5.2	Merseyside	43.1	4.2
Österreich	30.1	3.5	11	Norra Mellansverige	44.6	2.8	Flevoland	42.6	6.6
Italia	27.5	3	12	Östra Mellansverige	44.5	5	Eastern Scotland	42.5	3.1
España	25.5	2.5	13	Hamburg	43.4	4.3	Groningen	42.1	3.2
Ellada	22.7	1.8	14	South East	43.2	6.2	Bedfordshire, Hertfordshire	41.4	6.8
Portugal	19.3	1.5	15	West-Nederland	42.2	4.4	Hampshire & Isle of Wight	41.3	6.1
EU15	33.3	3.6	16	Scotland	40.3	3.3	Gloucestershire, Wiltshire	40.7	5.1
			17	Eastern	39.9	5.3	Greater Manchester	40.6	3.3
			18	Smålandmed Öarna	39.8	2.4	Vlaams Brabant	40.6	6.1
			19	South West	39.3	4.1	Zuid-Holland	40.6	4.6
			20	Manner-Suomi	39.1	4.7	South Western Scotland	40.5	3.7

Source: Based on Eurostat-Commission regional data

Obviously, some of the features of each country (legislation, training of the workers, infrastructures, etc.) could be factors determining its appropriateness for the location of KIS activities. Therefore, the differences observed among the fifteen countries included in the first part of table 2 can be due not only to economic factors (in a restrictive sense) responding exclusively to the dynamics of the forces determining the location of the economic activity (possibility to exploit externalities, benefits of scale economies, etc.), but also to an institutional framework able to attract certain activities. However, these differences are much smoother among the regions of a country. Therefore, it seems advisable to make the difference between the "country" factors that could affect the level of specialisation on KIS in each region and those specific regional factors (its communication infrastructures, labour force characteristics, closeness to potential clients, etc.). For this purpose, we have calculated the relative specialisation index of each region *i* within its country *C*, measuring to what extent a region is more specialised in an activity sector than the average of its country.

$$RSI(s)_i = \frac{SI(s)_i}{SI(s)_C} = \frac{x_{i,s} / X_i}{x_{C,s} / X_C}$$

when $RSI(s)_i=1$, the specialisation of region i in the sector under analysis is the same as that of the country C where it is included, while higher (lower) values mean a higher specialisation. Table 3 shows these values of the RSI for the ten regions registering the higher and lower relative specialisation level than their respective countries.

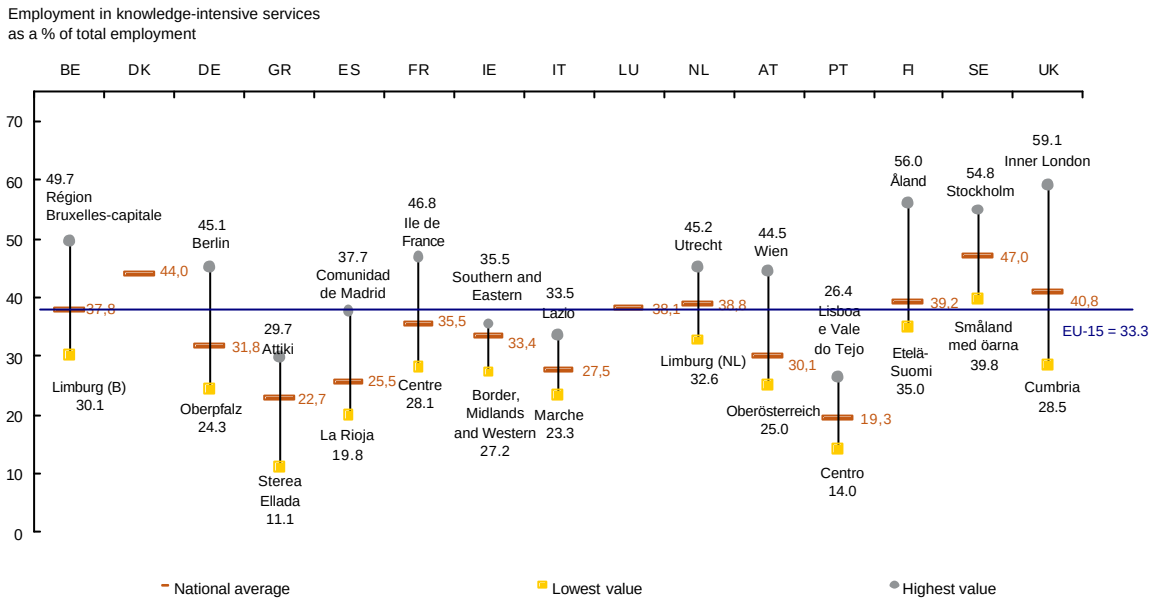
Table 3: Top-10 and Bottom 10 regions on specialisation on KIS relative on their countries

Rank	Region (NUTS2)	Country	SI (KIS)	RSI (KIS)
1	Wien	AU	44,5%	147,7%
2	Inner London	UK	59,1%	145,1%
3	Lisboa e Vale do Tejo	PO	26,4%	136,9%
4	Outer London	UK	50,3%	123,5%
5	Darmstadt	D	38,4%	120,7%
6	Uusimaa (Suuralue)	FI	46,5%	118,6%
7	Brabant Wallon	BE	44,8%	118,5%
8	Utrecht	NL	45,2%	116,7%
9	Stockholm	SE	54,8%	116,6%
10	Noord-Holland	NL	44,1%	113,8%
	….			
172	Notio Aigaio	HE	17,1%	75,3%
173	Thessalia	HE	17,0%	74,7%
174	Peloponnisos	HE	16,9%	74,4%
175	Centro	PO	14,0%	60,9%
176	Ionia Nisia	HE	16,3%	71,9%
177	Dytiki Ellada	HE	16,1%	70,8%
178	Cumbria	UK	28,5%	70,0%
179	Kriti	HE	15,6%	68,6%
180	Anatoliki Makedonia, Thraki	HE	15,0%	66,0%
181	Sterea Ellada	HE	11,1%	48,9%

Source: Based on Eurostat-Commission regional data

The first result we can observe in these results is that those regions which are relatively more specialised in KIS than their respective country are, with the exception of Lisboa – Vale do Tejo, in high income countries. The reverse is observed at the bottom of the ranking. Also we can observe that those regions which lead the RSI ranking occupy high positions in the SI ranking too, although with some exceptions (Vienna goes down to the 14th position, while different Swedish regions reach the top-10 ranking). So, we may conclude that KIS activities are concentrated, not only in some countries across Europe (notice that the specialisation index in Sweden is double the Portuguese figure), but also in those countries which have regions within them that concentrate a large part of the KIS activity. Graph 2 presents another way of comparing the figures, where the important role of highly populated, relatively high-income and international regions (mainly capital-regions) is outstanding in those extreme values representing the higher concentration of KIS.

Graph 2: Regional range of percentage of employment accounted for by knowledge-intensive services (KIS) by Member State in 2002 (1)



(1) Rankings exclude regions for which reliability levels do not permit publication according to CLFS.
Source: Eurostat — CLFS.

3.3 Is the geographical concentration a distinctive feature?

To analyse the geographical concentration of economic activity, there is a large set of indices, each one focusing on different aspects. The simplest one is the Herfindhal index. It is an absolute measure of specialisation often used in industrial economics to demonstrate how concentrated a sector is depending on the number of firms and their size. It can be used to provide a geographical perspective of the concentration of an activity. Basically, it adds up the squares of industry shares in the total activity in the region ($H(s) = S_i\ (x_{i,s} / X_{i.})^2$). It takes values between *1/N* and *1*. If all activity in industry *s* is concentrated in one region, geographical concentration is at its maximum, and the index will value 1. If there is a perfect distribution across the N regions, the

Herfindhal index will value 1/N. An advantage of this index is its simplicity, but it does not consider the distribution of all economic activity. If the activity in other industries *s'* ¹ *s* is concentrated, the H(s) will measure geographical concentration independently of it. Different alternatives can be considered in order to avoid such a shortcut. Ellison and Glaeser (1997) propose to use

$$G = \frac{\sum_{i=1}^{M} (s_i - x_i)^2}{1 - \sum_{i=1}^{M} x_i^2}$$

Another popular alternative is the Gini index. To measure geographical concentration through the Gini index some modifications are needed to the usual measure where the aim is the measurement of income concentration, since in such case equidistribution is understood as the situation where each of the N individuals has 1/N-*th* of the total amount, but it does not seem reasonable to compare the distribution of an activity as if each of the N regions should locate 1/N-*th* of the activity. It is usual to compare with the share in total area, population, etc. In this paper we consider the share on total employment. Therefore, the Gini index is computed as follows: Consider an industry *s* (services, KIS, etc.) and the territory (EU-15) divided in N regions each of them indexed by *i*. For each region we compute the share of employment that it has, both in the industry *s* under study as in total industries (that will be the reference). Subsequently, we rank the ratio on total employment. Following this, we can compute the cumulative shares on employment and use the formula

$$Gini(s) = \frac{\sum_{i=1}^{M-1} |p_i - q_i|}{\sum_{i=1}^{M-1} q_i}$$

The most frequent criticism of the geographical Gini coefficient (that it can be extended to other indexes as Ellison Glaeser) is based on the fact that it does not consider the *industrial* concentration of the activity. Going to the extreme, if one industry was a monopoly with a single business unit, it would appear as geographically concentrated. Obviously, there is some interest in providing a measure of geographical concentration which to some extent considers the industrial concentration that may exist. There are different approaches to this, but in this paper we cannot consider it given that we do not have data with all the EU companies in the KIS sector which are needed to compute them. However, it is necessary to point out that KIS, are one of the business sectors in Europe which exhibit less industrial concentration, given that it is dominated by thousands of firms in most regions. Moreover, major market shares are located for some selected sectors in some central regions and cities where many competitors do normally exist (e.g., in some national markets large management consultancy firms take only about 10% while the largest concentration in less developed regions –50% on average- count statistically in central regions since services are provided through the temporary movement of staff-; in other sectors such as legal or technical services large firms take less than 5% of the market shares on average; the rather low relative industrial concentration in KIS has been empirically confirmed by the works of Rubalcaba, 1999 and Kox (2002). Table 4 complements the information of the Gini index with the Herfindhal index.

Table 4: Concentration of KIS in the EU

Herfindhal index on Total empl.	Countries	NUTS1 regions	NUTS2 regions
KIS	0.1405	0.0211	0.0056
KIBS	0.2477	0.0437	0.0108
Services	0.1378	0.0200	0.0054
Manufacturing	0.1722	0.0286	0.0286
High-Tech manuf	0.1813	0.0314	0.0085
Minimum value	0.066667	0.012987	0.005525
Geographical Gini			
KIS	0.0333	0.0436	0.0331
KIBS	0.0297	0.1810	0.1230
Services	0.0623	0.0766	0.1864
Manufacturing	0.1027	0.0662	0.2979
High-Tech manuf	0.1393	0.1487	0.0850

From the results shown in Table 4, different conclusions can be drawn. Firstly, we can observe that the activities included within the KIS show similar geographical concentration levels (regarding employment) to those corresponding to the total services, irrespective of the level of geographical de-aggregation considered. However, when we analyse the high-technology manufacturing activities, these are slightly more geographically concentrated, which would mean that the lower dependence on transport costs of knowledge-intensive services could act as a key factor to differentiate between both activity sectors. The calculated Gini index (comparing the geographical concentration of KIS activities with the total economic activity) shows that the distribution of this sector is very similar to the total activity, and obviously with a lower geographical concentration than the total services or high-technology manufacturing activities. In contrast, KIBS are relatively more concentrated than KIS in all cases, and also more than the other sectorial aggregates at NUTS1 level, although not at NUTS2 level.

Table 5 shows the geographical concentration of KIS activities within each of the EU countries (again, compared to the total employment) using the values of the Gini index. The first result to be emphasized is the high level of heterogeneity observed within the countries under analysis. Thus, while there are countries such as Finland or Holland with a NUTS2 level, where the geographical concentration is considerably low, in other countries such as Greece, France or Spain the concentration level is much higher. The comparison with the concentration level of the high-technology manufacturing activities again proves that Holland and Finland are the countries where these activities have the lowest geographical concentration, while Greece and Spain register the highest level of concentration. These results confirm at a European level what Wood (2002) presented taking some case studies as a basis. According to these, the highest concentration corresponds on several occasions to those countries where services are less-developed, although with some exceptions such as Portugal, where a higher concentration would be expected, or the United Kingdom, which should have a lower concentration. The reason for the first exception is the high concentration in the region of Lisbon, which leaves the same low level of KIS to the rest of the regions, and the relative high concentration of the United Kingdom which is due to the regions surrounding the South East of London. In the latter case, a peculiar form of mid-high development of KIS in intermediate regions of the social hierarchy is more suitable to develop the de-centralisation economy within a relatively broader geographical context.

Table 5: Gini index of concentration of employment in each industry (vs. Total employment)

	Manufacturing		High-Tech manuf.		Services		KIS		KIBS	
	NUTS 1	NUTS 2	NUTS 1	NUTS 2	NUTS 1	NUTS 2	NUTS 1	NUTS 2	NUTS 1	NUTS 2
Belgique -België	0.0145	0.2325	0.1381	0.1884	0.0829	0.0756	0.0371	0.0315	0.0226	0.0859
Danmark	--	--	--	--	--	--	--	--	--	--
Deutschland	0.0953	0.0927	0.1657	0.0663	0.1246	0.0501	0.0231	0.0571	0.0270	0.1311
Ellada	0.2287	0.6136	0.2638	0.6031	0.0839	0.1742	0.1178	0.2610	0.1938	0.4268
España	0.0974	0.3281	0.1899	0.4197	0.1451	0.2544	0.0408	0.0942	0.1446	0.3295
France	0.2274	0.5020	0.0382	0.0580	0.0753	0.0878	0.0411	0.1058	0.1232	0.2988
Ireland	--	0.2574	--	0.0315	--	0.0416	--	0.0370	--	0.0789
Italia	0.0636	0.4238	0.1458	0.1045	0.0522	0.1553	0.0064	0.0466	0.0613	0.2041
Luxembourg	--	--	--	--	--	--	--	--	--	--
Nederland	0.3339	0.4122	0.1852	0.1827	0.1700	0.3012	0.0300	0.0278	0.0849	0.0980
Österreich	0.0085	0.0845	0.0323	0.0661	0.1485	0.1796	0.0588	0.0861	0.1293	0.2092
Portugal	0.0641	0.1198	0.0581	0.0634	0.0940	0.1282	0.0053	0.0293	0.0309	0.0904
Suomi/Finland	0.0041	0.1559	0.0055	0.0425	0.2120	0.1819	0.0023	0.0157	0.0013	0.0545
Sverige	--	0.1061	--	0.1219	--	0.1093	--	0.0328	--	0.1773
United Kingdom	0.1113	0.2030	0.0511	0.0772	0.0514	0.1098	0.0526	0.0644	0.1451	0.1505

Summary and conclusions

In this work, we have analysed the geographical concentration of knowledge-intensive service activities. The interest in this subject matters is based on different issues commencing from the fact that this sector is subject to deep changes which are reducing the importance of the geographical distance towards the client due to the development and application of information and communication technologies, and until the fact that its specific capacities can condition the development of the rest of activities within the different regions.

After outlining the diverse factors that are able to condition its location, derived from theories regarding international trade and regional location, we have analysed the location patterns of these activities in Europe. The results show that the concentration of this sector is very low (unlike what happens with high-technology manufacturing activities), although with substantial differences among countries. The concentration of KIBS is higher than the concentration of KIS, but generally lower than the manufacturing concentration, particularly that of high technology. In many countries, the concentration of KIS is even less concentrated than services. We can also confirm, by means of the concentration indices used, that KIBS in particular register a higher concentration within some countries (Mediterranean countries) whose development in the sector is lower than in others where the development is higher, although remarkable differences exist among countries. In general, KIBS are more concentrated than KIS and, at NUTS1 level, also more than other economic aggregates.

The lower concentration of KIS is not incompatible with the existence of some places where a certain volume of KIS activities is registered. The previous empirical

evidence (for example, Rubalcaba and Gago, 2001 or Bryson *et al*. 2004) confirms a certain accumulation of KIS, and especially KIBS, in cities located at the top of the urban hierarchy. This means that the values are extreme or atypical when making the indices, but not in reaching the conclusion of a panorama of complete concentration of the economic activity in Europe. Therefore, the results lead to an asymmetric bipolarity in the location behaviour of KIS and KIBS: general predominance of low concentration due to the more or less equal diffusion of these services in many regions where these are not very intensive (the majority of regions), and a very high concentration in some regions located at the top of the spatial hierarchy, particularly capital cities. The level and nature of the hierarchical ranking of advanced services depend considerably on the regional disposition of each country, so an influence of the trends towards the differentiated re-location, according to the country and sector taken into consideration, will be also expected.

References:

- Andersen, B; Howells, J.; Hull, R.; Miles, I.; Roberts, J. (2000) Knowledge and innovation in the new services economy. Edward Elgar, Cheltenham, UK, Northamton, USA.
- Antonelli, C. (1998) Localized technological change, new information technology and the knowledge-based economy: The European evidence. Journal of Evolutionary Economics (1998) 8: 177-198.
- Antonelli, C. (1999) The Microdynamics of Technological Change. Routledge, London and New York.
- Armstrong, H. y Taylor, J. (2000): *Regional Economics and Policy*. Blackwell, 3ª ed. Oxford.
- Bailly, A; Coffey, W.; Paelinck, J. H. P. and M. Polèse, 1992, *Spatial Econometrics of Services*. Avebury, Aldershot.
- Baró, E. and A. Soy, 1993, 'Business service location strategies in the Barcelona metropolitan region', in Daniels, P.W. *et al. The Geography of Services*. Frank Cass, London.

- Bennet, R., Bratton, A. Robson, P. (2000) Business advise: the influence of distance. Regional Studies 34, No. 9.
- Bonamy, J. and A. Valeyre, 1994, 'Services, relation de service et organisation', in J. Bonamy and N. May, *Services et mutatons urbaines: questionnements et perspectives*. Anthopos, Economica, Paris.
- Bryson, J. Daniels, P. Warf, W. (2004) Service Worlds. Routledge.
- Camacho, J.A. (2005) *"Servicios intensivos en conocimiento e innovación regional"*. *Otoño, 2005*
- Castells, M. (1989) *The informational city*. Blackwell. Oxford UK and Cambridge, US.
- Coffey, W. J. and R.G. Shearmur, 1996, The growth and location of high order services in the Canadian urban system, 1971-1991. *North American Meetings of the Regional Science Association International. Washington, D.C., November 14-17 1996.*
- Coffey, W.J and M. Polése, 1987, 'Trade and location of producer services'. *Environment and Planning A, 19/5:597-611.*
- Cooke, P. (1992): "Regional Innovation Systems: Competitive Regulation in the New Europe", *Geoforum*, 23, 365-82.
- Cooke, P.; Heidenreich, M. y Braczyk, H. (2003): *Regional Innovation Systems*, Routledge.
- Cuadrado Roura, J.R. and C. Del Río Gómez, 1993, *Los servicios en España*. Pirámide, Madrid.
- Cuadrado, J. R. and L. Rubalcaba, 1993, 'Regional Trends in Business Services Supply in Spain', in Daniels, P.W. *et al. The Geography of Services*. Frank Cass, London.
- Daniels, P.W, 1993, *Service industries in the world economy*. Blackwell, Oxford.
- Dekle, R. (2002) Industrial concentration and regional growth: evidence from the prefectures. The Review of Economics and Statistics, May 2002, Vol. 84, Iss. 2;M pg. 310.
- Duranton, G. and Pugo, D. (2005) From pectoral to functional urban specialisation, *Journal of Urban Economics*, vol. 57, no. 2, March 2005, pp. 343-370.
- Esparza, A. and A. Krmenec, 1994, 'Producer services trade in city systems: evidence from Chicago'. *Urban Studies, 31 (1); February 1994, pp. 29-46.*
- Gadrey, J. (1992) *L'économie des services.* La Decouverte, Paris.
- Gallouj, F. (2002) *Innovation in the service economy*. Edward Elgar.
- Giarini, O. (2002) The globalisation of services in economic theory and economic practice: some conceptual issues. In Cuadrado-Roura, J.R., Rubalcaba Bermejo, L. and Bryson, J. (eds.) (2002) *Trading services in the Global Economy*. Edward Elgar.
- Hansen, N. (1990) "Do producer services induce regional economic development? *Journal of Regional Science Vol 30, No 4: 465-476*
- Illeris, S. (1994) "La localisation des producteurs et utilisateurs de services". In Bonamy, J. and May, N *Services et mutatons urbaines: questionnements et perspectives*. Anthopos, Economica, Paris.

- Illeris, S., 1996, *The service economy: a geographical approach*. John Wiley & Sons, Chichester.
- Illeris, S.; Phillipe, J. (1993). "Introduction: the role of services in regional economic growth". In Daniels *et alt. The Geography of Services*. Frank Cass, London.
- *Jayet, H. (1994) "Services et space".* In Bonamy, J. and May, N *Services et mutatons urbaines: questionnements et perspectives*. Anthopos, Economica, Paris.
- Kox, H. (2002) Growth challenges for the Dutch business services industry. International comparison and policy issues. CPB, The Hague.
- Kox, H., 2004. The contribution of business services to aggregate productivity growth, in G. Gelauff et al. (eds), *Fostering productivity growth – patterns, determinants and policy implications*, Contributions to Economic Analysis Series No. 263, Elsevier Science, Amsterdam / Boston.
- Krugman, P. (1991a): *Geography and Trade*, MIT Press. Cambridge, Massachusetts.
- Krugman, P. (1991b): "Increasing Returns and Economic Geography", *Journal of Political Economy*, 99(3), 483-99.
- London.
- Makun, P. y MacPherson, A.D. (1997): "Externally- assisted Product Innovation in the Manufacturing Sector: The Role of Location, In-house R&D and Outside Technical Support", *Regional Studies*, 31(7), 659-88.
- Marshall, A. (1919): *Industry and Trade*, Macmillan. London.
- Marshall, N. and P. Wood, 1995, *Services & Space. Key aspects of Urban and Regional Development*. Longman Singapore Publishers, Singapore.
- Marshall, N; Damesick, P. and P. Wood, P, 1987, 'Understanding the location and role of producer services in the United Kingdom'. *Environment and Planning A: 19, pp. 575-96*.
- Miles et al. (2003): *Knowing how, knowing whom. A study of the links between the knowledge intensive services sector and the science base*, Institute of innovation research, University of Manchester / UMIST, Manchester
- Moulaert, F. and C. Gallouj, 1993, 'The locational geography of advanced producer firms: the limits of economies of agglomeration', in Daniels, P.W. *et al. The Geography of Services*. Frank Cass, London.
- Muller, E. y Zenker, A. (2001): "Business services as actors of knowledge transformation: the role of KIBS in regional and national innovation systems", *Research Policy*, 30, 1501-16.
- O'Mahony, M. and B. Van Ark (2003) *EU productivity and competitiveness: An industry perspective. Can Europe resume the catching-up process*?. European Commission, Brussels.
- OECD (2005) Enhancing the performance of the services sector. OECD, Paris.
- Oulton, N., 2001. Must the growth rate decline? Baumol's unbalanced growth revisited. *Oxford Economic Papers*, 53, 605-627. (Appeared earlier as: Oulton, N., 2000, *Must the*

growth rate decline? Baumol's unbalanced growth revisited, Working paper No. 107, Bank of England, London)

- Paolo Guerrieri, Bernardo Maggi, Valentina Meliciani, and Pier Carlo Padoan (2005) Technology Diffusion, Services, and Endogenous Growth in Europe: Is the Lisbon Strategy Useful? IMF Working Paper. International Monetary Fund WP/05/103
- Polèse, M. (1994): Économie Urbaine et Régionale. Economica, Paris.
- Rubalcaba, L, 1999, *Business Services in European Industry – Growth, Employment and Competitiveness*, European Commission, DGIII-Industry, Luxembourg.
- Rubalcaba, L. and Gago, D. (2003) "Location and role of innovative business services in European regions: testing some explanatory factors" The Service Industries Journal. January 2003. Volume 23
- Rubalcaba, L. and Kox, H. (2006) Business services in European Economic Growth. Palgrave-MacMillan, London.
- Rubalcaba, L., Merino, F. (2005) "Urban demand-supply interactions in business services" The Service Industries Journal. January 2005. Volume 24
- Sassen, S. (1990) *The Global City. New Yok, London, Tokyo*. Princeton.
- Senn, L., 1993, 'Service activities, urban hierarchy and cumulative growth', in Daniels, P.W. *et al. The Geography of Services*. Frank Cass, London.
- Shearmur and Alverge (2002) Intrametropolitan Patterns of High-order Business Service Location: A Comparative Study of Seventeen Sectors in Ile-de-France. *Urban Studies, Vol. 39, No. 7, 1143–1163, 2002*
- van Welsum, D., and Vickery, G. (2005), 'Potential offshoring of ICT-intensive using occupations', DSTI Information Economy Working Paper, DSTI/ICCP/IE(2004)19/FINAL, OECD, Paris; available at: http://www.oecd.org/sti/offshoring
- Windrum and Tomlinson. The article appeared as "Knowledge-intensive Services and International Competitiveness: A Four Country Comparison" in *Technology Analysis & Strategic Management*, Volume 11 (3), September 1999, pp. 391-408.
- Wood, P. (2001) Regional innovation and business services. Scott Policy Seminar.
- Wood, P. (Eds.) (2002) The business service revolution in Europe. Routledge, London and New York.