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UNIVERSIDADE DA BEIRA INTERIOR
Ciências Sociais e Humanas

Knowledge Intensive Business Services (KIBS) in Portugal: Location and Innovative Capacity

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Tese para obtenção do Grau de Doutor em
Gestão
(3º ciclo de estudos)

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Dedicatória

À minha filha Inês
Ao meu irmão Miguel

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Abstract

Within the service industry, the swift growth of the KIBS (Knowledge Intensive Business Service(s)) sector has played a crucial role in innovation processes. Above all, this role is confirmed by the fact that such entities do not turn in a simple performance in innovation activities as would be the case in simply meeting the needs of prevailing levels of demand or, more specifically, their clients. Instead, they establish bridges of knowledge and points of innovation between companies and science. The literature goes so far as to identify the origins of the third industrial revolution with the importance attributable to KIBS. While the debate on the growth of KIBS unfolds around these new specialist fields and the growth in the tertiary sector in general, there is ever growing recognition that both new manufacturing processes and new services and innovations in more general terms increasingly derive from KIBS.

Our interest in KIBS derives from a position broadly defended by a wide range of authors (Muller, 2001; Howells and Tether, 2004; Toivonen, 2004; Koch and Stahlecker, 2006): the irrefutable role played by KIBS in the development of their surrounding regions. In the Thesis below, we have sought to study these companies across four fundamental research facets: (i) location; (ii) cooperation with universities; (iii) factors of innovation and (iv) innovative and competitive capacities.

To approach factors of location, we deployed exploratory factorial analysis and Logit regression modelling and found that in this aspect, there was statistical significance for rural and urban KIBS. The results revealed that rural KIBS are essentially influenced by personal motivations and their owners tend to be younger and with fewer years of experience. In the case of urban KIBS, the main factor is the prevailing business conditions in the location with entrepreneurs tending to be older and with more years of experience.

Our analysis of cooperation between KIBS and universities involved the application of exploratory factorial analysis and a logit regression model. Our findings show that the probability of KIBS establishing partnerships with universities rises in accordance with the levels of proximity and trust, the types of cost associated with such partnerships and the age of the entrepreneur. Furthermore, we encounter no difference in terms of either location or typology. The results also enable us to conclude that there is a statistically significant effect between the employment of staff with higher education, the age and academic background of the company owner, and the logistical probability of the company locating in rural areas. This means that, while there is little or no direct cooperation between universities and KIBS companies, there is a transfer of knowledge courtesy of the university graduates employed in these professions. The level of graduate employment is high at both rural and urban KIBS.

To study the factors of innovation, we made recourse to confirmatory factorial analysis with the objective of verifying whether the strategy, the organisation, the learning, the networks and the process, influence the innovation activities ongoing at KIBS. We found that the network factor is of high importance to both KIBS types (professional and technological). However, professional KIBS also returned the strategy factor as the driver of innovation while technological KIBS

attributed greatest priority to learning as a factor for innovation. Furthermore, no statistically significant differences were identified between rural and urban located KIBS.

Finally, we applied structural equations for analysis of the innovative and competitive capacities of KIBS and evaluating up to just what point innovation depends on the nature of the service (technological or professional) and location (rural and urban). Firstly, the results of certain analytical processes found that the innovative capacities of the different types of rurally located KIBS displayed no statistical significance while at KIBS in urban locations, professional KIBS companies innovated less than their technological peers and the latter thereby proved able to simultaneously turn in better financial performance and hence may be deemed more competitive.

Key – Words: Knowledge Intensive Business services; location factors; innovation; innovative capacity.

Resumo Alargado

Dentro da indústria dos serviços, o rápido crescimento do sector dos KIBS (Knowledge Intensive Business Service) tem evidenciado um papel crucial nos processos de inovação. Este papel é afirmado, acima de tudo, pelo facto destes não terem uma performance simples na actividade inovadora, como seria a de atenderem, simplesmente, aos desejos da procura e, mais especificamente, ao desejo dos seus clientes, mas por criarem pontes de conhecimento ou pontes de inovação entre as empresas e a ciência. Defende-se também que a origem de uma terceira revolução industrial está na importância que tem que se dar aos KIBS. Embora o debate sobre o crescimento dos KIBS se desenrole em torno das suas novas especializações e do crescimento do sector terciário em geral, é cada vez mais notório que, tanto os novos processos de fabrico como os novos serviços e inovações em geral têm cada vez mais a sua origem a partir dos KIBS.

Tendo em conta a importância vital do sector dos KIBS, para a competitividade de qualquer economia, pretendemos na nossa investigação analisar os factores de localização do sector dos KIBS em Portugal e compreender a sua contribuição na capacidade inovadora e competitiva. Para isso, e com base na natureza dos KIBS (profissionais e tecnológicos) e o tipo de região (rural e urbano) visamos averiguar em que medida o tipo de natureza dos KIBS explica de forma distinta (ou não) a sua capacidade inovadora e competitiva.

Face ao presente enquadramento da problemática em estudo, são levantadas as seguintes quatro questões de investigação:

1. Quais os factores que explicam a localização dos KIBS nas diferentes regiões rurais e urbanas?
2. Qual o nível de cooperação entre os KIBS e as universidades?
3. Quais os factores que influenciam as actividades de inovação dos KIBS?
4. Existem diferenças ao nível da capacidade inovadora competitiva e o tipo de KIBS? Se sim quais? E qual a sua relação com o desempenho financeiro?

Tendo por base estas questões de investigação, são propostos na presente tese os seguintes objectivos:

1. Identificar os factores que influenciam a escolha de localização dos KIBS rurais e urbanos;
2. Analisar os modos de transferência de conhecimento entre os KIBS e as universidades
3. Identificar os fatores de inovação dos KIBS.
4. Averiguar até que ponto o nível de inovação dos KIBS depende do tipo de serviços (tecnológico vs. profissional), da sua localização (rural vs. urbano) e de que modo esta inovação influencia o seu desempenho financeiro

Na análise dos factores de localização utilizamos a análise factorial exploratória e a regressão modelo Logit, verificamos que a este nível apenas houve significado estatístico para os KIBS

rurais e urbanos. Os resultados evidenciaram que os KIBS rurais são influenciados essencialmente por motivações pessoais, e os seus empresários são mais novos e têm menos anos de experiencia. No caso dos KIBS urbanos o principal factor que influencia a sua localização são as condições económicas da localidade, e os seus empresários são mais velhos e têm mais anos de experiencia.

Na análise da cooperação entre KIBS e universidades foram usadas uma análise factorial exploratória e uma regressão modelo logit. Constatou-se que a probabilidade das empresas estabelecerem parcerias com instituições de ensino superior é positivamente influenciada por relações de proximidade e confiança, pelos tipos de custos associados à criação da cooperação e pela idade dos proprietários. Porém, não se verificaram diferenças ao nível de localização e tipologia. Os resultados permitiram ainda concluir que existe um efeito, estatisticamente significativo, da empregabilidade de trabalhadores com ensino superior, da idade e formação académica dos proprietários, sobre o logit da probabilidade da empresa se localizar em áreas rurais. Isto significa que, apesar de não existir uma colaboração directa entre as instituições de ensino superior e as empresas KIBS, existe uma transferência de conhecimento gerado pelas universidades nos profissionais empregados. A média de empregabilidade de profissionais com ensino superior é elevado tanto nos KIBS rurais como urbanos.

No estudo dos factores de inovação recorremos à analise factorial confirmatória no sentido de verificarmos se os cinco factores: estratégia, organização, aprendizagem, redes e processo, influenciam as actividades de inovação dos KIBS. Concluímos que o factor redes é importante para ambos tipos de KIBS (profissional e tecnológico). Contudo, os KIBS profissionais evidenciam o factor estratégia como o principal factor à inovação enquanto que para os KIBS profissionais é a aprendizagem o factor mais importante. Não se verificaram diferenças estatísticas significativas ao nível da localização.

Por fim, recorremos ao modelo de equações estruturais para analisar a capacidade inovadora e competitiva dos KIBS e avaliar até que ponto o seu nível de inovação depende da natureza de serviço (tecnológico ou profissional) e localização (rural e urbano). Em primeiro lugar, verificou-se que os KIBS rurais não tinham qualquer significado estatístico no nosso estudo. Relativamente aos KIBS urbanos, os resultados evidenciam que os KIBS profissionais inovam menos que os tecnológicos e estes têm um melhor desempenho financeiro, logo são considerados mais competitivos.

Key Words: Knowledge Intensive Business services; factores de localização; inovação; capacidade inovadora.

Indice

Part I

1. Introduction
1.1. The Framework

Research interest in the service sector has been rising ever since 1980, when regional development studies in Europe and North American began to focus on deindustrialisation related issues (Kline and Rosenberg, 1986; Von Hippel, 1988; Johne and Storey, 1998; Miles, 2000; De Jong et al., 2003). Thus far, services had been perceived as merely subsidiary to transformative and manufacturing activities. In the last two decades, attention has mounted especially on service activities given that they have not only generated progressively rising levels of growth in developed economies but have also been identified as major drivers of innovation (Wood, 2005).

Despite the growing awareness that innovation is not simply confined to technical processes and products, some recent innovation research has centred only on the observation of technical innovation and especially in the transformative industrial sector (Becker and Dietz, 2004; Huergo and Jaumandreu, 2004; Lynskey, 2004; Nieto and Santamaria, 2005). Indeed, greater importance has only more recently been given to the service sector (Gallouj and Weinstein, 1997; Tether, 2003). According to Tether et al. (2001), service company innovation has traditionally been perceived as something that takes place very slowly. Services were perceived as unable to innovate with such entities limited to adopting the innovations emerging out of transformative industrial companies. Pavitt (1984) also proposed that the smaller the service companies are, the less they would tend to run their own research and development (R&D) functions and ending up as mere recipients, absorbing the technology and innovation issuing out of other sectors.

Nevertheless, within the service industry, rapid growth in the Knowledge Intensive Business Service (KIBS) sector has demonstrated the crucial role played by innovation processes (Muller, 2001; Howells and Tether, 2004; Toivonen, 2004; Koch and Stahlecker, 2006). Above all, this role proves of such relevance given that the sector enables bridges of knowledge and innovation between companies and scientific output (Miles et al., 1995; Czarnitzki and Spielkamp, 2003). Furthermore, there are also authors who defend that the origins of a third industrial revolution may be traced to the importance due to KIBS companies (Tether and Hipp, 2002). Although the debate over the growth of KIBS revolves around their new specialist fields of competence and the growth in the tertiary sector in general, there is a rising level of acknowledgement that not only do new manufacturing processes but also new services and innovations in more general terms trace their origins to the KIBS sector (KaraÃmerlioglu and Carisson, 1999; Tomlinson and Milles, 1999, Frell, 2006).

Miles et al. (1995) identify three key KIBS characteristics: (i) the high level of importance attributed to professional knowledge by these companies; (ii) the company's strategic objectives include being the first to draw upon information and knowledge and deploy such knowledge to produce services and serve as intermediaries between these services, their

clients and their production processes; and, (iii) the sheer importance of the KIBS service type rendered to companies in terms of competition and competitiveness.

At this point, we need to differentiate between the two KIBS types referred to in the literature (Frell, 2006; Miles et al., 1995; Doloreux and Muller, 2007, Shearmur, and Doloreux, 2008): (1) Technological KIBS companies engaged in activities related to information technology, research and development, engineering and architecture and consultancy, testing and analytical techniques; and (2) Professional KIBS undertaking legal activities, accountancy, company bookkeeping, auditing and fiscal consultancy activities, and market studies as well as the entire scope of the publicity sector.

According to the research undertaken by Frell (2006), technological KIBS employ persons with higher levels of qualification that in turn impact on their levels of innovation while in the case of professional KIBS, the companies represent the suppliers with the clients themselves fostering the innovation.

Amara et al. (2008) refer that KIBS companies survive on knowledge based services. In this industry, transactions are made up of knowledge with the outputs very often intangible in nature. Innovations mostly result from new combinations of knowledge rather than new combinations of physical artefacts. Coffey (2000), in turn, highlights the rising interest in service producers (High-Order Producer Services - HOPS) and provides full recognition of their important role in western economies as from the end of the 1970s and in the early years of the 1980s. Service producers have experienced swift growth in their specific market sector (Daniels, 1985; Coffey and Shearmur, 1997). Furthermore, the role of regional competitiveness has also been identified and attracted the attention of both regional geographers and social scientists (Beyers and Alvin, 1985; Coffey and Polèse, 1987; and Illeris, 1996).

However, there remain significant difficulties in securing consensus around distinctive definitions for KIBS and HOPS, as both are terms applied in the definition of the service sector. The HOPS represent all those services that require a complex manipulation of symbols and the transformation of information, and very often proving highly complex and atypical (Reich, 1992; Daniels, 1985; Bryson et al., 2004). The meaning behind “knowledge intensive” may be summarised as service companies engaged in operations of a complex intellectual nature in which the human factor is fundamental (Alvesson, 1995).

The importance of studying these services was clearly made by Pires et al. (2008) in empirically demonstrating the positive effects of KIBS on the competitiveness of other companies and the added value thereby produced. Among all the other services to companies, KIBS have notched up swifter growth rates than all other sectors. This achievement is due to a range of issues, in particular, the outsourcing of such services by other sectors, the development of information and communication technologies, changes to the regulatory, legal and market frameworks as well as globalisation and internationalisation (Bengtsson and Dabhilkar 2009).

Taking into consideration that these companies are knowledge intensive, there is clearly a need to highlight how such knowledge is currently perceived as a fulcral resource for companies and taking on an ever higher profile in recognising and leveraging entrepreneurial opportunities (Andersson, et al., 2009). The growing body of literature on the importance of entrepreneurialism at the regional level, as well as location characteristics tend to concur that knowledge is at the core of the founding of new companies and hence opting to emphasise the knowledge spread mechanisms (spillovers) in effect at universities and other R&D institutions. Correspondingly, the knowledge generated emerges out of means of cooperation between companies and state funded research institutions (Audretsch and Lehmann, 2005). According to Acs et al. (2006), entrepreneurial activities may be expected to steadily grow in both size and effectiveness given that investment in new knowledge proves relatively high but within the framework of which, companies, especially KIBS, make recourse to genuine sources of knowledge (universities and R&D institutions).

Despite the plethora of voices raised in defence of the importance and the role that KIBS play in the economy and in regional dynamics (Marshall et al., 1987; Hansen, 1993; Miles et al., 1995; Muller and Zenker, 2001; Czarnitzki and Spielkamp, 2003; Miles, 2003), there have, however, been very few studies on the innovation activities in effect at KIBS (Koch, and Strotmann, 2008). From the perspective of Howells (2000), the fact that there are few studies on innovation in the service sector primarily stems from the highly heterogeneous nature of the sector and putting many researchers off. Nevertheless, there has been a steady increase in the numbers of these service sector companies. In particular, small KIBS have been recognised as playing a dynamic and central role in the "new" knowledge based economies. This recognition has fostered new and growing levels of research on this service sector (Wong and He, 2005).

As suppliers of knowledge intensive services, their provision in any specific location is frequently deemed an important leverage of the competitiveness of regional industries and economies. According to Dall'erba et al. (2007), there is a clear correlation between the level of employment in KIBS firms and the level of productivity of non-KIBS companies in the European Union regions hosting such companies.

Hence, associated with the role actually played by KIBS, theories have inevitably emerged on locations, serving as the foundation for the identification of the factors that may be behind the decisions of entrepreneurs in choosing one site over another for their business (Autant-Bernard et al., 2006; Van Praag and Versloot, 2007; Ferreira et al., 2010; Lafuente et al., 2010). The rural/urban dichotomy dealing with the location of entrepreneurial activities in rural areas is also a point of particular importance. This correspondingly drives the question: how do you define rural and urban regions?

Should we reach out for a universal concept defining the respective boundaries of rural communities, we shall act in vain. In some countries, the central authorities even attribute different definitions to the concept in accordance with the projects that are undertaken by each ministry (OECD, 2007). Nevertheless, population density remains the criterion most used

by economic actors as well as academic studies, in order to determine the boundary between rural and urban areas (North et al., 2001; Smallbone et al., 2002). The OECD has specifically deployed population density for the measurement of rural regions and establishing them as all areas home to less than 150 inhabitants per square kilometre (km2) (OECD, 1996). In regional terms, the OECD (2009) established a typology that takes into account the different geographies of regions. The international organisation classified regions as: (i) predominantly rural (all regions with more than 50% of their populations living in rural locations); (ii) intermediary (with less than 50% of the population in rural regions); (iii) predominantly urban (less than 15% of residents in rural areas). Furthermore, the European Commission (1997) also uses population density as a means of gauging the extent of rural communities in qualifying them as all areas where the population density drops below 100 inhabitants per km2. Kayser (1990) puts forward a more micro means of classifying rural communities through categorising them by municipality and holding that all municipalities with less than 5,000 inhabitants are rural with this criteria adopted within the scope of this research.

The European Union and many other OECD member states have introduced policies designed to foster entrepreneurialism as a key tool for rural development1. In Europe, diversification in the rural base of production was stipulated as an objective of rural development policies (European Commission, 1997). Similarly, there is growing demand and interest in founding and nurturing new business opportunities and perceived as a key factor in the development and revitalisation of some specific European areas (Rosell and Viladomiu, 2001). The OECD (2006) includes entrepreneurialism, endogenous economic growth and innovation as core issues to the New Rural Paradigm.

However, the rural areas remain well behind their urban counterparts in terms of hosting technological companies (Roper and Love, 2006). Correspondingly, classical and contemporary researchers have pointed to urban agglomerations as preferable for locating new businesses. From the outset, Smith (1776) argued that urban centres provided for a better division of labour. For Marshall (1890), urban centres provide a better supply of labour and greater access to non-traded products and goods. Access is also facilitated with monetary resources also in easier supply (Hoover, 1948) as well as the better evaluation of complementary services (Mydral, 1957). Jacobs (1969) holds that access to the infrastructures appropriate to entrepreneurial needs is undoubtedly easier in urban centres, and, above all, these urban centres, in comparison with their rural peers, bring together a far greater volume of business demand (Krugman, 1981, 1991).

In addition, transport, communication and information technology infrastructures clearly do hold great importance in physically and psychologically reducing the gap between the different environments, that is urban and rural areas (Grimes, 2000). Indeed, there are some formal, institutional and infrastructural disadvantages between the urban and rural realities in Europe and the many other OECD member states, although having been somewhat offset in

[1] Measures proposed by the European Commission in 1997 for encouraging the founding of new businesses in rural areas, article 33 of agenda 2000, entitled: Promoting the adaptation and development of Rural Areas; Ch IX.

the meanwhile, that ensure many rural areas are not able to experience the existence of certain technological levels already in effect in urban areas (Bade and Nerlinguer, 2000).

Given the paucity of studies on this type of service sector (KIBS) and given they play an increasingly active role in regional innovation and competitiveness, there is correspondingly an imperative to research the contribution actually made by such companies to the Portuguese economy. Thus, we set out the core conceptual model of this Doctoral thesis below (Figure 1).

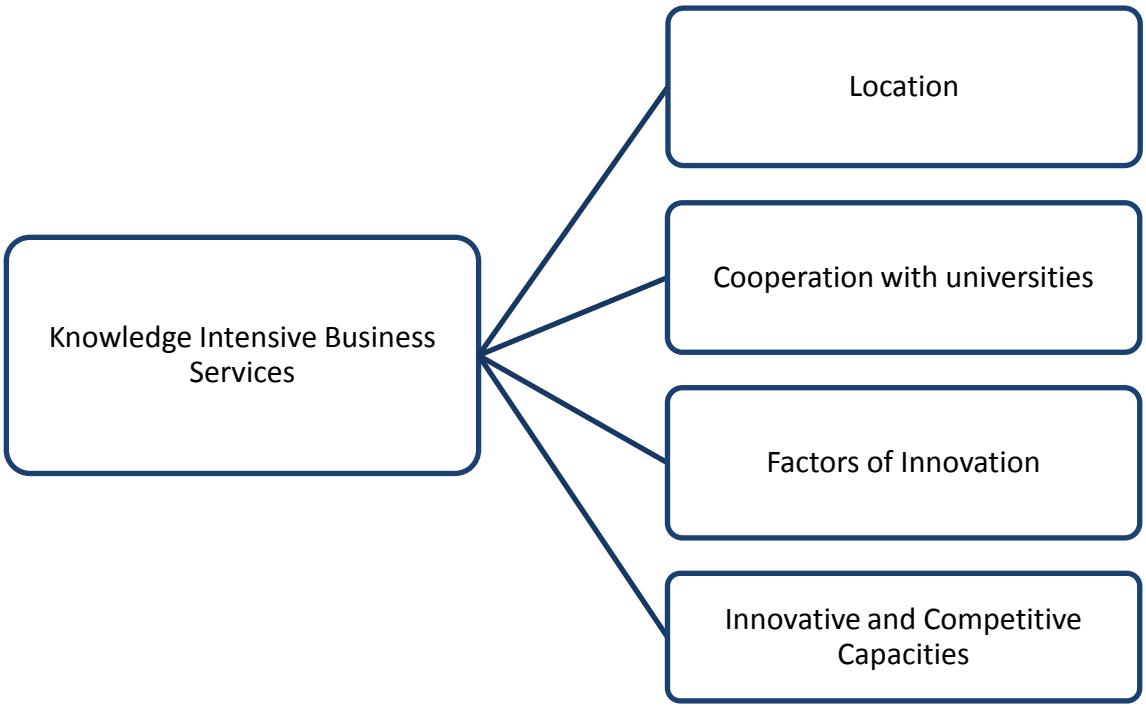


Figure 1: Doctoral Thesis Model

Taking into account the vital importance of the KIBS sector to the competitiveness of any economy, our research furthermore seeks to analyse the dynamics driving the location of the KIBS sector in Portugal and better understand its overall role within the framework of innovation and competitiveness. To this end, and based upon the KIBS type (professional vs. technological) and their location (rural vs. urban), we seek to ascertain to what extent the type and location of KIBS is able to generate insights into their innovative and competitive capacities.

In accordance with the framework set out above, the following four research questions are proposed:

1. What factors explain the location choices of KIBS companies?
2. What level of cooperation exists between KIBS and universities?
3. Which factors influence KIBS innovation activities?

4. Are there any differences in the levels of innovative capacities and the KIBS type? Where yes, what are they and what is their relationship with financial performance?

Based upon these four research questions, this thesis correspondingly incorporates the following objectives:

1. To identify the factors influencing the choice of rural and urban KIBS location options,
2. To analyse the means of knowledge transfer between KIBS and universities,
3. To identify KIBS factors of innovation,
4. To ascertain the extent that the respective level of KIBS innovation depends on its service type (technological vs. professional), on its location (rural vs. urban) and the impact this innovation has on company financial performance.

The relationship between the research questions and objectives may be set out as follows (Table 1):

Table 1 – Matrix of Research Question/Objectives

Objectives	Objective 1.	Objective 2.	Objective 3.	Objective 4.
Research Questions	To identify the factors influencing the choice of rural and urban KIBS location options.	To analyse the means of knowledge transfer between KIBS and universities.	To identify KIBS factors of innovation.	To ascertain the extent that the respective level of KIBS innovation depends on its service type (technological vs. professional), on its location (rural vs. urban) and the impact this innovation has on company financial performance.
1. What factors explain the location choices of KIBS companies?	X			
2. What level of cooperation exists between KIBS and universities?		X		
3. Which factors influence KIBS innovation activities?			X	
4. Are there any differences in the levels of innovative capacities and the KIBS type? Where yes, what are they and what is their relationship with financial performance?				X

1.2. Sample and Unit of Analysis

The sample was founded on a data base granted access to by Grupo Coface. This data base contains details on the trends (in terms of bankruptcies and operationally active companies) in KIBS between 2004 and 2009. The data base contained a total of 39,254 KIBS in 2004 and sliding to 34,644 KIBS in 2009 (4,578 closed down while 32 relocated internationally). The sample was extracted based upon company turnover and correspondingly only including companies returning turnover greater than € 0.01. These companies were selected according to their CAE (REV.3) and NACE (REV.2) business codes, similar to other researchers (Frell, 2006, Miles et al., 1995; Doloreux and Muller, 2007, Shearmur and Doloreux, 2008) in order to ensure the sample included both KIBS groups: technological KIBS (t_KIBS) incorporating companies engaged in activities related to information technology, research and development, engineering and architecture as well as activities within the scope of consultancy, testing and analytical techniques (NACE codes: 62.01; 62.02; 62.03; 62.09; 63.11; 63.91; 63.99; 71.11; 71.12; 71.20; 72.1; 72.2) and professional KIBS (p_KIBS), that incorporate the legal sectors, accountancy, company bookkeeping, auditing and fiscal consultancy activities, and market studies as well as the entire scope of the publicity sector (NACE codes: 69.10; 69.20; 73.20; 70.22; 73.11; 73.12; 78.10; 78.30; 74.20; 74.90). Table 2

details the economic activities identified as falling under the auspices of KIBS. Taking into consideration that one of the research objectives represents verifying the location of KIBS in rural and urban councils, we found from the outset that there were only 93 KIBS located in rural council with the remainder all established in urban councils (thus, in settlements with populations in excess of 5,000 inhabitants).

A total of 500 questionnaires were completed either by telephone or face-to-face with company owners. This process took place between 01/10/2010 and 15/12/2010.

Table 2: Classification of activities

NACE Codes Rev. 2 (2008)	**CAE Codes REV 3 (2007)**
62: Computer programming, consultancy and related activities	62: IT programming, consultancy and related activities
62.02: Computer programming activities	62010: IT programming activities
62.01: Computer programming, consultancy and related activities	62020: IT consultancy activities
63: Information service activities 63.11: Data processing, hosting and related activities	63: IT service activities 63110: Data processing activities, hosting and related activities
63.91: News agency activities 63.99: News agency activities	63910: News agency activities 63990: Other news agency activities
62.03: Computer facilities management activities	62030: IT facilities management and operational activities
62.09: Other information technology and computer service activities	62090: Other activities related to information and communication technologies
72 Scientific research and development	72: Scientific research and development
72.1 Research and experimental development on natural sciences and engineering 72.11 Research and experimental development on biotechnology	72110: Biotechnology research and development 72190: Other physical and natural science research and development
72.2 Research and experimental development on social sciences and humanities	72200: Social and human science research and development
69: Legal and accounting activities	69: Legal and accountancy activities
69.10 Legal activities	69101: Legal activities 69102: Notary related activities
69.20 : Accounting, book-keeping and auditing activities; tax consultancy	69200: Accountancy and audit activities; fiscal consultancy
73.20 Market research and public opinion polling -	73200: Market studies and opinion polls
70.22: Business and other management consultancy activities	70220: Other business and management consultancy activities 70210: Public relation and communication activities
71.1 Architectural and engineering activities and related technical consultancy 71.11 Architectural activities 71.12 Engineering activities and technical consultancy	71110: Architectural activities 71120: Engineering and similar technical activities
71.20 Technical testing and analysis	71200: Testing and analytical activities
73.1 Advertising 73.11 Advertising agencies 73.12 Media representation	73110: Publicity agencies 73120: Media placement activities
78.10 Activities of employment placement agencies	78100: Human resource recruitment and placement activities
78.30 Other human resources provision	78300: Other human resources
74.20 Photographic activities -	74200: Photographic activities
74.90 Other professional scientific and technical activities	74900: Other consulting, scientific, technical and similar activities

The research population distribution and sample is set out in the table below:

Table 3: Distribution of Population and Sample

Population							Sample 2010				
CAE	Total 2004	Data for 2009									
		Total	KIBS Type		Rural	Urban	Total	Rural	Urban	t_KIBS	p_KIBS
62010	1832	1513	t_KIBS			1513	19		19	t_KIBS	
62020	875	780	t_KIBS			780	5		5	t_KIBS	
62030	17	17	t_KIBS			17	7		7	t_KIBS	
62090	820	715	t_KIBS		1	714	9	1	8	t_KIBS	
63110	236	199	t_KIBS		1	198	4	1	3	t_KIBS	
63910	51	43	t_KIBS		1	42	1	1	0	t_KIBS	
69101	70	64		p_KIBS		64	1		1		p_KIBS
69200	9187	8413		p_KIBS	35	8378	150	35	115		p_KIBS
70210	41	38		p_KIBS		38	10		10		p_KIBS
70220	8575	7499		p_KIBS	12	7487	58	12	46		p_KIBS
71110	3105	2768	t_KIBS		15	2753	66	15	51	t_KIBS	
71120	4166	3704	t_KIBS		9	3695	37	9	28	t_KIBS	
71200	502	439	t_KIBS		1	438	9	1	8	t_KIBS	
72190	151	141	t_KIBS		2	139	5	2	3	t_KIBS	
72200	76	64	t_KIBS			64	10		10	t_KIBS	
73110	2395	2105		p_KIBS	2	2103	23	2	21		p_KIBS
73120	418	364		p_KIBS	1	363	4	1	3		p_KIBS
73200	280	237		p_KIBS	1	236	5	1	4		p_KIBS
74200	725	639		p_KIBS	3	636	21	3	18		p_KIBS
74900	5482	4705		p_KIBS	9	4696	44	9	10		p_KIBS
78100	240	187		p_KIBS		187	2		2		p_KIBS
78300	10	10		p_KIBS		10	10		10		p_KIBS
Total	**39.254**	**34.644**			**93**	**34551**	**500**	**93**	**407**	**172**	**328**

Thus, the final sample of 500 KIBS companies was: professional KIBS (65.6%, 328 companies) and technological KIBS (34.4%, 172 companies). Of the total, 18.6% of companies are located in rural locations (93 companies) while 81.4% have established their businesses in urban settings (407 companies).

Of the 328 professional KIBS companies, 63 are located in rural surroundings with the other 265 in urban locations. As regards technological KIBS, the numbers stand at 30 and 142 respectively (Table 4).

Table 4: Distribution of KIBS: typology and location

KIBS Typology		KIBS Location		Total
		Rural	Urbana	
p_KIBS	N	63	265	328
	%	12.6%	53.0%	65.6%
t_KIBS	N	30	142	172
	%	6.0%	28.4%	34.4%
Total	N	93	407	500
	%	18,6%	81.4%	100.0%

The hypotheses put forward were tested and the dependent and independent variables compared through the application of a diverse range of tests within the scope of Univariate analysis and multivariate analysis. The Univariate analysis (cross-referencing data, t tests and x2 tests) and multivariate (for example, confirmatory factorial analysis and logistical regression modelling and structural equations) techniques utilised are described in the respective chapters making up Thesis Part II (Figure 2), in the section on data analysis, and when providing an overview of the respective results of each of the statistical processes carried out.

The differing study dimensions approached in each chapter in Thesis Part II and the respective statistical and associated econometric techniques are set out in Table 5.

Table 5 – Questions, study dimensions and the statistical techniques deployed in each chapter

CHAPTER	DIMENSIONS AND COMPONENTS	STATISTICAL TECHNIQUE(S)
Chapter I	Analysis of issues relating to location and cooperation with higher education	Exploratory factorial analysis and logit regression modelling
Chapter II	Analysis of cooperation between KIBS and universities and the employment of professionals with higher education qualifications	Exploratory factorial analysis and logit regression modelling
Chapter III	Factors of innovation	Confirmatory factorial analysis
	Measuring innovative capacities and financial performance	Structural equation modelling

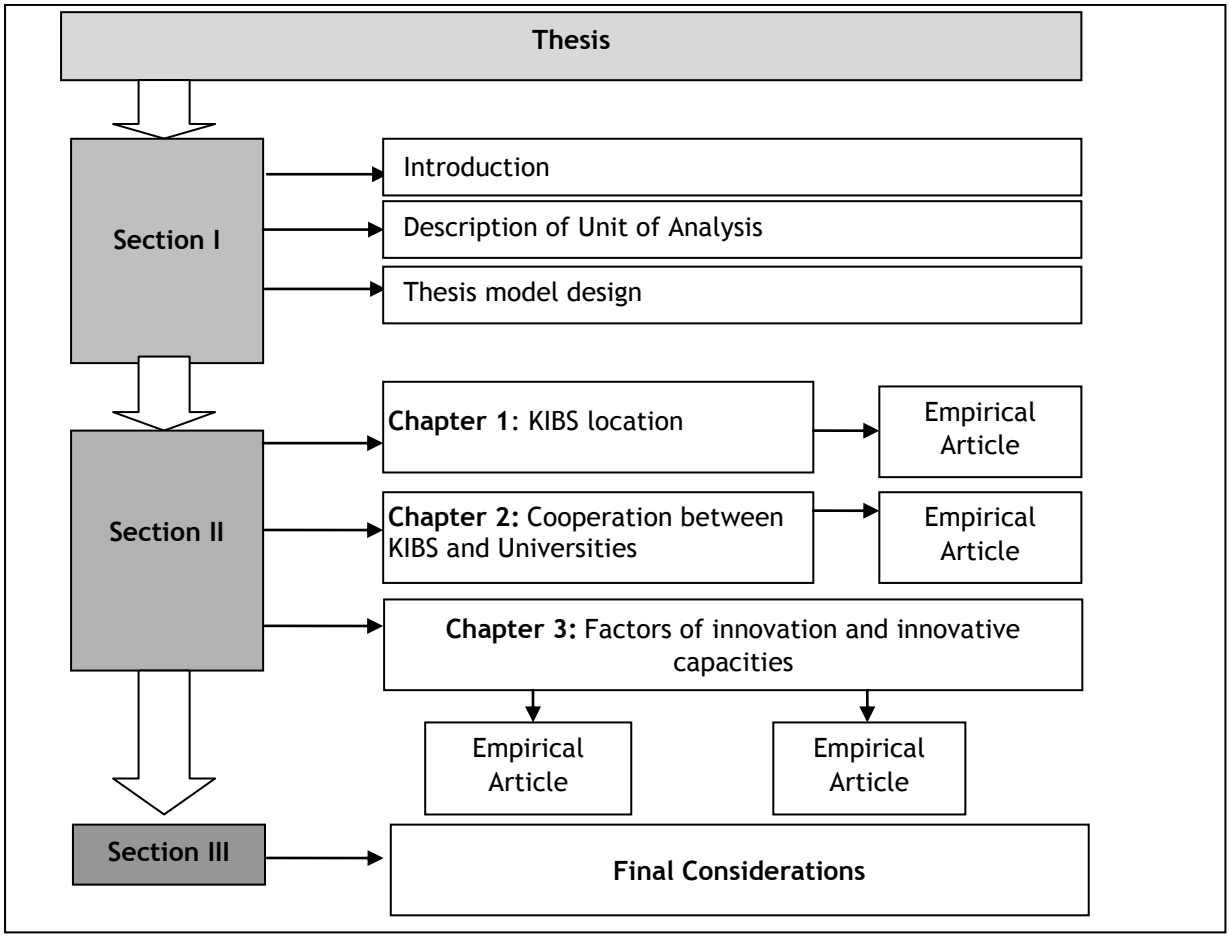
1.3. Thesis Model Design

This Thesis is structured into three core sections. This first is made up of the Introduction, which provides a brief overview of the literature transversal to the set of articles making up the body of the dissertation. This introduction also details our objectives and research

questions. We also present a description of both the population and the sample subject to analysis.

The second section is made up of three chapters containing four empirical studies. The third and final part provides the final Thesis considerations and puts forward the core conclusions and contributions generated by the research. A summary of the Thesis structure is provided below (Figure 2):

Figure 2: Thesis Structure



The four empirical articles in this thesis have all been submitted to international journals (table 5), in accordance with the content of each article and the core interests of the respective journal, with all currently undergoing peer review.

Table 5: Thesis empirical articles:

Chapter	Article	Journal
Chapter 1	Entrepreneurship and the Location of Knowledge Intensive Business Service Companies: An Empirical Assessment	Research Policy
Chapter 2	Knowledge Spillovers and Knowledge Intensive Business Services: An Empirical Study	Journal of Small Business Management
Chapter 3	KIBS innovation management capability in Rural Portuguese regions: empirical evidence	Industry & Innovation
	Influence of the KIBS Type and Location on their Innovative and Competitive Capacities	Technovation

PART II

Chapter 1

KIBS location

Entrepreneurship and the Location of Knowledge Intensive Business Service Companies: An Empirical Assessment

Abstract

In broad terms, the profile of entrepreneurship has been rising and attracting ever more interest within the scope of both development policy making and the research community. Inherently bound up with the importance of entrepreneurship to regional development are approaches able to explain both its incidence, especially in the case of knowledge intensive business services (KIBS), and the respective factors driving an entrepreneur's (as the individual responsible for entrepreneurial activities) decisions in choosing the company location.

Correspondingly, this study seeks to analyse KIBS entrepreneurship through identifying the factors behind companies locating in rural areas in accordance with the entrepreneur's profile. We used an exploratory factor analysis in order to identify the location factors and then used the logit model in order to analyze the influence of location factors in rural and urban KIBS. The results allowed to determine significant differences between rural and urban KIBS in relation to location factors. Economic conditions and the local infrastructures appear to be factors weighing most heavily in deciding the location of urban KIBS.

Furthermore, we aim to identify which regional drivers/inhibitors explain the choice of KIBS location.

Keywords: entrepreneurship; knowledge intensive business services; location factors

1. Introduction

In 1934, Schumpeter conceived of business owners as individuals appointed to the role of managing the implementation of new combinations of resources and that the entrepreneurial role consisted of identifying and engaging with new opportunities in the economic field. However, it was actually only after the 1980s that interest began to crystallise around the role of entrepreneurship in economic development due in no small part due to the revolution in endogenous growth studies (Low and MacMillan, 1988). This academic trend resulted in a new wave of research this time placing the individual

capacity to cope with risk at the centre of economic analysis (Groot et al., 2004). Furthermore, this ability to deal with risk had very early on been studied as one of the characteristics of entrepreneurialism (Knight, 1921; Lucas, 1978; Kihlstrom and Laffont, 1979; Kahneman and Tversky, 1979; Jovanovic, 1982; Parker, 1996; 1997).

Hence, entrepreneurial activities, in conjunction with all of the factors behind their existence, as well as their influence on regional economic development have been subject to study by a wide range of authors (Birley 1985, Kirchoff and Phillips 1988; Storey, 1994; Arauzo and Manjon, 2004). As far as the relationship between entrepreneurialism and economic growth is concerned, many authors have deemed it a fundamental factor to economic growth and perceiving the role of entrepreneurs as highly important in the creation of employment and fostering innovation (Wennekers and Thurik, 1999; Thurik and Wennekers, 2004; van Stel, 2006; Welter and Lasch, 2008).

Entrepreneurship has recently been defined as the design and launch of new economic activities (Davidsson et al., 2006). While entrepreneurs may be analysed individually, they operate at the organisational (Shane and Venkataraman, 2000), economic, social and institutional levels(Veciana and Urbano, 2008)

Underlying the issue of the importance of entrepreneurship to regional development, attention is inevitably drawn to issues related to location, thus, factors behind the decisions taken by business founders (bringing about the entrepreneurial activities) in choosing a specific location for their company (Von Thünen, 1826; Marshall, 1890; Weber, 1909; Christaller, 1933; Hayter 1997; Trullén, 2001; Parker, 2004; Autant-Bernard et al. 2006; Van Praag and Versloot, 2007; Ferreira et al., 2010; Lafuente et al. 2010). Regarding the dichotomy between rural and urban locations, various researchers have defended the position that such companies prefer locations in major urban environments (Smith, 1776; Marshall, 1890; Hoover, 1948; Myrdal, 1957; Jacobs, 1969; Krugman, 1981, 1991). Furthermore, at the level of international bodies, there is an increasing level of commitment to the revitalisation of rural areas deploying entrepreneurship so as to render them more competitive (OECD, 2006). In Portugal, interest in the study of entrepreneurship and more specifically in rural areas stems from the major asymmetries that these display in relation to their urban peers (Figueiredo et al., 2002; Silva, 2006).

Entrepreneurial activities in the knowledge intensive business service (KIBS) sector have attracted growing levels of research interest, due to the added value that they

endow on the economy (Timmons, 1998; Acs, 2002; Autio and Acs, 2007; Mina, 2008; Henrekson and Johansson, 2010). The KIBS sector is deemed strategic to not only generating innovation but also to the transfer of knowledge (Tether and Tajar, 2008; Acs et al., 2009).

Despite the existence of diverse studies on the advantages and disadvantages (North and Smallbone, 1996; Keeble, 1998; Dawe and Bryden, 1999; Bryden et al. 2004; Agarwal et al 2009) and factors behind the location of companies (Elgen et al 2004; Meyer 2003; Audrestch et al 2005; Autant-Bernard et al. 2006), there are still very few studies, and to the point of non-existence, focused upon the KIBS sector. This study thereby seeks to contribute towards overcoming this shortcoming in the literature.

Correspondingly, this study aims to analyse the entrepreneurial dimension to KIBS through the identification of those factors determining the choice of location between rural and urban environments by such companies in accordance with entrepreneur profiles. We, furthermore, aim to identify the regional factors driving and inhibiting this choice of location.

The article is structured as follows: firstly, we carry out a review of the literature on entrepreneurialism, on KIBS and approaches to company location. Secondly, we set out our methodology, with a description of the sample and methods adopted before presenting and discussing the results obtained. Finally, we put forward our final considerations.

2. Literature Review

2.1.Entrepreneurship and entrepreneurs

Schumpeter (1934, 1939, 1942) identifies the entrepreneur as the main driver behind economic development. Such individuals are able to bring about the innovations that enable the generation of profits while assuming the risks inherent to their "creations". According to Schumpeter, development implies the introduction of new combinations into the circular flows of economic life and thus entrepreneurs prove able to introduce innovations to such an extent that they cause cyclical ruptures in the economy. Such combinations, introduced by these new actors (the owners of businesses), throw up new forms of production, new products, new technologies, new forms of organisation, new markets and new resources for their products and outputs, thus shaping economic development and the very future of capitalism.

Another approach to the role of entrepreneurs is proposed by Kirzner (1973). This author argues that entrepreneurs are actors driving market equilibrium and their activities are essential to competitiveness, with the latter factor inherent to entrepreneurial processes (Fuller-Love 2009; Schindehutte and Morris 2009; Fuentes et al., 2010; Chiles et al. 2010). In turn, research by McClelland (1961) contemplates the personality of the entrepreneur and details the individual characteristics and types propitious to the production of innovative businesses. McClelland finds that entrepreneurship is linked to a desire for self-fulfilment that ends up transposed to the business, where risks, diverse in nature, may be taken on and financial success attained out of competence and not by mere chance. Between the 1960s and 1970s, the notion of the entrepreneur as somewhat different to the remainder of the population (Kilby, 1971) took hold. During this period, the entrepreneur's personality was emphasised in terms of their capacity to deal with exposure to risk and personal ambition (Kihlstrom and Laffont, 1979). Interest in the personal characteristics of entrepreneurs continued into the 1980s (Gartner, 1988).

The conceptual portrayal of entrepreneurs in this period was they derived from a homogenous group with a different psychological profile to the rest of society (Hebert and Link, 1989). The need to establish a relationship between entrepreneurial decisions and their personal characteristics, and including parental professions, gender, race or ethnicity, academic qualifications, years of experience in the sector of activity and age, have only more recently drawn the attention of the research community (Mitchell et al., 2002; Lafuente et al., 2010).

However, interest in entrepreneurship has gained increasing relevance within the contemporary environment whether for governments (NCOE, 2001), companies and decision makers (Galbraith, 1985; Hansen, 1987; Felsenstein, 1996; Sternberg and Arndt, 2001) or for researchers themselves (Hisrich et al., 2007; Audretsch, 2007; Mabhbubani, 2008). We may also add that state bodies have paid attention to the role of entrepreneurship within the scope of regional growth and particularly in rural areas since the 1990s (European Commission, 1997; 2006). Correspondingly, there has been rising demand for an interest in launching and nurturing new businesses representing a key factor in the development and revitalisation processes targeting certain specific European regions (Rosell and Viladomiu, 2001). Thus, entrepreneurship as a qualified economic development mechanism is able to guarantee the supply of goods and services to a community while simultaneous generating employment and therefore wealth and

correspondingly ensuring governments move to design policies rendering support to such phenomena (Audretsch and Fritsch, 2002).

According to the *Global Entrepreneurship Monitor* (GEM, 2007) report, the instance of entrepreneurialism is above all else a complex phenomenon. The variety of concepts surrounding it is substantial and wide reaching. Additionally, prior to a company even beginning operations, the entrepreneurial process has actually already been launched.

We should, at this point in time, stress that there are two types of entrepreneur: the individual who has simply embarked on the adventure of running a business and attempts to do this within a competitive market despite not having any major growth aspirations, and/or the individual who has a specific business for a determined period of time and engaged in innovating that business for that same period of time. Both represent differing facets of entrepreneurship with the GEM (2007) report also presenting characteristics deemed inherent to entrepreneurship and including motivations, innovations and the desire of entrepreneurs to attain high levels of growth. As regards the contribution made by entrepreneurship to overall economic development, the same report (GEM 2007) states that countries with lower levels of per capita income display national economies characterised by small scale companies. Furthermore, in countries experiencing rising per capita earnings, industrialisation and economies of scale are both to the fore and thus play an important role in the economic development of such countries.

The OECD (2005) puts forward that between 20% and 40% of employment in more industrialised countries is directly related with a high rate of entrepreneurship. This serves above all as a catalyser of economic growth and national competitiveness (GEM, 2010) and represents a crucial input to economic development (Gatner, 1988; Sarasvathy, 2001; Baron, 2004; Sternberg, 2004; Krueger, 2007). Thus, analysing entrepreneurship in KIBS proves of particular relevance as these make up a category of service activities that is commonly very highly innovative as well as facilitating innovation in other economic sectors, including the transformative industries (Miles et al., 1995).

2.2.Entrepreneurship in KIBS

KIBS have reported substantial growth rates since the second half of the 1990s (Mamede et al., 2007). The *European Monitoring Centre on Change* (2005) defines

KIBS as a subset of services rendered by companies within the overall panorama of the service sector. These services are only involved in changing the state of the goods produced, information or even knowledge and not actually in the production of these assets. As companies rendering services to companies, KIBS focus on supplying knowledge, intensively applied to business processes taking place in organisations. Such client organisations very often extend to including the public sector. Therefore, KIBS are not simply rendering services to companies but instead providing them with a service that inherently incorporates the intensive transfer of knowledge and technology. The growth in KIBS is an integral part of the major transformations taking place within a framework of an increasingly dynamic knowledge based market (Antonelli, 1999) and simultaneously playing an important role in shrinking some transaction costs due to the rise in applied information technology (Langlois, 2003).

According to Hertog (1998), KIBS foster and nurture innovation enabling the spread of innovative concepts and ideas and become a tangible source of capital and correspondingly now play a fundamental role in bringing about economic competitiveness. The importance of studying these services is demonstrated by the research of Pires et al. (2008) that highlights the positive effects of KIBS on the competitive positioning of other companies and the added value produced. Within the overall range of services rendered to companies, KIBS have consistently turned in higher growth rates than other segments ever since the 1980s, which is, in turn, due to a range of factors, especially the outsourcing of these services by other sectors, the boom in information and communication technologies, changes to the regulatory, legal and market frameworks and all against the background of globalisation and internationalisation (Wood, 2005; Corrocher, et al, 2009; Bengtsson, and Dabhilkar, 2009).

The OECD (1999) report furthermore stresses the role played by KIBS within their host communities: generating innovation and a receptiveness to technology among business actors while nurturing connective networks between these actors. Mamede et al. (2007), in research looking at Portuguese KIBS, conclude that their dynamics are distinct to other industries as their emergence is more closely related with the availability and relevant competences of their business owners than with any system of incentives, for example, designed to encourage the launch of technology companies.

The competitiveness of these companies seems very closely related with this sector (European Commission, 1998) and there have been various studies finding in support of

that relationship (Muller, 2001; Wood, 2006; Muller and Doloreux, 2009; Consoli and Hortelano, 2010). The company services sector is an important part of the economy and due also to the fact it has recorded the highest growth rates in terms of both added value and employment throughout recent years. Its importance to the competitiveness of the companies served, as well as to overall economic growth, deserves greater policy attention.

There is major potential for boosting the KIBS role within both the European and world economies through the implementation of policies and actions designed to improve the structural conditions. Such would include ensuring a regulatory framework favourable to small and medium sized companies and grants and supports for raising productivity, creating employment, competitiveness, inter-business cooperation, boosting awareness about the prevailing knowledge profile as well as modernising state administrative structures (OECD, 2007).

Sheamur and Doloreaux (2008) argue that KIBS contribute towards innovation and regional competitiveness in keeping with a twofold perspective. The first stems from how KIBS interact with other local actors with a view to producing innovation and consequently regional development. This first perspective advocates how KIBS should be able to participate in regional development whenever those regions are able to host the leveraging of synergies.

From a second perspective, KIBS contribute towards regional development at a distance, without actually being located in the regions through recourse to information and communication technologies. From this latter view, we may move onto discussing the different approaches to issues surrounding the location of KIBS.

2.3.Approaches to the location of KIBS

The location decisions of KIBS and their contribution towards the local and/or regional economies have been subject to analysis by a range of researchers (Ohuallacháin and Reid 1991; Coffey and Shearmur 1997; Gong, 2001).Their location within urban environments, their sensitivity to general economic agglomerations (Eberts and Randall, 1998; Poehling, 1999; Wernerheim and Sharpe, 2003) and their trend to gather into spatial clusters (Coe, 1998; Keeble and Nachum 2002) have all been documented and researched according to a range of methodological tools. Many of these studies have been motivated by an interest in grasping the dynamics of local and

regional economies and understanding the reasons for some geographies to grow more and faster than others (Moyart, 2005).

The location of economic activities has long since attracted particular interest from the research community (Arauzo and Viladecans, 2006). Von Thünen (1826) first contemplated this issue in his study on the concept of property estate rents within which he proposed the distance factor as the most important aspect to defining rent levels. Marshall (1890) focused upon the agglomeration of economies and the concept of an industrial district. Weber (1909) began by approaching the location of industry and particularly stressed the importance of minimising costs. According to Weber (1909), there were three factors determining the location of an industrial firm: the cost of transport, the cost of labour and the advantages associated with agglomeration (economies of scale).

Hoover (1948) studied what he referred to as the spatial division of the market, combining scale and agglomeration with the costs of transport. Lösch (1954) looked at the scale of the market which he perceived as homogeneous along with demand and that transport costs are proportional to the distance to be covered and Christaller (1933) conceived the theory of central places thus providing a fundamental contribution towards the analysis of urban system structures.

According to Capello (2007), there are two theoretical groupings (broadly within the scope of "regional economics"), firstly that approaching the question of economic logic in seeking to explain the location of companies and then another second group studying why some areas end up as more developed than others: (i) location theories: the economic mechanisms causing the distribution of activities in space, (ii) growth and regional development theories: centring on spatial facets of economic growth and the territorial distribution of earnings.

As regards location theories, Capello (2007) identifies another two core theoretical clusters: (i) theories on the minimisation of costs given that it is important for companies to ascertain the price of raw materials and, in accordance with the respective location, just how much it will cost to get them into the company so as to be in a position to meet market demand, and (ii) profit maximisation theories given that, when faced by a specific distribution of demand, the company objective becomes how to structure itself to meet such demand.

As regards growth and regional development theories, Capello (2007) sets out three main groups of theory: (i) classical and neoclassical theory within which the objective is

to identify the factors generating employment and earnings within a localised system over a short period of time, (ii) theories on capital, labour and non-utilised resources within which the core objective is the identification of mechanisms enabling a region to avoid poverty and guarantee a minimum set level of wellbeing and hence guaranteeing a certain level of per capita earnings to residents, and (iii) modern growth theories with the purpose of researching the locally present conditions enabling the economic system to produce high levels of competitiveness and innovation.

Furthermore, Hayter (1997) proposes three distinct approaches to analysing the locations of economic activities: (i) neoclassical, (ii) institutional and (iii) behavioural. Each of these approaches has been adopted by various researchers. The neoclassical approach (Grimes, 2000; Ouwersloot and Rietveld, 2000; Holl; 2004) is broadly dedicated to the theory of location with its analysis correspondingly centred on strategies for maximising profits and minimising costs: for example, costs of transport and labour and economic externalities.

The institutional perspective (Galbraith; 1985; Felsenstein, 1996 Arauzo and Viladecans, 2006) affirms the importance of taking into consideration not only the company's search for appropriate sites but also the institutional framework surrounding such sites and made up of clients, suppliers, commercial associations, regional systems, government entities and other companies.

The behavioural approach in turn contemplates the levels of uncertainty and lack of objective information. According to Arauzo and Manjón (2004), the behavioural factors to location are not uniform, and hence diverge from one geographic area to another. Within such circumstances, entrepreneurs (the decision makers) base their options on non-economic factors and hence on issues related with the personality characteristics of the entrepreneurs themselves. This type of localised decision making is more frequent in small and medium sized companies that fundamentally decide on their location out of place of origin, the experience of the entrepreneur in the sector and the financial position of the respective individual. Table 1 systematically details the main location factors according to each of the three approaches alongside the different studies produced.

Table 1: Factors in company location

Approach	Factors	Studies
Behavioural Factors (B)	B1: The founder, managers and employees wish to live there B2: Residence founder proximity B3: Good housing conditions B4: Climate B5: Community attitude towards the business community B6: Recreational and leisure activities B7: The founder having been born there B8: Good means of access B9. Financial position of the entrepreneur	Elgen et al (2004); Meyer (2003); Audrestch et al (2005); Autant-Bernard et al. (2006); Trullén (2001); Hayter (1997); Ferreira et al. (2010); Lafuente et al. (2010); Parker (2004); Van Praag and Versloot (2007)
Neoclassical Factors (N)	N10. Distance between companies and urban centres N11. Distance to the market and the agglomerations present N12. Road infrastructures N13. Geographic specialisation N14. Human capital qualifications N15. Costs with industrial property N16. Costs with salaries N17. Population density N18. Prevailing level of local economic activity N19. Other physical infrastructures (railroads, airports, telecommunications, etc.). N20. Proximity to raw materials N21. Proximity to services	Grimes (2000); Ouwersloot and Rietveld (2000); Holl (2004); Costa et al (2004); Hayter (1997); Ferreira et al (2010); Lafuente et al (2010)
Institutional Factors (I)	I22. Company incubator I23. Access to knowledge generated by universities and research centres I24. Located close to centres of government I25. Access to science parks I26. R&D, job and other incentives I27. Proximity to educational institutions I28. Technological fairs I29. Leading entrepreneurs from the region	Galbraith (1985); Arauzo and Viladecans (2006); Felsenstein (1996); Hayter (1997); Ferreira et al. (2010); Lafuente et al. (2010)

From the perspective of Malecki et al. (2004), KIBS are essentially located in urban centres as these are the optimal environments for the incidence of entrepreneurial innovations as well as the development of networks leading to innovation. Nevertheless, Sheamur and Doloreaux (2008), in their study of Canada involving the selection of KIBS from 152 urban agglomerations and KIBS from 230 rural areas, find that service companies in the latter areas had arrived in from urban environments and had opted to locate in rural areas. What reasons might have led this type of company to choose an urban or a rural environment? What driving/inhibiting factors might be bound up with rural and/or urban areas? In fact, various research projects have striven to identify the advantages and disadvantages of companies locating in rural areas (table 2) but no study has been made on the advantages and disadvantages of KIBS locating in rural areas.

Table 2: Advantages and disadvantages of locating companies in rural areas

Advantages	Approaches
1.Quality of life 2. Property/buildings/storage costs 3. Costs of supplies/raw materials/services 4. Costs of labour (local employees) 5. Availability of qualified and specialist labour 6. Availability of non-qualified and non-specialist labour 7. Availability of property/buildings/warehouses 8. Availability of supplies/raw materials/services 9. Natural position/surrounding environment	Hodge and Monk (1987); Keeble et al., (1992); Townsend, (1993); Smallbone et al., (1993); Keeble and Tyler (1995); North and Smallbone, (1996); Keeble, (1998); Dawe and Bryden, (1999); Bryden et al. (2004); Agarwal et al (2009)
Disadvantages	
1. Isolation 2. Shortage of appropriate road infrastructures 3. Inappropriate supplies /raw materials/services 4. Lack of qualified and specialist labour 5. Lack of non-qualified and non-specialist labour 6. Difficulty in accessing telecommunications infrastructures 7. High labour costs (salaries) 8. Lack of property/buildings/warehouses 9. Lack of demand	

3. Methodology

3.1.Sample and Methods

The sample was drawn from a database made up of a total of 34,644 KIBS. The database was extracted in accordance with the business volume of turnover and only considering those companies recording business volumes in excess of €0.01. These companies were in selected according to their CAE (REV.3) and NACE (REV 2) codes. The final sample was made up of around 500 companies. The total number of rural KIBS existing (93 companies) was fully incorporated into the sample with the remaining 407 KIBS forming the urban sample, according to the Kayser criteria (1990), hence companies located in urban councils with populations in excess of 5,000 inhabitants. Taking into account the differentiation between rural and urban areas, we labelled KIBS as rural (r_KIBS) and urban (u_KIBS) in accordance with their respective locations.

The statistical methodological processing began with a descriptive analysis of entrepreneur profile and the advantages and disadvantages of locating KIBS in rural surroundings. In order to be able to compare the averages of the two analyses between the two samples (rural and urban), we deployed the Mann-Whitney U test. With the

objective of studying the determinant factors to KIBS location, we made recourse to the Factorial Analysis (FA) technique so as to group the 29 variables into a reduced group of factors thereby enabling the identification of structural relationships between these variables.

We applied the main component method for the extraction of factors before implementing the Varimax rotation methodology to obtain a factorial solution. The estimation of scores was carried out according to the pondered square minimum method. Finally, we deployed a logistical regression model to analyse the predicted location of KIBS.

4. Results analyse

4.1. Entrepreneur Profile

According to the descriptive statistics, the profile of entrepreneurs included within this study is set out in table 3. We correspondingly find that 77% of entrepreneurs are male in gender and a clear majority (85%) hold higher education qualifications. The average entrepreneur age is 42, with a standard associated deviation of eight years. On average, these entrepreneurs report approximately three years of previous experience in the business sector.

Analysis of the entrepreneur profile by KIBS location type furthermore reveals that the average entrepreneur age in urban companies is higher than peers at rural companies. There is a similar finding in terms of years of prior experience in the sector. In fact, the probabilities of significance associated with the Mann-Whitney U test for the two independent samples (table 4, p=0.000 and p=0.002, respectively) enable, across all levels of significance, the rejection of the null hypothesis for equality between the averages of the groups under analysis.

Table 3: **Descriptive statistics: entrepreneur profile**

	Rural KIBS		Urban KIBS		Total	
	N	%	N	%	N	%
Gender						
Feminine	28	30.1	87	21.5	115	23.1
Masculine	65	69.9	318	78.5	383	76.9
Education						
Non-University	33	35.5	40	9.8	73	14.6
University	60	64.5	367	90.2	427	85.4
	Average	**(SD)**	**Average**	**(SD)**	**Average**	**(SD)**
Age	39.8	(7.51)	42.68	(8.05)	42.14	(8.02)
Experience in the sector (years)	2.12	(2.71)	3.62	(3.41)	3.34	(3.34)
Observations	93	18.6	407	81.4	500	100

Table 4 Comparing the averages: age and experience in the sector according to KIBS type

	Rural KIBS	Urban KIBS	Mann-Whitney U Test
	Averages		*p-value*
Age	39.8	42.68	0.000*
Experience in the sector (years)	2.12	3.62	0.002*

**p<0,05*

4.2.Advantages and disadvantages of locating KIBS in rural environments

Regarding the advantages and disadvantages of locating this company type in rural surroundings, our recourse to the *Mann-Whitney U* test for the two independent samples reveals that, on average, entrepreneurs attributed greater importance to quality of life, costs and the availability of supplies, raw materials and services and labour costs as the advantageous facets to locating companies in rural regions (table 5).

Table 5: Location disadvantages: rural and urban environments

	Rural		Urban		Mann-Whitney U Test
	Average	SD	Average	SD	(*p*-value)
1. Isolation	3.28	1.107	1.55	.780	0.000*
2. Shortage of appropriate road infrastructures	1.51	.701	1.10	.381	0.000*
3. Inappropriate supplies/raw materials/services	1.44	.714	1.15	.624	0.000*
4. Lack of qualified and specialist labour	1.88	.883	2.09	.558	0.000*
5. Lack of non-qualified and non-specialist labour	1.96	.871	2.08	.545	0.022*
6. Difficulty in accessing telecommunications infrastructures	1.53	.842	1.17	.495	0.000*
7. High labour costs (salaries)	2.38	.833	3.13	1.277	0.000*
8. Lack of property/buildings/warehouses	1.90	.861	1.38	.644	0.000*
9. Lack of demand	4.47	1.006	2.76	1.107	0.000*

**p < 0.05*

In the case of rural location disadvantages, we would highlight that the factor assuming least significance is the lack of non-qualified and non-specialist labour (table 6).

Table 6: Location advantages: rural and urban environments

	Rural		Urban		Mann-Whitney U Test (*p*-value)
	Average	SD	Average	SD	
1.Quality of life	4.53	0.636	4.31	0.715	0.002*
2. Property/buildings/storage costs	3.94	0.586	4.04	0.669	0.044*
3. Costs of supplies/raw materials/services	4	0.78	3.11	1.842	0.000*
4. Costs of labour (local employees)	3.58	0.901	2.73	1.214	0.000*
5. Availability of qualified and specialist labour	3.74	0.875	3.89	1.562	0.578
6. Availability of non-qualified and non-specialist labour	3.37	0.857	3.8	0.6	0.000*
7. Availability of property/buildings/warehouses	3.92	0.612	3.93	0.508	0.825
8. Availability of supplies/raw materials/services	4.14	0.746	3.97	0.475	0.000*
9. Natural position/surrounding environment	4.06	0.438	4.04	0.558	0.922

**p < 0.05*

4.3.KIBS location: determining factors

With the objective of identifying those factors contributing towards the final KIBS location decision in the different areas, entrepreneurs were questioned as to the level of importance of a set of 29 factors explaining the choice of location according to the business and on a five point rising scale of importance (the Likert scale). The Factorial Analysis (FA) technique was applied to gather these 29 variables into small groups of factors thus able to generate insights into the structural relationships between these variables. The KMO (Kaiser-Meyer-Olin) value returned was 0.917, which indicates a very high level of appropriateness of this technique (Greene, 2003).

The Bartlett test ($p=0.000<0.05$) also demonstrated that the variables all display significant levels of correlation. We furthermore utilised the main component method for the extraction of factors and applied the Varimax rotation method to obtain a factorial solution. The estimation of scores was attained through the pondered square minimum method. Components with variables displaying factorial significance of less than 0.40 (in terms of absolute value) were eliminated from the matrix. Also withdrawn from analysis were those variables with close factorial significance across different

factors (difference lower than 0.1). We therefore proceeded to remove variable 26 from the analysis and again repeating the entire process so as to obtain the factorial solution.

The factorial solution obtained identified four latent factors that account for 55% of total variability. Table 7 presents the 28 variables grouped into the four latent factors, with internal consistency and variance explained by each factor.

Table 7 Factorial Analysis: summary of latent factors

Designation of factors	Identification of Items	Cronbach's Alpha (No. items)	Variance explained (%)
F1: Local economic and infrastructural conditions	8, 9, 10, 11, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 25	0.905 (16)	33.7
F2:Access to technologically superior knowledge	23, 27, 28, 29	0.666 (4)	8.2
F3: Individual motivations	1, 2, 3	0.578 (3)	6.5
F4: Location related motivations	4, 5, 6, 7	0.506 (4)	6.5

Analysis of the internal consistency of each factor revealed clearly acceptable *alpha* values for all factors, thus, values greater than 0.5. The F1 factor is bound up with a higher percentage level of explained variance (33.7%) comparative to the other factors, a result that led to the direct application of the rotation method. Analysing the grouping of the variables, the factors were found to have been interpreted as follows: economic conditions and local infrastructures, ease of access to technologically superior knowledge, individual motivations and motivations related to the location. These four factors resulting from factorial analysis were introduced into the econometrics model for the study of independent and explanatory variables.

4.4.Predicting KIBS location: logistical model

With the objective of predicting, in probabilistic terms, the incidence of decisions to locate KIBS entities in rural environment based upon the profile of the entrepreneur and the factors determinant in the choice of business location, we made recourse to a logistical regression model.

The function deployed in logistical regression in order to estimate the probability of a determined outcome j (j = 1, …,n) for the dependent variable being "successful", hence, KIBS companies opting to locate in rural environments $P[Y_j = 1] = \hat{\pi}_j$), may be

expressed as: $\hat{\pi} = {e^{X\beta}}/{1 + e^{X\beta}}$, in which $\hat{\pi}$ represents the vector of estimated probabilities, X is the matrix for independent variables and β is the vector of logistical regression coefficients (Green. 2003). Rendering this function linear through the *logit* transformation of the dependent variable obtains the logistical regression model under analysis:

$$Logit(\hat{\pi}_j) = \beta_0 + \beta_1 Control\ Variables\ o_j + \beta_2 Factor1_j + \beta_3 Factor2_j + \beta_4 Factor3_j + \beta_5 Factor4_j$$

In this model, the control variables correspond to the entrepreneur's profile, gender, age, academic qualifications and prior experience in the business sector. The variables related with the different location factors in turn relate to those obtained through factorial analysis. Therefore, the independent variables inputted to the model are both qualitative and quantitative. The qualitative variables enter the model re-codified as dummy variables. The logistical regression parameters are estimated according to the maximum accuracy method.

Once adjusted, the logistical regression model evaluates the significance and quality of the adjusted model as well as the significance of the regression coefficients. The evaluation of the model's own significance is attained through the application of the test accuracy ratio comparing the accuracy of the null model (including only the constant term) with the accuracy of the complete model (including the constant term and all the explanatory variables). In order to test the quality of model adjustment, the -2LL (Log Likelihood) indicator was deployed.

The conclusion reached testified to the model's significance, implying that there is at least one independent variable linear related with $Logit\ (\pi_j)$. So as to identify which independent variable(s) significantly influence $Logit\ (\pi_j)$, we applied the *Wald* test. In this case, the objective involved testing whether a specific coefficient is null, conditioned by the values estimated for the other coefficients. The strength of the association between the independent variables and the dependent variable is evaluated through Nagelkerke's $pseudo - R^2$. The interpretation of the model's parameters is achieved through betas. When these values become difficult to interpret, recourse is made to the exponential interpretation of these coefficients, thus, the odds ratio and the probabilities.

To model the probability of KIBS companies opting for locations in rural environments, the aforementioned logistical regression model was applied. The variable

KIBS company location received the codes "0-urban" and "1-rural". The qualitative independent variables gender and academic qualifications were also codified as dummy variables, with the reference classes (codified with 0's in the first column of the contrast matrix), respectively being male and no university level education.

Analysing the null model (including only the constant term), we find that all observations return incidence probability estimated at 0.189, with the percentage of correctly classified cases at 81.1%. The estimate of the constant is -1,454 with a standard associated error of 0.115. The Wald statistical test results in $X_W^2 = 159.34$, with the p-valor=0.000, and hence rejecting the hypothesis $H_0: \beta_0 = 0$. The odds ratio is 0.234. Table 8 presents the estimates of the parameters and respective standard errors for the different estimated regression models, the accuracy ratio test (G^2) evaluating model significance, the -2LL statistic for verifying adjustment quality and Nagelkerke's pseudo-R^2, used to measure the strength of the association between the independent variables and the dependent variable.

The final column in this table details the results of the simplified model 3, thereby summarising the readjustment of the logistical regression model only with the significant independent variables.

Table 8: Logit coefficients for the logistical regression model

	Model 1	Model 2	Model 3	Final Model
Gender (M)	0.176 (0.279)		-1.340 (1.505)	
Ed.Qual (non-university)	-1.635* (0.293)		-2.091 (1.362)	
Age	-0.041** (0.018)		-0.098 (0.100)	
Prior business experience	-0.101*** (0.052)		-0.400*** (0.239)	-0.420** (0.157)
Factor 1		-5.621* (1.045)	-7.286* (1.881)	-6.926* (1.549)
Factor 2		-0.216 (0.449)	-0.249 (0.603)	
Factor 3		0.815** (0.355)	1.035* (0.505)	0.921** (0.451)
Factor 4		0.290 (0.296)	0.331 (0.355)	
Intercept	1.749 (0.799)	-6.505 (1.426)	-1.248 (4.491)	-6.794 (1.853)
pseudo-R^2 Nagelkerke	0.159	0.945	0.962	0.955
-2Log Lilekihood (sig)	428.171 (0.98)	42.759 (1)	29.94 (0.95)	34.904 (1)
G^2 (sig)	51.375 (0.000)	433.870(0.000)	446.268(0.000)	441.725 (0.000)
Correctly classified (urban environment)	96.0	99.0	99.5	99.5
Correctly classified (rural environment)	15.1	97.8	96.8	98.9
Correctly classified (total sample)	80.9	98.8	99.0	99.4
No. of observations	498	491	490	491

* *level of significance* 0.01
** *level of significance* 0.05
*** *level of significance* 0.10

As regards model 1 testing the difference in accuracy ratios (G^2=51.315, com p-valor=0.000), this indicates that, whatever the level of significance, the difference between the null model and the additional model of explanatory variables detailing entrepreneur profile is statistically significant and thus confirming that at least one of the four variables, *gender*, *academic qualifications*, *age* and *prior experience in the sector* is relevant to explaining the location of KIBS companies. The same conclusion is reached for the remaining models, given that the probability of significance found by the different G^2 tests was 0.000, hence finding that all models are significant.

The probability of significance associated with the -2LL statistic varies from between 0.95 and 1, thereby not rejecting the null hypothesis that each of the models adjusts to the data. The results of Nagelkerke's pseudo-R^2 for each model respectively reveal: the explanatory variables included in model 1 enable a reduction in the level of dependent variable uncertainty by 15.9%, the explanatory variables included in model 2 reduce dependent variable uncertainty by 94.5%, the explanatory variables incorporated into model 3 lower uncertainty by 96.2%, and, finally, the explanatory variables included in the final model reduce dependent variable uncertainty by 95.5%.

Hence, we conclude that all the estimated models display an appropriate standard or adjustment to the data. In accordance with the classification observed and foreseen for KIBS in rural and urban surroundings, it was concluded that a logistical regression cut value of 0.5 correctly classifies: 80.9% of cases, 98.8%, 99% and 99.4% of cases, respectively for each model. Comparing the null model with the final readjusted version verifies that there was an increase of 18.3% in the percentage of correctly classified cases.

According to the Wald test associated with the logit coefficients of each of the logistical regression models estimated, we found that:

In model 1: for a significance level of 0.05, only the academic qualifications (p=0.000) and entrepreneur age (p=0.025) variables attain significance. For the significance level of 0.10, we find that prior experience in the business sector also returns a significant result (p=0.052) represent a statistically significant effect on the logit of companies locating in rural environments.

In model 2: for a significance level of 0.05, only the factors F1 (p=0.000) and F2 (p=0.022) return statistically significant effects on the logit of KIBS companies locating in rural surroundings.

In model 3: for a significance level of 0.05, only the factors F1 and F2 continue to bear a statistically effect on the logit of companies locating in rural environments. At a significance level of 0.01, we also find the variable of previous business sector experience holds significance.

Hence, readjusting the regression model to include only the statistically significant explanatory variables from model 3, we reach the regression coefficients for the new model. Table 9 summarises the logistical regression coefficients and their significance to the final model.

Table 9: Logistical regression coefficients and their significance: final model

	B	S.E.	Wald	Df	Sig.	Exp(B)
Prior experience	-.420	.157	7.167	1	.007	.657
F1	-6.926	1.549	19.995	1	.000	.001
F3	.921	.451	4.174	1	.041	2.512
Intercept	-6.794	1.853	13.439	1	.000	.001

The Exp (β) column is the exponential of the model coefficients and estimates the odds ratio of the dependent variable by independent variable unit. Thus, we find that the odds ratio of a company locating in a rural environment is 0.657 for each year of previous entrepreneur business experience representing the hypotheses of KIBS companies in a rural environment relative to locating in an urban environment decreases by 34.3% for each additional year of entrepreneur experience in the business. When analysing the impact of the economic conditions and local infrastructures (F1) and individual motivation (F3) factors, we find the probability of KIBS companies locating in a rural environment rather than an urban environment slide by 99% for each unit of variance in F1 and jump by 151 % for each unit of F3 variance.

We may thus conclude that the probability of KIBS companies opting for a rural location rises in accordance with the individual motivations of the entrepreneur in question and decreases according to greater prior experience in the sector and better economic conditions and local infrastructures. These results are consistent with the conclusions reached by Sheamur and Doloreaux (2008) and Lafuente et al. (2010).

The readjusted logistical regression model, as already mentioned, classifies the sample companies effectively: beyond correctly classifying 99.4% of KIBS companies, this model also displays very high levels of sensitivity (97.8%) and specificity (99.7%), demonstrating the strong predictive abilities of the model.

Conclusions

This research project approached three interrelated and core theoretical facets, entrepreneurship, the entrepreneurship of knowledge intensive business service companies and factors of location.

With a growing consensus around knowledge intensive companies playing a major role in both regional competitiveness and development, it becomes correspondingly imperative to verify whether there are factors determining their location or whether they

simply flourish in a region for no particular reason in particular. More specifically, we need to analyse if companies located in rural regions display profiles similar or different to their peer entities in urban contexts. Furthermore, this study of the location/entrepreneurship dichotomy takes on still greater importance when taking into consideration the sharp asymmetries potentially existing between these two areas, as is indeed the case of Portugal.

Thus, and in accordance with the results obtained, we find that entrepreneurs locating their business in urban surroundings, on average, are not only older but also have greater experience in the sector. Hence, we may correspondingly put forward that older entrepreneurs and with a longer establish business background prefer to set up their companies in urban areas and are clearly influenced by the economic conditions and local infrastructures. Bade and Nerlinger (2000) and Roper and Love (2006) showed similar results. This type of location factor is classified as neoclassical and the type adopted by entrepreneurs following strategies designed to maximise profits and minimise costs. In the case of rural companies, entrepreneurs are on average younger and having gained lowers levels of experience in their respective sector of activity. This group of entrepreneur favours behavioural type factors, such as individual motivations, in decision making over business location. Thus, we may state that this type of entrepreneur opts for locations based upon non-economic factors, hence, those related to personality characteristics (Ferreira et al., 2010; Lafuente et al, 2010).

Correspondingly, this research project sought to contribute towards advancing academic studies on the location and entrepreneurialism ongoing in rural areas as well as the framework for entrepreneurial support policies targeting such areas. Indeed, given such areas are more disadvantaged than their urban counterparts, entrepreneurs deciding to set up their business there are residents from those regions, hold some kind of affective bond with the respective locations in addition to being younger. Thus, we may also conclude that should knowledge intensive entrepreneurial support policies for rural areas, beyond all the benefits that such companies bring to their host regions, would also nurture entrepreneurship in younger business persons and thereby foster growth in employment and consequently generate wealth in these regions.

Diverse political entities need to take on a greater awareness and understanding of how entrepreneurial activities emerge out of specific contexts. As we have seen, not only are rural KIBS location factors not equal to urban KIBS but the profiles of their entrepreneurs also differ. Hence, entrepreneurial support policies and attempts to

accurately target such resources need to take into consideration two fundamental aspects: (i) identifying the entrepreneurs in areas due to receive support, and (ii) understanding just what led them to locate in these areas.

The key limitation to our research findings basically derives from its reliance on a sample and failing to reflect the entire universe of KIBS in Portugal. Nevertheless, we believe we do still contribute towards a better understanding as to the reasons leading knowledge intensive companies to opt for rural areas and in what way these differ from urban contexts.

As regards future lines of research, we would propose the introduction of other variables that might also influence decision making processes on locations and that did not fall within the scope of this study and also perceive whether or not the activity type influences company location. Correspondingly, does a professional knowledge intensive company behave similarly to a technological knowledge intensive company? In fact, despite such companies sharing the knowledge intensive dimension, they do deal with particularly distinct realities given their focus on completely different knowledge types.

Furthermore, it would be of relevance to compare the empirical evidence of this study with other regions internationally, with different structural and economic characteristics and see up to what point this typology of location factors is applicable. Finally, looking at whether the presence of transformative industry influences KIBS location preferences might also prove of distinct worth.

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Chapter 2

Cooperation between KIBS and Universities

Knowledge Spillovers and Knowledge Intensive Business Services: An Empirical Study

Abstract

Knowledge is increasingly perceived as a central factor for company competitiveness. With the transfer of knowledge one of the core functions of knowledge intensive business service (KIBS) companies, the objective of our research incorporates analysis on how the transfer of knowledge takes place between the higher education sector and the KIBS universe. Our empirical results demonstrate that cooperation between KIBS and universities occurs independent of their location (rural or urban) and typology (professional or technological). We furthermore found that rural KIBS have increased their levels of graduate employment faster than their urban KIBS peers.

Key words: knowledge; spillovers; cooperation; universities; KIBS

Introduction

Knowledge is currently perceived as the fulcral core of companies and taking an ever higher profile within the scope of recognising and capitalising on entrepreneurial opportunities (Andersson, et al., 2009; Noel, 2009). This knowledge is the product of universities that thereby contribute towards fostering productivity and innovation, key factors to boosting development and regional competitiveness (Martin, 1998; Muller, 2001; Howells and Tether, 2004; Toivonen, 2004; Koch and Stahlecker, 2006; Tolstoy, 2009). The rising number of studies on the importance of entrepreneurship at the regional level, as well as the characteristics of location, reveal how the key to founding new companies would seem to be knowledge and hence throwing the spotlight on knowledge spillovers generated by universities and other research and development (R&D) institutions. Furthermore, some of the knowledge generated emerges out of cooperation between companies and public research institutions (Varga, 2000; Audretsch and Lehmann, 2005; Riddel and Schwer, 2003). According to Acs et al. (2006), entrepreneurial activities are tending to be ever higher in standard with investment in new knowledge remaining relatively high while companies, especially

new companies, simultaneously making recourse to true sources of knowledge (universities and R&D). Meanwhile Varga (2002) studies the location of knowledge spillovers as a type of economic agglomeration and a means of contributing to regional economic development and as such deserving priority within the context of political practices. Furthermore, Roura (2009) holds how the employment of individuals who have completed higher education reflects on the development and competitiveness of regions. Entrepreneurship also plays a role in regional development as first defended by Schumpeter (1934, 1939, 1942). The entrepreneur represents the primary driving force behind economic development. Indeed, entrepreneurship is able to roll out the innovation enabling profits to be obtained through assuming the risks inherent to creativity. Furthermore, such entrepreneurialism, particularly in the case of new companies, and especially high technology and/or knowledge intensive activities, may originate inside universities with many student engaged in developing projects in the course of their studies, which they later go onto implement and commercialise (Smilor et al., 1990; Steffensen et al., 2000; Feller et al., 2002). According to EIRMA (2007), the importance of the transfer of knowledge and cooperation between companies and universities is a great value due to its major input into the development of regional competitiveness.

Correspondingly, interest in Knowledge Intensive Business Services (KIBS) has steadily risen ever since such companies were identified as generating added value to the economy (Acs, 2002; Autio and Acs, 2007; Henrekson and Johansson, 2010). In this way, KIBS are perceived as being of great strategic importance given that they are in the vanguard of innovation practices as well as constantly carrying out practices of overall great importance to the development and diffusion of knowledge (Tether and Tajar, 2008; Acs et al, 2009). As renderers of knowledge intensive services, the presence of KIBS in a specific location is frequently considered as an important leverage of regional industrial competitiveness (Muller and Zenker, 2009). From the perspective of many authors, there is a clear correlation between the employment rate accounted for by KIBS entities and the level of productivity of non-KIBS companies in the regions hosting the former (Dall'erba et al. 2007; Delmar and Wennberg, 2010). However, there are also studies that take this viewpoint further and differentiate between the KIBS universe breaking down such companies into the professional and the technological with the latter deemed to display a greater propensity to employ

individuals with higher education than professional KIBS (Frell, 2006; Corrocher et al., 2009).

According to Malecki et al. (2004), KIBS essentially opt for locations in urban centres as these inherently prove the most propitious to business innovation and networks boosting regional levels of competition. Nevertheless, Sheamur and Doloreaux (2008) encounter a downturn in the numbers of KIBS companies in urban agglomerations in favour of rural areas.

Correspondingly, and in parallel with the sheer scale of the relevance attributed by the literature, this research seeks to study the dichotomy between KIBS location (rural and urban) and the KIBS typology (professional and technological) and the means and ways knowledge is transferred between universities and such companies.

Following this introduction, we set out a review of the literature on the role of universities in the transfer of knowledge and their relationships with KIBS. Subsequently, we put forward our methodology and analysis of the results obtained before closing with some final considerations.

Literature Review

The role of universities in the transfer of knowledge

According to Parker and Zilberman (1993), conveying academic knowledge may be defined as a process based upon understanding, information and innovation being moved out of universities to companies. Meanwhile Varga (2000) describes how this transfer may take place through three mechanisms: (i) through networks (frequent personal contacts) between university and industry professionals, (ii) through the diffusion of technology and the formalisation of business relationships (reciprocal trust), and (iii) through the utilisation of university infrastructures, such as libraries, scientific laboratories, IT facilities and research centres located on university campuses and thus enabling a sharing of research costs (mutual competences).

However, research on academic knowledge and its transfer dates back only to the beginning of the 1980s, a point in time when attention shifted to the economy in general and new economic policies in particular (Varga, 2009). This new concern led to the emergence in the literature of a new economic geography (Krugman, 1991), both in terms of endogenous growth theory (Romer, 1986, 1990), which pointed to the importance of empirically testing the existence and spread of knowledge, and in terms

of the growing focus on the right "mix" of policies able to best nurture university-based regional development, commonly benchmarked on Silicon Valley or Route 128 (Isserman, 1994; Reamer et al., 2003). Correspondingly, endogenous growth theory began to diverge from neo-classical theory given its emphasis on how economic growth did not derive from diverse forces external to an economic system but was rather the result of properties at work actually within the economic system (Romer, 1990). At the heart of this theory is the conception that technological transfers result from the specific concrete intentions of various economic actors to boost their profits (Romer, 1990; Sugerstrom et al, 1990; Aghion and Howitt, 1992). However, according to Acs et al (2009), endogenous growth theories have failed on one critical factor: the transmission of knowledge by spillovers to entrepreneurship / entrepreneurs (Audretsch, 1995). This implies that knowledge is itself a prerequisite and a fundamental condition for the growth and success of companies (Acs et al, 2009).

Since this period (the 1980s), in Europe, the USA and Asia, an array of technological centres have been founded and intimately related with regional development. The USA attributes 70% of its research budget to technological programs, which are partially allocated to a specific type of university participation and enabling the latter sector to share and reduce research and development costs (Varga, 2002; 2009). As the OECD advocates (2007), universities play an increasingly relevant role in terms of levels of knowledge transfer and the competitiveness of the regions that host them. There is a growing body of work testifying to the importance of entrepreneurship at the regional level and demonstrating the crucial factor in the founding of new companies is knowledge and correspondingly emphasising the impact of knowledge spillovers from universities and other R&D institutions.

Within this framework, we put forward the following three research hypotheses:

H1: Cooperation between KIBS companies and universities is positively related with the sharing of R&D resources.

H2: Cooperation between KIBS companies and universities is positively related with the reduction in research costs.

H3: Cooperation between KIBS companies and universities is positively related with working networks.

According to Acs et al (2009), entrepreneurialism contributes towards economic growth whenever it serves as a conduit for knowledge and hence investing in research and development not so as to commercialise the findings but rather to capitalise on the

potentially latent opportunities. Falling within this scope is the underlying relationship between companies and knowledge spillovers with some authors proposing that through this relationship the generation of innovations is possible (whether in products or services) that consequently increase market share (Jaffe, 1989; Feldman and Florida, 1994; Anselin et al, 1997, 2000; Varga, 1998; Fischer and Varga, 2003).

We would thus put forward the following research hypotheses:

H4: Cooperation between KIBS companies and universities is positively related with the interests of companies in raising their market share.

H5: Cooperation between KIBS companies and universities is positively related with the creation of innovation.

Various authors have come out in favour of universities taking on a determining role as a motor of regional development. This role may be played out through the implementation of innovative projects, such as e-learning initiatives based upon wireless communication networks, or through the rendering of support to the launching of start-ups and spin-offs, as well as establishing mechanisms for transferring technology (Rogers, 1999; Etzkowitz et al., 2000; Wright et al., 2004; Ferreira et al., 2010).

According to EIRMA (2007), the importance of the transfer of knowledge and joint cooperation between companies and universities is now greatly valued due to the strength of its input into regional development. We would furthermore point out how universities are able to meet company expectations and hence facilitate cooperation between the respective participants through: (i) producing the sustained research that proves of worth and applicable to companies, (ii) training the generations of scientists and engineers capable of being productive and useful outside of the teaching system, (iii) recognising that conveying knowledge is an integral component to the research undertaken within the university environment, (iv) contributing towards the development of local communities through cooperation with companies, particularly small and medium sized companies, (v) educating individuals and encouraging their creative capacities, and (vi) acting as "guardians of knowledge".

There are various means of processing the transfer of knowledge identified in the literature: the geographic proximity/concentration of companies, related research centres and industries (Feldman, 1994; Koo, 2005; Storper and Scott, 1995; Audretsch et al., 2005; Audretsch and Lehmann, 2006; Goldstein and Drucker, 2006), the level of

university expenditure on research (Varga, 2000), social networks (Breschi and Lissoni, 2007), and cooperation between companies (Rutten, 2003).

Furthermore, in addition to these conduits for the transfer of knowledge, cultural differences and the prevailing level of entrepreneurialism, especially at the regional level, also very much need taking into account. Indeed, these cultural difference reflect in social networks with different intensities (Saxenian, 1994; Fischer et al 2001; Feldmen and Desrochers, 2004) and the level of entrepreneurship present in a region may determine the level of success attained in the capacity to transform knowledge into actual innovation (Acs and Varga, 2005; Inzelt and Szerb, 2006; Mueller, 2006; Koo, 2007). Gilbert et al. (2008) find that the clusters forming regions, in conjunction with knowledge spillovers, contribute towards regional development through boosting the propensity and capacity for innovation, the launching of new products onto the market and a greater capacity to deal with economic growth in their surrounding environment.

Correspondingly, spillovers would seem to appear in any place: (i) through the movements of highly specialised professionals, (ii) through the utilisation of a specific technology in the production of specific products, and (iii) through the relationships behind the knowledge applied by R&D service professionals, thus, the existence of human capital generating a formal and informal interchange of persons and ideals while simultaneously raising the standards of operational efficiency (Eliasson, 1996; Acs, 2002; Delmar and Wennberg, 2010).

Within this context, and in accordance with the pertinence of geographic proximity to cooperation between universities and companies, we furthermore formulated the following research hypothesis:

H6: Cooperation between companies and universities is positively related with their respective geographic proximity.

Spillovers also play another role in the transfer of knowledge given the fact that a particular type of knowledge being deployed by one company does not prevent it from being deployed by another. Hence, this dissemination of knowledge stimulates and nurtures economic vitality through the emergence and growth of companies (Dahlander and Magnusson, 2005; Agarwal et al, 2007). National competitiveness and economic development are profoundly bound up with information and knowledge economy related concepts (Cooke, 2002). Any consideration on the “new economy” quite quickly reveals that it is dominated by the information and communication technologies and biotechnology. However, we should also highlight that these innovative industries

emerge and grow within specific geographic locations (Rutten, 2003). Cooke (2002) identifies the following factors as fundamental to their formation: financing for scientific research by risk capital firms, new businesses, establishing company incubators able to operate differently to those currently in existence as human capital is frequently in greater demand than that supplied, and capital as this represents an essential ingredient to both knowledge economies and cluster construction.

We may thus correspondingly highlight the following factors of cooperation between universities and companies (Table 1):

Table 1: Factors of cooperation between universities and companies

Factors of cooperation	Approach
Geographic proximity, Frequent personal contacts Reciprocal trust, Mutual competence, Shared R&D costs, Expanding the geographic scope of the market covered, Developing new products and/or services, Managing the formal and informal interchange of persons and ideas, Raising operational efficiency, Sharing technologies and knowledge, Learning from cooperation partners, Reducing general costs.	Parker and Zilberman (1993); Rutten (2003); Audretsch and Lehmann (2005); EIRMA (2007); Breschi and Lissini (2007); Varga (2009).

KIBS and knowledge transfers

Within the service industry, the rapid advance of the KIBS sector since the mid-1980s has demonstrated the extent of its highly important role in innovation processes (Muller, 2001; Howells and Tether, 2004; Toivonen, 2004; Koch and Stahlecker, 2006; Strambach, 2008). Nevertheless, Hauknes (1999) draws attention to the need to define the concept of 'knowledge intensity' with this question posed in terms of the transaction conditions and the provision of services. According to Hauknes (1999), the intensity of knowledge may be analysed according to two dimensions: (i) knowledge that is sought after from a specific service provider. Then, depending on whether the supplier is to a greater or lesser extent specialist in its specific type of intensive knowledge, (ii) the knowledge sought after from a specific knowledge intensive service. In this case, the intensity of the knowledge enables clients to choose one service to the detriment of another and taking into consideration the respective fluctuations in the intensity of the knowledge incorporated. Knowledge intensity is also defined in accordance with the

structure of employee qualifications, with the greater degree of specialisation reflecting a greater degree of knowledge intensity (OECD, 2001; Hass and Lindemann, 2003).

KIBS may be classified and divided up into two main groups (Frell, 2006; Miles et al., 1995; Doloreux and Muller, 2007, Shearmur, and Doloreux, 2008): technological KIBS Tecnológicos (t_KIBS) and professional KIBS (p_KIBS). The t_KIBS category incorporates activities related with information technology, research and development, engineering activities and architecture as well as activities related to consultancy and testing and analysis techniques. The p_KIBS include the legal, accountancy, bookkeeping and auditing sectors and activities such as fiscal consultancy, market studies as well as the entire publicity sector. The role played by KIBS in innovation is above all testified to by the fact that their performance in innovation is no simple matter as it would be if they simply met the existing market demands and more specifically the desires of their clients (Boden and Miles, 2000; Wood, 2002; Glücker and Armbruster, 2003; Tödtling et al, 2006). Instead, KIBS serve a role analogous to bridges for knowledge or bridges between companies and science for innovation (Miles et al. 1995; Czarnitzki and Spielkamp, 2003). Furthermore, there are authors who maintain that the origins of the third industrial revolution lie in the importance that needs to be attributed to KIBS (Tether and Hipp, 2002).

In this sense, we may affirm that knowledge is simultaneously the greatest input and output (Miles, 2001; Gallouj, 2002). One of the main KIBS contributions towards service and system innovation is the contextualisation that they render to knowledge (Miles et al., 1995; Bessant and Rush, 2000; Strambach, 2001; Wood, 2002; Muller and Doloreux, 2007). Strambach (2008) defends that KIBS contribute to the knowledge dynamic across diverse contexts, with processes involving the creation, utilisation, transformation, movement and diffusion of knowledge (Bettencourt, et al., 2002).

The success of these processes depends on the specialisation of the actors involved (KIBS and their client companies) and the context in which they occur (Malerba and Orsenigo, 2000). The importance of studying these services is demonstrated by Pires et al (2008) in empirically proving the positive effects of KIBS on the competitiveness of other companies and the added value thereby produced. Across the services rendered to companies sector, KIBS companies have recorded faster growth than other segments and a performance due to a range of factors, especially the outsourcing of these services by other sectors, the sheer extent of progress in the field of information and communication technologies, regulatory, legal and marketplace changes as well as the

broader prevailing backdrop of globalisation and internationalisation (Teece et al., 1997 and 2000; Dosi, et al., 2000; Bengtsson and Dabhilkar 2009).

While the debate on the growth of KIBS revolves around their new specialisations and the growth of the tertiary sector as a whole, there is growing acknowledgement as to how both new manufacturing processes and new services and innovations in general increasingly originate in KIBS companies (Kakaomerlioglu and Carisson, 1999; Tomlinson and Miles, 1999; Frell, 2006).

Miles et al. (1995) distinguish between three core KIBS characteristics: (i) the high priority attributed by these companies to professional knowledge, (ii) their desire to ensure their companies are actual primary information and knowledge resources, or deploying such knowledge to produce services that serve as intermediaries between these services, their clients and their production processes, and (iii) the great importance of this service type for levels of competition and competitiveness. Strambach (2008) stresses how KIBS utilise three distinctive categories of knowledge (analytical, synthetic and symbolic).

In industry, transactions are knowledge rendered form with the outputs very often containing major intangible components. Innovations in the majority of cases mostly result from new combinations of physical artefacts. Furthermore, its role in regional competitiveness has also come in for attention and studied by geographers and other regional specialists (Beyers and Alvin, 1985; Coffey and Polèse, 1987 and Illeris, 1996). As the suppliers of knowledge intensive services, the presence of these companies in a particular place is frequently considered an important leverage of regional industrial competitiveness to such an extent that a clear correlation between the level of employment generated by KIBS companies and the level of non-KIBS company productivity, that is at all other companies in the respective region, has been identified (Dall'erba et al., 2007; Delmar and Wennberg, 2010).

According to den Hertog (2000), analysing the role of KIBS in innovation processes opens up an understanding of the way that knowledge is produced and utilised in the economy as well as its role in these processes. The production of a specific service is very often the result of the joint efforts of various services, for example, in providing client attendance services where client satisfaction is the main objective (den Hertog, 2000). The interactional processes between KIBS companies and their clients are the main mechanism in the generating, processing and transferring of knowledge (den

Hertog, 2000; Bettencourt et al., 2002; Wood, 2002; Miles, 2005; Muller and Doloreux, 2007).

KIBS companies serve as the catalysers driving the fusion of various knowledge types, especially those involving tacit knowledge, localised in the most inner reaches of companies and also in the service sector (den Hertog, 2000, Strambach, 2001). We would here stress the concepts of interactive learning and the user-producer connection, in which the KIBS role is greatly to the fore (Lundvall, 1988, 1992). In summary, the KIBS form a category of service activities incorporating intensive knowledge utilisation that is not only often highly innovative but also facilitates innovation in other economic sectors (Miles et al., 1995; Delmar and Wennberg, 2010).

In the literature, there are few studies focusing upon the difference in the KIBS company profile. According to research undertaken by Frell (2006), t_KIBS employ persons with higher levels of qualification than p_KIBS with this factor impacting on their levels of innovation and in p_KIBS innovation is fostered more in the relationships with suppliers and clients (Freel, 2006).

These findings open up the grounds for questioning as to whether there are clear differences in the types of KIBS (professional and technological) and their location (rural and urban). We correspondingly set out the following research hypotheses:

H7: Do t_KIBS employ a greater percentage of professionals with higher education qualifications than p_KIBS.

H8: Do u_KIBS (urban) employ a greater percentage of professionals with higher education qualifications than r_KIBS (rural).

Methodology

Sample

With the objective of analysing the transfer of knowledge, hence the cooperation ongoing between universities and KIBS companies, we drafted and implemented a questionnaire for a final sample of 500 KIBS companies. The study sample stems from a data bases supplied by Coface Group and containing details on KIBS company trends (companies declaring bankruptcy, launched and operational) between 2004 and 2009. Based on the data, in 2004 Portugal hosted a total of 39,254 KIBS companies that declined to 34,644 firms in 2009.

We were also able to verify that 4,610 KIBS (13%) may be considered inactive in 2009, with only 87% actually operational. The sample was extracted from the data base

according to business volume selecting only those companies recording a turnover in business volume of over €0.01.

The sample was then narrowed down by company business codes CAE (REV.3) and NACE (REV 2), similar to the approaches made by other researchers (Frell, 2006, Miles et al., 1995; Doloreux and Muller, 2007, Shearmur, and Doloreux, 2008) so as to incorporate two KIBS groups into the sample: technological KIBS focused upon activities related to information and communication technologies, research and development, engineering and architecture and related activities, testing and analysis techniques (NACE codes: 62.01; 62.02; 62.03; 62.09; 63.11; 63.91; 63.99; 71.11; 71.12; 71.20; 72.1; 72.2) and professional KIBS operating in the legal, accountancy and bookkeeping sectors and auditing, fiscal consultancy, market studies activities as well as the entire public relations sector (NACE codes: 69.10; 69.20; 73.20; 70.22; 73.11; 73.12; 78.10; 78.30; 74.20; 74.90). The final sample of 500 KIBS companies was structured as follows: professional KIBS (65.6%, 328 companies) and technological KIBS (34.4%, 172 companies). Of the entire sample, 18.6% of companies were located in rural surroundings (93 companies) with 81.4% found in urban environments (407 companies).

Of the 328 professional KIBS companies, 63 were located in rural regions with 265 in urban settlements while the figures for technological KIBS came in at 30 and 142 respectively (Table 2). We define as rural, all locations containing fewer than 5,000 inhabitants (Kayser based criteria, 1990)

Table 2: Distribution of KIBS: typology and location

		KIBS Location		**Total**
KIBS Typology		Rural	Urban	
Professional	N	63	265	328
	%	12.6%	53.0%	65,6%
Technologica	N	30	142	172
l	%	6.0%	28.4%	34,4%
Total	N	93	407	500
	%	18.6%	81.4%	100.0%

Statistical methods and variables adopted

Based on descriptive statistics, we found that only 4.8% (24) of the KIBS companies making up the sample directly cooperated with higher education institutions. Despite not finding any differences in the levels of cooperation either by company typology (professional versus technological) or by location (rural versus urban), the results of the logistical regression model return a logit probability of companies establishing partnerships with higher education institutions is positively influenced by relationships of proximity and networks, by the types of costs associated with establishing such cooperation partnerships and by the age of the owners.

The indirect effects of the transfer of knowledge generated by universities to KIBS companies were also taken into consideration through the proportion of professionals recruited with levels of higher education. Through the application of the non-parametric Mann-Whitney U test, we find that in 2004 the proportion of employees with higher education was higher in u_KIBS than in r_KIBS. However, this situation did not remain constant as in 2009 the result returns the consequences of a strong rise in the percentage of graduate employees at rurally located KIBS companies and rising from 67% to 75%. As regards the KIBS typology, both p_KIBS and t_KIBS display high levels of graduate employment, varying between 79% and 82%, with their being no statistically significant difference between these two KIBS types.

Finally, to evaluate the relationship between the KIBS location and the likelihood of employing members of staff who have completed higher education, we once again made recourse to a logistical regression model.

Analysis of Results

Cooperation between Universities and KIBS

To evaluate the significance of the factors of cooperation and the entrepreneur profile (gender, age, academic background) on the probability of ongoing cooperation between universities and KIBS companies, we deployed logistical regression.

In adjusted regression models, the regression parameters were estimated through recourse to the maximum accuracy method. The significance and the quality of the models, as well as the significance of the regression coefficient were all validated. We respectively, made recourse to the accuracy ratio test, the -2LL (Log Likelihood)

indicator and the Wald test. The explanatory capacity of the model was evaluated by pseudo-R^2.

The level of significance (α) for determining whether a factor attains significance is set at the value of 0.05 (thus, 5%). The other levels of significance deployed are 0.1 and 0.01. We furthermore respected the rule of rejecting H0 whenever p-value ≤ α.

Table 2 presents the absolute and relative frequencies for cooperation established between higher education institutions and KIBS companies, as well as the probability of significance resulting from the chi-square test. Correspondingly, we find that only 24 KIBS companies establish direct cooperation with universities, 14 p_KIBS and 10 t_KIBS. Of the 473 KIBS companies stating they do not cooperate with higher education institutions, 312 are p_KIBS and 164 are t_KIBS. Distribution by location is also included in the contents of Table 3.

Table 3: Distribution of cooperation according to KIBS typology

KIBS Typology				**Cooperation**		χ^2 **(sig.)**	
				Don't Coop	Coop		
Professional	**KIBS location**	Rural	N	**59**	**2**		
			% Total	18.1	3.7		
		Urban	N	**253**	**12**	0.933	
			% of Total	77.6	3.7		
Technology		Rural	N	**28**	**1**		0.584
			% of Total	16.4	0.6		
		Urban	N	**133**	**9**	0.865	
			% of Total	77.8	5.3		

Based upon the chi-square statistical test and the respective significance probability, we conclude that the level of cooperation established with universities does not depend on the company typology (p=0.584>0.10) or by means of location (p=0.933 in p_KIBS (professional) and p=0.865 in t_KIBS (technological).

Subsequently, with the objective of identifying and capturing the factors relevant to the relationships between higher education teaching institutions and KIBS companies, we applied exploratory factorial analysis to the set of variable identified in the literature as factors of cooperation (Table 3).

Rotation Varimax factorial analysis demonstrated, through the Bartlett test (sig=0.000), a correlation between factors 1 to 4 and 5 to 12, adjusting the data very well to the analysis according to the KMO (0.855). The two factors created explain 84.3% of data

variation. The first factor is entitled **close and trusting relationship** and gathers together items 1 to 4. The percentage of variance explained comes in at 51.6%, and with reliability deemed excellent (0.931). As regards the second factor, this refers to **types of cost associated with cooperation** and covers eight items (5 to 12) this results are consistent with Varga (2000 and 2009).

The findings also point to a very good level of internal consistency, measured by Cronbach's alpha (0.969). The percentage of variance explained by this factor was 32.7%. Table 4 summarises the information on the two latent factors extracted through factorial analysis.

Table 4: Factorial Analysis: summary of the latent factors

Factor titles	Item identification	Cronbach 's Alpha (No items)	Explained variance (%)
F1: Economic conditions and local infrastructures	1. Geographic proximity 2. Frequent personal contact 3. Reciprocal trust 4. Mutual competences	0.931 (4)	51.6
F2:Access to superior technological knowledge	5. Expanding the geographic scope of the market covered 6. Developing new products and/or services 7. Sharing R&D costs 8. Managing the formal and informal interchange of persons and ideas 9. Raising operational efficiency 10. Sharing technologies and knowledge 11. Learning from cooperation partners 12. Reducing general costs	0.969 (8)	32.7

We now move onto analysis of the significance of these factors as regards the probability of cooperation existing between higher education institutions and KIBS companies deploying the control variables reflecting the entrepreneur profile (gender, age, academic background). The cooperation variable is codified as 0- does not cooperate and 1-cooperates. The qualitative independent variables, gender and academic background, were also codified as dummy variables with the reference classes being male and having graduated from higher education respectively.

Table 5 summarises the information on the independent variables in the estimated regression model, as well as the statistical evaluation of the significance, quality and explanatory capacity of the model. Firstly, given $G^2=160.472$; $p<0.001$, we may conclude that there is at least one independent variable in the model with predictive power over our variable dependent. Secondly, the -2LL statistic presented (where the p-

value corresponds to -2LL=X^2(493-5-1=487)=31.419 is 1>0.05) indicates the model does fit the data. The value of pseudo-R^2 (0.862) also reveals that the explanatory variables incorporated into the model reduce the uncertainty of the dependent variable by 86.2%. According to the statistical probability of significance associated with the Wald test, only the model's independent variables Factor 1 (p=0.004), Factor 2 (p=0.000) and entrepreneur age (p=0.017) hold significance at a level of 5%. Re-estimating the model with only the significant variables, we obtain the final readjusted model.

Table 5: Logistical Regression Model: cooperation

	Initial Model				Final Readjusted Model			
	B	EP	Sig.	Exp (B)	B	EP	Sig.	Exp (B)
FACTOR 1	3.383	(1.16)	0.004**	29.463	2.446	(0.56)	0.000***	11.540
FACTOR 2	2.489	(0.60)	0.000***	12.049	2.065	(0.42)	0.000***	7.884
Age	0.193	(0.08)	0.017*	1.212	0.172	(0.06)	0.006**	1.188
Education (No-HE)	1.071	1.98	0.589	2.918				
Gender (F)	-5.763	3.64	0.114	0.003				
Intercept	-14.714	5.318	0.006	0.000	-13.030	3.458	0.000	0.000
$\mathbf{G^2}$ (sig)	160,472 (0,000)				155,037 (0,000)			
-2LL	31.419				37.052			
Pseudo-R^2	0.862				0.836			

* Level of significance 0.05 No-HE – No Higher Education F- Female
** Level of significance 0.01
*** Level of significance 0.001

Therefore, the results of the logistical regression model show the probability logit of companies entering into partnerships with higher education institutions is positively influenced by relations of proximity and trust, by the types of costs associated with establishing cooperation alongside the age of business owners. Hence, we find the ratio of companies cooperating directly with higher education institutions rises in accordance with the incidence of close and trusting relationship, with better market perspectives and the higher the age of owners.

Given the high percentage of companies underestimating the importance of cooperating with universities (95.2%) to the development of their businesses, we analysed the effects of universities indirectly transferring knowledge to KIBS companies through the proportion of professionals contracted with higher education qualifications.

Regarding 2004, companies in the study return an average of around 80% (M = 0.80; DP = 0.28) of employees with an undergraduate degree or higher education qualification. In 2009, this proportion remained high (M=0.81; DP=0.26).

Through the application of the non parametric Mann-Whitney U test, we find the percentage of graduate workers in 2004 was higher on average in u_KIBS companies than their r_KIBS counterparts (given $p=0.026<0.05$) and hence rejecting the equal average null hypothesis). This finding does not hold for the 2009 figures given that the proportion of employees with higher education at rurally located KIBS companies rose significantly between 2004 and 2009 (up from 67% to 75%).

In fact, in 2009, the average proportion of employees with higher education did not differ significantly according to the KIBS location ($p=0.152>0.05$). As regards the KIBS typology, both the p_KIBS and the t_KIBS companies return high rates of professional employment with graduate levels of education (varying between 79% and 82%), with no statistically relevant differences between the two KIBS types ($p_{2004}=0.632$ and $p_{2009}=0.702 >0.05$).

Analysing the KIBS company type separately to location (Table 6), we find that the urban p_KIBS company return a higher level of graduate employment in 2004 than rural p_KIBS companies. In t_KIBS companies, this difference retains statistical significance in 2009.

Table 6: Comparison between the average proportion of graduate employees by KIBS typology and location

p_KIBS or t_KIBS	Type of Location (dummies)		Employees with higher education in 04	Employees with higher education in 09
Professional	Urban	Average	0.82	0.82
		SD	0.25	0.24
	Rural	Average	0.65	0.78
		SD	0.42	0.31
Mann-Whitney U Test		**p-value**	**0.039***	**0.938**
Technology	Urban	Average	0.83	0.84
		SD	0.26	0.24
	Rural	Average	0.75	0.69
		SD	0.32	0.33
Mann-Whitney U Test		**p-value**	**0.390**	**0.009***

* Level of significance 0.05

Finally, in evaluating whether the transfer of knowledge and cooperation between universities and companies is demonstrated through the employment of higher education graduates, we again made recourse to the logistical regression model (Table 7).

Table 7: Logistical regression model: knowledge transfers in regional development

Independent Variables	B	EP	Sig.	Exp (B)
PTrabCurSup04	-2.212	0.837	0.008**	.110
PTrabCurSup09	2.386	1.001	0.017*	10.866
Education (No-HE**)**	-1.605	0.424	0.000***	.201
Gender (F)	0.468	0.330	0 .156	1.597
Age	-0.057	0.022	0.009**	.944
Intercept	1.684	1.078	0 .118	5.390

* Level of significance 0.05 No-HE – No Higher Education F- Female
** Level of significance 0.01
*** Level of significance 0.001

According to the Wald test (more specifically, the probability of significance) associated to the logit coefficients of the estimated model (Table 6), the results do enable us to conclude that there is an effect, statistically significant, of employing higher education graduates ($p=0.008$ and $p=0.017<0.05$), and of the age ($p=0.009<0.05$) the academic background of owners ($p=0.000<0.05$) on the probability logit of companies locating in rural environments. Based upon the model's coefficients, we correspondingly find that the ratio of companies locating in rural communities rises in keeping with the level of employment of higher education graduates, with the owner having completed that level of study and when the business owner's age is lower.

Thus, we may conclude that rural professional and technological KIBS companies employ more members of staff with higher education qualifications. As regards their urban professional and technological KIBS counterparts, we may state that statistically, the employment of higher education qualified professionals is not related to type of KIBS. These results enable us to thus state that the employment of graduates, age and the academic background of business owners do have a statistically significant impact on the logit probability of the company locating in a rural environment. This means that, while there is no direct cooperation between higher education institutions and KIBS companies, there is a transfer of knowledge generated by universities through the professionals employed by KIBS entities, like Delmar and Wennberg (2010) was defended.

In summary, despite no direct institutional cooperation, KIBS companies receive an input of knowledge generated by universities and conveyed through the professionals employed and the academic learning process that they have been through in the aforementioned academic institutions.

We present the summary table of the results of our hypotheses.

Table 8: Hypothesis result

Hypothesis	Result
H1: Cooperation between KIBS companies and universities is positively related with the sharing of R&D resources.	Reject
H2: Cooperation between KIBS companies and universities is positively related with the reduction in research costs.	**Accept**
H3: Cooperation between KIBS companies and universities is positively related with working networks.	**Accept**
H4: Cooperation between KIBS companies and universities is positively related with the interests of companies in raising their market share.	Reject
H5: Cooperation between KIBS companies and universities is positively related with the creation of innovation.	Reject
H6: Cooperation between companies and universities is positively related with their respective geographic proximity.	**Accept**
H7: Do t_KIBS employ a greater percentage of professionals with higher education qualifications than p_KIBS.	Reject
H8 Do u_KIBS (urban) employ a greater percentage of professionals with higher education qualifications than r_KIBS (rural).	Reject

Conclusion

The core objective of this research was to analyse the transfer of knowledge from universities to KIBS companies carried out directly through the formalisation of partnerships or business relationships, or indirectly through rates of graduate employment at such companies. We furthermore sought to verify any differences brought about by the location (rural versus urban) and typology (professional versus technological) of KIBS companies.

In order to achieve this objective, we carried out a review of the literature to conclude on two fundamental points: (i) the role of universities in the transfer of knowledge within the scope of which we extracted twelve fundamental factors to cooperation between universities and KIBS companies (ii) and the knowledge present in KIBS. Through multivariable statistical analysis, we found that there were no differences in the cooperation between companies and universities whether by location or by typology. In practice, this means that companies cooperating with universities do so independently of being professional or technological, urban or rural. These results are consistent with

Miles et al (1995) and Strambach (2008) that makes no distinction between the location or type, only concludes that these companies cooperate and use knowledge-intensive
As regards the transfer of knowledge between universities and companies taking place through the employment of professionals who have graduated from higher education, our conclusions demonstrate that the ratio of companies located in rural communities rises in accordance with the level of graduate employment, where the business owner holds graduate qualifications and the younger the respective is individual. Hence, as regards employing members of staff with higher education in rural areas, at both professional and technological companies, this rises in keeping with the younger the age range and the higher the level of the entrepreneur's educational qualifications. However it is noteworthy that both the professional and technological undertakings, rural or urban areas have high levels of employability of professionals with academic high qualifications, which means that these companies employ such professionals regardless of location or type, contrary to what defends Frell (2006), which argues that technological KIBS employ more skilled professionals who KIBS professionals, as well, but also does not corroborate the findings of Malecki et al (2004), which argues that these companies prefer urban location to access to specialized labor. KIBS simply employ people skilled (Delmar and Wennberg, 2010)

These results mean that despite their being few companies understanding the potential and the benefits from cooperating formally with universities, such cooperation is attained more informally through the employment of professionals who have attained graduate levels of education. This means that knowledge does spillover from universities to companies through the former's graduates. For example, Roura (2009) defends how the indicators best able to capture regional competitiveness and development are employment in research and development and the level of graduate education. Hence, we may also point out that these rurally located companies are making their contributions towards better employment standards in these regions.
With these results, we wish to contribute towards boosting the level of understanding of the cooperation dynamics between KIBS companies and universities. We also provide an input into policy making in identifying a clear need to strengthen the more formal relationships between KIBS and universities, through research project partnerships in conjunction with support for companies to enhance their willingness to engage in direct cooperation with universities and accessing the state of the art knowledge present within

such environments. Such is the path towards nurturing business development and competitiveness and with spread effects into the wider surrounding local region. With rural areas lagging the most and seeing that younger entrepreneurs prefer these regions, we should correspondingly establish incentive and support schemes for the founding of companies in these areas as there are currently only 93 KIBS in the rural regions of Portugal. Given that they employ persons with higher qualifications and in contexts when there is so much discussion of youth employment, and especially graduates, this would appear to be a solution for at least part of this problem.

The main limitation to our research was the low number of companies cooperating with universities and hence preventing a broader dimension to the study. Furthermore, we were also unable to analyse which cooperation mechanisms were deployed by KIBS companies and by universities. Finally, we analysed this cooperation only from the KIBS perspective while the same analytical process would also serve to capture the university's perspective.

As further lines of research, we would propose the comparison of our results here with those gathered in other countries so as to verify whether KIBS companies behave in similar or different ways. We would also suggest the completion of a longitudinal study at an interval of five years, following the application of new support policies aiming to bring about this cooperation and to verify whether there have been any changes in cooperation preferences. We might also take into consideration whether start-up KIBS companies display the same type of behaviour as the KIBS analysed within the framework of this study and whether they have greater propensity to cooperation with universities and which means do they use in conjunction with whether or not their start-up category influences the priority attributed to employing specialists.

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Charpter 3

Factors of innovation and innovative capacities

KIBS innovation management capability in rural and urban Portuguese regions: empirical evidence

Abstract

This article aims to evaluate the innovation management capacities of knowledge intensive business services (KIBS) and verify to what extent these companies return different profiles when classified by location (urban vs. rural) and typology (professional vs. technological) dimensions. Taking a sample of 500 KIBS, we applied a questionnaire with results revealing different explanatory variables for KIBS innovation capacities. From the set of five dimensions studied, the factors relating to strategy, learning, and network best explained rural versus urban KIBS innovation capacities. We conclude that the networks factor is important to both company types (professional and technological) while in the case of professional KIBS both networks and strategy prove fundamental while for such technological companies learning joins networks in taking precedence. No differences were encountered in terms of location.

Key-Words: Innovation, Knowledge intensive business, Innovation Capacity; rural versus urban.

1. Introduction

Entrepreneurial activities, in conjunction with all the factors perceived as driving them, and their influence on regional economic development have been the subject of studies by a diverse range of authors (Birley, 1985, Kirchoff and Phillips, 1988; Storey, 1994; Acs, 2002; Cooke, 2002; Baumol, 2002; Autio and Acs, 2007; Henrekson and Joansson, 2010). Correspondingly, the *National Commission on Entrepreneurship* (NCOE) White Paper (2001) identifies innovation as the greatest contribution made by entrepreneurialism at the local level.

Since the 1980s, the vision of the traditional and linear model of innovation has been subject to change and placing greater emphasis on the more dynamic and interactive facets (Kline and Rosenberg, 1986; Von Hippel, 1988). Currently, innovation is broadly recognised as one of the key drivers of economic growth in what has become known as the knowledge society (Stough, 2003; Mention, 2011). Hence, within a prevailing business context of ever greater competition, innovation is increasingly a critical factor for companies seeking to establish a dominant position in

the marketplace (Cheng et al., 2010) and to boost their competitiveness (Hu and Hsu, 2008; Kaminski et al., 2008). Innovation is thus perceived as one of the main means of adapting to the ever faster dynamic surrounding environment (Roberts and Amit, 2003; Hua and Wemmerlov, 2006; Doloreux and Melancon, 2008).

Some progress has been made regarding the generalised acceptance of services, in particular Knowledge Intensive Business Services (KIBS), as fostering a rise in technology and innovation (den Hertog, 2000; Haukness, 2000; Muller and Zenker, 2001; Gallouj, 2002; Tether, 2003; Koch and Stahlecker, 2006; Sheamur and Doloreaux, 2008). According to Miles (2001), KIBS are attributed a fundamental role as intermediaries in system innovation. The relationships between KIBS and companies in other sectors clearly delivers a positive impact on the latter businesses (Freel, 2006) enabling better performances in terms of research and development, employee skills, cooperation and networking and correspondingly enhancing innovation ratios.

From the perspective of Wood (2005), research on regional innovation has only echoed national studies in awarding primacy to regional competitiveness as a process guided and technologically driven by innovation. However, there has been growing recognition of the input made by innovation at institutions, especially KIBS, towards this same regional development and competitiveness (den Hertog, 2000; Wood, 2005).

The role of KIBS in regional innovation systems, especially in the support activities rendered to transformation industries and small and medium sized enterprises (SMEs) in general, has been identified by various studies (Cooke, 2001; Arvanitis, 2002; Czarnitzki and Spielkamp, 2003; Wood, 2005; Wong and He, 2005).

In Europe, since 1997, the diversification of rural productive activities has been established as an objective for rural development policies (European Commission, 1997). Similarly, there has been rising interest and demand for the means to set up and run new businesses, perceived as a key factor in development and revitalisation processes for certain defined European areas (Rosell and Viladomiu, 2001; OCDE, 2006).

Hence, and in accordance with the thesis that KIBS make major contributions towards innovation and consequently towards regional development and particularly of rural regions as detailed in our brief review of the literature, we pose the following research question: how do KIBS perceive and position themselves towards innovation in Portugal? This article aims to evaluate the innovation management capacities of

knowledge intensive business services (KIBS) and verify to what extent these companies return different profiles when classified by urban versus rural.

The article is structured as follows: in section two, we proceed with our review of the literature focusing upon progress in the study of service sector innovation and the extent of KIBS innovation in particular. In section three, we set out our methodology, the data range, sample selection and statistical methodology. In the fourth section, we analyse the results obtained before closing with some final considerations.

2. Service sector innovation

Research into service sector innovation attained maturity in the 1980s (Kline and Rosenberg, 1986; Von Hippel, 1988; Johne and Storey, 1998; Miles, 2000; De Jong et al., 2003). Hitherto, there had been very little focus on service sector based innovation, a situation that Salter and Theter (2006) term an 'omission'. As Miles (2000) describes, through to the 1980s, innovation in services had gained something of a "Cinderella" status as it was never invited to the ball with the emphasis exclusively on industrial and transformation sectors. Therefore, innovation in this era was perceived as associated with technological materials and equipment (Fucks, 1968; Bell, 1973; Abernathy and Utterback, 1978; Pavitt, 1984).

However, as from the late 1980s and the mid-90s (termed the technological assimilation phase), with the rise of the service sector and the shrinkage in traditional industries in more developed economies, it became ever harder to ignore the innovation input of services (Grönroos, 2000; Hipp, 2000; den Hertog et al., 2003; Salter and Tether, 2006; Howells, 2007). In this period, innovation was approached from the transformation sector perspective. Corresponding to the advance of the service sector, there was a boom in studies broadly focusing on the impact of technology on services (Barras 1986, 1990; Galouj, 1998, 2002; Pires et al., 2008).

This reached such an extent that Barras (1986) made a particular effort to set out a theory on innovation in services taking into consideration the role that service sector based innovation might play within growth cycles. Given there was no service based classification of innovation, the definition set out by Pavitt (1984) was transposed to the service sector by Miozzo and Soete (2001) as follows: (i) predominantly a service supplier, (ii) service networks, (iii) generate an intensive scale of service production, and (iv) specialist suppliers of science based technology and services. According to

Miles et al. (1995), when seeking to identify forms of service innovation, these may appear in the forms of product innovation, which should derive from innovation processes and very often correspond to demand based needs, process innovation, emerging especially through new technology related drivers, and innovation delivery, in turn related with the application of new resources and methods such as new means of interaction between service companies and their clients.

Furthermore, Gallouj (1994) proposed the following formal innovation related activity categorisation: anticipated innovations, described as the most authentic form of innovation and correspondingly the least frequent type of innovation and the most difficult to implement (essentially consisting of coming up with something completely new), objective innovation, as the most frequent and incurring least risk (essentially the exploration of new methods or recycling those already existing), and value innovation (and essentially involving the leveraging of already existing experiences and the specialisation of capacities and knowledge able to nurture the appearance of new ideas and solutions). Subsequently, Evangelista (2000) classified services into four groups: (i) technological users, (ii) interactive services (iii) science and technological services and (iv) consultancy technological services.

As from the mid-90s, we may say that we entered into a new phase of service innovation research referred to by Salter and Theter (2006) as of 'differentiation'. In this period, researchers were already aware that service innovation differs from transformation sector innovation given the inherently different characteristics of services resulting in a parallel need to establish new approaches due to these intrinsic features of services (Miles, 2005). According to Muller (2001), after having criticised the traditional dichotomy between goods and services, innovation should be conceived of as an association of processes. Expressed alternatively: is the distinction between production innovation and process innovation relevant for the analysis of innovative interactions between the transformation industry and services? Contrary to the position traditionally taken by various authors (Gadrey, 1996; Tether et al., 2001; Djellal and Gallouj, 2008), innovation in services is perceived as something taking place very slowly. Services were thereby seen as incapable of innovating and ending up merely by adopting the innovations generated by transformation industry companies (Gallouj and Weinstein, 1997; Tether, 2003). In effect, the point made by some authors is that the service sector innovates differently to the transformation industry (Tether, 2005; Cainelli et al., 2006; Evangelista, 2006). Hence, despite this rising awareness that

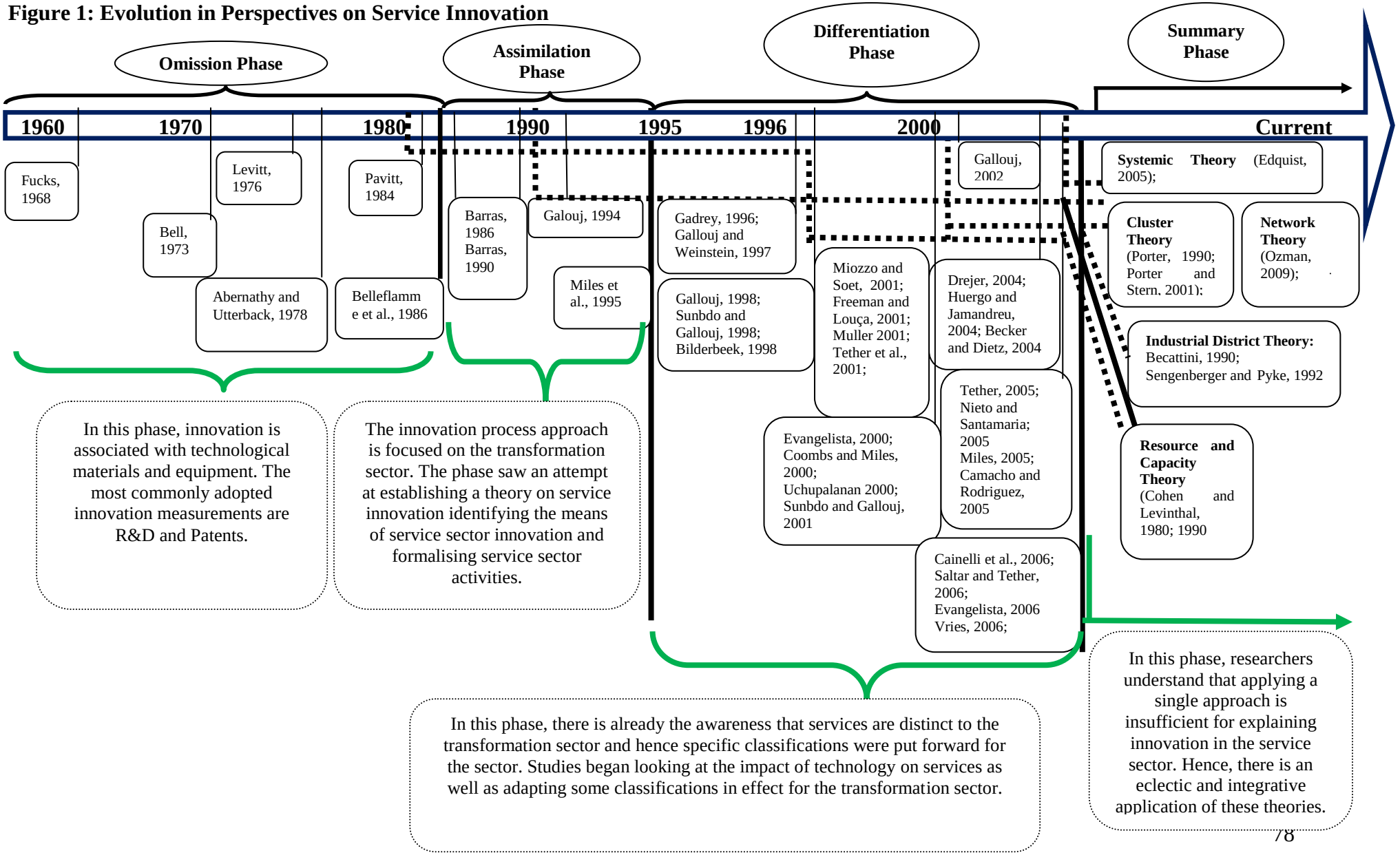
innovation is not simply confined to technical processes and products, some recent research on innovation related activities has focused solely on observing technical innovation and in particular in the transformation sector industries (Becker and Dietz, 2004; Huergo and Jaumandreu, 2004; Lynskey, 2004; Nieto and Santamaria, 2005). Only more recently has greater importance been attributed to service sector innovation that had previously fallen broadly off the research agenda (Gallouj and Weinstein, 1997; Sundbo and Gallouj, 2001; Tether, 2003; Drejer, 2004; Tether and Tajar, 2008).

Currently, we may state that we live in a 'summary' phase in the academic construction of innovation in services (Salter and Tether, 2006). On the one hand, various authors draw on the knowledge generated by previous research and apply it to service sector innovation while on the other hand new research approaches are emerging for the analysis of this theme as theory has not proven sufficient for explaining such a complex phenomenon and in a sector with so many specific characteristics as services.

Within this overall perspective, we find that the main approaches may be broken down into: (i) the systematic approach and innovation systems (Edquist, 2005) that consider factors such as institutional organisation, culture and the history of the countries and regions where innovation takes place and is divulged thereby promoting company innovation capacities (Nelson and Winter, 1992; Freeman, 1987, 1988; Lundvall, 1985, 1988, 1992; Carlsson and Stankiewitz 1991; Nelson, 1993; Nelson and Rosenberg, 1993; Tödtling, 1995; Edquist, 1997; Cooke et al., 1997; Braczyk et al., 1998; Mytelka, 2000; Kaufmann and Tödtling, 2001); (ii) the network approach (Nelson 1993, Nelson and Rosenberg 1993; Breschi and Malerba 1997; Cooke et al. 1997; Fischer and Snickars 2001, Simmie, 2003; Lorentzen, 2008; Ozman, 2009) with its emphasis on the industrial network approach put forward by Hakansson and Johanson (1992); (iii) the clusters approach focusing upon the competition faced by companies in their immediate surroundings thus boosting their capacities for innovation (Porter, 1990; Porter and Stern, 2001; Furman et al. 2002) contrasting with the industrial district approach that considers the extent of cooperation and competition between companies (Becattini, 1990; Sengenberger and Pyke, 1992); and (iv) the resource and capacity approach that stresses the utilisation of company resources and internal capacities as fundamental to leveraging innovation (Prahalad and Hamel, 1990; Cohen and Levinthal, 1989 and 1990).

Within this framework, we may conceive of an evolutionary perspective of the different phases in studying service sector innovation (Figure 1).

Figure 1: Evolution in Perspectives on Service Innovation



3. Innovation Capacities at Knowledge Intensive Business Services

KIBS form a service activity category susceptible to high levels of innovation as well as facilitating such changes in other economic sectors, including the transformation sector, essentially due to their core knowledge intensity characteristics (Miles et al., 1995).

This sector has turned in one of the the best growth performances in developed economies (Wood, 2002; Toivonen, 2004; Wood, 2006). KIBS are non-material companies providing intangible and highly personalised services that, on the one hand, act as external sources of knowledge to their clients and, on the other hand, are ever more the independent creators of innovation (Gallouj and Weinstein, 1997; Czarnitzki and Spielkamp, 2003). The majority of companies belonging to this sector are micro and medium sized young companies (Toivonen, 2004; Koch and Stahlecker, 2006; Koch and Strotmann, 2008). KIBS display capacities for storing knowledge and experiences in addition to being at ease in cooperating thereby lowering uncertainty and enhancing their ability to come up with innovative outputs (Cohen and Levinthal, 1989; 1990; Malerba and Torrisi, 1992; Johannisson, 1998; Becker and Peters, 2000; Lynskey, 2004; Schmidt, 2005; Koch and Strotmann, 2008). The technological and organisational managerial capacities characterising these companies also prove determinant to this innovation capacity (Lynskey, 2004; Webster, 2004). Therefore, the balance that KIBS attain between their internal capacities and openness to the surrounding environment represents one of the main factors for such innovation capacities (Deephouse, 1999).

According to den Hertog (2000), analysing the role of KIBS in innovation processes places the focus on the way that knowledge is produced and deployed in the economy in addition to the role of KIBS in these same processes. The production of a specific service is very commonly the result of combining efforts in the production of services, for example, in attending the client (with client satisfaction the primary objective) (den Hertog, 2000). KIBS function as catalysts fostering the fusion of various knowledge types, especially tacit knowledge, localised whether in the deepest internal company recesses or in the service sector (den Hertog, 2000, Strambach, 2001).

Within this context, attention must be paid to the concepts of “interactive learning” and “user-producer connection” within which KIBS play a preponderant role (Lundvall, 1988; 1992). We would highlight how KIBS may play three roles in supporting companies in other sectors: (1) facilitating innovation, (2) conveying innovation, (to the extent they play a fundamental role in the transfer of innovation),

and (3) as sources of innovation (to the extent they create and launch innovation) (Miles et al., 1995; Bilderbeek et al., 1998).

According to Sheamur and Doloreaux (2008), KIBS contribute towards regional innovation and competitiveness through their interactions with other local actors with the objective of producing innovation and, consequently, regional development. In this perspective, KIBS participate in regional development whenever these same regions display synergies and irrespective of whether or not KIBS are located in these or other regions.

Having thus far dealt with the importance of KIBS to innovation and how they contribute towards its incidence leads us onto the fulcral question: *what factors serve to evaluate this innovative capacity?*

3.1 Innovation capacity factors of evaluation

While there is broad consensus with the position that innovation is fundamental to performance and sustainable competitiveness, there is no such agreement on just how this might be evaluated (Drazin and Schoonhoven, 1996; Tushman and O'Reilly, 1997; Kodama, 2006 and 2009). Innovation is perceived from different perspectives and these differ in the object of their focus: concepts and strategic considerations, methodology and models, measurements and analytical priorities (Souitaris, 2002).

Recently, researchers have displayed a particular interest in emphasising the characteristics of the companies and the factors leading them to innovate (Hwang, 2004; Lemon and Sahota, 2004; Tidd and Bessant, 2009). Some studies have defended that the emergence of new ideas, fundamental to company innovative capacities, depends upon the creation of knowledge (Cohen and Levinthal, 1990; Macdonald and Williams, 1994; Koc and Ceylan, 2007). Associated with the importance of creating new ideas comes the importance of its correct transmission, adoption and utilisation, to the extent that company members of staff are appropriately aligned and informed about the knowledge due to be conveyed, and all fundamental to the survival of innovative companies (Monge et al., 1992; Tidd and Bessant, 2009).

Some authors also propose the internal ambience of organisations, appropriately defining the innovation strategy and its communication to employees are also fundamental to innovation (Roberts and Berry, 1985; Wheelwright and Clark, 1995; Slappendel, 1996; Lemon and Sahota, 2004). As regards organisation, some specialists

pay particular attention to the organisational structure in conjunction with the interest shown internally in organisational innovation for example providing encouragement for staff participation in innovation processes so as to bring about still more innovation (Wheelwright and Clark, 1995; Slappendel, 1996). The organisational culture also leads to the production of knowledge held by different members of staff with different capacities but where effective and efficient team working takes place able to jointly solve problems and thus generate synergy effects (Amabile et al., 1996; McGourthy et al., 1996; Damanpour and Gopalakrishnam, 1998; Lemon and Sahota, 2004). Dussage et al., (1992) point out that taking the appropriate strategic options and organisational culture depend on costs, deadlines and the risk levels that companies are able to incur.

As regards process innovation, we may include innovations to products, processes, specific consumer needs as well as the acquisition of technology (Roberts and Berry, 1985; Cooper, 1990; Koc and Ceylan, 2007). More recently, attention has been attracted to research and development through internal investment, recourse to outsourcing, or establishing research networks as fundamental to innovative capacities (Moritra and Krishnamoorthy, 2004; Castellani and Zanfei, 2006; Frenz and Ietto-Gillies, 2007). According to Tidd and Bessant (2009), the evaluation of company innovative capacities should be carried out in accordance with strategy, organisation, learning, processes and networks.

4. Methodology

4.1 Measuring the variables

The innovation capacity variable was evaluated based upon five core dimensions: Strategy (S), Organisation (O), Networks (N), Learning (L), and Process (P). Each dimension was measured according to the set of indicators detailed in Table 1 below.

Table 1 – Analytical scope and measurement indicators

Dimensions	Indicators	Authors
Strategy (S)	S1- Do employees recognise the importance of innovation to competitiveness? S2- Is company innovation strategy clearly shared by all members of staff so everyone knows of the targets to be achieved? S3 – Do employees recognise that for the organisation to be competitive, distinctive skills are required? S4 – Does the company plan for the future and anticipate threats and opportunities (through recourse to forecasting tools and techniques)? S5- Do senior members of staff perceive innovation as a critical factor for company development? S6-Does senior management show commitment towards fostering and nurturing innovation? S7- Is the organisation equipped with the mechanisms for analysing new technological developments and markets and what is their impact on organisational strategy? S8- Is there a clear bond between innovation projects and the entire scope of the business strategy?	Roberts and Berry (1985); Cooper (1990); Dussage et al. (1992); Koc and Ceylan (2007); Tidd and Bessant (2009).
Process (P)	P1- Does the company have the means to manage new products from design through to launch? P2- Are innovation projects normally delivered on time and within budget? P3- Does the company have the means of verifying all consumer needs are truly understood and not merely at the marketing level? P4- Does the company have the process management mechanisms able to adapt procedures so as to guarantee a successful final outcome? P5- Does the company systematically research new ideas for new products? P6- Is the company equipped with the mechanisms guaranteeing the involvement of all departments in the development of new products and processes? P7- Does the organisation have a clear system of choice for innovation projects? P8- Is the organisational system flexible and enabling the rapid implementation of small scale projects?	Roberts and Berry (1985); Cooper (1990); Koc and Ceylan (2007); Tidd and Bessant (2009).
Organisation (O)	O1- Does the company structure foster rather than hinder development? O2- Do employees work well in teams and across departments? O3- Are employees involved in putting forward ideas for improving products and processes? O4- Does the company structure foster swift decision making? O5- Does communication across different hierarchical levels work effectively? O6- Does the company have a system for supporting and rewarding innovation initiatives? O7- Does the organisation create a climate favourable to the creation of new ideas that encourage employees to come forward with proposals? O8- Does the organisation work well as a team (or teams)?	Roberts and Berry (1985); Dussage et al. (1992); Wheelwright and Clark, (1995); Slappendel (1996); Lemon and Sahota (2004); Tidd and Bessant (2009).
Learning (L)	L1- Is there major commitment towards employee training? L2- Does the company spend time either on reviewing projects in order to improve performance or on the performance of follow up actions? L3- Does the company analyse its errors so as to raise the standard of its activities and processes? L4- Does the company make systematic comparisons of its products and processes with those of its competitors. L5- Does the company share experiences with other companies in order to gain a better understanding of them? L6- Does the company record progress so as to enable other persons in the organisation to benefit from such learning? L7- Does the organisation learn from other organisations? L8- Does the organisation utilise measures enabling the identification of areas susceptible to improvement and innovation?	Cohen and Levinthal (1990); Monge et al. (1992); Macdonald and Williams (1994); Koc and Ceylan (2007); Frenz and Ietto-Gillies (2009); Tidd and Bessant (2009).
Networking (N)	N1- Does the company have good relationships (win-win) with suppliers? N2- Does the company understand well the needs of its end consumers/users? N3- Does the organisation work with universities and other research centres potentially able to help with developing its knowledge? N4-Does the company work closely with consumers to come up with new concepts? N5- Does the company cooperate with other entities in the development of new products and processes? N6- Does the company actively develop external networks with individuals able to render support (for example, specialists in specific fields). N7- Does the organisation share its needs and skills with education sector entities? N8- Does the organisation work closely with users of its products and services?	Moritra and Krishnamoorthy (2004); Castellani and Zanfei (2006); Frenz and Ietto-Gillies (2007); Tidd and Bessant (2009).

4.2 Sample

The data base sample was established according not only to company business turnover, and hence only including those companies recording earnings in excess of €0.01, but also their respective CAE (REV.3) and NACE (REV 2) corporate codes in line with other research projects (Frell, 2006, Miles et al., 1995; Doloreux and Muller, 2007, Shearmur, and Doloreux, 2008) in order to factor both KIBS groups into the sample: technological KIBS (t_KIBS), with activities focused on information technology, research and development, engineering and architecture or consultancy related activities as well as testing and analytical activities (NACE codes: 62.01; 62.02; 62.03; 62.09; 63.11; 63.91; 63.99; 71.11; 71.12; 71.20; 72.1; 72.2) and professional KIBS (p_KIBS), operating in the legal, accountancy, auditing and document processing sectors, tax consultancy, market studies as well as the entire public relations sector (NACE codes: 69.10; 69.20; 73.20; 70.22; 73.11; 73.12; 78.10; 78.30; 74.20; 74.90). Taking into consideration that one of the research objectives involved the verification of the location of KIBS in rural and urban council, we may immediately point out that there were only 93 KIBS located in rural councils with the remaining all operating out of urban councils, hence, with populations of greater than 5,000 inhabitants.

4.3 Methods

We first applied Cronbach's Alpha in an exploratory approach in order to analyse the internal consitency of the Innovation Activities (IA) and which questions, when removed, would considerably boost this indicator. Modelling with Confirmatory Factorial Analysis (CFA) then served to evaluate the factors that make up the latent variable associated with the importance of IA. The estimate methodology deployed was maximum similarity with bootstrap. We furthermore carried out a comparison of the five innovative activities as regards the respective location (Rural vs. Urban) and the typology (Professional vs. Technological) with this process making recourse to the t test for analysing the differences between the two measurements. Finally, we applied Repeated Average ANOVA for the analysis of the existence or otherwise of statistically significant differences between the factors. This analysis was carried out for all four company typologies (Rural/Technological, Rural/Professional, Urban/Technological and Urban/Professional).

Calculations of the descriptive measures and Cronbach's Alpha were produced by recourse to SPSS version 19.0 while for CFA we made usage of AMOS 19.0. The level

adopted for determining significance was 5% and the confidence intervals (CI) were established at 95%.

4.4 Analysis of construct reliability

Factorial analysis is a general linear modelling technique where the objectives involve identifying a relatively small number of latent variables (factors or constructs) that explain the structural correlation observed between a set of expressed variables (items). They may be classified into two types in accordance with the non-existence (Exploratory Factorial Analysis – EFA) or the existence (Confirmatory Factorial Analysis – CFA) of hypotheses on the factorial structure able to explain the correlations between the variables (Schumacker and Lomax, 2004). Hence, CFA is eligible for utilisation in the factorial validation of a research instrument (Schumacker and Lomax, 2004), with the technique adopted for the validation of the conceptual model proposed in this research.

We began by carrying out EFA. Analysing Cronbach's Alpha (Table 2) for each of the KIBS innovation activity factors proved that they were acceptable as in no case was the result returned below 0.6. (Nunnally, 1978; Bagozzi and Yi, 1988). However, in order to attain these results, it did prove necessary to remove item O7 (Does the organisation create a climate favourable to the creation of new ideas that encourage employees to come forward with proposals?) from the Organisation factor as well as the items N3 (Does the organisation work with universities and other research centres potentially able to help with developing its knowledge?) and N7 (Does the organisation share its needs and skills with education sector entities?) from the Networks factor. In the case of the Learning factor, item L3 (Does the company analyse its errors so as to raise the standard of its activities and processes?) was withdrawn.

Table 2 – Cronbach's Alpha for each IA factor

Factors	Indicators	Cronbach's Alpha
Strategy	S1; S2; S3; S4; S5; S6; S7; S8	0.632
Process	P1; P2; P3; P4; P5; P6; P7; P8	0.672
Organisation	O1; O2; O3; O4; O5; O6; O8	0.634
Networks	N1; N2; N4; N5; N6; N8	0.614
Learning	L1; L2; L4; L5; L6; L7; L8	0.655

4.5 Construct Confirmatory Factorial Analysis

In terms of CFA, a model was estimated for the IA construct. There is no single statistical test that best evaluates the CFA model and, correspondingly, a range of

measure have been put forward for evaluating the quality of adjustments and deployed in other research projects, including Chi Square ($\chi 2$), the Comparative Fit Index (CFI), the Incremental Fit Index (IFI), the Normed Fit Index (NFI) and the Root-Mean-Square Error of Aproximation (RMSEA) (Bagozzi and Foxall 1996, Bagozzi and Yi 1988, Diamantopoulos and Siguaw, 2000). As discussion of the respective advantages and disadvantages of these respective adjustment measures falls beyond the scope of this research, we would simply recommend Hair et al. (2009) for a more detailed explanation of the measures and respective means of calculation.

Confirmatory Factorial Analysis (CFA) was carried out with the AMOS 19 software (SPSS Inc., Chicago, Il). Evaluating the quality of overall model adjustment to structural correlation returned values indicating a good level of adjustment with CFI and GFI in excess of 0.9 and PCFI over 0.6. We also found $\chi 2/gl$ ~2 and RMSEA with results between 0.5 and 0.8 with a non-significant P[rmsea≤0,05] probability, indicating good model adjustment (Schumacker and Lomax, 2004).

Analysing the quality of adjustment (table 3) through the aforementioned measures, we concluded that despite all the coefficients estimated being statistically significant, the level of adjustment is low. Therefore, the multidimensional construct associated with IA is not confirmed based upon the sample's results. The adjustment indicators in Table 3 represent the estimated data for variables with statistically significant coefficients (and boosting Cronbach's Alpha). All factors displayed high levels of indexed adjustment (Bagozzi and Foxall, 1996; Bagozzi and Yi, 1988, Diamantopoulos and Siguaw, 2000).

Table 3 – Confirmatory Factorial Analysis for IA and by factor

	$\chi 2$	df	p-value	CFI	IFI	NFI	RMSEA
Global	3636,958	738	0.000	0.555	0.558	0.502	0.089
Strategy	42,856	20	0.002	0.927	0.928	0.874	0.048
Process	62,223	20	0.000	0.903	0.905	0.865	0.065
Organisation	38,336	14	0.000	0.933	0.934	0.900	0.059
Networks	13,705	9	0.133	0.981	0.982	0.949	0.032
Learning	20,154	14	0.125	0.986	0.986	0.955	0.030

Given the results obtained, CFA was subsequently carried out on each factor thus, rather than considering a multidimensional construct for the IA, various unidimensional constructs were analysed under the auspices of Strategy, Process, Organisation, Networks and Learning. For estimating these constructs, we applied the items that had not been excluded by the results of Cronbach's Alpha. Hence, and based upon these

results, we are able to confirm that the IA factors do in reality correspond to distinct constructs.

4.6. Construct analysis by location and typology

This section of the results analyses the constructs for KIBS located in urban and rural environments in accordance with its typology: either t_KIBS or p_KIBS. For each construct, a variable composite was established according to the average of the items in that respective construct.

In the case of companies located in rural locations (Table 4).

Table 4 – Descriptive statistics and t test by typology and rural location

Factor	KIB	N	Average	Stand. Deviation	CI for 95% average		*p*
					Lower limit	Upper Limit	
Strategy	Professional	63	6.11	0.41	6.00	6.21	0.663
	Technology	30	6.15	0.38	6.00	6.29	
Process	Professional	63	5.97	0.45	5.85	6.08	0.314
	Technology	30	6.07	0.46	5.90	6.24	
Organisation	Professional	63	6.05	0.46	5.93	6.16	0.373
	Technology	30	6.14	0.49	5.96	6.32	
Networks	Professional	63	6.07	0.47	5.95	6.18	0.278
	Technology	30	6.17	0.37	6.04	6.31	
Learning	Professional	63	6.03	0.56	5.89	6.17	0.221
	Technology	30	6.18	0.48	6.00	6.36	

t_KIBS companies have higher average concordance scores although there are no statistically significant differences ($p>0.05$) between technological and professional companies in the average scores for each of the various constructs. The Process construct returned the lowest average score both at p_KIBS (5.97±0.45; IC95%: 5.85,6.08) and at t_KIBS (6.07±0.45; IC95%: 5.90,6.24) companies. In the case of t_KIBS, with the higher levels of concordance among factors, Learning (6.18±0.48; IC95%: 6.00,6.36) and Networks (6.07±0.47; IC95%: 5.95,6.18) while for KIBS professional companies the constructs with the highest levels of concordance proved to be Strategy (6.11±0.41; IC95%: 6.00,6.21) and Networks (6.07±0.47; IC95%: 5.95,6.18).

Hence, we find that the Networks construct is common to both KIBS types and in this sense we are aligned with those authors defending how setting up and fostering Networks is fundamental to the development of innovation (Moritra and

Krishnamoorthy, 2004; Castellani and Zanfei, 2006; Frenz and Ietto-Gillies, 2007). We should highlight how these two types of companies display different levels of intensive knowledge (Shearmur and Doloreux, 2008) and hence in the case of t_KIBS the Learning construct proves more important as the nurturing of new ideas is fundamental to the innovative capacities of companies and is dependent on the creation of knowledge (Moritra and Krishnamoorthy, 2004; Castellani and Zanfei, 2006; Frenz and Ietto-Gillies, 2007). In the case of p_KIBS, the Strategy construct has higher scores and in agreement with the idea that correctly drafting and communicating the strategy to employees is fundamental to innovation (Roberts and Berry, 1985; Wheelwright and Clark, 1995; Slappendel, 1996; Lemon and Sahota, 2004).

From analysis of the ANOVA Repeated Measures results (Table 5) and for companies located in rural communities we find that there are statistically significant differences between the factors and both for p_KIBS and for t_KIBS ($p<0.001$). We utilised this analysis in order to eliminate the systemic bias as well as to reduce the variance in error.

Table 5 – Innovation Activity ANOVA for rural KIBS

	Source of variation		SQ Type III	gl	MQ	F	P
p_KIBS	Factors	Sphericity Assumed	5.041	4	1.260	18.849	0.000
		Greenhouse-Geisser	5.041	3.428	1.470	18.849	0.000
		Huynh-Feldt	5.041	3.479	1.449	18.849	0.000
		Lower-bound	5.041	1.000	5.041	18.849	0.000
	Error (Factors)	Sphericity Assumed	70.602	1056	0.067		
		Greenhouse-Geisser	70.602	905.033	0.078		
		Huynh-Feldt	70.602	918.386	0.077		
		Lower-bound	70.602	264.000	0.267		
t_KIBS	Factors	Sphericity Assumed	1.742	4	0.435	6.983	0.000
		Greenhouse-Geisser	1.742	3.363	0.518	6.983	0.000
		Huynh-Feldt	1.742	3.455	0.504	6.983	0.000
		Lower-bound	1.742	1.000	1.742	6.983	0.009
	Error (Factors)	Sphericity Assumed	35.169	564	0.062		
		Greenhouse-Geisser	35.169	474.217	0.074		
		Huynh-Feldt	35.169	487.201	0.072		
		Lower-bound	35.169	141.000	0.249		

Regarding companies located in urban areas (Table 6), the results are almost entirely similar to their peers in rural environments. The average scores for each construct are high and there are no significant differences ($p>0.05$) between professional and technological typologies.

Table 6 – Descriptive statistics and t test for typology and urban location

Factor	KIB	N	Average	Standard Deviation	CI for Average 95%		*p*
					Lower limit	Upper limit	
Strategy	Professional	265	6.05	0.39	6.01	6.10	0.635
	Technology	142	6.03	0.43	5.96	6.10	
Process	Professional	265	5.97	0.42	5.92	6.02	0.815
	Technology	142	5.96	0.49	5.88	6.04	
Organisation	Professional	265	6.04	0.44	5.98	6.09	0.415
	Technology	142	6.00	0.57	5.90	6.09	
Networks	Professional	265	6.12	0.48	6.06	6.18	0.362
	Technology	142	6.07	0.53	5.99	6.16	
Learning	Professional	265	6.15	0.47	6.09	6.20	0.335
	Technology	142	6.10	0.50	6.01	6.18	

The Process construct was that which returned the lowest average score and both for p_KIBS (5.97±0.42; IC95%: 5.92,6.02) and for t_KIBS (5.96±0.49; IC95%: 5.88,6.04). In the case of t_KIBS, the factors gaining the highest scores were Learning (6.10±0.50; IC95%: 6.01,6.18) and Networks (6.07±0.53; IC95%: 5.99,6.16). In p_KIBS, the constructs attaining highest average concordance levels were Networks (6.12±0.48; IC95%: 6.06,6.18) and Strategy (6.05±0.39; IC95%: 6.01,6.10). As had already been referred during the analysis of rurally located KIBS, we would again highlight that innovative activities do not depend on an urban location, as stated by the OECD (2007), but rather on the KIBS typology (Frell, 2006). In the comparison of factors (Table 6) and for p_KIBS, there are significant difference between the factors ($p<0.05$). Additionally, in the case of t_KIBS, there are no statistically significant differences ($p>0.05$) between the diverse respective factors.

Table 6 – Innovation Activity ANOVA for urban KIBS

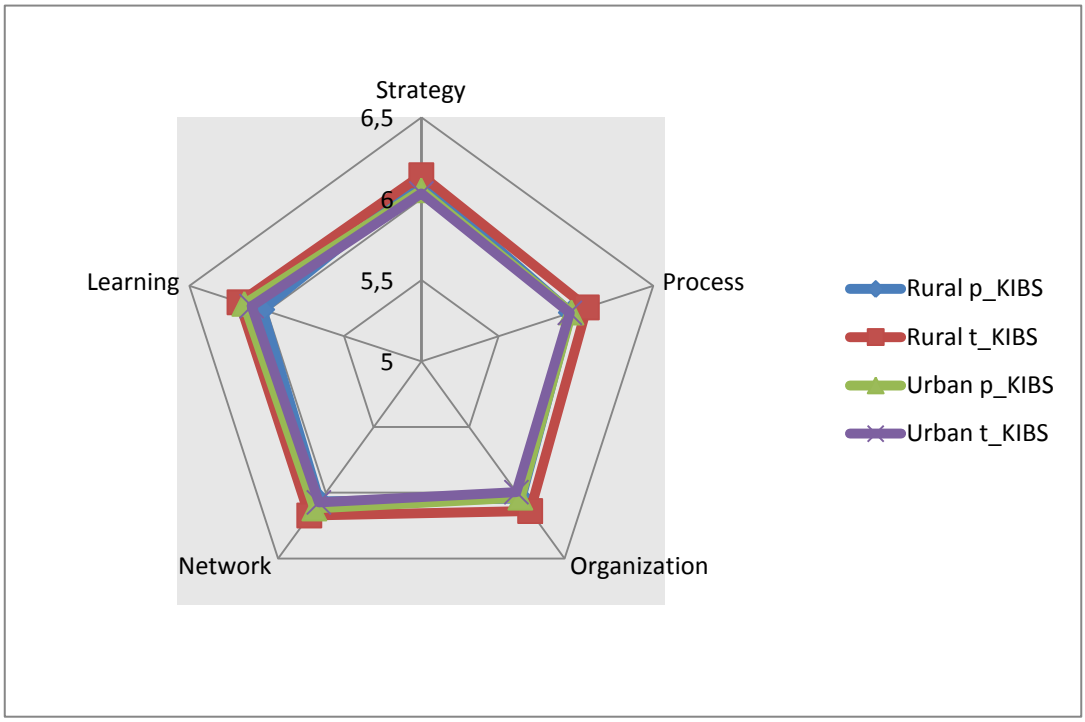
	Source of variation		SQ Type III	Gl	MQ	F	P
p_KIBS	Factors	Sphericity Assumed	0.657	4	0.164	2.695	0.032
		Greenhouse-Geisser	0.657	3.494	0.188	2.695	0.039
		Huynh-Feldt	0.657	3.728	0.176	2.695	0.035
		Lower-bound	0.657	1.000	0.657	2.695	0.106
	Error (Factors)	Sphericity Assumed	15.110	248	0.061		
		Greenhouse-Geisser	15.110	216.611	0.070		
		Huynh-Feldt	15.110	231.129	0.065		
		Lower-bound	15.110	62.000	0.244		
t_KIBS	Factors	Sphericity Assumed	0.215	4	0.054	0.733	0.571
		Greenhouse-Geisser	0.215	2.626	0.082	0.733	0.519
		Huynh-Feldt	0.215	2.911	0.074	0.733	0.532
		Lower-bound	0.215	1.000	0.215	0.733	0.399
	Error (Factors)	Sphericity Assumed	8.510	116.000	0.073		
		Greenhouse-Geisser	8.510	76.158	0.112		
		Huynh-Feldt	8.510	84.430	0.101		
		Lower-bound	8.510	29.000	0.293		

The average profile for five factors scores by typology and location is presented in the next Table 7 and plotted in figure 2.

Table 7: Scors by tipology and location

Factors	**Tipology and location**			
	Rural p_KIBS	**Rural t_KIBS**	**Urban p_KIBS**	**Urban t_KIBS**
Strategy	6,107143	6,145833	6,053302	6,033451
Process	5,968254	6,070833	5,97217	5,961268
Organization	6,045351	6,138095	6,037736	5,995976
Network	6,066138	6,172222	6,120126	6,07277
Learning	6,029478	6,17619	6,145553	6,097586

Figure 2: Plot by typology and location



5. Conclusion

The literature proposes that KIBS hold an overall immensely important role in innovation processes in general terms even while there remains certain difficulties in homogenizing the evaluation criteria for innovation capacities. Correspondingly, this study sought to analyse the innovative capacities of knowledge intensive service companies by type (professional vs. technological) and location (rural vs. urban).

Taking into account the results obtained, we found that KIBS are creators and drivers of innovation even while their respective innovation capacities are explained by different variables when approaching the sample by professional/technological or urban/rural. In accordance with our analysis of the different dimensions fostering innovative capacity, we identify the following: strategy, networks, learning, process, and organisation. It should be highlighted that there are differences in terms of company typology (professional vs. technological) while there are no statistically significant differences in terms of location. Hence, we verified the fact that KIBS opting in favour of urban environments with more opportunities does not bear any influence on their innovation factor related decisions. While some studies (Cooke, 2001; OECD, 2007) have claimed that innovative capacities and strategies do depend on the respective region of location,

this study finds that means of innovation is dependent on the respective KIBS typology (technological or professional) (Frell 2006). Similarly, the innovation activity dimensions of greatest relevance to both the t_KIBS and p_KIBS company types (Muller, 2001; Muller and Doloreux, 2009) are Networks. Furthermore, we should stress our findings differentiate between the two types: for t_KIBS, the most important factor is learning, while for p_KIBS strategy prevails (den Hertog 2000; Muller and Zenker 2001; Wood 2005; Simmie and Strambach, 2006).

Through this diagnosis of the innovation capacities of Portuguese KIBS, we seek to contribute towards a better understanding of the dynamics and the differences between such capacities at knowledge intensive companies. Their relevance derives from their crucial role in the competitiveness and development not only of the respective companies they interrelate with but also of the surrounding host region. We believe this research may be seen as a step towards directly assisting in the definition of policies both at the micro level, in the innovation management capacities in effect at KIBS, and at a more macro level, in terms of supporting the development of such knowledge intensive companies in Portugal.

The key limitations inherent to our study are the fact that they relate only to a sample of companies and hence it does not represent the universe of KIBS companies in Portugal.

We would thus suggest as a future line of research that such a methodology be applied to other international regions so as to verify whether or not the dimensions tested here return the same results elsewhere.

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Influence of the KIBS Type and Location on their Innovative and Competitive Capacities

Abstract

This article analyses the innovative and competitive capacities of Knowledge Intensive Business Services (KIBS) and evaluates the extent to which their levels of innovation depends on the service type (technological or professional) and location (rural and urban). Through recourse to structural equation models, the results demonstrate that innovative capacities are strongly dependent both on the type of service and the respective company location. We found that urban technological KIBS companies display greater innovative capacities and better financial performance than their professional service peers. Furthermore, networks were identified as the key explanatory factor behind these innovative capacities.

Key - Words: KIBS**,** competitive and innovative capacities, factors of innovation, location, performance.

1. Statement of Problem

Innovation is the process through which opportunities are transformed into practical utility (Tidd et al., 1997). The effective implementation of innovation has gained increasing recognition as a synonym for building sustained competitive advantage and thereby boosting organisational performance (Koc and Ceylan, 2007). Against a backdrop of sharply rising competition, innovation is a critical factor for companies whether striving for a dominant market position or attempting to increase their profits (Hu and Hsu, 2008; Kaminski et al., 2008). Many authors back innovation as being the only means of ensuring companies adapt to their ever more dynamic surroundings (Roberts and Amit, 2003; Hua and Wmmerlov, 2006; Doloreux and Melancon, 2008). Through analysis of the introduction of new processes, products and ideas at the organisational level, it proves possible to measure the innovative capacities of companies (Hurley and Hult, 1998). Innovation stems from the flexibility of companies able to choose between different options for the satisfaction of consumer needs (Banbury and Mitchell, 1995) through sustained strategies and based upon the resources and capacities existing in companies, which not only enable them to meet such needs today but earn the revenues necessary to do so into the future (Wernerfelt, 1984;

Barney, 1991; Drazin and Schoonhoven, 1996; Tushman and O'Reilly, 1997; Souitaris, 2002; Hwang, 2004; Lemon and Sahota, 2004). However, despite the growing awareness that innovation is not constrained to technical processes and products, some recent research projects have still focused exclusively on technical innovation and particularly in the transformation industrial sector (Becker and Dietz, 2004; Huergo and Jaumandreu, 2004; Lynskey, 2004; Nieto and Santamaria, 2005).

Within the service industry, the swift growth of *KIBS* (*Knowledge Intensive Business Service*) companies has played an undeniable role in innovation processes (Muller, 2001; Howells and Tether, 2004; Toivonen, 2004; Koch and Stahlecker, 2006). This role taken by *KIBS* in innovation is confirmed above all by the means by which they reach beyond simplicity within the scope of innovative activities, as might be the case when simply meeting the demand present, or more specifically client needs. However, actually in the field, they act to serve as bridges of knowledge and innovation between companies and the outputs of the scientific and academic fields (Miles et al., 1995; Czarnitzki and Spielkamp, 2003).

Despite the existence of many voices defending the scope of the importance and the role KIBS play in regional economic dynamics (Marshall et al., 1987; Hansen, 1993; Miles et al., 1995; Muller and Zenker, 2001; Czarnitzki and Spielkamp, 2003; Miles, 2003; Muller and Doloreux, 2009), there remain very few studies making any approach to innovative activities ongoing in this service sector (Koch and Strotmann, 2008). Howells (2000) explains this fact by pointing to the great heterogeneity at the core of this sector working to discourage many researchers. Small scale KIBS, in particular, have been attributed due recognition as dynamic entities and central to the new knowledge based economies. This position is obtained through generating creative innovations to their own specific benefit and within which they are no longer seen as merely early adopters or users of new technologies designed by others. Indeed, this recognition is now fostering new and rising levels of research on this service sector (Tether, 2005; Wong and He, 2005). Given the KIBS play a fundamental role at the level of innovation in their host communities, there is a corresponding need to make recourse to theories on location in attempts to explain the factors underpinning the entrepreneur's decisions in choosing a specific location for setting up and implementing their respective companies (Cooke, 2001; Arvanitis, 2002; Czarnitzki and Spielkamp, 2003; Wood, 2005; Wong and He, 2005; Ferreira et al., 2010). The rural/urban dichotomy dividing the location of entrepreneurial activities in rural communities is a

point of especial importance given that they then register different performances than their urban peers (European Commission, 1997; Rosell and Viladomiu, 2001; OECD, 2006). The location of KIBS and their contributions towards local economies have been the subject of analysis by various researchers (´OhUallacháin and Reid, 1991; Coffey and Shearmur, 1997; Gong, 2001). Their location within the urban environment, their sensitivity to the general agglomerative effects of economies (Eberts and Randall, 1998; Poehling, 1999; Wernerheim and Sharpe, 2003) and their trends towards forming spatial clusters (Coe, 1998; Keeble and Nachum, 2002) have been documented through recourse to various methodological tools. A significant proportion of these studies have sought to research the dynamics of local economies and regional development to better grasp the reasons for some regions growing faster and further than others (Moyart, 2005). Thus far, there have been practically no studies focusing on the influence of the KIBS type and location on innovative capacities. Correspondingly, and with the objective of overcoming this shortcoming in the literature, this research project seeks to ascertain the extent to which the innovative and competitive capacities of such companies are influenced by the service type (technological vs. professional) and their respective location (rural vs. urban).

Our research project is structured as follows, following this introductory section; we carry out a review of the literature relevant to the KIBS role in innovation and in regional innovation systems and the innovative capacities and the locations of KIBS. We then set out the methodology adopted, which we described in the sample above, the statistical methods and the variables utilised. This is followed by analysis and discussion of our results before putting forward our final considerations.

2. Theoretical framework and literature review

2.1 The role of KIBS in regional innovation systems

Innovation emerges out of a specific social, cultural, economic and political environment to take on a systematic characterisation (Cooke and Heidenreich, 1998). Edquist (1997) defined innovation systems as complexes of features and components that working mutually together condition and contract other complexes, with each feature endowed with clearly defined functions. According to Lundvall (1992), an innovative system is made up of features and relationships that interact through the production dissemination and utilisation of new economic knowledge. This approach served as the impulse for the exploration of regional innovation systems (Cooke et al.,

1997; Cooke, 1998). Beyond agglomeration and competitiveness, innovation is a key input into economic growth within the current knowledge paradigm (Stough, 2003).

Porter and Stern (2001) state that the very vitality of innovation depends on the *national innovative capacity*. This capacity is, above all, the potential of each country and in both political and economic terms to produce a flow of business relevant innovations. According to Sundbo (1998), innovation in the service sector: (i) may be boosted by new products or services; (ii) new processes; (iii) new forms of organisation; (iv) new marketing techniques; (v) alterations in the physical object format; (vi) changes at the intellectual level (consultancy services); (vii) new means of transporting products; (viii) the introduction of new strategies. According to Camacho and Rodrigues (2005), in order to study service sector innovation, a combination of theories needs adopting ranging from the most recent to the oldest as innovation in this type of sector needs to incorporate a range of issues beyond the introduction of new products and processes.

Furthermore, the growing importance of company innovation, especially under the auspices of KIBS, towards regional competitiveness and development has gained recognition in the literature (Malecki et al, 2004; Wood, 2005; Muller and Doloreux, 2009). The role of KIBS in regional innovation systems, especially as regards support for the transformative industries and small and medium sized companies in general, has furthermore been proven by research findings (Cooke, 2001; Wood, 2005).

From the perspective of Muller and Zenker (2001), KIBS operate across two fundamental levels: (i) acting as a resource drawing on external knowledge and contributing towards innovation at client companies; (ii) introducing internal innovations, derived from highly qualified local labour, thus contributing towards the growth and development of the economy. According to Czarnitzki and Spielkamp (2003), KIBS may serve as bridges of innovation whenever the following interactions are in effect: (i) the purchase of goods from transformation companies; (ii) selling services to transformation companies; (iii) that mutually complement their respective products and services. Hipp (2000) maintains that innovations produced by service companies are converted into added value at other companies and are strictly related to information technologies. Metcalfe and Miles (2000) consider KIBS companies as actors in innovation given that, in transferring knowledge, they serve as innovation co-producers in conjunction with their clients (den Hertog and Bilderbeek, 1999; den Hertog, 2002). KIBS display three fundamental characteristics that drive innovation (Aslesen and Isaksen, 2007): (i) generating the knowledge that facilitates innovation;

(ii) organising innovation processes at client companies; (iii) guiding and advising on the type and form of innovation that clients should adopt while simultaneously supervising such processes.

Correspondingly, according to Muller (2001), there are three KIBS characteristics worthy of particular note: (i) the intensity of knowledge embedded in KIBS services rendered to clients (which is the characteristic that does most to distinguish this company type from all others); (ii) the consultancy function (which may be expressed as a problem resolution function); and (iii) the intense interaction with clients accessing such services. Knowledge flows between KIBS and other companies, that effectively represent partnership status, ensure that specific solutions are sought out for each client and thereby enabling the latter to boost their own respective knowledge levels.

According to Miles (2001), KIBS are recognised for the fundamental role they play as intermediaries in system innovation. The KIBS relationship with companies from other sectors clearly bears a positive impact on the latter as they are able to raise their level of recourse to R&D, boost employee capacities, foster cooperative relationships and thereby enhance their overall innovation ratio (Freel, 2006).

KIBS are currently considered as a strategically important sector for the development of both industries and regions (Aslesen and Isaksen, 2007), are intensely concentrated in urban areas (Fischer et al., 2001), and perceived as an essential component to their host community innovation systems. KIBS companies typically provide employment to highly qualified members of staff and combine (den Hertog, 2000): (i) general, scientific and technological information; (ii) the experience and competences acquired in projects then conveyed to clients; (iii) the tacitly acquired knowledge of their clients. This results in KIBS working and focusing upon the resolution of client problems.

According to Sheamur and Doloreaux (2008), KIBS foster regional innovation and competitiveness through the way in which they interact with other local actors with the objective of producing innovation and consequently developing the region. Meanwhile, Drucker (1985) identifies innovation as a specific instrument for entrepreneurs. This involves the act of endowing resources with new means of creating wealth. Thus, innovative companies tend to present better economic-financial performances than the non-innovative (Koellinger, 2008; Bigler, 2009; Ferreira, 2010; Marques et al., 2011). In every sector of the economy, innovation is thus fundamental to survival and sustained success in increasingly globalised marketplaces. Innovation enables companies to respond to diversified and constantly changing patterns of demand and

bringing about improvements across the different facets and activities of society (Cooke and Heidenreich, 1998). Hence, innovation is perceived as a driver of progress, competitiveness and economic development (Romer, 1994; Johansson et al., 2001).

However, innovation represents a highly complex process with small and medium sized companies encountering obstacles to innovation and only able to make significant progress when cooperating with other entities optimised at deploying their internal knowledge in combination with the specific skills of their partners (Muller and Zenker, 2001). Kleinknecht (1989) identifies the following key barriers to innovation: (i) a lack of financial capital; (ii) a shortage of management level qualifications; and (iii) difficulties in obtaining the technological information and know-how necessary to innovation.

Greater utilisation of information flows is essential to the creation of organisational capacities and has led to the establishment of the core foundations to organisational success (Cohendet and Steinmueller, 2000). In turn, Bughin and Jacques (1994) propose that the major obstacle to innovation is not so much related to companies experiencing some kind of short sightedness but rather fundamentally due to the incapacity of companies to adopt that which they term "the key principles to management": (i) marketing and R&D efficiency; (ii) synergies between marketing and R&D; (iii) communication capacities; (iv) organisational and innovation management excellence; and (v) the protection of innovation. This suggests that internal R&D, at least in the case of the majority of companies, proves insufficient for them to identify, leverage and maximise their innovation potentials.

We correspondingly propose the following six research hypotheses:

H1: Difficulties in accessing financing produce a negative impact on innovative capacities

H2: Difficulties in demand (limited client base) produce a negative impact on innovative capacities

H3: Shortages in qualified human resource skills produce a negative impact on innovative capacities

H4: Organisational related difficulties produce a negative impact on innovative capacities

H5: Cooperation related difficulties produce a negative impact on innovative capacities

H6: KIBS innovative capacities have a positive impact on financial performance.

New products require new capacities and, in a final analysis, a new combination of already existing competences (Koch and Strotmann, 2008). These new competences represent a pre-condition for generating new products and services and may be considered the result of the acquisition, assimilation and dissemination of new knowledge (Cohen and Levinthal, 1989; 1990) and that understood as the innovative capacity. Specific innovative capacities result from individual competences, already acquired knowledge and the specific skills of companies as well as recourse to diverse means of knowledge (Cohen and Levinthal, 1990; Malerba and Torrisi, 1992; Becker and Petrs, 2000; Schmidt, 2005). Very often and in particular at innovative small and medium sized companies, idiosyncratic internal capacities are particularly related with the profile of the respective entrepreneur, hence bound up with his/her experiences, motivations, networks, creativity, strategic orientation as well as the prevailing innovation activities (Lynsksey, 2004; Webster, 2004).

Hence, we arrive at our next research hypothesis:
H7: The entrepreneurial profile positively influences innovative capacities

2.2 KIBS factors of innovation

Measuring service innovation, and particularly within the KIBS sector, remains problematic as there is no consensus surrounding the conceptual framework (Flikkema et al, 2007). According to the Oslo Manual (OECD, 1997), non-technological innovation covers all types of innovation and not only those related with the introduction of new technologies or significant changes to goods and services or even those related to the utilisation of new processes. Innovation is perceived from different perspectives and that differ not just on the object of focus but also across concepts, strategic considerations, methodologies and models, measurement and analysis (Souitaris, 2002). Recently, research has shown particular interest in detailing and highlighting the company characteristics and factors that drive innovation (Hwang, 2004; Lemon and Sahota, 2004; Tidd and Bessant, 2009). Some studies maintain that the emergence of new ideas, clearly fundamental to any company innovative capacity, only arise out of the creation of knowledge (Cohen and Levinthal, 1990; Macdonald and Williams, 1994; Koc and Ceylan, 2007). Interlinked with this importance attributed to new ideas comes the relevance of its appropriate conveyance and application within the

scope of the company so that ideas may be shared and thereby foster the likelihood of innovation (Monge et al., 1992; Tidd and Bessant, 2009). The internal company environment proves a mitigating factor across the dimensions of organisational structure and development, establishing a suitable innovation strategy and communicating this to employees and all fundamental factors for innovation (Roberts and Berry, 1985; Wheelwright and Clark, 1995; Slappendel, 1996; Lemon and Sahota, 2004). For example, how are members of staff encouraged and motivated to participate in innovation processes able to actually drive progress (Wheelwright and Clark, 1995; Slappendel, 1996). An organisational culture that nurtures creativity and the spread of knowledge between the different employees with distinct capacities will enable a company to generate solutions while simultaneously leveraging potential synergies (Amabile et al., 1996; McGourthy et al., 1996; Damanpour and Gopalakrishnam, 1998; Lemon and Sahota, 2004). Nevertheless, and as Dussage et al. (1992) defend, the choice of the appropriate strategy or organisational culture depends on costs, on deadlines and on the risks the company is prepared to incur.

Innovation in processes may extend from innovations to products, processes, specific consumer needs as well as the acquisition of new technology (Roberts and Berry, 1985; Cooper, 1990; Koc and Ceylan, 2007). More recently, internal investment in R&D, outsourcing R&D, or participating in R&D networks have been identified as factors able to drive innovation capacity (Moritra and Krishnamoorthy, 2004; Castellani and Zanfei, 2006; Frenz and Ietto-Gillies, 2007). From the perspective of Tidd and Bessant (2009), a company's innovative capacity may be measured based upon factors related to strategy, organisation, learning, process and networks.

Within this framework, we correspondingly set out the following four research hypotheses:

H8: Strategy has a positive influence on innovative capacities

H9: The organisation has a positive influence on innovative capacities

H10: Learning has a positive influence on innovative capacities

H11: Process has a positive influence on innovative capacities

H12: Networks have a positive influence on innovative capacities

2.3. KIBS innovative capacities and location

Currently, the general prevailing consensus favours the idea that, beyond the differences existing in regional innovation performance, the actual innovative capacity and company strategy depends on the region located in (Cooke et al., 2004). Furthermore, in addition to any actual innovation capacities, government support for innovation policies and technological change in regions, and especially in rural regions, proves critical (Doloreux and Dionne, 2008). According to the OECD (2007), the motivation underpinning such support should be based upon studies of the differences between regional innovation hence enabling policies to be put into practice enabling lesser developed regions to boost their performances particularly in terms of innovation. Nevertheless, there still remain relatively few such studies examining the impact of the innovation processed by KIBS at the regional level (Shearmur and Doloreux, 2009). Studies done thus far on KIBS have focused on: (i) the impact that they have on employment (Chadwick and Glasson, 2008; Shearmur and Doloreux, 2008); (ii) the impact on the growth of cities (Simmie and Strambach, 2006; Aslesen and Isaksen, 2007a); (iii) the proximity effect on the transfer of knowledge and their clients (Aslesen and Jakobsen, 2007); (iv) the innovation effect on the transformative industry and its cooperative relationships with KIBS (Muller, 2001; Aslesen and Isaksen, 2007b; Muller and Doloreux, 2009); and (v) on the relationship between the surrounding host innovation systems (Hu et al., 2006; Kich and Stahlecker, 2006).

Indeed, the one question has has not been subject to study is exactly the differences between innovation at KIBS taking into consideration the type of services (professional vs. technological) and their locations (rural vs. urban). This research project seeks to narrow that shortcoming by simultaneously focusing on analysis of the innovative and competitive capacities of these KIBS types in conjunction with their location. In order to achieve these goals, three different approaches are made.

In the first, KIBS are perceived as directly influencing the innovative capacities of their clients and are hence fundamental contributors to innovation systems. This approach is taken by Cooke and Leydesdorff (2006) who argue that KIBS companies play an important role in the creation of local innovation infrastructures, contributing towards the region thereby building up their own competitive advantages. Within this context, Aslessen and Isaksen (2007a) find a strong presence of KIBS in urban areas with this explained through recourse to the laws of supply and demand. Urban areas displaying more favourable pre-conditions to innovation, such as the provision of knowledge (universities and research centres), are those which best contribute to KIBS

development and their spectrum of activities (Keeble and Nachum, 2002; Aslesen and Isaksen, 2007a).

Within a second approach, KIBS are studied as innovative in their own rights, and not in terms of their relationships with other companies, thereby rendering their host surroundings more competitive than others. Within this scope, KIBS locate in regions that have socio-cultural and institutional structures that favour constant and continuous learning and innovation and hence themselves opting to locate in those regions perceived as entrepreneurial (Markusen, 1999; Keeble and Nachum, 2002; Cooke et al, 2004; Doloreux, 2004).

Finally, and within a third approach, those KIBS located in regions otherwise lagging in development are identified (McCann, 2007). That is, different types of company require different types of knowledge intensity and contact networks. Hence, KIBS tend to locate more in urban areas within which networks are more easily facilitated and intensive knowledge shared (Crevoiser and Camagni, 2001; Malecki, 2007).

Within this context, we put forward the following two research hypotheses:

H13: Urban KIBS display greater innovative capacities than the rural.

H14: Urban KIBS attain better financial performances than the rural.

3. Methodology

3.1 Sample

A questionnaire was drafted and applied to a final sample of 500 Portuguese KIBS companies. The sample behind this study was built up according to a data base detailing the evolution (number of companies entering into bankruptcy and in business) of KIBS between 2004 and 2009. This data base contains a total of 34,644 KIBS entities of which 4,578 closed down with a further 32 relocating internationally. The data base was extracted by company turnover and hence incorporating only those entities recording a turnover in excess of € 0.01.

These companies were selected according to their CAE (REV.3) and NACE (REV 2) codes, in accordance with other research projects (Frell, 2006, Miles et al., 1995; Doloreux and Muller, 2007, Shearmur and Doloreux, 2008) so as to incorporate two KIBS types: technological KIBS (t_KIBS) made up of companies engaged in activities related to information technology, research and development, engineering, architecture and other consultancy related activities, testing and analytical techniques (NACE: 62.01; 62.02; 62.03; 62.09; 63.11; 63.91; 63.99; 71.11; 71.12; 71.20; 72.1; 72.2 codes) and professional KIBS (p_KIBS) that include the legal, accountancy and book-keeping sectors as well as audit, fiscal consultancy and market study activities as well as the entire publicity sector (NACE: 69.10; 69.20; 73.20; 70.22; 73.11; 73.12; 78.10; 78.30; 74.20; 74.90 codes).

The final sample of 500 KIBS companies was thereby structured as follows (table 1): p_KIBS (65.6%, 328 companies) and t_KIBS (34.4%, 172 companies). Of the total of these companies, 18.6% were located in rural regions (93 companies) and 81.4% in urban environments (407 companies).

Table 1: Distribution of KIBS: typology and location

KIBS typology		KIBS Location		
		Rural	Urban	**Total**
p_KIBS	N	63	265	328
	%	12.6%	53.0%	65.6%
t_KIBS	N	30	142	172
	%	6.0%	28.4%	34.4%
Total	N	93	407	500
	%	18.6%	81.4%	100.0%

Of the 328 p_KIBS companies, 63 were located in rural communities and 265 had set their companies up in urban settlements. Meanwhile, for t_KIBS, 30 of the companies had opted to go rural with 142 sticking to urban environments. Defined as rural zones were all locations with total populations below 5,000 inhabitants (criteria based on Kayser, 1990).

Variables deployed

The following table systematises the variables applied in structural equation modelling and their respective means of measurement in order to test the research hypotheses set out above.

Table 2: Dimensions and study variables

	Dimensions	Variables	Mesure
	Financial Performance	Turnover	Quantitative Intervals
Obstacles to Innovation	Obstacles to financing	Lack of equity capital Lack of external capital High wage costs	LIKERT Scale from 1 to 5 (1= not at all important; 5= very important)
	Obstacles in demand	Difficulties in forecasting levels of demand	
	Lack of qualified staff	Research and development Production Marketing and Sales	
	Obstacles related to organisation	Difficulties in the level of innovation organisation	
	Obstacles related to cooperation	Shortage of opportunities to cooperate with: (ii) Other companies (ii) Research bodies Lack of access to knowledge produced at universities and research centres Lack of access to external information	
Innovation	Factors of Innovation	Strategy Organisation Process Learning Networks	LIKERT Scale from 1 to 7 (1= not at all important; 7= very important). With 8 items for each factor.
	Innovative Capacities	Innovations in services	No. of service innovations
		Innovations in processes	No. of process innovations
		Organisational Innovations	No. of organisational innovations
		Introduction of already existing services in new markets	No. of already existing services introduced to new markets
		Number of Patents	No. of Patents
		Brands registered	No. of Brands
		Creation of new service designs	No. of new service designs
		Creation of new process designs	No. of new process designs
Business Characteristics	Owner profile	Entrepreneur age	Age
		Entrepreneur experience in the sector	Years of experience
		Education	Education
		Gender	0=male; 1=female
Employee Characteristics	Professional qualifications	Employees with higher education qualifications	Number of employees
Location and typology	Company characteristics	Rural Technological KIBS Rural Professional KIBS Urban Technological KIBS Urban Professional KIBS	1= rural 0= urban
		Length of company service	

3.2 Structural Modelling Results

The structural model estimate seeks to ascertain just which Innovation Activity (IA) factors, among the other respondent company and entrepreneur characteristics, directly or indirectly impact on the innovative and competitive capacities of the KIBS sector. The innovative capacity represents the average of the number of service innovations

(given this is the only type of innovation recorded in respondent answers) and to what extent this influences KIBS competitiveness as measured by turnover.

Table 3 portrays the estimate results, reliability intervals at 95% and structural model p-values. The methodology applied for estimation was that of maximum accuracy with bootstrap.

Table 3 – Structural Modelling Results

			Beta	Reliability Interval (95%)		p
				LI	LS	
Network	<---	Strategy	0.44	0.34	0.55	< 0.001
Network	<---	Learning	0.44	0.35	0.52	< 0.001
Professional urban companies	<---	Experience (years)	0.02	0.01	0.03	< 0.01
No. of Innovations	<---	Length of service (years)	-0.02	-0.03	-0.01	< 0.001
No. of Innovations	<---	Technological urban companies (0 – No; 1 – Yes)	0.39	0.17	0.64	< 0.001
No. of Innovations	<---	Network	0.21	0.05	0.36	< 0.01
No. of Innovations	<---	Experience (years)	0.04	0.02	0.06	< 0.001
No. of Innovations	<---	Difficulties in organising innovation	-0.12	-0.20	-0.04	< 0.01
No. of Innovations	<---	Professional urban companies (0 – No; 1 – Yes)	0.34	0.13	0.55	< 0.001
Turnover	<---	Technological urban companies (0 – No; 1 – Yes)	69.48	28.021	105.57	< 0.001
Turnover	<---	No. of Innovations	23.18	3.78	43.79	< 0.05

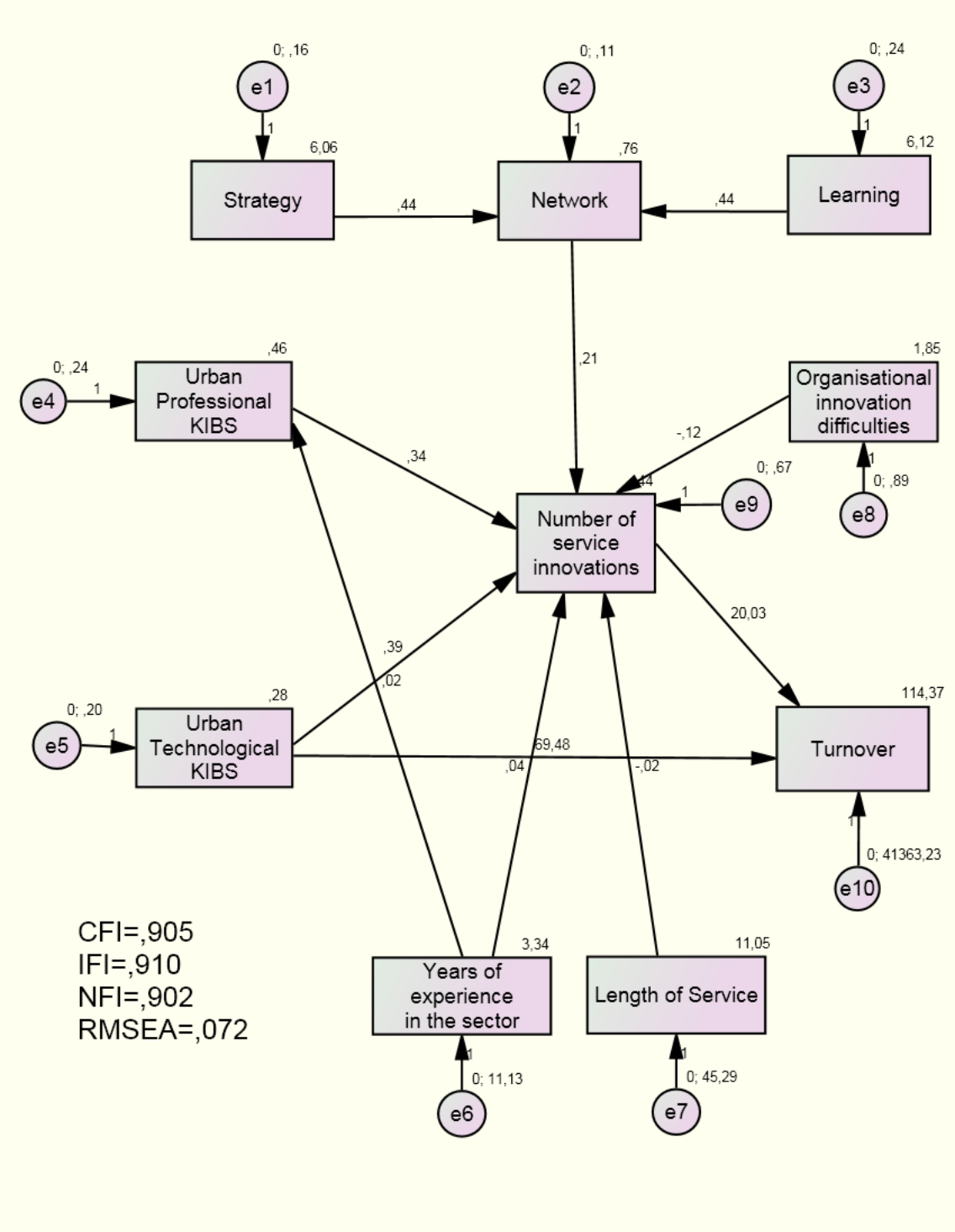
Analysing the adjustment quality (Table 4) according to the Averages Comparative Fit Index – CFI, Incremental Fit Index – IFI, Normed Fit Index – NFI and Root-Mean-Square Error of Approximation – RMSEA) concludes that, in addition to the statistical significance of all coefficients subject to testing, adjustment is good.

Table 1 – Structural Modelling Adjustment Averages

Chi	df	p-value	CFI	IFI	NFI	RMSEA
198.238	34	0.000	0.905	0.910	0.902	0.074

The model under study, represented in figure 1, presents the standardised factorial weightings for the final simplified model.

Figure 1: Structural model



The variables bearing a statistically significant direct influence on the number of product innovations are length of service in years (β=-0.02; IC95%: -0.03,-0.01;

p<0.001), an urban environment location and being a technologically (β=-0.39; IC95%: 0.17,0.64; p<0.001) or a professionally (β=0.04; IC95%: 0.02,0.06, p<0.001) focused KIBS company, the network factor in innovative activities (β=0.21; IC95%: 0.05,0.36; p<0.01), and the length of experience of the company manager/owner (β=0.04; IC95%: 0.02,0.06, p<0.001).

Analysing the direct, indirect and total effects (Table 5) of the diverse variables subject to analysis in terms of numbers of innovations, we find the factors Learning and Strategy generated no direct and statistically significant impact, however, as they influence the Networks factor, with the latter holding a statistically significant impact on innovation levels, there is an indirect effect of 0.09 (H12) for the aforementioned two factors (learning and strategy).

Table 5 –Direct, indirect and total effects

	Num. of Innovations (2009)			**Turnover**		
	Direct	Indirect	Total	Direct	Indirect	Total
Experience (years)	0.04	0.01	0.05	-	-	-
Learning	-	0.09	0.09	-	-	-
Strategy	-	0.09	0.09	-	-	-
Network	0.21	-	0.21	-	-	-
Professional urban companies (0 – No; 1 – Yes)	0.34	-	0.34	-	-	-
Technological urban companies (0 – No; 1 – Yes)	0.39	-	0.39	69.48	7.82	77.30
Difficulty in organising innovation	-0.12	-	-0.12	-	-	-
Length of service (years)	-0.02	-	-0.02	-	-	-
No. of Innovations (2009)	-	-	-	23.18	-	23.18

An average increase of one point in the level of alignment between the Learning and Strategy factors causes, and as mediated by the Networks factor, an increase of 0.09 innovations. It may thus be concluded that the Networks factor generates a positive impact on KIBS innovative capacities. This thereby corroborates other studies that point to the founding and running of networks as essential to the development of innovation (Moritra and Krishnamoorthy, 2004; Castellani and Zanfei, 2006; Frenz and Ietto-Gillies, 2007).

The length of manager experience also holds a direct impact of 0.04 and an indirect impact of 0.01 (mediated by whether the company is urban and professional), hence, this reflects how an additional year of experience fosters an average increase of 0.05

innovations (H7). Hence, the fact that an entrepreneur or owner has built up greater experience in the sector implies that they shall seek to foster innovation into the future. As defended by various authors, entrepreneurial characteristics are fundamental to the existence of innovation within organisations (Lynsksey, 2004; Webster, 2004).

The variable associated to location and given that the results demonstrate that whether KIBS are urban and professional generates a (total) direct impact of 0.34 and it may thus be inferred that a company's location in an urban environment and engaged in professional sector activities leads to a rise of 0.34 in innovations. In urban technological companies, this effect stands at 0.39 (H13).

At this stage, we should highlight two important results: (i) KIBS companies located in urban areas display greater innovative capacities than their rural counterparts, as Aslessen and Isaksen (2007) have proposed; (ii) urban technological KIBS companies hold greater innovative capacities (even while the gap is not especially large) than their professional KIBS peers, as identified by Frell (2006).

The variable related to difficulties in terms organising innovation (H4) has a significantly direct negative impact, -0.12, on the number of innovations. An average rise of one unit attributed to difficulties in organising innovation causes an average slide of 0.12 in innovations. Thus, we find that KIBS companies experiencing internal difficulties in terms of how they handle innovation processes turn in lower levels of overall innovative capacity. As defended by Bughin and Jacques (1994), this is one of the key management principles that companies experience great difficulty in overcoming in the field.

Length of service also generates a directly negative effect on innovations of -0.02. Hence, for every extra year of employee company service, there is an average decline of 0.02 in the number of innovations. The fact that the company has a strong or at least established track record may lead to a propensity to drive less innovation.

The variables that have a direct and statistically significant influence on turnover (Table 1) are the number of innovations in 2009 (β=23.12; IC95%: 3.78,43.79; $p<0.05$), its location in an urban environment and being a technologically based company (β=69.48; IC95%: 28.02,105.57; $p<0.001$). The variable applied to urban technological KIBS returns a direct of effect of 69.5 on Turnover and an indirect effect of 7.82 (total effect of 77.3) and we may correspondingly deduce that where a company is located in an urban context and focused upon the technological sector, its average turnover rises by over € 77,300 thousand than would otherwise be the case. The number of innovations

also generates a direct impact on estimated turnover of 23.18, which indicates that the increased innovation on average generates additional turnover of € 23,180 (H6). Thus, we can conclude that urban technological KIBS firms return a financial performance better than urban professional KIBS companies. Taking into consideration financial performance is a means of measuring the competitive capacities of a company, we may assume that technological KIBS entities are more competitive given that they not only turn in better financial performances but also prove more innovative.

We set out the results to our hypotheses in Table 6:

Table 6 – Research Hypotheses Results (Proven/Unproven)

Hypotheses	Relationship	p-value	Result
H1: Difficulties in accessing financing produce a negative impact on innovative capacities	Financial obstacles →number of innovations	P=0.297	Rejected
H2: Difficulties in demand (limited client base) produce a negative impact on innovative capacities	Demand obstacles → number of innovations	P=0.217	Rejected
H3: Shortages in qualified human resource skills produce a negative impact on innovative capacities	Lack of human resource → number of innovations	P=0.901	Rejected
H4: Organisational related difficulties produce a negative impact on innovative capacities	**Difficulty in organising innovations →number of innovations**	**P < 0.01**	**Accepted**
H5: Cooperation related difficulties produce a negative impact on innovative capacities	Obstacles to cooperation →number of innovations	P=0.102	Rejected
Hip. 6: KIBS Innovative capacities have a positive influence on financial performance.	**Turnover <---Number of innovations**	**P < 0.05**	**Accepted**
H7: The entrepreneurial profile positively influences innovative capacities	**Experience (years) →number of innovations**	**P= 0.01**	**Accepted**
H8: Strategy has a positive influence on innovative capacities	Strategy →number of innovations	p=0.608	Rejected
H9: The organisation has a positive influence on innovative capacities	Organisation →number of innovations	p=0.362	Rejected
H10: Learning has a positive influence on innovative capacities	Organisation →number of innovations	p=0.241	Rejected
H11: Process has a positive influence on innovative capacities	Process →number of innovations	p=0.381	Rejected
H12: Networks have a positive influence on innovative capacities	**Networks →number of innovations**	**P < 0.01**	**Accepted**
H13: Urban KIBS display greater innovative capacities than the rural	**Urban companies → number of innovations** **Rural companies →number of innovations**	**P < 0.001** **P=0.156**	**Accepted**
H14: Urban KIBS attain better financial performances than the rural.	Urban companies → Turnover	P=0.156	Rejected

Conclusions

In the review of the literature undertaken within the scope of this research project, we aimed to focus on the importance of KIBS companies within the framework of both innovation as well as the relationship with location. Therefore, we sought to evaluate whether or not innovative capacities serve as drivers of better financial performances in

addition to whether or not their location in rural or urban environments bears any impact on their innovation activities.

In our empirical study, we found that urban KIBS firms displayed greater innovation capacities than those located in rural surroundings. This conclusion comes in support of other research findings that emphasise that urban settings have more favourable pre-conditions for innovation, such as the presence of knowledge organisations (universities and research centres) that in turn provide inputs into the development and activities of KIBS (Keeble and Nachum, 2002; Aslesen and Isaksen, 2007a). Furthermore, the financial difficulties currently being encountered may have impacted to a greater extent on companies located in less advantaged regions with a lower propensity to innovative activities. We also found that of the five Factors of Innovation (Strategy, Process, Organisation, Learning and Networks) only the factors of strategy, learning and networks play significant roles in company innovation capacities. However, our results do not portray any statistically significant differences in terms of whether the company is professionally or technologically based. Given that networks were demonstrated to have a direct impact on KIBS innovative capacities, we would highlight here the findings of Ozman (2009) who also put forward results attributing a fundamental role to networks in innovation performance as they both nurture and foster technological transfers. Thus, a network is, at its core, the scope of influences existing within any specific system and place, and resulting from the dynamic process of accumulating experiences and learnings (Imai, 1989; Lorentzen, 2008).

Another variable influencing KIBS innovative capacities was that of entrepreneur profile. Whenever the entrepreneur reports more experience in the sector, this ensures a rise in the level of innovation. This conclusion has also been returned by other research projects (Lynsksey, 2004; Webster, 2004). Furthermore, where the company has a long established track record, there is a trend towards lower innovation levels than more youthful companies.

We would also wish to emphasise that, despite the prevailing financial and economic difficulties experienced, these KIBS companies did not identify such circumstances as impacting on innovation even though internal organisational issues did. We may thus assume that such difficulties relate to the company encountering certain shortcomings at the organisational level and on occasion resulting in lower levels of innovative capacity. Bughin and Jacques (1994) also hold that this is one of the key management principles that companies find most difficult to implement.

Finally, as regards the competitive level of KIBS as described by the average of their financial performance through turnover, we demonstrate that technological KIBS beyond returning better financial performances than their professional counterparts, also display better innovation capacities. Hence, we may argue that technological KIBS companies are effectively more competitive than professional KIBS. However, the location (urban vs. rural) held no influence in these terms.

In Portugal, there are not many KIBS firms located in rural areas and this might result, when analysing them in terms of the remainder of the sample, the urban located KIBS, in a lack of statistical significance as is the case in our study, thereby restricting the applicability of these particular results. Additionally, the non-representative nature of the sample from across the entire universe of KIBS in Portugal represents another study limitation.

Similarly, we would thus propose that future lines of research apply this KIBS classification methodology, by location and typology, to other international business realities and even comparative study analyses so as to ascertain whether there might be any differences between innovative and competitive capacities. It would furthermore be of relevance for future research projects to analyse the sustained dynamics of such companies over an extended temporal period.

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PART III

Conclusion

A good theory needs to be simple, sober and realistic (Popper, 1959, Pearl, 2000). These were the underlying principles guiding the four empirical articles that make up this Doctoral Degree Thesis. Following a thorough review of the literature, covering a range of different positions from across the academic theories, we have sought to put forward some theories on Portuguese KIBS sector companies.

Our interest in KIBS derives from the irrefutable role that such entities play in the development of their host regions and broadly defended by a diverse range of authors (Muller, 2001; Howells and Tether, 2004; Toivonen, 2004; Koch and Stahlecker, 2006). In this Thesis, we aimed to study these companies across four fundamental research facets: (i) location; (ii) cooperation with universities; (iii) factors of innovation and (iv) factors of innovation and competition. As aforementioned, these four areas emerge out of research questions that we now proceed to answer.

1. What factors best explain KIBS location options?

To answer this question, we made recourse to exploratory factorial analysis and logit regression modelling. Our results show that rural KIBS factors of location differ to the urban. In the latter case, entrepreneurs are clearly influenced by the economic and local infrastructures and thus clearly under the sway of neoclassical factors; adopting profit maximisation and cost minimisation strategies (Bade and Nerlinger, 2000; Roper and Love, 2006). These owners and managers tend to be older and have more experience in the sector of activity they are dedicated to.

In the case of rural KIBS, the factors of location are related to behavioural factors, especially individual motivations. We may state that they are broadly bound up with the personality characteristics of the entrepreneurs themselves, and hence non-economic factors (Ferreira et al., 2010; Lafuente et al., 2010). Such entrepreneurs are younger than their peers at urban KIBS (with a lower average age) and have correspondingly lower levels of professional experience. We may therefore portray them as younger and still finding their footings in the sector and more susceptible to locating their businesses in perhaps already familiar rural areas.

Following this research into the factors of location, we proceeded to learn whether or not such companies engaged in cooperation with universities, as is maintained by many authors, and whether or not they employ qualified professionals (Dall'erba et al., 2007; Acs et al., 2009). Hence, we are now in a position to respond to a second research question:

2. What is the level of cooperation ongoing between KIBS companies and universities?

Through recourse to exploratory factorial analysis and logit regression modelling, we identified that there was no difference in levels of cooperation between KIBS levels of cooperation (whether by urban vs. rural and professional vs. technological) with universities. This means that any KIBS cooperation with universities is done so independent of the type of service rendered and whether urban or rural located (Miles et al., 1995; Strambach, 2008). As regards the transfer of knowledge between universities and KIBS, this takes place through the employment provided to graduates with the rural company ratio of graduate employment rising in proportion to the level of companies located in that rural areas. Hence, as regards the employment of graduates in rural areas, at both professional KIBS and technological KIBS, this rises the younger their owners are and the higher their own respective levels of education. Contrary to the position taken up by Malecki et al. (2004), that KIBS prefer to take up locations in urban areas due to the access to specialist professionals, in the case of the KIBS companies making up this study, the level of higher education qualified professionals is greater in rural areas. As broadly defended by the literature, KIBS companies make recourse to specialist labour that enables them to foster innovation activities and leading onto our second research question seeking to identify just which factors hold greatest influence over innovation activities in effect at companies.

3. *What factors most influence KIBS innovation activities?*

Through recourse to confirmatory factorial analysis, we did identify differences in terms of KIBS type (professional vs. technological) while finding no statistically significant difference in terms of location (rural vs. urban). While some studies (Cooke et al, 2001; OECD, 2007 b) have found evidence that innovative capacities and the company innovation structure depend closely upon the respective region where they are located, our study finds that innovation levels fundamentally depend on the type of activities KIBS undertake: technological (t_KIBS) or professional (p_KIBS), as indeed found by Frell (2006). Furthermore, the key dimension to innovation activities at both t_KIBS and p_KIBS (Muller, 2001; Muller and Doloreux, 2009) are networks. We would nevertheless emphasise that while t_KIBS stress learning as important to innovation, p_KIBS opt in favour of the strategy factor (den Hertog 2000; Muller and Zenker 2001; Wood 2005; Simmie and Strambach, 2006).

Following analysis of the factors impacting on innovation activities, we may now move onto our final research question:

4. *Are there any differences in terms of competitive and innovative capacities and the type of KIBS? If yes, what are they and what relationship do they have on financial performance?*

In the analysis of innovation capacity and financial performance, through deployment of structural equation modelling, we find that urban KIBS (u_KIBS) return a higher level of innovation capacity than the rural (r_KIBS). We also verified that of the five factors of innovation taken up by this study (Strategy, Process, Organisation, Learning and Networks), while the factors of strategy, learning and networks are significant in terms of the innovative

capacities of these companies (Castellani and Zanfei, 2006; Koc and Ceylan, 2007; Frenz and Ietto-Gillies, 2007; Tidd and Bessant, 2009). However, we did not encounter any difference between the service type (professional vs. technological) even though our results show that the greater the experience of the respective entrepreneur in the sector, the greater the level of innovative output (Lynsksey, 2004; Webster, 2004). In terms of obstacles to innovation, we would point to, despite the prevailing difficulties and credit restrictions, KIBS not identifying these factors as hindering innovation as this is caused more by levels of internal organisation. We may therefore assume that such an obstacle relates to organisational shortcomings, for example: in terms of communication between employees, team working so as to generate synergies and appropriate organisational structures for innovation processes and thereby capping the extent of innovation possible. Finally, as regards the competitiveness of KIBS, as measured by their financial performance as expressed in turnover, t_KIBS were found to turn in better financial performances than p_KIBS while simultaneously registering a greater capacity for innovation. We may thus naturally propose that the more innovative KIBS are also the most competitive. This finding also backs the position that technological sector investment may drive a better financial performance and thereby enhance the competitive advantages in effect at companies. We now move onto the limitations of our research project. As all such research inherently contains its own limitations as the studies carried out do not provide the definitive responses to the questions raised but rather provide a foundation stone for building new discoveries and future lines of research.

Limitations and Future Lines of Research

Any research project inevitably incurs its own limitations. The perfect study has never and will never be carried out. Indeed, these respective limitations vary in accordance with the deliberate and the subconscious choices made (Ferreira, 2003).

One limitation found in our research was the sheer level of complexity involving each of the respective issues raised, a facet that was duly recognised at the outset of this Thesis and not only because the very subject matter, innovation in services and focusing especially on KIBS, is relatively recent in addition to the lack of any consensus as to the best means of statistically capturing innovative capacities. As regards this latter dimension, we sought to overcome this lack by setting out a sufficiently broad reaching theoretical framework enabling us to perceive the various different positions of authors and adopt an analytical methodology best adapted to such purposes.

Another limitation relates to the company sample our findings are based on that, while statistically valid, does not represent the entire universe of KIBS in Portugal. Furthermore, that we only had access to a limited scope of r_KIBS companies did influence the statistical analytical processes open to us when comparing them to their urban peers.

Correspondingly, and as regards future lines of research, we would hereby propose the application of this KIBS classification methodology, by location and typology, to other

countries so as to ascertain whether or not there are other factors of location beyond innovative and competitive capacities. It would also be of relevance for future research to focus on the underlying dynamics of these companies over a sustained period of time. Through recourse to respondent answers over a period of five years, for example, we would be able to build up a picture of events ongoing within the scope of the Thesis. In the specific case of r_KIBS, verification of variations in the numbers of such companies in such regions would be of particular interest given there are currently only 93 KIBS. In the case of location theories, there is a clear requirement to apply a multidisciplinary approach as, in keeping with the findings of this study, the location options of r_KIBS are different to the urban. Thus, inputs from other fields of the social sciences might make an important contribution towards better understanding the factors underlying decision making by the entrepreneurs themselves.

Cooperation with universities is another research theme that requires future attention with the objective of analysing the complexity and progress, or otherwise, in such relationships. Given that KIBS are knowledge intensive companies, it would be expected that the university/company relationship would be relatively close and intense. However, despite a low level of companies declaring cooperation with universities, it would indeed seem important to monitor where future trends in this field head.

As regards innovation, we would particularly like to see verification as to whether or not r_KIBS raise their level of innovation and whether or not these have any impact on financial performance thus achieving greater competitiveness. Finally, we would also suggest that future studies take into consideration the impact of KIBS innovative capacities on the competitiveness and the development of their host regions.

Implications

Stemming from this project are two major research conclusions with consequences for both the business community and government.

Taking into consideration that these companies are located within a sector of great uncertainty and complexity, the capacity to adapt to the prevailing contingencies is fundamental. The greater the level of this adaptive capacity, the greater the competitive advantage over other players in the market. One means of attaining this is through cooperation with universities. Knowledge intensive Portuguese companies, in order to fulfil an inherent characteristic of KIBS companies, being in the very vanguard of knowledge deployment, have to reach out to the locations where such knowledge is effective generated, within the academies. Another means of differentiation is through innovation. Furthermore, boosting innovative capacities works to contribute towards a better financial performance and consequently towards overall company profitability. However, this facet is bound up with private cooperation with universities. Hence, should entrepreneurs place greater emphasis on cooperating with universities, the latter may be able to facilitate companies attaining levels

of differentiation and especially through access to the knowledge generated within and thereby drive the production of innovation.

Another implication within this scope applies to the terms and conditions of public policies. The authorities need to better understand the complex environment that companies currently face. Only thus is there any real likelihood of adopting the appropriate policies tailored to the private sector realities of the 21st century.

Policies that nurture entrepreneurialism in rural areas should take into account that this type of company, when located in lesser developed regions, turns in similar levels of performance than their urban peers. Boosting their numbers will ensure the progress towards overcoming regional equalities and achieving a more balanced national distribution of income. Entrepreneurial support policies might prove able to boost regional development and thereby consequently make an input into raising the standard of living in the company's host community. Properly understanding the factors of location and entrepreneurial characteristics is a fundamental step towards taking the most suitable decisions able to maximise the potential for launching companies as well as enhancing the business environment for those existing, and especially targeting knowledge intensive entities given their role in managing and promoting innovation.

Thus, programs able to open up links between this sector and universities are fundamental as is the case with acknowledging and rewarding existing companies for their innovative capacities. Despite not having identified financing as an obstacle to innovative capacity, times are turbulent and such provision of funding clearly represents one incentive for driving relationships susceptible to generating innovation.

Given the looming scale of change, we must adopt new measures and new policies and we believe that funding and financing the founding of such companies does contribute towards regional development and particularly within the Portuguese environment where the rural/urban dichotomy remains so pronounced as well as for the competitiveness of those entities interacting with these new KIBS companies. We therefore believe that the results of this research project provide a deeper and more detailed insight into this sector hitherto subject to so little research, particularly in Portugal.

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Annex

CARTA DE APRESENTAÇÃO

Caro Empresário/Empresaria

No âmbito da realização da minha Tese de Doutoramento em Gestão estou a desenvolver o estudo no sector das Empresas de serviços de conhecimento intensivo (em inglês KIBS).
Neste sentido e porque é cada vez mais pertinente o estudo deste sector de serviços, devido ao seu contributo para a inovação, desenvolvimento e competitividade regional, vimos solicitar que preencha o questionário em anexo.

Leia atentamente o enunciado do questionário. Lembre-se de que **não existem respostas certas ou erradas**. É importante que as suas respostas sejam **sinceras**. Tente responder de acordo com aquilo que realmente ocorre na sua empresa e não de acordo com a forma como acha que deveria fazer ou como considera que os outros o/a fariam. Não tem um tempo limite para o preenchimento do questionário, mas procure dar a resposta mais imediata a cada uma das afirmações/questões. No fim de cada questionário **verifique que respondeu a todas as questões**.

Todos os dados contidos nos questionários a que responda são **TOTALMENTE confidenciais e anónimos**.

Em meu nome e da Universidade da Beira Interior
Agradecemos a sua colaboração

Atentamente de Vª. Ex.ª

Cristina Fernandes

P.S. - Se pretender esclarecer alguma dúvida ou qualquer outro assunto, queira contactar-me: Cristina Fernandes (kristina.fernandes@sapo.pt) - Telemóvel: 918683444

Questionário de apoio à realização da Tese de Doutoramento em Gestão da doutoranda Cristina Fernandes

Neste questionário vai encontrar um conjunto de afirmações sobre dados gerais da sua empresa, actividades de inovação, cooperação com instituições de ensino superior e factores de localização. Dependendo do tipo de empresa assim a reacção a estas afirmações poderá ser distinta. Assegure-se que as suas respostas são representativas do seu modo de agir às diferentes afirmações. Em cada um dos itens **assinale com uma cruz** (**X**) a resposta que lhe parece mais expressiva do **modo como habitualmente encara as situações expostas.**

I . Dados Pessoais E Gerais

1. Perfil do empresário

PERFIL	EMPRESÁRIO
1.1 Cargo	
1.2 Quando começou a fazer parte da empresa? (caso não seja o primeiro proprietário)	
1.3 Morada da empresa	
1.4. Pagina na Internet	
1.5. CAE	
1.6) Data de nascimento / idade	
1.7) Habilitações académicas *(1=ensino básico, 2=ensino secundário, 3=Escola de Formação profissional, 4=licenciatura, 5=mestrado, 6=Doutoramento*	
1.8) Formação técnica (física, electrónica, mecânica, engenheira,…) *(0=não; 1=sim)*	
1.9) SEXO *(F=feminino; M=masculino)*	
1.10) Nasceu nesta localidade? *(0=não; 1=sim)*	
1.11) Cresceu nesta localidade? *(0=não; 1=sim)*	
1.12) Quantas empresas criou antes desta? *(numero de empresas)*	
1.13) Tinha alguma experiência anterior nesta área de negócio? *(numero de anos)*	
1.14) Existe mais algum empreendedor na sua família ou na sua rede de amigos próximos? *(0=não; 1=sim)*	
1.15) Qual a relação deles consigo? *(1=pai/mãe, 2=avô/avó, 3=irmão/irmã, 4=filho/filha, 5=primos, 6=amigos, 7=outros)*	
1.16) Qual era a sua actividade antes de entrar nesta organização? *(1=tinha outros negócios, 2=director de outra empresa do mesmo sector, 3=director de outra empresa de sector diferente, 4=trabalhador de uma empresa do mesmo sector, 5=trabalhador de uma empresa sector diferente, 6=desempregado, 7=outro)*	
1.17) Onde estava localizada esta empresa? *(1=cidade, 2=distrito, 3=região, 4=país, 5= outro país. (Indicar a localização)*	

2. O capital da empresa é qual controlado por outra empresa (aproximado)

2.1Não	
2.2.Sim: até ao montante de 25%	
2.3.Sim: de 25% a 50%	
2.4: Sim: mais de 50%	

3. No ultimo exercício económico foi o volume de negócios

3.1.Menos de 50.000€	
3.2.De 50.000€ a 100.000€	
3.3. De 100.000 a 200.000€	
3.4. De 200.000€ a 300.000€	
3.5. De 300.000€ a 400.000€	
3.6. De 400.000€ a 500.000€	
3.7.Mais de 500.000€	

4.Numero de funcionários ao serviço

	2004	**2009**
4.1.Número total		
4.2.Numero de trabalhadores com curso universitário:		
4.2.1.Ciencias exactas		
4.2.2.Ciencias Sociais e Humanas		
4.2.3. Ciência e Tecnologia		
4.3 Ensino Secundário		
4.4. Ensino Básico		

5. Nos anos 2004 a 2009 qual ou quais as regiões que têm maior peso no volume de negócios da empresa

Regiões	2004	2009
	%Vol.Negócios	
5.1.Norte		
5.2.Centro		
5.3.Lisboa		
5.4.Alentejo		
5.5.Algarve		
5.6.Madeira		
5.7.Açores		
5.8.Regiões Internacionais		

6.Qual ou quais os sectores com maior participação no volume de negócios da empresa.

Sectores	**2004**	**2009**
	% Volume de Negócios (=100%)	
6.1.Sector Publico		
6.2.Empresas do sector Privado:		
6.3.Empresas Industriais de alta tecnologia		
6.4. Empresas Industriais de media tecnologia		
6.5. Empresas Industriais de Baixa tecnologia		
6.6.Particulares		

II.Actividades de Inovação

7. Responda às seguintes questões, assinalando o seu grau de importância

Questão	**Grau de importância: 1= nada importante; 7=muito importante**						
	1	2	3	4	5	6	7
7.1- Os colaboradores da empresa reconhecem a importância da inovação para a competitividade.							
7.2- A empresa tem mecanismos que a auxiliam na gestão de produtos novos desde a ideia do seu lançamento.							
7.3- A estrutura da empresa não compromete a inovação mas ajuda ao seu desenvolvimento.							
7.4- Há um grande compromisso para com a formação dos colaboradores.							
7.5- A empresa tem uma boa relação (win-win) com os fornecedores.							
7.6- A estratégia de inovação da empresa é partilhada de forma clara junto de todos os colaboradores para que estes conheçam as metas a cumprir.							
7.7- Os projectos de inovação são normalmente cumpridos dentro dos prazos e do orçamento.							
7.8- Os colaboradores trabalham bem em conjunto e também para além das fronteiras departamentais.							
7.9- A empresa despende tempo na revisão dos nossos projectos para assim os melhorar e ao desempenho nas acções seguintes.							
7.10- A empresa compreende muito bem as necessidades dos seus consumidores /utilizadores finais.							
7.11- Os colaboradores reconhecem que, para que a organização seja competitiva, é importante que tenha. competência(s) distintiva(S)							
7.12- A empresa tem mecanismos que verificam se todas as necessidades dos consumidores são realmente entendidas (não apenas ao nível do marketing).							
7.13- Os colaboradores estão envolvidos na sugestão de ideias para melhorar produtos ou processos.							
7.14- A organização trabalha com universidades e outros centros de investigação que a possam ajudar a desenvolver o seu conhecimento.							
7.15. A empresa analisa os seu erros de modo a melhorar as suas actividades e processos.							
7.16- A empresa olha para o futuro de modo a antecipar as ameaças e oportunidades (utilizando ferramentas e técnicas de previsão).							
7.17- A empresa tem mecanismos de gestão dos processos que permitem adequar procedimentos de modo a garantir o seu sucesso final.							
7.18- A estrutura da empresa ajuda à rápida tomada de decisões.							
7.19- A empresa trabalha muito perto dos seus consumidores de modo a desenvolver novos conceitos.							
7.20. A empresa compara sistematicamente os seus produtos e processos com os dos seus concorrentes.							
7.21- Os colaboradores(/profissionais?) que ocupam cargos de topo têm uma vêm a inovação como factor determinante ara o desenvolvimento da empresa.							
7.22- A empresa pesquisa novas ideias para novos produtos de forma sistemática							
7.23- A comunicação entre os vários níveis de hierarquia funciona de forma eficaz.							
7.24- A empresa colabora com outras empresas no desenvolvimento de novos produtos ou processos.							
7.25- A empresa partilha experiências com outras empresas que a ajudam na compreensão das mesmas.							
7.26- Quem ocupa cargos de topo mostra um compromisso para com o apoio à inovação.							
7.27- A empresa tem mecanismos que garantem o envolvimento de todos os departamentos no desenvolvimento de novos produtos ou processos.							
7.28- A empresa tem um sistema de apoio e recompensa às iniciativas de inovação.							
7.29- A empresa tenta desenvolver redes externas com indivíduos que a podem auxiliar (por exemplo com especialistas em conhecimento específico).							
7.30- A empresa regista a sua evolução de desenvolvimento de modo a que outras pessoas na organização possam tirar partido dessas aprendizagens.							
7.31- A organização tem mecanismos para analisar os novos desenvolvimentos tecnológicos e de mercado e qual o seu impacto para a estratégia da organização.							
7.32- A organização tem um sistema claro de escolha de projectos de inovação.							
7.33- A organização tem um clima favorável à criação de novas ideias, que incentiva os colaboradores a fazer as suas propostas.							
7.34- A organização partilha as suas necessidades e competências com organismos de educação.							
7.35- A organização aprende com as outras organizações.							
7.36- Existe um ligação clara entre os projectos de inovação e toda a estratégia de negócio.							
7.37- Sistema da organização é flexível e auxilia a rápida concretização de pequenos projectos .							
7.38- A organização trabalha bem em equipa (ou equipas)							
7.39- A organização trabalha de perto com os utilizadores dos seus novos produtos ou serviços.							
7.40- A organização utiliza medidas que a ajudam a identificar onde e quando pode melhorar a sua inovação.							

8. Quais foram os principais obstáculos á inovação

Obstáculos	Grau de importância: 1= nada importante; 5=muito importante				
	1	2	3	4	5
8.1 Financiamento					
8.1.1. Capitais próprios insuficientes					
8.1.2.Capitais externos insuficientes					
8.1.3. Custos Salariais elevados					
8.2. Difícil previsão da procura					
8.3. Falta de pessoal qualificado:					
8.3.1. Investigação e Desenvolvimento					
8.3.2.Produção					
8.3.3.Marketing e Vendas					
8.4. Outros obstáculos					
8.4.1. Inovações difíceis de organizar					
8.4.2. Possibilidades de cooperação Insuficientes:					
8.4.2.1.Com outras empresas					
8.4.2.2. Com organismos de pesquisa					
8.4.3. Insuficiente acesso ao conhecimento produzido em universidades e centros de investigação					
8.4.4. Insuficiente acesso a informações externas					

9. Quantifique o número de inovações processadas nos seguintes parâmetros para 2004 e 2009

Tipos de inovação	2004	2009
9.1. Inovações no produto/serviços		
9.2. Inovações no processo		
9.3. Inovações organizacionais		
9.4.Introdução de produtos já existentes em novos mercados		
9.5. Número de Patentes		
9.6.Criação de Marcas		
9.7. Criação de novos designs para o produto		
9.8. Criação de novos designs para os processos		
9.9: Descreva a principal inovação implementada no último ano		

III . Cooperação com as instituições de ensino superior

10. De entre os factores que se seguem, quais os que se revelam mais importantes para o desenvolvimento de relações de colaboração para com as instituições de Ensino Superior?

Factores	Grau de importância: 1= nada importante; 5=muito importante				
	1	2	3	4	5
10.1.Proximidade Geográfica					
10.2.Contactos pessoais frequentes					
10.3.Confiança recíproca					
10.4.Competencia mutua					

11. Qual o tipo de colaboração mais importante que liga a sua empresa à instituição de ensino superior com a qual estabeleceu a cooperação, após a realização da mesma?

Tipo de colaboração	Grau de importância: 1= nada importante; 5=muito importante				
11.1. Ausência de colaboração	**1**	**2**	**3**	**4**	**5**
11.2.Fraca colaboração					
11.3.Colaborações esporádicas					
11.4.Colaboração continua.					
11.5.Menos de 3 meses					
11.6.Entre 3 e 6 meses					
11.7.Entre 6 e 12 meses					
11.8. Mais de 12 meses					
11.9. Recorre com frequência aos docentes do ensino superior					
12. Qual a instituição se ensino superior com maior impacto na cooperação com a sua empresa.					

12. Das seguintes alternativas indique pela sua importância as que tiveram maior influência na criação da cooperação entre a empresa e a Instituição de ensino superior.

Tipos de custos	Grau de importância: 1= nada importante; 5=muito importante				
	1	**2**	**3**	**4**	**5**
12.1.Ampliar o mercado da região geográfica de actuação					
12.2.Desenvolver novos produtos e/ou serviços					
12.3.Partilhar custos de I&D					
12.4.Gerar intercâmbio formal e informal de pessoas e ideias					
12.5.Elevar a eficiência operacional					
12.6.Partilhar tecnologias e conhecimento					
12.7.Aprender com o parceiro de cooperação					
12.8.Reduzir custos gerais.					

IV . Factores de Localização

13. Indique, dos factores seguintes, quais os que influenciaram na sua decisão de localizar aqui a sua empresa:

Factores	Grau de importância: 1= nada importante; 5=muito importante				
	1	2	3	4	5
13.1.O fundador, os gestores e os funcionários desejam viver nessa localidade					
13.2.Proximidade da residência do fundador					
13.3.Boas condições de alojamento;					
13.4.Clima;					
13.5.Atitude da comunidade face aos negócios;					
13.6.Actividades recreativas e de lazer;					
13.7.O fundador ter nascido nessa localidade;					
13.8.Bons acessos;					
13.9.Estatuto financeiro do empreendedor;					
13.10.Distancia a que as empresas se encontram dos centros urbanos.					
13.11.Distancia ao mercado e a dimensão das aglomerações.					
13.12.Infra-estruturas rodoviárias.					
13.13.Especialização geográfica.					
13.14.Qualificação do capital humano.					
13.15.Custos da propriedade industrial.					
13.16.Custos com salários.					
13.17.Densidade populacional.					
13.18.Nível de actividade económico do local onde se localiza a empresa.					
13.19.Outras infra-estruturas físicas (caminhos de ferro, aeroportos, telecomunicações, etc.).					
13.20.Proximidade das matérias – primas.					
13.21.Proximidade dos serviços.					
13.22.Incubadora de empresas.					
13.23.Acesso ao conhecimento gerado pelas universidades ou centros de investigação.					
13.24.Localização perto de centros administrativos.					
13.25.Acesso aos parques de ciência.					
13.26.Incentivos de I&D, criação de empregos ou outros incentivos.					
13.27.Proximidade de instituições de ensino.					
13.28.Feiras tecnológicas.					
13.29.Empresários de referência na região.					

14. Quais as vantagens de localização neste local?

Vantagens	Grau de importância: 1= nada importante; 5=muito importante				
	1	2	3	4	5
14.1. Qualidade de vida					
14.2. Terrenos/ edifícios/custos de armazenagem					
14.3. Custos de fornecimentos / custo de matérias-primas/custo de serviços					
14.4. Custo da mão-de-obra (salários)					
14.5. Disponibilidade de mão-de-obra qualificada e especializada					
14.6. Disponibilidade de mão-de-obra não-qualificada e não-especializada					
14.7. Disponibilidade de terrenos /edifícios/armazéns					
14.8. Disponibilidade de fornecimentos/ matérias-primas/ serviços					
14.9. Posição natural /meio envolvente					

15. Quais as desvantagens da escolha deste local?

Desvantagens	**Grau de importância: 1= nada importante; 5=muito importante**				
	1	**2**	**3**	**4**	**5**
15.1. Isolamento					
15.2. Infra-estruturas rodoviárias inadequadas					
15.3. Fornecimentos/matérias-primas/serviços inadequados					
15.4. Falta de mão-de-obra qualificada e especializada					
15.5. Falta de mão-de-obra não-qualificada e não-especializada					
15.6. Dificuldade de acesso a infra-estruturas de telecomunicações					
15.7. Elevados custos de mão-de-obra (salários)					
15.8. Falta de terrenos/ edifícios/armazéns					
15.9. Falta de procura					