KIBS IN PERIPHERAL REGIONS: MAJOR OUTLINES
KIBS NAS REGIÕES PERIFÉRICAS: CONSIDERAÇÕES GERAIS

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ABSTRACT

Firms, in general, have an absorptive capacity that permits them to recognize the value of new, external information, assimilate it, and apply it to commercial goals. This capacity results from their level of prior related knowledge and they can become creators of innovation in a context of micro and small sized young firms, coming up with innovative outputs.

The first goal of this paper is to pursue this discussion in the context of KIBS (Knowledge Intensive Business Services) which are non-material firms, providing intangible and highly personalized services submitted to the general market rules. Also, the geography of KIBS will be emphasized by pointing out the restrictions related to its major role in the peripheral areas of the world. Therefore, this paper presents an analysis of cross country experiences, identifying bottlenecks and common results to demonstrate the major role of KIBS in such environments.

The conclusion of the research is twofold: For peripheries, the innovation capacity of KIBS depends on their internal capacity to innovate (as pushing forces), but for KIBS, their main function depends on the *readiness* of their clients to use their skills to innovate (as pulling forces). This last determinant varies with the readiness of their clients to network and innovate and with their labor force to learn.

Keywords: KIBS; Business Services; Knowledge Management; Peripheries

RESUMO

Em geral, as empresas têm uma capacidade de absorção que lhes permite reconhecer o valor da nova informação e de a assimilar ou aplicar para diversos fins comerciais. Esta capacidade resulta do seu nível de conhecimento prévio que lhes permite atuar como fontes externas de conhecimento, podendo tornar-se criadoras de inovação num contexto de micro e pequenas empresas.

O primeiro objetivo deste artigo é o de seguir esta discussão no contexto de Knowledge Intensive Business Services (KIBS), fornecendo serviços intangíveis e altamente personalizados de acordo com as regras gerais de mercado. A geografia das KIBS será destacada indicando as restrições relacionadas ao seu papel principal nas áreas periféricas. Apresenta-se uma análise de experiências pelo mundo, identificando bloqueios e práticas comuns na tentativa de demonstrar o papel principal das KIBS em ambientes menos promissores.

A conclusão indica-nos que para as periferias, a capacidade de inovação das KIBS depende da sua capacidade interna de inovar mas a sua função principal de promotora depende da prontidão dos seus clientes absorver novos conhecimentos e ideias , um movimento que se robustece em ambientes de redes.

Palavras-chave: KIBS; Apoio às Empresas; Gestão do Conhecimento; Periferias

JEL Classification: O32, L22 e L25

1. INTRODUCTION

According to literature reviews, KIBS (Knowledge Intensive Business Services) are non-material firms providing intangible and highly personalized services. Their capacity to act as external sources of knowledge to their clients allows them to become independent creators of innovation in a context of micro and medium sized young firms, coming up with innovative outputs.

Since the 1960s the conceptualization of KIBS has changed into a more systemic perspective to explain innovation in the service sector. Firstly, this paper revisits and discusses this conceptual evolution which has been deeply linked to a better understanding of what innovation is about. For almost three decades, between the beginning of the 60s and towards the ends of the 80s, innovation was associated with technological materials and equipment, essentially pointing to product innovation. R&D played a deep role in establishing innovative firms.

A new phase started in the 90s when the innovative processes focused more on the transformation sector, emphasizing the development of new organizational products in the service sector and, moreover, contributing for increasing the new managerial capacity of firms. As organizational innovation was taking place, in a context of lower investments but still permitting rising profits for firms, new theoretical approaches exploited the role of service innovation and its capacity to spread, dragging innovation with it. Soon after, a clear theoretical feature was developed for the distinct function of services within the growing transformation sector so that new specific classifications could allow measuring the impact of such firms for innovation and growth. The most recent research in the field points out an integrative and holistic approach to better seize innovation in services and its impact across the other economic activities.

More than the impact across sectors, we would like to emphasize the geography of KIBS. After a conceptual introduction, the empirical part of this study analyzes the level of efficiency of KIBS as instruments to diffuse knowledge and stretch marketing or organizational innovation in the peripheral areas.

The materials and methods to sustain this essay are composed by the description of a series of case studies in Spain, Brazil, Finland, Canada, Italy and Portugal. Their comparative analysis suggests cross country experiences, identifies bottlenecks and finds common results in an effort to demonstrate the major role of KIBS in such environments, generally populated by small firms.

The third part of this paper tackles the general capacity of small firms to learn when located in peripheral environments, hereby considered to be one of the most serious restrictions in the acting role of KIBS. A theoretical framing justifies this view as well as a set of results obtained from a previous European project on the contribution of innovation for the dynamics of local development.

This second empirical discussion is based on a set of data gathered from 323 firms located across six European peripheral regions located in Belgium (Hainaut, West Flanders), France (Aude, Gard), Ireland (Border, Southwest), Poland (Kujawsko-Pomorskie), Portugal (Oeste, Alentejo Central) and the UK (Devon and Cornwall, Hereford and Worcester). The argument emphasizes the key trends of small firms when in the presence of more, or less, innovative attitudes. Furthermore, it characterizes the actual skills in management and labor as well as their capacity to learn by interacting and cooperating with external agents – characteristics that are crucial to absorb the inputs that KIBS may transmit to their clients.

Finally, the conclusion of the research is twofold: For peripheries, the innovation capacity of KIBS depends on their internal capacity to innovate (as pushing forces), but for KIBS, their main function depends on the *readiness* of their clients to use their skills to innovate

(as pulling forces). This last determinant varies with the readiness of their clients to network and innovate and with their labor force to learn.

2. CONCEPTUAL DEVELOPMENTS

Throughout the last decades many studies related to innovation have been presented, contributing with sufficient scientific ground to a clear understanding about the innovative processes. In general, there is an almost consensual understanding on the complexity of innovation and also on the fact that knowledge plays a major role to address it. However, innovation goes much beyond product and process development. It presents an interactive nature for which knowledge, the main pillar, is not only a firm characteristic but also a spatial endogenous characteristic.

Thus, although the firms' capacity to set up flourishing innovation processes is frequently understood as a similar, key success factor in both manufacturing and service sectors, there are distinctions to be made: Not only services and manufacturing have different innovation drivers, but they also both depend differently on the social and regional contexts in which firms are embedded.

Besides these points, most of the theoretical approaches on innovation focus on product development, lacking clear conclusions for process, organizational or marketing innovation, frequently related to service organizations and in particular to KIBS.

So, it is not surprising that, in light of an emerging "knowledge-based economy", studies related to particular, fast growing service subsectors, such as KIBS, are promising and meaningful scientific contributions. KIBS use high quantities of knowledge based attributes when providing their support to clients, shedding new light on the better understanding of the complex innovation processes and, subsequently, to growth.

In this paper we emphasize both aspects: KIBS as an important emerging sector able to innovate and, moreover, as a potencies role player in the regional development process. As innovators, Nählinder, 2002, pointed out KIBS as able to provide the most innovative activities within the service sector, almost similarly to high-tech manufacturing activities.

KIBS are non-material firms providing intangible and highly personalized services (Cohen and Levinthal, 1989):

- They act as external sources of knowledge to their clients
- They are independent creators of innovation
- The majority of firms are micro and medium sized young firms
- They store knowledge and experiences, are flexible to cooperate – coming up with innovative outputs

Much has been written about the KIBS role as a facilitator, carrying and being a source of innovation (Bilderbeek and Hertog, 1998a; Bilderbeek *et al* 1998; OCDE, 2006). The reason is that they may combine with the traditional knowledge structure, formed by universities and public research centres, or act as "bridges to innovation" (Czarnitzki and Spielkamp, 2000), easing the knowledge flow among organizations by means of multiple interactions, even with competitors. As an example, KIBS would facilitate innovations in clients by helping to adopt solutions previously developed in other sectors or firms (i.e. any software solution).

Finally, KIBS are also important innovation performers, depending to a great extent on professional knowledge (related to specific technical fields) and providing, at the same time, intermediate products and services that are knowledge based (Miles et al., 1995). Computer services, R&D as well as different type of consultancy services (technical, legal, etc.) are among the most representative activities (González-López, 2006).

Table 1 – Conceptual contributions for KIBS

Phases	Years	Authors	Theoretical framing
	1960	Fuchs, 1968	
Omission	1970	Bell, 1973 Levitt, 1976 Abernathy, 1978	
	1980	Pavitt, 1984 Belleflamme et al., 1986 Barras, 1986	*Resource and Capacity Theory* Cohen and Levinthal, 1989
Assimilation	1990	Barras, 1990 Galouj, 1994	*Industrial District Theory* Becattini, 1990 Sengenberger and Pyke, 1992 *Cluster Theory* Porter, 1990 Porter and Stern, 2001
	1995	Gadrey et al., 1995 Miles et al., 1995 Gallouj and Weinstein,1997	
	1998	Gallouj, 1998 Sunbdo and Gallouj, 1998 Bilderbeek, 1998	
Differentiation	2000	Evangelista,2000 Uchupalanan, 2000 Sunbdo and Gallouj, 2001	
	2001	Miozzo and Soet, 2001 Freeman and Louça, 2001 Gallouj,2002	
	2004	Drejer, 2004 Huergo and Jamandreu,2004 Becker and Dietz, 2004	
Synthesis	2005	Tether, 2005 Nieto and Santamaria, 2005 Miles, 2005 Camacho and Rodriguez, 2005	*Systemic Theory* Edquist, 2005
	2006	Cainelli et al., 2006 Evangelista, 2006 Vries, 2006	
	2009		*Network Theory* Ozman, 2009

Source: Fernandes et al, 2011

Notwithstanding the major role of KIBS in the innovation process of their clients, it is not yet quite clear how KIBS organizations perform innovation in their own products. Still, there is a consensus that, differently from manufacturing, innovativeness or creative ideas may, in such cases, extend right through the all service organizations being carried out by individual employees (Sundbo 1996) who are quite self-ruling in the KIBS environment (Alvesson, 2004, Morris and Empson 1998). Often these same employees, also in charge of development, production and marketing, are strongly client-oriented (Alvesson 2004). If innovation is due to happen in such circumstances, it can be anticipated that most of them will happen outside formal activities as "unintended innovations" (see Toivonen and Tuominen 2006, Gallouj 2002a and b) – possibly even as a result of tailor-made solutions for clients. These characteristics of the KIBS environment justify the hypothesis that

theoretical approaches developed for manufacturing contexts are not directly applicable to KIBS (Tuominen and Toivonen, 2007).

In the last forty years and quite connected to the evolution in the concept of innovation, the interest in knowledge-intensive business services is taking form, clearly emerging as such from the mid-1990s. As can be observed in Table 1, many contributions of recognized authors have directly or indirectly tackled the issue of business services (Fernandes et al, 2011).

In a first phase, called of omission, innovation was associated to technological materials and equipment so that the support to innovativeness, accomplished by means of instruments related to R&D and patents, was the more accepted way to evaluate outcomes. In this case, KIBS were not understood as contributors to innovation or to the growth process as such, due to the fact that emphasis was put on measuring the outcomes of innovation, and it was not possible to identify the links between these and the innovative process.

A few years later, during the so called assimilation phase, researchers of innovation started focusing their attention on the innovative process in a broader concept, including the transformation sector as being responsible for process innovation, and a strong effort was made to identify all the specific determinants able to push innovation further.

Both Barras, 1986, who had focused on Theory of Reverse Product Cycle (RPC) and Information Technology (IT) for innovations in services, and Gershuny, 1983, accepted the view that services were largely non innovators, although the information technology could significantly improve the costs and quality of services. Gallouj and Weinstein, 1997, also emphasized the interactive character of services. These were contributions to the advance of the "assimilation" phase and the acceptance that innovation in services was fundamentally similar to that of the industry.

The start of a "differentiation phase" resulted from the observation that services are distinct from the transformation sector, demanding new analytical approaches: theoretical and empirical research observing the impact of technology on services and trying to adapt new classifications able to reflect it. As such, the most consistent criticism to the RPC came from Uchupalanan (2000): RPC considered just one source of innovation (IT), presenting a dichotomy between product and process with firms performing as passive recipients of innovation of IT suppliers.

The classification provided by Miozzo and Soete, 2001, was an important contribution to characterize service firms in different categories towards a synthetic approach:

- Sectors dominated by suppliers, like education and personal services. These firms give only limited contributions to the technological process and most of the innovations come from the suppliers of equipment, materials and information;
- Sectors of scale intensive physical networks or information networks, like gas supply and banks. Technological innovations usually originate in the industry, but the nature of these innovations is strongly determined by their use in the service firms;
- Sectors that supply specialized technologies based on science, like software and laboratories. The main sources of technology are research, development and software activities of the firms of the sector.

Soon, it was obvious how a single approach was inadequate to explain innovation in the services sector, therefore requiring an integrative theoretical view to advance to new conclusions.

The approach of "synthesis" defends that innovation in services and in industry do not follow totally different paths. Conceptual achievements for the understanding of innovation, both in industry and in services, could be of mutual interest. The integration of a mutual view of this concept materialized in the last version of the Oslo Manual: "the scope of

what is considered to be an innovation has now been expanded to include two new types: marketing and organizational innovation" (OECD, 2005, p. 3).

Also, as a consequence of the evolution of this conceptual outline, the current definition of KIBS is recognized by industrial classification and includes the following disaggregated subsectors:

- 721 Hardware consultancy
- 722 Software consultancy
- 723 Data processing
- 724 Data base activities
- 725 Maintenance and repair of office, accounting and computing equipment
- 729 Other computer r elated activities
- 731 Research and development
- 732 Research and experimental development on social sciences and humanities
- 741 Legal, accounting, book-keeping and auditing activities; tax consultancy;
- market research and public opinion polling; business and management
- consultancy
- 742 Architectural, engineering and other technical activities
- 743 Advertising
- 749 Business activities (other)

3. FIRST EMPIRICAL EVIDENCE: CASE STUDIES ACROSS THE WORLD

The following chapter presents a series of empirical studies developed by several authors. The experiences of Spain, Finland, Brazil, Canada, Italy and Portugal permit adding a cross country comparative analysis, identifying bottlenecks and common outlines in the active responsibility KIBS may achieve in innovation systems or innovative contexts.

Spain (2006)

The selected Spanish case was described by González-López, 2006. In order to carry out the analysis, the author used microdata provided by the Technological Innovation Panel (PITEC), also used for the Community Innovation Survey in Spain. The information regards the years 2003 and 2004, and the observation panel contains information for 7,283 firms in 2003 and 8,720 in 2004. The considered KIBS branches used were the following:

- Software (NACE 722)
- Other computer activities (NACE 72 apart from 722)
- Research and Development (NACE 73)
- Architectural and engineering activities and related technical consultancy (NACE 742)

The addressed research question was the following: How do consultants, laboratories and private institutes perform as sources for innovation?

The conclusion was clarifying:

- 53% of the SIS firms used KIBS as an information source for innovation;
- Only 17.6% of them considered it as very important;
- KIBS were more widely used than other institutional sources like universities (44.3%) or technological centers (42.3%);
- Universities were considered as "very important" by a higher share of users (21.5%) compared to the KIBS case (17.6%);
- Moreover, internal sources are the ones more widely used followed by equipment providers and clients. Additionally, the former ones are considered as very important by a large share of users (35%).

Finland (2007)

The selected Finnish case was described by Tuominen and Toivonen, 2007. The study was conducted by using a reduced empirical data set, consisting of 31 interviews in three KIBS firms. These firms are an architectural office, an accounting office and an engineering consultancy firm, all employing 100-300 persons. Two of the firms are a part of a larger corporation. All of these firms conduct project-based business, and their organization structures are also quite similar.

The addressed research question was the following: How does the innovation process in KIBS manifests?

The conclusion was insipient but quite inspiring:

- Frequently, the development of activities moved very quickly from individual considerations to collective actions;
- There is an iterative, inseparable nature of different types of behaviors;
- These are not analogous in the different phases of an innovative process;
- Each phase of the process contains many, if not all, of these behaviors in different combinations.

Brazil (2007)

The selected Brazilian case was described by Kubota, 2007. The study used micro data of the Survey of the Economic Activity in São Paulo (Paep) 2001, of Fundação Sistema Estadual de Análise de Dados (SEADE).

The addressed research question was the following: Do KIBS contribute to technological innovation of product and/or process of their clients?

The conclusion was partial:

- Years of study, sector and the size of the firm contribute positively to the propensity to innovate;
- All sectors are more innovative than "other services";
- Particularly, when related to legal/internet solutions, business communications, advertising and management consulting show that service firms that contract KIBS are not more innovative that those that do not.

Canada (2010)

The selected Canadian case was described by Doloreux et al, 2010, using a sample of 102 regions in Quebec from which 62 are rural (no municipality of over 10,000) and 42 are urban (municipality of over 10,000). Factor analyses, Cluster analyses and logistic regression are applied in order to answer several different questions.

For our discussion, the major research question addressed was the following: Does innovation in KIBS services vary according to the industrial context within which they are located?

The conclusion was very interesting but complementary to the previous case study and claiming for further research:

- Innovation in KIBS varies both across continuous space and across discrete territories;
- However, this is not affected by firms' information gathering and collaborative behaviors;
- Since these factors have no effect, we face limits in the understanding of the geography of innovation which call for further exploration.

Italy (2011)

The selected Italian case was described by Corrocher et al, 2011. The study was conducted in the region of Lombardy to a sample of 441 KIBS firms. The sample was stratified by size

and geographical area, and three sectors have been observed: computing services, research and development and other professional activities such as engineering offices and consulting services, such as architect, engineering and technical offices and law, market research and consulting, as well as other activities.

The addressed research question was the following: What are KIBS' competitive strategies?

The conclusion was expectable but still very useful:

- Innovativeness mainly embodied technological change, and the quality of services are the most relevant, competitive drivers;
- Severe local competition based on price; speed of delivery and proximity to customers also represent crucial variables;
- Human resource training but with a tendency for lack of attention towards new competences and more creative profiles.

Portugal (2011)

The selected Portuguese case was described by Fernandes et al, 2011. The analytical methodology was applied to a total of 93 firms, considered peripheral KIBS, and extended to a group of 407 KIBS urban in nature and, hence, firms located in urban councils with populations in excess of 5,000 inhabitants. Factor analysis has been applied to this sample in order to be able to reply to the following research question:

Which factors contribute towards innovation capacities in KIBS? And does the structure of a predefined measurement model remain constant for different groups or populations with different characteristics?

The conclusion was also expectable and common to the case of innovation in any other sector of the economic activity. No, the structure does not remain constant, and the most significant set of factors is:

- The communication between departments, rewards innovative initiatives;
- Cooperation with other firms, relationship with users of new products or services, learning, projects revision or the sharing of experiences with other firms;
- At the process level, support mechanisms for managing new products and searching for new ideas;
- Good strategic decisions are made when the company attempts to anticipate threats and opportunities and shows commitment to innovation.

Given the different methodical approaches used and the diversity of the presented questions by the authors, a standard, cross country comparative analysis is not possible. However, a first conclusion is that there are no opposing opinions, and some of the conclusions are common or complementary.

Adding up several results, it is possible to confirm that KIBS work out as innovation drivers although not many consider them as very important ones. For the Brazilian case, which is strongly related to small firms acting in peripheral environments, the role of KIBS to promote innovation is proven. In our view, this situation justifies the arguments to be presented in the next chapter which focus on the role of KIBS depending on the readiness of the other firms, their clients, to innovate.

Moreover, due to the irregularity of the innovation process, KIBS are able to provide flexible solutions which are useful. However, the happening of innovation within KIBS firms has not been clearly explained. This does not seem to happen as a regular and common process; when innovation happens, it is generated as an internal procedure that results from targeted choices of the company.

In brief, innovation does not necessarily have to occur for the success of KIBS, and if it takes place, it is because the company has an intended innovative behavior, like in any other service or industrial sector.

Frequently, innovative behaviors occur as a consequence of both managers and employees within a firm – an issue which is better explained in the context of social or organizational psychology. So, from a wider angle, innovation is 'the intentional introduction and application within a role, group, or organization of ideas, processes, products or procedures, new to the relevant unit of adoption, designed to significantly benefit the individual, the group, organization or wider society' (West and Farr, 1989 and 1990).

4. SECOND EMPIRICAL EVIDENCE: RESTRICTIONS FOR PERIPHERIES

A further contribution to the present discussion is to explore the nuances of innovative behavior at the level of the KIBS firms, considered as stockholders, actors within specific environments. Aware of such specificities, these firms can become the edge of the divergence between peripheral, gapping regions and more developed, growing ones.

Wood, 2009, explained that KIBS services are frequently delivered at local scales, although they require national and international knowledge and expertise. The author explains how positive this is for central areas and cities, where KIBS join the already dynamic, corporate activities.

But, in cases where KIBS are located in peripheral areas, there are questions about their role and how far they can act towards innovative processes:

- Do they perform differently when located in peripheral environments?
- Are they exposed to firms equally prompt to cooperate, share information, network and learn?
- How flexible are such firms to constantly learn new skills or absorb the different kinds of innovation?
- Does this reduce the activities of KIBS or, rather, expand their responsibility in the process?

In order to investigate how the innovative behavior takes place in the KIBS context, a view of knowledge intensive services and the nature of their activities is welcome (de Jong et al., 2003) but not sufficient. Doloreux, 2010, confirms the view that such behavior is also geographically determined and quite distinct if the firms are located in peripheral, gapping areas. Although most of the literature has proven that innovation in peripheral regions results in the lack of critical mass, density of players and relationships, strategic choices may be frequently taken in order to surpass such bottlenecks.

One of the vertices towards which technical change, innovation and knowledge converge is the organization's capacity to learn. Although intangible, such major drivers can be related to factors internal or external to the firm, particularly if human capital can serve to perceive the nature of such learning capacity. In this study the organization's capacity to learn will be detected by variables such as the multiple characteristics of the top managers, skills and training for the workforce or other aspects such as interactions with suppliers, customers, industry associations and public support bodies. All these aspects determine firms' capacity to innovate and shape several typical, entrepreneurial behaviors particularly worth investigating when the firms locate in peripheral environments.

Innovation as bilateral interdependencies between small firms and their environments
In 2003, a major European project[1] was conducted with the goal to investigate how a set of 323 agro food firms located in 12 different European peripheral regions were performing towards innovation (Noronha Vaz, 2004). Clustering techniques based on variables related to the history of the firm, sources of capital and governmental support characterised three groups of firms as non-innovators, innovators and followers. Their choices concerning firm leadership, skills of the labour force and interaction with other stakeholders have been studied and compared. A very important contribution from that project to the understanding of innovation was to specify how firms learn for the innovation process, generating the so called behavior patterns for innovation.

This useful example highlights the learning process of firms in general, when located in peripheral regions. The lessons can also help us to perceive the potential role of KIBS for regional development.

Table 2 – Territorial systems by NUTS level, designation and size

		Nuts level	Terminology	Size km²
1	Alentejo Central (P)	Nuts III	Region	7,228
2	Aude (F)	Nuts III	Departments	6,139
3	Northern Border (Irl)*	Nuts III	Region	12,341
4	Cremona (I)	Nuts III	Province	1,770
5	Devon and Cornwall (UK)	Nuts II	Group of counties	10,262
6	Gard (F)	Nuts III	Department	5,853
7	Hainaut (B)	Nuts II	Province	3,785
8	Hereford and Worcester (UK)**	Nuts II	Group of counties	3,923
9	Kuzawsko-Pomoskie (Poland)	n.a.	Province	20,099
10	Piacenza (I)	Nuts III	Province	2,589
11	Oeste (P)	Nuts III	Region	2,512
12	South West (Irl)	Nuts III	Region	12,306
13	West Flanders (B)	Nuts II	Province	3,134

Source: National statistics in Noronha Vaz, 2005

*Only a part of the Nuts III region has been selected
**Nuts II region includes the county of Warwickshire. However, in this research, Warwickshire is excluded for the sake of homogeneity.

The study followed some basic criteria in the choice of the areas to be observed (Table 2 shows the regional provenience of the investigated firms), as Morgan and Crawford (2004) noted that they all should be:

- Administratively discrete: It was important to identify territories for which official economic data could be collected and, as far as possible, that the territories were at a similar level in the different areas;
- Lagging: This was defined both economically and geographically. These were areas that had lower levels of economic development than the national average. From a geographical standpoint, there was particular interest in more remote areas where levels of communications infrastructure also compared unfavourably with other, more developed regions;

[1] INNOVALOC, granted by the EC, program Socio Economic Knowledge Base, 2000-2003

- Peripheral: The study focused on rural development and the place of the food industry within it, so it was important that the chosen areas were those in which agriculture played an important role. Territories dominated by large, urban populations were generally to be avoided. The final questionnaire received 323 validated replies from small firms selected for sampling.

The application of K-mean cluster analysis to the set of 323 firms resulted in three distinct groups, each one representing a different behavioral pattern towards innovation.

Table 3 supplies, for each group, the values of the key identification variables that meaningfully measure the level and type of innovativeness. Note that, for analytical purposes, the value 1 indicates Yes (the referred cluster performs that type of innovation) and value 0 indicates No (the referred cluster does not perform that type of innovation). Also, the variables considered are directly connected to the types of innovation discussed in the previous theoretical session: Product innovation, process innovation, organizational innovation and marketing innovation.

Cluster 1 is composed of 86 firms and is mainly characterised by a lack of innovation. Those firms belonging to the group only performed organizational changes inside their units. They are located essentially in the Portuguese regions Alentejo Central (19%) and Oeste (12%), the Belgium region of West Flanders (14%) and the Irish regions of South West (13%) and Border (11%). Please see Annex 1 for detailed information on the percentages of the other regions. They will be labelled as the *Non-Innovators*.

Cluster 2 is composed of 160 firms, representing the higher innovative level. The firms included in this group perform all the types of innovation listed previously. As their innovative initiatives are also new to the market, they will be labeled as *Pioneers*. Firms belonging to this cluster are mainly coming from The British areas of Devon/Cornwell (17%) and Hereford/ Worcester (16%) and the Polish region Kuzawsko-Pomorskia (15%).

Table 3 – Patterns of innovation, results from K-mean cluster analysis

	Cluster 1: Non-Innovators	**Cluster 2: Pioneer Innovators**	**Cluster 3: Follower Innovators**
Variables of innovation	N= 86	N= 160	N= 77
Product innovation: New or substantially modified products	0	1	1
Process innovation: New or substantially modified production processes	0	1	1
Process innovation: New ingredients	0	1	1
Marketing innovation: New packaging material	0	1	0
Marketing innovation: Visual appearance	0	1	1
Organizational innovation	1	1	1
Newness of innovation	0	1	0

Source: Noronha Vaz, 2005

Cluster 3 is composed of 77 firms and distinguishes from the other two due to two factors: the high level of innovation performed in the firms but, contrarily to the previous

case, innovation developed is not new to the market. This is the reason why the group has been labelled as *Followers*. This cluster is mainly composed of the French regions of Aude (27%) and Gard (14%).

The research clearly indicates a negative correspondence between the firm age and its aptitude to innovate. *Innovators* registered the lower weight of firms with more than 10 years. Only in this group, were new firms with less than 5 years found. *Non innovators* are greatly composed of aged firms.

All of the 3 groups mainly chose the option *Personal or family idea* when asked about the main sources of the original business idea. The same happened with the business location, with personal or family reasons predominating homogeneously. Considering that we are dealing with very small firms, such choices based on familiar roots were to be expected.

Retained earnings were the primarily used source of capital for the 3 groups. This source was followed by bank loans, particularly in the case of *Innovators* (70% of firms in this group used this source). *Followers* were the ones that most often asked for governmental support and subsidies (29% versus 14% from non-innovators and 10% from pioneers).

Regarding the used sources for innovative activities, and excluding the *Non-innovators*, we can find some slight differences between the two clusters performing innovation.

Regarding process innovation, in-house developments were the main starting point for both groups (58% of firms with affirmative answers in pioneers versus 62% in followers). Equipment and services suppliers were indicated as the following main source of process innovation (35% for *Innovators* and 34% for *Followers*). Therefore, *Innovators* have a higher proportion of contacts abroad compared to *Followers*.

Also, customers have a similar effect, yet with less importance than the previous. For the *Followers,* more important than customers were similar firms (29% of firms in this group used this source), a natural source for *imitators*.

Regarding product innovation, in house developments were once again the main source used (83% affirmative answers by *Innovators* and 62% by Followers). However, contrary to what was stated before, when developing new products, firms also use customers as an important source (57% by *Innovators* and 51% by Followers) as they function as drivers for innovation due to market pressure.

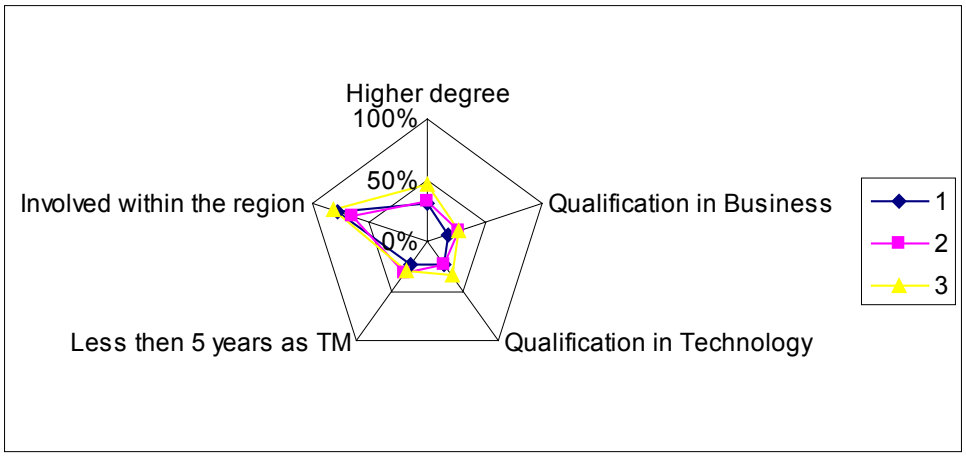
As presented, the main conclusion for our discussion is that, in peripheral areas, process innovation depends mostly on the level of in-house developments and equipment and services suppliers – *Innovators* having a higher propensity to explore contacts abroad. Thus, the major need for learning in the case of these firms is accentuated when they are located within peripheral environments, due to the fact that their innovation drivers or sources are less diversified. The results quantitatively confirm most of the literature related to knowledge management and the importance of learning for the organizations. It seems the situation gets sharper in peripheral environments –leadership and labor forces are not provided with the best tools to improve learning capacity.

The organization's capacity to learn in the behavioral patterns of small firms

In order to be able to better identify the importance of specific assets related to human capital, we have observed in detail some of the attributes of the three clusters: characteristics of the top manager (TM), skills of the labour force and interactions with other agents internal or external to the region. Below, the results report (as earlier) only those firms located in the peripheries.

Figure 1 presents the relative perceptual heights of the different attributes that characterize TMs. The comparative graph identifies the three groups of firms, concluding about those characteristics that are more distant from the innovative behaviour that, in this case, they are very few and quite tenuous.

Figure 1 – Characteristics of the TM

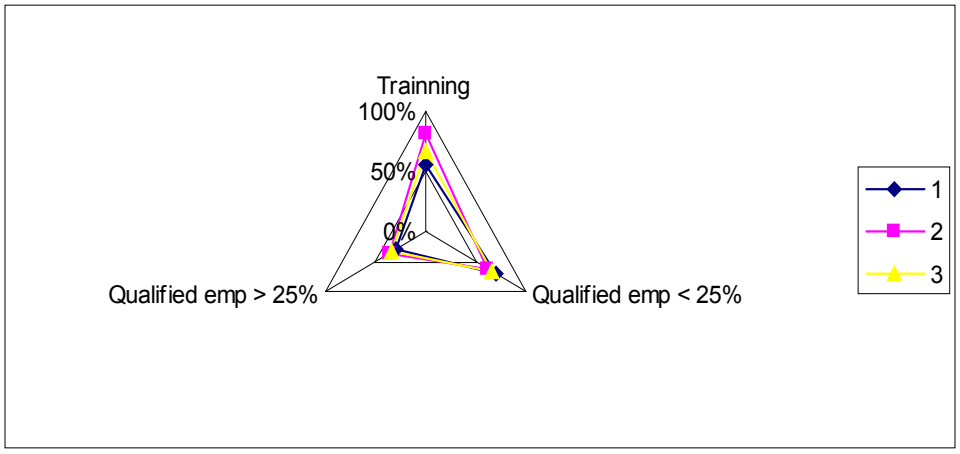


1 - Non-Innovators 2 - Pioneers 3 - Followers

In spite of the fact that *Followers* do have a higher number of TM with higher education, this attribute does not seem to be much of a determining one in what concerns different attitudes between *Innovators* and *Non innovators*. In any case, many firms still do not have TM with higher education. In those cases when it exists, around 25% is formation in business or economics and 27% in technology or engineering.

The *Non-innovators* and *Followers* tend to hire more TMs in the technological areas. *Innovators* and *Followers* have more TMs that are recent in their position (less than five years). Another attribute that we have analyzed is the involvement of the TM to the region. It was very curious to observe that *Innovators* do not look for TM with regional involvement or provenience, but rather on the contrary. This is not the case for the *Followers*, which have the highest percentage of TMs with regional links of the three groups.

Figure 2 – Skills of the labor force



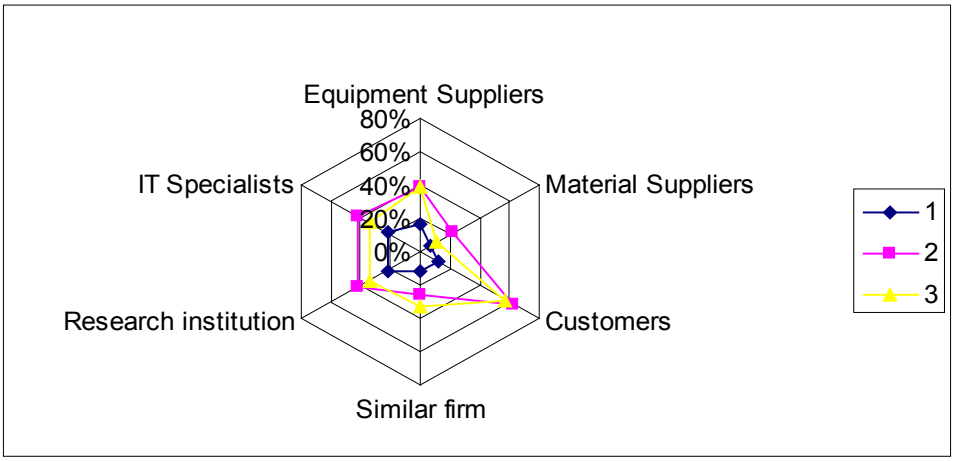
1 - Non-Innovators 2 - Pioneers 3 - Followers

Figure 2 represents the perceptual heights of those attributes determining the degree of formation of the labor force in the observed firms. Training carried out by the firms as well as qualified technical formation of labour were the selected items. The number of firms having fewer than 25% of its employees with technical qualification is very high in all three groups of firms, and it is clear that innovators have more trained personnel than the other

groups. Training is an attribute that serves better than technical qualification to distinguish the behavioral patterns. There is a clear predominance of firms that have carried out training (81%) in the group of Innovators compared to the Non-innovators or even the Followers (55% and 68%).

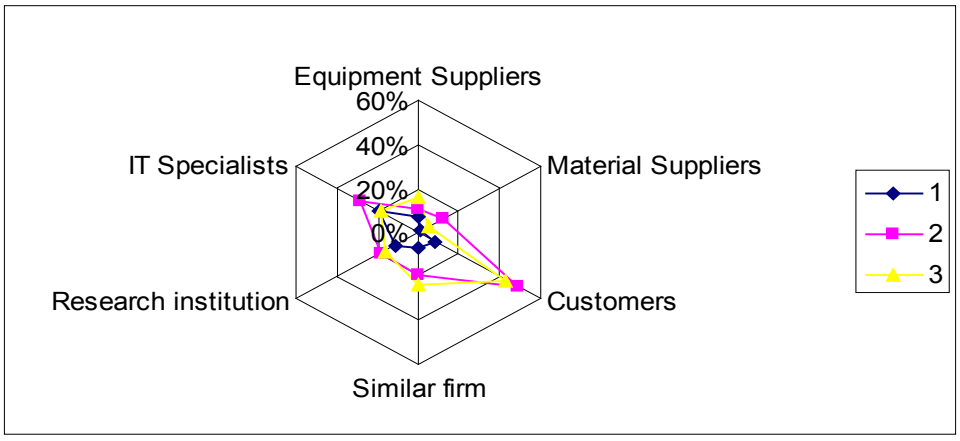
Figure 3 and Figure 4 help to perceive the role of the environment in the firms' strategic attitude, as well as help to identify their openness to cooperate with KIBS towards innovation. If we compare the distance among the lines related to each group, we realize that the interactions with other agents do represent determinants with a much higher level of significance to innovation than the previous two groups of attributes.

Figure 3 – Interactions with other agents internal to the region



1 - Non-Innovators 2 - Pioneers 3 - Followers

Figure 4 – Interactions with other agents external to the region



1 - Non-Innovators 2 - Pioneers 3 - Followers

5. CONCLUSION

From a macro economic and social dimension, there are many challenges to firms located in peripheral areas that choose to innovate. Most hindrances are related to the small market opportunities and/or low population density, but there are also other constraints related

to the lack of technological opportunities and loose networking systems that can justify it (Doloreux, 2010). Certainly, for knowledge creation, deficient knowledge-intensive clusters or lack of technological complementarities with other sectors obstruct the creation of positive externalities such as agglomeration economies or other kinds of economic advantages. However, studies have proven that, in spite of such restrictive environments, some small and medium sized firms are able to progress, innovate and became competitive, including at the international level. Much depends on their absorptive capacity to learn and on their strategic choices to innovate. In general, such firms are small sized, facilitating the strategic decision of the top managers and easing improvements in the quality of the labor force. This study showed that, across the world, KIBS are acting irregularly as innovation drivers, although they could provide such function easily if their clients would defy them to act in such a direction. In peripheral regions, for example, most of innovations' inputs are obtained from internal sources – not surprising, since the external relations are, in general, distant and loose. Should KIBS tighten up links with their clients, such firms could modify this phenomenon. In addition, the level of qualification of both top managers and human resources is low, demanding upgrading and more support for success cases. This could be understood as an additional role for KIBS, accepting such firms as eventual providers of incremental and process innovation.

From the micro economic point of view, the readiness to innovate of an individual firm is related to factors such as: formation of the leadership or labour skills, coordination with suppliers and clients and, mostly, respective costs. Relationships with research institutions or other external connections are also stressed by tight profit margins. This is why new customers or demanding client requirements (imposing quality standards or the promotion of regional products in connection with chambers of commerce, for example) also increase the number of innovative actions taken by the small firms. KIBS, as permanent partners of such firms and ahead in terms of knowledge, should be called to give their own contribution to firms' better performance, innovation and regional growth, sharing a symbiotic set of pulling and pushing forces for innovation and change at the firm level.

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