KNOWLEDGE-INTENSIVE BUSINESS SERVICES (KIBS) AND THEIR ROLE IN THE KNOWLEDGE-BASED ECONOMY

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Knowledge-Intensive Business Services (KIBS) and their Role in the Knowledge-Based Economy

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Abstract

The development of knowledge-intensive business services in recent decades can be interpreted as one of the indicators of a transformation from an industrial economy into a knowledge-based one. Not only do quantitative measures, whether in the form of sales or employment figures (e.g. Chadwick, Glasson and Lawton Smith, 2008), undoubtedly show the expansion of these services; but also their characteristics make it clear that they significantly affect the formation and spread of knowledge throughout the economy.

This article presents an analysis of the KIBS sector based on a literature review. In the first section, it presents the issues connected with defining and categorizing KIBS. In the second one, it shows the significance of this type of service, highlighting its influence on the innovativeness of the companies which it serves. The third section consists of a detailed review of the literature devoted to research on KIBS.

Keywords: *knowledge-intensive business services (KIBS), innovation, knowledge*

JEL codes: *L84, O33*

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1. Introduction

Knowledge-intensive business services (KIBS) are an important part of knowledge-intensive sectors in every economy. The development of KIBS in recent decades can be interpreted as one of the major factors in a transition from an industrial economy into a knowledge-based one. Not only do quantitative measures, whether in the form of sales or employment figures (e.g. Chadwick, Glasson and Lawton Smith, 2008), undoubtedly show the expansion of these services, but also their characteristics seem to confirm their significant effect on the formation and spread of knowledge throughout the economy. This results in a growing interest on the part of researchers in the analysis of KIBS. This article presents an overview of the literature on these services and highlights their significance for economic development.

2. Defining and categorizing KIBS.

The problems associated with defining and characterizing KIBS stem from the fact that it is difficult to define and measure the knowledge-intensity of these services. One possible indicator for defining the knowledge-intensity of KIBS could be the structure of the formal education of the employees working for such companies (Miles, 2005). However, despite the fact that this indicator is relatively easy to measure, it has a major drawback: it does not include the non-formal education and work experience of employees, which is crucial for KIBS activity. Without specialized experience, companies offering KIBS have no chances in the struggle against market competition. In addition, this indicator does not take into account other forms of knowledge, such as tacit knowledge within the company, the organization's ability to learn, or its ability to acquire knowledge from the wider environment.

Another disadvantage of this indicator is underestimation of the performance of KIBS sector companies, such as service innovation. To include the value of KIBS production, one should collect information on R&D spending, or the number of patents obtained by KIBS companies. Information on patents, however, may not be meaningful because, due to the characteristics of KIBS, reporting patents in this sector is relatively uncommon. The same applies to expenditure on R&D, which might instead take an informal form. In addition, an indicator based only on R&D expenditure does not take

into account the fact that knowledge which has been generated in one sector can be applied in another. In this way, a sector with low R&D spending may be the primary user of knowledge generated in other sectors.

Knowledge-intensity might also mean a non-routine character of services (Muller and Doloreux, 2009). If that is the case, the meaning of "routine" has to be determined, and this is not an easy issue. Another approach is to define knowledge-intensity as the ability to integrate different sources of information and knowledge in innovation processes within the company. According to this definition, KIBS are characterized by an ability to retrieve information from outside the company and transform this information, combined with knowledge about the company, into a service useful to their clients. In other words, KIBS are intermediaries between the producers of knowledge and its users (Hipp, 1999).

An important feature of KIBS indicated by many researchers is that they are addressed to companies or organizations, rather than to households (Toivonen, 2004). KIBS are largely based on professional knowledge (expertise) associated with a specialized field or discipline, and provide intermediate (not final) products (den Hertog, 2000). Due to the fact that KIBS companies offer intangible services with a high degree of adaptation to the needs of individual customers, the "production" of such services requires close and intensive collaboration between the given company and its customers. Without the collaboration of customers with a company offering KIBS, it is impossible to obtain tacit knowledge located in the client organisation, which is an important component of knowledge-intensive services. Below are gathered the most important definitions and characteristics of KIBS identified in the literature.

Table 1. Definitions and characteristics of KIBS according to various authors.

Author	**KIBS definition**	**KIBS characteristics**
Miles et al. (1995)	"services that involved economic activities which are intended to result in the creation, accumulation or dissemination of knowledge"	- they rely on professional knowledge to a high extend; - they either are themselves primary sources of information/knowledge or they use knowledge to produce intermediate services for their clients' production processes; - they are of competitive importance and supplied primarily to business.
Den Hertog (2000)		- private companies/ organisations; - they rely on knowledge or expertise related to a specific (technical) discipline or (technical) functional domain; - they supply intermediate products and services that are knowledge based.
Toivonen (2004)	"those services provided by businesses to other businesses or to the public sector in which expertise plays an especially important role"	- they have numerous and versitile contacts with different stakeholders; - they form a node in a system of customers, cooperation partners, public institutions and R&D establishments.
Pardos, Gomex-Loscos and Rubiera-Morollon (2007)	"personalized services that offer a relatively diversified range with high quality provision"	- they imply an important connection with information, new technologies, new management, production/sales techniques, to new markets.
Koch and Strotmann (2008)	"highly application-oriented services (in which) tacit knowledge plays an important role"	- they require specialized knowledge and cumulative learning processes
Consoli and Elche-Hortelano (2010)	"intermediary firms which specialise in knowledge screening, assessment and evaluation, and trade professional consultancy services"	

Source: Own, based on literature review.

The main problem in classifying KIBS is the lack of compatibility of official statistical categories of industries and services with reality. To define KIBS properly, a detailed description of company activities is often required, rather than the statistical data on which international classifications are based. Taking into account the pace of changes in the KIBS sector and the often blurred boundaries of its sub-sectors, it is difficult to determine which business services should be classified as KIBS and which should not. Another problem is that some services included in KIBS are provided not only on a business-to-business basis, but also to individuals. Examples of such services include computer and legal services. At the same time, knowledge-intensive services are provided in some sectors not classified as KIBS and therefore they should be included in the KIBS category. It must be remembered that these services are not only offered by companies specializing in providing KIBS.

Despite the many disadvantages of classifying KIBS on the basis of official statistical classifications, many scientists apply them in their research. According to Baláž (2004), typical examples of KIBS are: accounting, management consultancy, technical engineering, R&D activities, design, services related to computer and information technology, and financial services. This author includes NACE (Classification of Economic Activities in the European Community) sectors 64-74 (see the table below) in KIBS and highlights the particular importance of information and communication KIBS. In the opinion of Baláž (2004), communication services enhance the transfer of KIBS to all users in the economy, thus enabling the spread of KIBS to other sectors of the economy. As a result, technological and organizational innovations are produced and applied.

Another classification of KIBS is proposed by Miles et al. (1995). They divide them into traditional professional services (KIBS I) and businesses using new technologies and new knowledge-intensive services (KIBS II) creating new technologies. The first group of these services includes marketing, advertising, etc., while the second group covers services such as software design (Table 2).

Later, the division between KIBS I and KIBS II turned into a division between a) consulting services, such as legal services, accounting, auditing, market research and management; and b) technical services, which include activities related to computer services or engineering/construction services. The first of

these exist in the literature as P-KIBS (Professional KIBS) and the second as T-KIBS (Technical KIBS). Some authors do not include the IT sector (72 in the NACE classification) in T-KIBS, but treat it as a separate, third category. Sample classifications of KIBS proposed by various authors are presented in Table 2.

Table 2. Definitions and characteristics of KIBS according to various authors.

Author	Knowledge-intensive business services
Baláž (2004)	64 Post and telecommunications 65 Financial intermediation services, except insurance and pension funding services 66 Insurance and pension funding services, except compulsory social security services 67 Services auxiliary to financial intermediation 70 Real estate services 71 Renting services of machinery and equipment without operator and 72 Computer activities and software supply 73 Research and development 74 Other business services (Legal activities, accountancy, advertising)
Miles I. et al. (1995)	KIBS I: Traditional Professional Services, liable to be intensive users of new technology ▪ Marketing/advertising; ▪ Training (other than in new technologies); ▪ Design (other than that involving new technologies); ▪ some Financial services (e.g. securities and stock-market-related activities); ▪ Office services (other than those involving new office equipment, and excluding "physical" services like cleaning); ▪ Building services (e.g. architecture; surveying; construction engineering, but excluding services involving new IT equipment such as Building Energy Management Systems)); ▪ Management Consultancy (other than that involving new technology); ▪ Accounting and bookkeeping; ▪ Legal services; ▪ Environmental services (not involving new technology, e.g. environmental law; and not based on old technology e.g. elementary waste disposal services). KIBS II: New Technology-Based KIBS ▪ Computer networks/telematics (e.g. VANs, on-line databases); ▪ some Telecommunications (especially new business services); ▪ Software; ▪ Other Computer-related services - e.g. Facilities Management; ▪ Training in new technologies; ▪ Design involving new technologies; ▪ Office services involving new office equipment); ▪ Building services (centrally involving new IT equipment such a Building Energy Management Systems));

	▪ Management Consultancy involving new technology; ▪ Technical engineering; ▪ Environmental services involving new technology; e.g. remediation; monitoring; Scientific/laboratory services; ▪ R&D Consultancy and "high-tech boutiques".
Koch and Strotmann (2006)	Technical KIBS 72.1 Hardware consultancy 72.2 Software consultancy and supply 72.3 Data processing 72.4 Data base activities 72.5 Maintenance and repair of office, accounting and computing machinery 72.6 Other computer related activities 73.1 Research and experimental development on natural sciences and engineering 74.2 Architectural and engineering activities and related technical consultancy 74.3 Technical testing and analysis Professional KIBS 73.2 Research and experimental development on social sciences and humanities 74.1 Legal, accounting, book-keeping and auditing activities / tax consultancy / market research etc. 74.4 Advertising

Based on: Baláž (2004), Miles et al. (1995); Koch and Strotmann (2006).

Koch and Strotmann (2006) identify fewer service types as KIBS than other authors. They list among KIBS those belonging to NACE sectors 72, 73 and 741-744, excluding certain sub-sectors from 744, e.g. the activities of holding companies .

The classifications used in many works devoted to KIBS frequently follow the NACE scheme, which has become popular for identifying KIBS and is used by official bureaus in many countries, especially in the European Union. Sometimes other industry classifications are also applied, e.g. the International Standard Industry Classification (ISIC), which is a United Nations system for classifying economic data.

3. Significance of the KIBS sector

Many publications stress the close relationship between KIBS and the levels of innovation and performance of the whole economy (e.g. Hipp, 1999; Tomlinson, 1999; Aslesen and Isaksen, 2007). It is an increasingly common belief that KIBS not only perform innovation activities in the service of the manufacturing sector, but they are also "bridges of knowledge" or "innovation bridges", connecting the manufacturing sector, science and customers (Czarnitzki and Spielkamp, 2003).

Works devoted to KIBS are often based on Schumpeter's concept, according to which new combinations of existing means of production drive economic growth in the economic system (Baláž, 2004). With an increase in the importance of intangible resources in the modern economy, the generation and diffusion of knowledge are the main drivers of innovation. The knowledge at the base of innovations might be tacit or explicit, but innovations are usually the result of interaction between these two types of knowledge. Both tacit and explicit knowledge can be created in a company or acquired from external sources. One of the main external sources of knowledge for companies are KIBS.

The growing demand for KIBS results inter alia from the rapidly changing technological environment and the increasing complexity of science. Companies are more and more often unable to cope with the challenges of the environment by using their own resources. Therefore they use KIBS to avoid the cost of acquiring and maintaining professional knowledge internally. As Miles et al. (1995) note, companies nowadays apply two processes as they aim to achieve better results. The first of these processes is specialization – organizations focus on their core competencies and outsource other activities. In this way, they eliminate problems associated with management and the integration of the different aspects of their business. The second process – called flattening or de-layering – is characterized by a reduction in the number of organisational layers by compressing the hierarchy of management and eliminating middle management. These two processes both result in an increased demand for KIBS.

Moreover, organizations have realized that if they want to deal with local and international competition, they must invest not only in human and material resources, but also in intangible resources, such as abilities, skills, organizational processes, intellectual property, and, finally, the information and knowledge possessed by the organization. These and other assets are complex and difficult for other organizations to copy, allowing the creation of a long-term competitive advantage. Companies offering KIBS create and take care to preserve their intangible resources, and through their services they also help other companies create such resources.

The reasons for this phenomenon include the fact that KIBS play an active role in creating and spreading knowledge and increasing output capacity (Baláž, 2004). They provide access to scientific and technological information and they act as holders of proprietary, quasi-generic knowledge, implemented by interacting with customers and the scientific community. Moreover, they act as an active link between the codified knowledge stored in universities and research laboratories and the tacit knowledge located in the practices of companies (den Hertog, 2000).

Because of their numerous and broad contacts with various partners, such as clients, public institutions, companies engaged in R&D, research institutes and universities, KIBS are seen as integrators of different parts of the innovation system (Toivonen, 2004). By creating an appropriate infrastructure, KIBS affect the ability of the economy to perform the innovative activities that are so important for the development of a competitive knowledge-based economy.

The importance of KIBS might also be confirmed indirectly by the growing interest of researchers in this area. The next section of this article presents a brief overview of the major research areas on KIBS.

4. Research on KIBS

Research on KIBS has a relatively short history. Scholars only began carrying out studies in this area in the 1990s. Although more than two decades of KIBS investigation have now taken place, there are still many unanswered questions concerning this type of service and its influence on the whole economy.

Three main phases of KIBS research can be identified in the literature. The first of these mainly concerned theoretical aspects of these services. Miles et al. (1995) were the first to identify the detailed characteristics of KIBS and they offered a list of the sectors that fall into this category. The idiosyncratic features of KIBS were a high level of innovativeness and a contribution to the development of many economic sectors and the economy as a whole. The second phase abounded with more empirical evidence on the uniqueness of KIBS. Studies were conducted on their innovation patterns (Freel, 2006) and interactions with clients (den Hertog, 2000). Special attention was given to their influence on regional and national innovation systems (Muller and Zenker, 2001; Thomi and Bohn, 2003; Baláž, 2004) and regional development (Wood, 2006). The current third phase of KIBS

research involves in-depth analysis of the various factors and determinants connected with the operations of such companies and their interactions with the environment.

The literature on KIBS can also be analysed in terms of the various aspects of these services concerned. Such an overview is presented in Table 3. The first area of analysis is innovativeness. In analyses of KIBS and their innovativeness, the following streams can be identified: the innovativeness of KIBS themselves, that of the customers they serve (e.g. manufacturing companies), innovation patterns and types.

The issue of innovativeness also arises within the second area: interactions between KIBS and the environment. Here one can find analyses of KIBS-related regional development, spacial proximity, clustering and regional innovation systems.

The third area concerns knowledge and all the processes related to it, e.g. R&D activities, knowledge management, knowledge absorptive capacity, knowledge spillovers, expert knowledge, etc.

The fourth area puts emphasis on the human aspects of KIBS – the people who perform KIBS. Companies offering such services search for well-educated and experienced employees (Pardos, Gomex-Loscos and Rubiera-Morollon, 2007; Czarnitzki and Spielkamp, 2000). The human aspects of KIBS have therefore engaged the attention of researchers. Sample topics here are: skills requirements and associated educational levels, HR practices, interpersonal relations, the role of entrepreneurs and social capital, and 'knowledge angels'. There are also some other areas which have not been classified and explained here, such as the sources of the competitiveness of KIBS and their productivity. All the above-mentioned areas together with articles covering them are collected in the table below.

Table 3: Research areas on KIBS.

Research area	**Authors**
KIBS and their innovativeness	
innovativeness of KIBS themselves	(Czarnitzki and Spielkamp, 2000)
innovativeness of customers they serve	(Aarikka-Stenroos and Jaakkola, 2012); (Yam, 2011); (Aslesen and Isaksen, 2007); (Toivonen, 2004)
innovation patterns and types	(Amara, Landry and Doloreux, 2009), (den Hertog, 2000); (Freel, 2006); (Corrocher, Cusmano and Morrison, 2009)
KIBS and their interactions with the environment	
sectoral growth	(Evangelista, 2012);
spacial proximity	(Doloreux, Freel and Shearmur, 2010); (Koch and Stahlecker, 2006)
regional innovation systems	(Thomi and Bohn, 2003); (Stahlecker and Koch, 2004); (Koch and Stahlecker, 2006); (Bishop, 2007)
clustering	(Shearmur and Doloreux, 2012)
Knowledge and the related processes	
R&D activities	(Hipp, 1999)
knowledge management	(Andreeva and Kianto, 2011)
knowledge absorptive capacity	(Tseng, Pai and Hung, 2011); (Koch and Strotman, 2008)
knowledge spillovers	(Bishop, 2007); (Fernandes and Ferreira, 2011)
expert knowledge	(Aslesen and Isaksen, 2007)
Human aspects of KIBS	
skills requirements/associated educational levels	(Consoli and Elche-Hortelano, 2010)
role of entrepreneur and social capital	(Gianecchini and Gubitta, 2012)
knowledge angels	(Muller and Doloreux, 2009); (Muller, Zenker and Ramos, 2012)
Other areas	
sources of KIBS competitiveness	(Corrocher, Cusmano and Morrison, 2012)
KIBS productivity	(Musolesi and Huiban, 2010)

Source: Own, based on literature review.

It can be concluded that research on KIBS has been evolving from that based simply on identifying such services and highlighting their innovativeness to an in-depth examination of the myriad factors connected with them, their interactions with other companies, and with the environment. It is also worth mentioning that many studies on KIBS are devoted not to a single area from those mentioned above, but interlink two or three of them and aim to identify the correlations between them. Two examples are the study of the relationship between the sources of knowledge, innovation and

productivity by Musolesi and Huiban (2010) and that on expert knowledge as an input in innovation processes by Aslesen and Isaksen (2007).

5. Conclusion

The importance of the knowledge-intensive business services sector for the development of the economy is growing. In the 80s and 90s this sector became the fastest growing sector in the OECD countries (OECD, 2001).

The development of KIBS in recent decades can be interpreted as one of the indicators of a transformation from industrial economies into knowledge-based ones. Quantitative measures, in the form of sales or employment figures (e.g. Chadwick, Glasson and Lawton Smith, 2008), undoubtedly show the expansion of these services; but their characteristics also make it clear that they significantly affect the formation and spread of knowledge throughout the economy. This is also confirmed by the literature presented in this article. The future of the KIBS sector is undoubtedly one of further rapid development.

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