

*This article has three contributions. First, it presents initial concepts on the central topic of research – Knowledge Intensive Business Services (KIBS). Second, it posits a group of authors and their views over time. Third, the article brings its conclusion on the overall review in the indexed databases and their trends over time.*

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# Bibliometric analysis of knowledge intensive business services<sup>1</sup>

## *Análise bibliométrica de negócios com uso intensivo de conhecimento*

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### Abstract

The purpose of this exploratory and qualitative approach study is to promote an overall review of the literature in Scopus and Web of Science international indexed databases, and in the National one Scielo, on the theme of KIBS - Knowledge Intensive Business Services in order to understand how it has been approached by scientific researchers in the last 15 years. To do so, 299 articles were identified through a bibliometric analysis. The results of the research, generated from the most prestigious and most recent papers, show a tendency to analyze KIBS in their functions and roles with the largest concentration being from the international publications in the English language. A strong synergy between the Scopus and Web of Science indexed

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databases can also be perceived. This situation found should provide a basis to expand the future investigation in other directions on the same theme of KIBS.

**Keywords:** KIBS. Innovation. Knowledge. Bibliometric. Business.

## Resumo

A abordagem exploratória e qualitativa do estudo tem como finalidade promover uma revisão global da literatura, nas bases indexadas internacionais Scopus e Web of Science e nacional Scielo, sobre o tema KIBS – Knowledge Intensive Business Services, procurando entender como é abordado pelos investigadores científicos nos últimos 15 anos. Para isso, foram identificados 299 artigos por meio da análise bibliométrica. Os resultados da pesquisa, gerados a partir dos trabalhos de maior prestígio e mais recentes, apontam uma tendência em analisar KIBS nas suas funções e papéis, sendo a maior concentração das publicações internacionais no idioma inglês. Também é percebida uma forte sinergia entre as bases indexadas Scopus e Web of Science. Essa situação encontrada deverá permitir ampliar as futuras investigações em outras direções, na mesma temática, KIBS.

**Palavras-chave:** KIBS. Inovação. Conhecimento. Bibliometria. Negócios.

## Introduction

Since the initial work of Miles et al (1995), an increasing number of contributions questioned the traditional view of the service companies as incapable of producing innovations. Researchers and practitioners have recognized that, far from being innovative stragglers or just intensive generators of technologies and in manufacturing novelties, services are becoming an increasingly more important place for innovative companies (Howells, 2004; Tether & Metcalfe, 2004). Although it has had a very rapid growth since the 1970s, it is increasingly recognized that KIBS, Knowledge Intensive Business Services, are essential constituent parts of the innovation systems in services (Cooke & Leydesdorff, 2006) and are vectors of transmission of knowledge (den Hertog, 2000; Muller & Zenker, 2001; Miles, 2008).

Thus, over the last years, understanding KIBS in an economy based on learning has received increasingly more attention from empirical studies made and characterized according to the region, theme, and main conclusions (Doloreux & Laperrière, 2013).

In this article we are going to share the initial vision of researchers who for fifteen years have dedicated themselves to investigating the theme of KIBS, known in the international literature as Knowledge Intensive Business Services. Furthermore, we are going to explore the papers published in indexed databases Scopus, Web of Science (international) and Scielo (national), presenting the view of each researcher on the world scenario.

Finally, we will analyze their relations transversally in order to find the theme's trend over time.

This article has three contributions: First, it presents initial concepts on the central topic of research — Knowledge Intensive Business Services (KIBS). Second, it posits a group of authors and their views over time. Third, the article brings its conclusion on the overall review in the indexed databases and their trends over time.

## **Knowledge Intensive Business Services**

This section describes the theme of KIBS, bringing an initial understanding to the investigation made.

More precisely, Hertog (2000, p. 505) defines KIBS as: "Private organizations or companies relying heavily on professional knowledge related to a specific (technical) discipline or (technical) functional domain, and supplying intermediate products and services that are knowledge-based". Another general definition is presented by (Miles et al, 1995; Boden & Miles, 2000; Tomlinson, 2002; Nahlinder, 2002; Cric, 2004; Miles, 2005) who define KIBS as a group of companies that serve to find solutions based on specific knowledge for other companies. In addition, Aslesen & Isaksen (2007a) suggests another definition of KIBS: They are concerned mainly with providing knowledge-intensive inputs for the business processes and collaborative learning of other organizations, including the private and public sector, in which both the company providing KIBS and the client company learn in solving specific problems or of the client companies that lead to the development of new knowledge as a result of the collaborative learning (Hertog, 2000).

In another definition of KIBS (Muller & Zenker, 2001; Wong & He, 2002 and Den Hertog, 2000); (Miles et al., 1995): They provide a platform to study a set of integrated services for innovation by developing knowledge together with their clients, performing the co-production of knowledge. They are referred to as facilitators, carriers, or sources of innovation; they are services involving economic activities that result in the creation, dissemination, or accumulation of knowledge.

Finally, Miles et al (1995), Hertog and Bilderbeek (1998), Hipp (2000), André et al (2002), Miles (2007) consider KIBS to be agents of dissemination and transfer of knowledge and innovation to its clients, which cannot be disassociated from the national-regional economic and social environment (macro and micro).

So, as we can see, there are several definitions of KIBS, but no conclusion or consensus formed (Den Hertog, 2000; Garcia-Quevedo et al, 2013; Audretsch, 2012). Therefore, it is necessary to review the literature proposed by bibliometrics to understand the evolution of the theme over time.

## Methodology

A total of 299 international and national papers were collected from the indexed databases ISE Web Knowledge, Scopus, and SciELO to carry out the bibliometric analysis, making it possible to identify the thematic areas that are related to the central research theme of KIBS (Innovation). It was possible to identify synergy with the papers only on the ISI Web Knowledge and Spocus databases. To emphasize the importance of the research topic, a timeline was established based on the analysis of the databases Spocus, SciELO, and ISI Web Knowledge in order to understand the concentration of the publications. The proposal was to establish a broader view of the theme over time, since the beginning of its publication, by checking the papers up to the year 2014. We can see a greater concentration on publications in number from 2008 to 2013, and highest point being in 2012. In performing the bibliometric analysis, the same studies were found between productions of greater prestige and the older ones, such as Muller & Zenker (2001), Miles (2005), Simmie & Strambach (2006) and Koch & Strotmann (2006). In that case, the repetition of the analysis was not necessary since it conforms to one of the options presented.

## Bibliometric analysis of Knowledge Intensive Business Services (KIBS): most prestigious productions

This session posits a group of authors and their views over time.

Doloreux & Muller (2008) presented the characteristic and the role of KIBS in the innovation system, considering the following: they rely heavily on professional knowledge; or they are primary sources of information and knowledge, or they use the knowledge to produce intermediate services for their clients' production processes; they are of competitive importance mainly for the business.

Miozzo & Grimshaw (2005) based their study on empirical analysis of IT (Information Technology), exploring the lessons for modularity that can be drawn from the outsourcing of knowledge intensive services (KIBS). Modularity is often presented as a design strategy that stimulates innovation.

Muller & Zenker (2001) pointed out that in recent years there was an increase in the attention given to knowledge intensive services and they adopted in their research building an overview of the role and function of KIBS in innovation systems, as well as their activities of knowledge production, transformation, and dissemination. They focused their approach on small and midsize companies.

Amaraa, Réjean Landrya & Traoréb (2008) present their vision of KIBS from the study of managing innovation protections in the intensive use of knowledge based on a multivariate model defined as a Probit (MVP) that

considered simultaneously a lot of methods for protecting intellectual property (IP). As a result, they reached the conclusion that patents, design standard registrations, trademarks, confidentiality, and lead-time are legal and informal methods that are used jointly and that they should be protected from rival companies.

Yam, Lo, Tang & Lau (2010) decided to analyze the sources of innovation, the capacity of technological innovation, and the performance in the manufacturing industries of Hong Kong. They also explored the dual role of KIBS as both sources of bridges and of innovation, concluding that the information available outside the company affects innovation capacity, while external expert organizations only affect the allocation of resources.

Bader (2007) analyzes the legal protection strategies in emerging business areas, such as the service industry sector. Patents are especially considered as a means of intellectual property to protect service innovations, in particular those of intensive knowledge use (KIBS). This contribution focuses on the opportunities and risks of intellectual management.

Miles (2005) defines as an objective of the research to analyze the intensive business services, or KIBS, considered by the author as the fastest growing areas in the European economy and increasingly important contributors to the performance of the sectors that are their clients.

Simmie & Strambach (2006) contribute with the proposal to develop a theoretical position to understand the role of services in innovation in the post-industrial societies. They argue that the role of KIBS in innovation can be theoretically understood in terms of evolutionary and institutional economics where the urban ones are seen as dependent systems that need to work on a network in the production and transfer of knowledge.

Smedlund & Toivonen (2007) aim at introducing the concept of knowledge intensive services in the context of regional networks and analyze the roles of KIBS in the development, especially from the point of view of the regional intellectual capital. They highlight that the production networks should emphasize explicit knowledge while the developing networks should emphasize the tacit knowledge. They also point out that innovation networks should emphasize the human potential, providing the information necessary to act as sources of innovation and facilitators in the process.

Corrocher, Cusmano & Morrison (2008) investigate the variety of standards in different typologies of intensive knowledge services considering the case of Lombardy, a manufacturing area developed for industrial activities that are experiencing a widespread transformation in the sense of content, higher knowledge. It resulted in identifying four KIBS profiles, which are as follows: interactive innovation mode, product innovation mode, conservative innovation mode, and Techno-organizational innovation mode.

Koch & Strotmann (2006) bring as a contribution a multivariate empirical analysis of the determinants of post-entry performance of KIBS, presenting growth equations based on functional links to the knowledge suppliers,

clients, and cooperation partners, impacting the performance of the beginner KIBS.

Aslesen & Isaksen (2007) compare the relevance of two complementary approaches as analytical tools when exchanging knowledge intensive services in innovation processes. The first approach focuses the importance of the knowledge of business experts in the innovation process and the second relates to a broader set of sectors as potentially important knowledge-intensive service providers. The analysis was based on two Norwegian sectors dominated by different knowledge, agriculture and the software industry, respectively.

Doloreux, Amara & Landry (2008) present a large-scale survey of 1,124 KIBS companies in Quebec (Canada) where they empirically explore the extent to which the KIBS from various sectors and regions differ in their characteristics and use of innovation practices. They reveal that KIBS have different characteristics and behaviors of innovation in all sectors.

Consol & Elche-Hortelano (2010) critically discuss a conceptual flaw in the general literature that portrays KIBS as a homogeneous group of activity based on the analysis of official data on occupational information in the United States. Their conclusion is based on the existence of different routes to analyze the composition of industries and sectors such as the output they produce (products and innovations) or the entries that are used (labor, capital, and inputs).

Doloreux & Shearmur (2011) bring as a contribution the relation between space and innovation and defend that few studies consider the broader framework within which companies operate. They believe that innovation varies both in the continuous space and in distinct territories; however, it is affected by the collection of information from companies.

Kubota (2008) identified in his study by analyzing microdata from the Survey of the Economic Activity in São Paulo (Paep) in 2001 the possibility to state that KIBS contribute to the technological innovation of their clients from their own sector.

Guimarães & Meirelles (2014) try to identify clusters of a specific type of KIBS, the Technological kind (T-KIBS) by calculating Quotients of Location (QL) of each municipality and through the application of software that could check a high dispersion of QL values found, confirming the differences of the activities in relation to the market and the productive process.

**Table 1: Summary of the analysis of the most prestigious authors**

Authors	Research Focus
(Doloreux & Muller, 2008)	Characteristics and the role of KIBS.
(Doloreux, Amara & Landry, 2008)	Characteristics and behaviors of KIBS for innovation

(Yam, Lo, Tang & Lau, 2010)	Dual role of KIBS with bridges for innovation
(Simmie & Strambach, 2006)	KIBS role in post-industrial society
(Smedlund & Toivonen, 2007)	Regional networks and KIBS roles in intellectual development
(Miozzo & Grimshaw, 2005)	Design strategy for innovation
(Muller & Zenker, 2001)	KIBS as knowledge production activities
(Amaraa, Réjean Landrya & Traoréb, 2008)	Innovations protection from KIBS
(Bader, 2008)	Patents as a means of intellectual property protection for innovations
(Miles, 2005)	Fastest growing areas in the European economy
(Corrocher, Cusmano & Morrison, 2009)	Different types of KIBS
(Aslesen & Isaksen, 2007)	KIBS approach with analytical tools for innovation
(Consol & Elche-Hortelano, 2010)	KIBS as input and output of a composition for innovation
(Doloreux & Shearmur, 2010)	Relationship between space and time to KIBS
(Kubota, 2009)	Technological contribution of KIBS to customers
(Guimarães & Meirelles, 2014)	Agglomeration of a specific type of KIBS (T-Kibs)

Source: Author

## **Bibliometric analysis of Knowledge Intensive Business Services (KIBS): latest productions**

Najafi-Tavani, Giroud & Andersson (2013) demonstrate that the interaction between knowledge and network-based activities is a determining factor of the known foreign subsidized influence, which is essential for understanding how subsidiaries gain influence within a multinational company. They point

out that the impact of the subsidiary-headquarters insertion, external insertion, and development of knowledge about the influence is mediated by the extent of the inverse knowledge transfer. This mediating role sheds new light on the predecessors to the subsidiary influence.

June & Kheng (2013) relate the research to innovation in general in order to help create a better understanding of innovation based on human behavior. They bring the perspective of the individual influenced by the leader and by the intensive use of knowledge in the service sector in Malaysia.

Mukkala & Tohmo (2013) promote with the study an investigation on the mobility of the inter-industry work giving special attention to workers moving across the board in high-tech or knowledge-intensive services sectors, trying to validate if the characteristics of mobile workers support the effective transfer of knowledge among all sectors.

Mas-Tur & Soriano (2013) present the characteristics of startup companies in the market that improve their innovation capacity through the use of knowledge-intensive services. They analyze the level of innovation among these companies and their characteristics such as size, sector, competition, age, gender... They concluded that KIBS stimulate startups.

Doloreux & Laperrière (2013) analyze the relationship between the different degree of internationalization and the innovation activities of KIBS. They understand that there are differences between the groups of KIBS analyzed, particularly with respect to their characteristics, innovation activities, the use of source of knowledge, the use of advanced technologies and value-added practices, as well as results from innovation. However, these differences are not always systematic.

Hipp, Gallego & Rubalcaba (2013) focus their analysis on the KIBS in Europe, identifying data at the company level based on the Fourth Community Innovation Survey by Eurostat. They explore a set of variables related to innovation within the 27 Member States. The results highlight the relatively high innovation of KIBS and its cooperative nature in the external sense of partners in achieving their innovation processes with important implications in terms of knowledge management and formulation of innovation policies.

Asikainen (2013) in her study tries to identify differences in survey, development, innovation, and intensive use of knowledge (KIBS). She finds differences in the function of international market for the production of innovation and in the existence of innovation in the sectors. She realizes that the role of KIBS is central in investigation and innovation in emerging systems and act as transmitters of knowledge between markets.

Fernandes, Ferreira & Marques (2013) develop a study involving the description and modeling of innovation management capabilities in knowledge-intensive business services (KIBS) trying to identify the profile of entrepreneurs when sorted by location in the rural and urban dimensions. They perceive that KIBS have a high capacity for innovation and differ

according to their geographical location. They conclude that rural KIBS are influenced by the strategy factor while urban KIBS receive influence from learning and networking.

Zaefarian, Henneberg & Naudé (2012) establish their approach in the configuration of improving the performance of companies overall by leveraging commercial structures, a precise alignment to the structure of relationship, and business strategy. They focused their approach on the analysis of KIBS in order to confirm the existence of a relational and ideal configuration for each type of business and strategy.

Jacobs, Koster & van Oort (2013) collaborate that the impact of the multinational companies on the birth of KIBS has been investigated by researchers from the approach of case studies, thus limiting the possibility of generalization. They question the quantitative approach of the investigations using a continuous space to test if proximity is important for the co-localization of KIBS and the multinational companies in the metropolitan region of Amsterdam, Netherlands.

Mercedez (2014) brings as an objective in the study a vision about the geographic and technological gap in the knowledge diffusion process. The author shows how the high standard technologies account for a significant part of the regional process of innovation using the extended knowledge production function.

**Table 2: Summary of the analysis of more recent authors**

Authors	Research Focus
(Najafi-Tavani, Giroud & Andersson, 2013)	Intensive knowledge transfer from the network activity interaction
(Mercedez, 2014)	Technological and geographical distance in the knowledge diffusion process
(June & Kheng, 2014)	Human behavior and the relationship with knowledge intensive - KIBS
(Mukkala & Tohmo, 2013)	Features of workers with knowledge intensive knowledge transfer
(Mas-Tur & Soriano, 2013)	Features of start-ups that enhance their ability to innovate with KIBS.

(Doloreux & Laperrière, 2013)	Relationship between the degree of internationalization of companies and KIBS
(Hipp, Gallego & Rubalcaba, 2013)	Innovation variables from KIBS
(Asikainen, 2013)	Differences in innovation, research, development and KIBS
(Fernandes, Ferreira & Marques, 2013)	Description and modeling of innovation management capabilities in knowledge-intensive business services (KIBS)
(Zaefarian, Henneberg & Naudé, 2012)	KIBS analysis to confirm and existence of a relational setting and ideal for every type of business and strategy
(Jacobs, Koster & van Oort, 2013)	Impact of multinational companies on the birth of KIBS

Source: Author

## Conclusion

This session presents the conclusion on the overall review in the indexed databases and their trends over time.

Given the contributions proposed by the article, which are initial concepts of KIBS, one can realize that there is no consensus on the definition of the central theme of research, but there are related approaches directed to study applied by the researcher.

When postulating a group of authors and their views over time, the emphasis is demonstrated on the ability to analyze KIBS in their roles and functions. This overall review makes it possible for us to finish by stating that over time, since its origin, KIBS have been emphasized in the international literature, creating an opportunity for further papers in Brazilian literature.

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