

KNOWLEDGE INTENSIVE BUSINESS SERVICES (KIBS): A Decade of Development to Innovation¹

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ABSTRACT

Researchers took interest in analyzing KIBS, Knowledge Intensive Business Services because of the importance of its role in the development of the new economy of knowledge and of innovation. KIBS had its origin in the United States and Europe, where it gained visibility in the world economy. The objective of this article is to review the literature about KIBS since its origin to the present day, considering a period from 2000-2014 from the application of the bibliometric method used in the indexed databases SCOPUS, SCIELO, and ISI WEB OF KNOWLEDGE. As a result, we noticed that over the 15 years of evolution, the topic of KIBS has been seen in higher concentration in the analysis of characteristics and roles for innovation and can be interpreted in different ways and types of study. It is understood that there is an evolution of the theme in the literature and its relevance to innovation, becoming a part of the new economy based on intensive knowledge.

Keywords: Knowledge; Innovation; Knowledge Intensive Business Services; KIBS.

1. 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 (Cooke & Leydesdorff, 2006) and are vectors of transmission of knowledge (den Hertog, 2000; Muller & Zenker, 2001; Miles, 2008).

Thus, over the last 15 years, understanding the role and the contribution of 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).

Considering this initial context, we have defined that the objective of this article, which is part of a PhD research in management, is to review the literature about KIBS since its origin to the present day, considering a period from 2000-2014 from the application of the bibliometric method used in the indexed databases SCOPUS, SCIELO, and ISI WEB OF KNOWLEDGE. The keywords used were (1) Knowledge Management, (2) KIBS, and (3) Innovation, which identified, based on the Boolean method "AND" OR "AND NOT", 299 papers related

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to the central theme of the qualitative and exploratory research. We specifically intend to work with the following central issue in the study after identification: (1) How is *KIBS viewed in the literature after a decade of evolution for innovation?* To do this, we divided up the study into six sessions as follows: Session 1 - Introduction; Session 2 - Literature Review; Session 3 - Presentation of the View on the Study's Methodology; Session 4 - Bibliometric Analysis of the Study; Session 5 - Results of the Analysis of the Productions; and finally Session 6 - Conclusion.

2. LITERATURE REVIEW

More precisely, (Hertog, 2000) 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 in order to understand the evolution of the theme over time.

3. METHODOLOGY - Structure of the Study's Bibliometrics

To define the type of study requires understanding the purpose of the research and to analyze its issues so that the answers can be given at the end of the investigation. For (Gil, 1999, p.42) research is seen as, "The formal and systematic process of applying the scientific method. The fundamental objective of the research is to discover the answers to problems by using scientific procedures." For (O'Connor, 1981) bibliometrics has much to contribute in the field of information where its long-term benefits emerge towards the causal explanations of the bibliographic phenomena aimed at consistent benefits for the research.

We can understand the bibliometric analysis from the perspective of three bibliometric laws and principles, which are as follows: Bradford's Law, Lotka's Law, and Zipf's Laws, all of them well known for their applications focused on analysis of articles, words, and authors most cited in scientific papers. Bradford's Law makes it possible to estimate the degree of relevance of journals in a given area of knowledge, creating a core of a supposedly higher quality. Lotka's Law analyzes based on the scientific production of some researchers, supposedly the most prestigious ones in a particular area of knowledge. Zipf's Laws focus the analysis on the occurrence of words in a particular scientific text in the theme investigated. Table 1 summarizes the main bibliometric laws and principles presented, their study focuses, and their main applications in the management of information and knowledge.

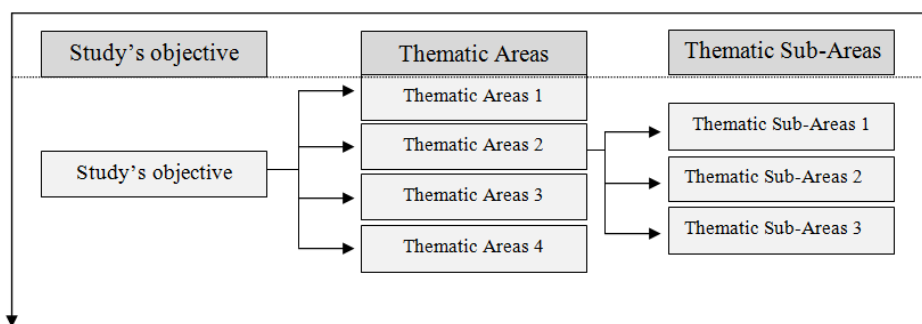
Laws and Principles	Focus of the Study	Applications
Bradford's Law	Periodicals	Estimates the degree of relevance of the periodicals in a given field of knowledge.
Lotka's Law	Authors	Estimates the degree of relevance of the authors in a given field of knowledge.
Zipf's Laws	Words	Automatic indexing of scientific and technological articles.

Table 1: Main Bibliometric Laws and Principles

(Farias Filho, 2009) reinforces the laws presented, Bradford, Lotka, and Zipf, defining the bibliometric analysis as a broad theoretical framework obtained from databases in order to search words and key terms as well as relevant authors and publications listed as national and international periodicals used to generate enough knowledge to be used in research.

The first test was an attempt to present the keyword tree structure that was used with search engines in order to find articles that provide information relevant for searching the first keywords and key terms related to KIBS.

Figure 1: Keyword Tree



Source: Adapted from Farias Filho (2009)

Configured as an exploratory qualitative study, the literature review was done using bibliometric analysis from the database SCOPUS, SCIELO, and ISI WEB KNOWLEDGE from 2000 to 2014, where it was possible to observe a growing number of international publications on the theme of KIBS, Knowledge Intensive Business Services, in the past 15 years. The following keywords were used: (1) Knowledge Management, (2) KIBS, and (3) Innovation. Based on the Boolean method "AND" OR "AND NOT", they identified 299 papers related to the central theme of the research, KIBS. All papers have been cataloged using the software EndNote.

4. BIBLIOMETRIC ANALYSIS OF THE STUDY

To perform the bibliometric analysis, a total of 299 international and national papers were collected along with one (1) national doctoral thesis from the indexed databases *ISE WEB KNOWLEDGE*, *SCOPUS*, and *SCIELO*.

The identification of the problem was done based on the bibliometric methodology mentioned and gave origin to the research based on applying the Keyword Tree technique, thus highlighting the importance for tests in searches in the subject area. Based on the structure and the overall objective of the research, the method made it possible to identify the thematic areas that are related to the central theme of the research, KIBS (Innovation).

Table 1: Thematic Areas of Relevance

Scopus	Scielo	ISE Web Knowledge
Business, Management and Accounting	-	Operation Research Management Science
Engineering	Engineering	Engineering
Social Science	Applied Social Sciences	Social Sciences Other Topics
Computer Science	-	Computer Science
Economics, Econometrics, and Finance	Economy	Business Economics

Source: author

Based on the thematic areas, it was possible to identify the main types of documents found in the investigation. As mentioned previously, we analyzed 299 papers and 1 (one) thesis paper in looking for the gaps of the literature review. We realized that the initial publication medium in 2000 was the conference that over time evolved into the paper on indexed databases up to the year 2014, as shown below.

Table 2: Main Documents

Scopus	Scielo	ISE Web Knowledge
Journals	Magazine	Journals
Conference Proceedings	-	Conference/Meetings
Books	-	-
Book Series	-	-
-	Thesis	-

Source: author

In order to identify the main journals and publishing conferences, the bibliometric analysis guided the result as shown in Table 3, finding 12 indexed papers in the ISI Web Knowledge and Spocus databases.

Table 3: Summary of the database comparative analysis

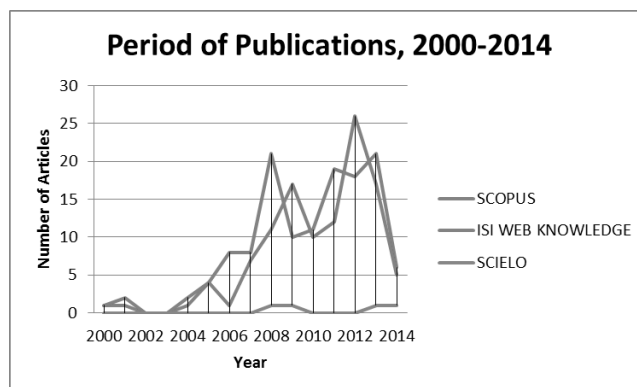
Papers
IBM Systems Journal
Industry and Innovation
International Journal of Technology Management
International Small Business Journal
Journal of Evolutionary Economics
Journal of Knowledge Management
Research Policy
Service Business
Service Industries Journal
Technology Innovation and Policy
Technovation
Tourism Economics

Source: author

In performing the bibliometric analysis, the same studies were found between productions of greater prestige (most cited) 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, thus continuing with the analysis of the most current ones.

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, as shown in graph 1.

Figure 1 - Publications on the Portals Scopus, ISI Web Knowledge, and Scielo



Source: author

5. RESULTS OF THE ANALYSIS OF THE PRODUCTIONS

5.1 - *Of Greater Prestige (most cited)*

(Doloreux & Muller, 2009) 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, 2008) 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, 2009) 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, 2010) 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, 2009) 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.

5.1.1 - Of Greater Prestige (most cited) - Summary

Table 4: Synthesis of the analysis of the most prestigious authors

Authors	Focus on Investigation
(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)	Role of KIBS in post-industrial society
(Smedlund & Toivonen, 2007)	Regional networks and roles of KIBS in intellectual development
(Miozzo & Grimshaw, 2005)	Strategy of design for innovation
(Muller & Zenker, 2001)	KIBS as knowledge production activities
(Amaraa, Réjean Landrya & Traoréb, 2008)	Protection of innovations from KIBS
(Bader, 2008)	Patents as a means of intellectual property or protecting innovations
(Miles, 2005)	Fastest growing areas in the European economy
(Corrocher, Cusmano & Morrison, 2009)	Different typologies of KIBS
(Aslesen & Isaksen, 2007)	Approach of KIBS as analytical tools for innovation
(Consol & Elche-Hortelano, 2010)	KIBS as input and output of a composition for innovation
(Doloreux & Shearmur, 2010)	Relation between space and time for KIBS
(Kubota, 2009)	Technological contribution of KIBS for clients
(Guimarães & Meirelles, 2014)	Cluster of a specific type of KIBS, (T-Kibs)

Source: Author

5.2 - *Oldest*

(Ferreira & Quadros, 2006) analyze the characteristics of KIBS in Brazil so as to contribute to understanding how implications from this innovation process can be contradictory for the training of regional KIBS. On the one hand they have access to new technologies and interaction in international service flows, and on the other there is some abandonment of research and development activities, which are vital to maintain critical skills for KIBS. They based their analysis on the international literature and on the research done by PEAP, the first research on service and innovation in Brazil in line with the guidelines of the Oslo Manual.

Table 5: Synthesis of the analysis of the oldest authors

Authors	Focus on Investigation
(Ferreira & Quadros, 2006)	Characteristics for training regional KIBS

Source: Author

5.3 - *Most Recent*

(Najafi-Tavani, Giroud & Andersson, 2014) 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, 2014) 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 they differ according to their geographical location. The authors 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 6: Synthesis of the analysis of the most recent authors

Authors	Focus on Investigation
(Najafi-Tavani, Giroud & Andersson, 2013)	Transfer of intensive knowledge based on the interaction of network activities
(Mercedez, 2014)	Geographic and technological gap in the knowledge diffusion process
(June & Kheng, 2014)	Human behavior and its relation with intensive use of knowledge - KIBS
(Mukkala & Tohmo, 2013)	Characteristics of workers with intensive use of knowledge in knowledge transference
(Mas-Tur & Soriano, 2013)	Characteristics of startups that improve their ability to innovate with KIBS
(Doloreux & Laperrie`re, 2013)	Relationship between the degree of internationalization of companies and KIBS
(Hipp, Gallego & Rubalcaba, 2013)	Variables of innovation 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)	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)	Impact of multinational companies on the birth of KIBS

Source: Author

6. CONCLUSION

We realized from analyzing the most prestigious and oldest publications a concentration of authors who adopt investigating characteristics and roles of KIBS (Simmie & Strambach, 2006; Ferreira & Quadros, 2006; Smedlund & Toivonen, 2007; Doloreux & Muller, 2008; Doloreux, Amara & Landry, 2008; Yam, Lo, Tang & Lau, 2010). Another concentration done by (Bader, 2007; Amaraa, Réjean Landrya & Traoréb, 2008) adopt investigating the protection of innovations through patents and KIBS. As for the technological contribution, we found (Kubota, 2008; Guimarães & Meirelles, 2014).

The most recent publications are composed of studies by (Mukkala & Tohmo, 2013; Mas-Tur & Soriano, 2013) that also focus on investigation in analyzing KIBS characteristics and startups to improve capacity. (Hipp, Gallego & Rubalcaba, 2013; Asikainen, 2013; Fernandes, Ferreira & Marques, 2013) address the variables, differences, and mainly the innovation management capacity in KIBS. (Najafi-Tavani, Giroud & Andersson, 2013; Mercedez, 2014) adopt the transfer and dissemination of knowledge from the geographical, technological, and network gap.

Thus, the highest concentration of papers analyzed are to investigate characteristics and the roles of KIBS for innovation. Thus, KIBS can be interpreted in many ways, but one issue is quite clear independently of the single concept, its purpose: to contribute with innovation of the companies assisted by generating business with intensive use of knowledge. It is understood that there is an evolution of the theme in the literature and its relevance to innovation. Therefore, KIBS is part of the new economy based on knowledge.

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