

# KIBS Role in the Innovation and Internationalization Processes of Firms: A Bibliometric Overview

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**Abstract:** In recent decades, KIBS have been one of the most dynamic segments of the service sector in European countries and are one of the fastest growing sectors of the European Union economy. KIBS are firms that provide knowledge-intensive inputs to the business processes of other organizations. In the regional and national economy, KIBS have played a central role in innovation as carriers, producers and mediators of knowledge. Consequently, this knowledge has a critical impact on the internationalization of firms. New sources of information and knowledge help firms compete and grow in markets of which they possess little or no prior knowledge. Firms face difficulties in foreign markets, so they need to develop a strong knowledge base to successfully compete across borders. The intensity of knowledge and the diversity of knowledge sources positively impact both the internationalization of firms and their innovation. Knowledge-intensive firms represent a link between their customers and the knowledge base available across the economy, and therefore act as a catalyst for innovation and internationalization. Recognizing the important role played by KIBS and to provide an overall picture of the research field, a bibliometric approach was performed, based on a mapping of scientific publications, intellectual structure and research trends related to the area under study, highlighting the current approaches of reference on the subject of innovation, internationalization and knowledge. In light of this consideration, the main objective of this study is to identify some of the most relevant research in this field and some of the newest trends, according to the information found in the Web of Science database, thus contributing to the enrichment of the existing literature. The specific objectives of this study are as follows: (1) to identify how the concepts of KIBS, innovation and internationalization are defined in the literature and assess the evolution achieved in the field of research; (2) to identify and measure research productivity, the trend of collaboration between countries, and the main and most relevant journals and authors; and (3) to analyze and map citations and research topics to identify the intellectual structure of the literature.

**Keywords:** bibliometric analysis, innovation, internationalization, Knowledge-Intensive Business Services, KIBS

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## 1. Introduction

Knowledge Intensive Business Services (KIBS) firms are among the most dynamic segments of the service sector in European countries since the last 20 years and are one of the fastest growing sectors in the European Union economy (Strambach, 2008; Hu et al., 2013).

KIBS are firms that provide knowledge-intensive inputs to the business processes of other organizations (Muller & Doloreux, 2009). IT (Information Technology) services, R&D services, technical consulting, legal, financial and management consulting, and marketing communications are typical KIBS firms. In the regional and national economy, KIBS are playing a central role in innovation as carriers, producers and mediators of knowledge (Hipp & Grupp, 2005; Miles et al., 1995; Bao & Toivonen, 2014). This knowledge has critically impacted the internationalization of firms. New sources of information and knowledge help firms compete and expand in markets of which they have little or no prior knowledge (Autio et al., 2000). Therefore, knowledge customization has a positive influence on proactive internationalization strategies, such as external innovation and new organizational methods (Braga et al., 2018).

According to Braga & Marques (2016), internationalization is a dimension yet to be explored. The present study seeks to fill the gap in the literature regarding the role of KIBS in the internationalization of firms, by using a bibliometric analysis to map and analyze the scientific production in this area and thus contribute to enrich the existing literature by providing insight into the main research trends in this field.

The main objectives of this study are as follows: (1) to identify the definition of the concepts of KIBS, innovation and internationalization in the literature and the evolution achieved in the research field; (2) to identify and measure research productivity, the trend of collaboration between countries, and the main and most relevant

journals and authors; (3) to analyze and map co-citations and research themes to identify the intellectual structure of the literature.

## **2. Literature review**

### **Knowledge-intensive business services (KIBS)**

As the world and the modern economy have evolved, the importance of intangible resources has increased, with knowledge featuring prominently as one of the main drivers of business development (Hipp et al. 2015). Companies feel increasingly unable to deal with the growing competition and the challenges of the economy based only on their own resources. In this sense, knowledge-intensive companies are fundamental to avoid the costs in maintaining, and even capturing, new professional knowledge (Baláž, 2004). For several authors, KIBS are firms that aim to find solutions for other companies, based on a specific area of knowledge (Miles et al., 1995; Miles, 2005). Gallego & Maroto (2015) identify KIBS as economic agents specialized in transferring, exchanging and/or selling knowledge to the market, while continuing to learn in networks.

According to Miles et al. (1995), KIBS can be classified as professional KIBS (P-KIBS) or technological KIBS (T-KIBS). The former is associated with firms that require a high level of specialization and whose activities comprise technical skills, such as legal, business and management, consulting, marketing, and other scientific and professional services. On the other hand, T-KIBS are more associated with activities comprising technical-scientific content, such as business consulting hardware and software, computing, and information technology, among others.

Interest in KIBS has significantly increased due to their major impact on the innovation of companies and consequently on the economy of countries. Hipp et al. (2015) even state that KIBS will probably be one of the main drivers of future growth in the European Union. KIBS can act as users, creators and transfer agents of technological and non-technological innovations, playing an important role in the creation and dissemination of organizational, institutional and social knowledge, thus creating positive externalities through the transfer and creation of useful innovations for the remaining economic agents ((Miles et al. 1995; Hertog, 2000). In order for this whole process to be viable, a critical point is the relationship of KIBS with customers. According to Miles (2000), KIBS cooperate with external agents to a greater degree compared to other services, where the relationship with customers is one of the most crucial and characteristic elements of their innovation processes. This interaction is fundamental for KIBS to grasp customers' needs and thus provide the most appropriate service for each specific case. However, this interaction is not only critical for the customization of the service to translate into value for the customer, but it is also a source of information and knowledge that feeds the company's innovation process.

(Castaldi, 2008) further states that, by providing knowledge, KIBS represent a link between their customers and the knowledge base available throughout the economy, thus acting as a catalyst for innovation. This process enhances the customer knowledge base by combining and integrating with the KIBS' knowledge base (Hipp et al. 2015). Therefore, the influence of KIBS on business innovation owes much to the type and intensity of the relationship between the organization providing the service and the customer (Hu et al. 2013).

### **KIBS: Internationalization**

A firm's ability to extract, analyze and use knowledge is also critical in exporting and is one of the most important factors when aiming to enter a new market in which it does not yet have much experience (Love & Roper, 2015). As companies face difficulties in foreign markets, they need to develop a strong knowledge base to successfully compete across borders. It is widely known that knowledge intensity and diversity of knowledge sources positively impact a firm's internationalization (de Clercq et al. 2012; Hilmersson, 2013) and also its innovation process (Anoruo & Dipietro, 2006; León-Ledesma, 2005). KIBS then serve as touch points with other markets, where they gain access to valuable information and knowledge that they can absorb, store and codify to incorporate into their extant knowledge base (Doloreux & Laperrière, 2014).

There is increasing empirical evidence suggesting the positive influence of knowledge-intensive firms on companies' competitive ability. A study conducted by Martinez-Gomez et al. (2010) shows the positive impact between exporting and the use of services provided by KIBS. This relationship is shown to be favorable when

the firm's export intensity is relatively low. It can be assumed that services provided by knowledge-intensive firms are useful for companies in the early stages of their internationalization process, so that the existing knowledge exchange enhances performance abroad. Moreover, Jack et al. (2008) state that the degree of interaction between KIBS and their customers likely influences the company's choice of entry mode abroad. This fact is reflected in a study by Cardone-Riportella & Cazorla-Papis (2001) that highlights that the intensity or level of interaction required for service delivery is directly linked to foreign market entry modes.

### 3. Methodology

A bibliometric study is a quantitative analysis that uses a set of mathematical and statistical methods for the processing of scientific literature (Cronin, 2001).

To perform this analysis, the data were extracted from the WoS Core Collection database. The content analysis followed the methodology proposed by Goksu (2021) and Khatib et al. (2021). The articles were selected based on title, abstract, and keywords. First, to search for publications, the following keywords were input: "KIBS" or "Knowledge Intensive Business Services", or "Knowledge-Intensive Business Services", and "Internationalisation" (there was no distinction between the words "internationalization" and "internationalisation" in the extraction because the number of articles obtained in the two searches was the same, so it was not necessary to use a specific search method — in this case, "internationali\*ation"). Next, only articles were selected, thus excluding other types of documents. Subsequently, the selected categories were Management, Business and Economics. Finally, the chosen research areas were Business Economics, Operations Research Management Science and Social Science Other Topics. The data collection covers the period from 1993 to 2021, which resulted in a total of 579 articles (see Figure 1).

The results extracted from the database were then compiled in the VOSviewer software. This software is used to construct and visualize bibliometric maps, as well as to present the thematic flow of knowledge and identify information clusters of the analyzed bibliographic data (Khatib et al. 2021).

### 4. Results

#### Publication trends

Figure 1 shows the evolution of the number of articles published in the period under analysis. It is worth noting that in the early years, mainly from 1993 to 2002, the number of articles published in this area is very small: a total of only 15 publications. In the following years, interest in KIBS steadily increased, particularly in the last decade, with the exception of 2014, in which more than 30 articles per year were published. In this period, the growth rate was 19%. The most significant years were 2016 and 2020, with 58 and 70 published articles, respectively.



Figure 1: Total number of published articles

Within the subject of KIBS, it is possible to find several areas of research. Breaking down the study into subject areas is a useful tool for identifying the performance of each area based on the publications. The area of KIBS already encompasses a variety of research fields, from Economics to other distinct areas such as Environmental Studies. The categories on the podium — Management, Business, and Economics — represent the majority of published articles, with the Management area standing out as the most relevant, with 336 articles, which represents about 58% of the 579 publications under review. The following categories show a considerable drop in the number of articles, resulting in less than 100 articles for each area.

#### Most Productive Countries and Journals

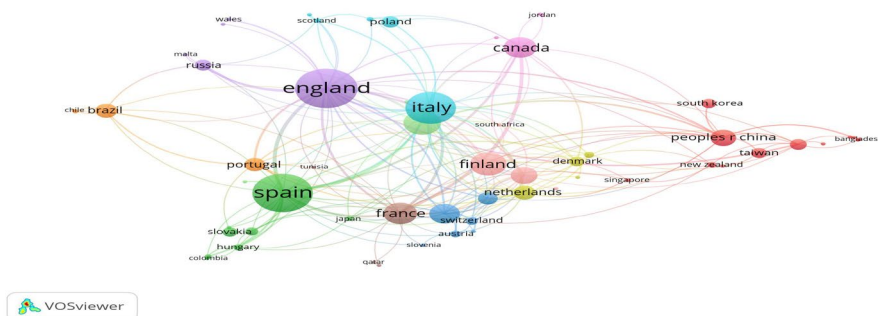
Inter-country collaboration is an important factor to take into account because the exchange of knowledge from different sources is useful for academic success and evolution. A total of 68 countries were extracted from the data set. Table 1 shows the 15 most productive countries. England tops the list of most productive countries, with a total of 95 published articles, followed by Spain (92) and Italy (72). These three countries stand out because they represent almost half of the published articles (44.7%). Of the 15 countries under analysis, it is in Europe (11 countries) that most articles on KIBS are published. Next, in North America, the USA and Canada are the countries with the most published articles: 48 and 40, respectively. In South America, only Brazil stands out, with 22 publications. Similarly, in Asia, only China is on the list, with 28 articles.

**Table 1:** The 15 countries with the most published articles

Countries	Total of Publications	% of 579 Publications	Citations
England	95	16.379	2421
Spain	92	15.862	1789
Italy	72	12.414	2139
USA	48	8.276	1554
Finland	46	7.931	1596
France	41	7.069	688
Canada	40	6.897	916
Germany	37	6.379	1913
Sweden	30	5.172	633
China	28	4.828	641
Brazil	22	3.793	110
Netherlands	22	3.793	447
Portugal	21	3.621	382
Norway	20	3.448	406
Poland	17	2.931	91

Regarding citations, the positions of the countries change significantly, as is the case of Germany: despite having less than half of the articles published in Spain, it has more citations (1,913 citations).

The bibliometric map of inter-country co-authorship shown in Figure 3 provides a broader view of the collaboration between the 60 main countries. England is the country that collaborates most with other countries, presenting 28 links, followed by France (24 links), USA (23 links), Spain (22 links), and Italy (21 links). The remaining countries have fewer than 20 links. It is also observed that England collaborates more frequently with Spain, Italy and the USA. Spain collaborates with several European countries, but mainly with Canada. And China collaborates mostly with the USA, followed by England and other nearby countries, such as Australia and Taiwan. Among all the countries, those that collaborate more with countries anywhere in the world are England, the USA and France. The remaining 8 countries excluded by VOSviewer, such as Turkey, Estonia or the Czech Republic, were not expressively involved in publications with other countries and therefore no connection is observed.



**Figure 1:** Bibliometric map of inter-country co-authorship

Table 2 lists the 10 scientific journals with the highest number of published articles on the topic. Two indicators were used to evaluate the influence of the journals: ACA (Average Citation per Article) and the impact factor of 2020. This analysis will help differentiate between the quality and productivity of publications in journals. While the number of citations is an indicator of journal influence, the number of publications is an indicator of productivity (Kumar et al. 2020). The scientific journal with the highest production is Service Industries Journal, with 50 published articles. But despite having the largest number of published articles, this journal is not the best performing. *Research Policy* has fewer publications and yet is the journal with significantly more citations (2,282 citations) and the highest ACA (163 citations per article). This proves that a large number of publications does not always guarantee a higher number of citations. It should also be noted that the *Journal of Knowledge Management* presents lower results compared to other journals featured in the list, but it is the most prestigious journal among academics.

**Table 2:** The 10 scientific journals with the most publications

Journal	Articles	Citations	ACA	Impact Factor (2020)
Service Industries Journal	50	1454	29.08	6.539
Regional Studies	33	642	19.45	4.672
Industrial Marketing Management	20	969	48.45	6.96
Industry and Innovation	16	295	18.44	3.424
International Journal of Technology Management	16	176	11	1.667
Research Policy	14	2282	163	8.11
Service Business	14	305	21.78	2.791
Journal of Knowledge Management	13	626	48.15	8.182
Knowledge Management Research Practice	13	143	11	2.744
Journal of Business Industrial Marketing	11	156	14.18	3.462

**Top authors: the most productive and most influential**

1,147 authors were included in this study. The h-index was used as an indicator of research performance. The h-index is a robust estimator of the total impact of an author's contribution to a given field of research. Table 3 presents the top 10 authors who have contributed the most to the literature in this research area. With 22 publications (3.95% of 579 publications), Doloreux D from Canada was the most productive author. Shearmur R, with the best h-index (30), and Miozzo M were the next, with 14 and 10 published articles, respectively. The remaining authors, mostly European, contributed less than 10 articles each. These results show that the study of KIBS and Internationalization is already a growing topic, with author Doloreux D presenting the second highest h-index (27), dominating this field of research.

**Table 3:** The 10 most productive authors

Author	Country	Total of Publications	Total of Citations	% of 579	H-index
Doloreux D	Canada	22	586	3.950	27
Shearmur R	Canada	14	360	2.513	30
Miozzo M	England	10	292	1.795	20
Miles I	Russia	9	132	1.616	2
Grandinetti R	Italy	8	308	1.436	14
Rodriguez M	Spain	8	128	1.436	8
Lafuente E	Spain	7	89	1.257	11
Antonelli C	Italy	6	???	1.077	22
Bolisani E	Italy	6	77	1.077	14
Mas-verdu F	Spain	6	179	1.077	15

In addition to the most productive authors, the most influential authors were also studied, as they are those who have central and important scientific articles in the research field (Racherla & Hu 2010). In this section, the TLS (Total Link Strength) indicator was used, extracted from the VOSviewer software, which indicates the total strength of a given researcher's citation links with other researchers. The top 10 authors in the field of KIBS are shown in Table 4.

**Table 4:** The 10 most influential authors

Auhtor	Country	Total of Publications	Total of Citations	TLS	H-index
Doloreux D	Canada	22	586	856	27
Shearmur R	Canada	14	360	532	30
Muller E	Germany	1	475	435	2
Zenker A	Germany	1	475	435	5
Miles I	Russia	8	132	292	2
Amara N	Canada	5	323	291	27
Landry R	Canada	5	323	291	27
Grandinetti R	Italy	8	308	270	14
Rodriguez M	Spain	8	128	267	8
Bettencourt LA	USA	1	409	244	17

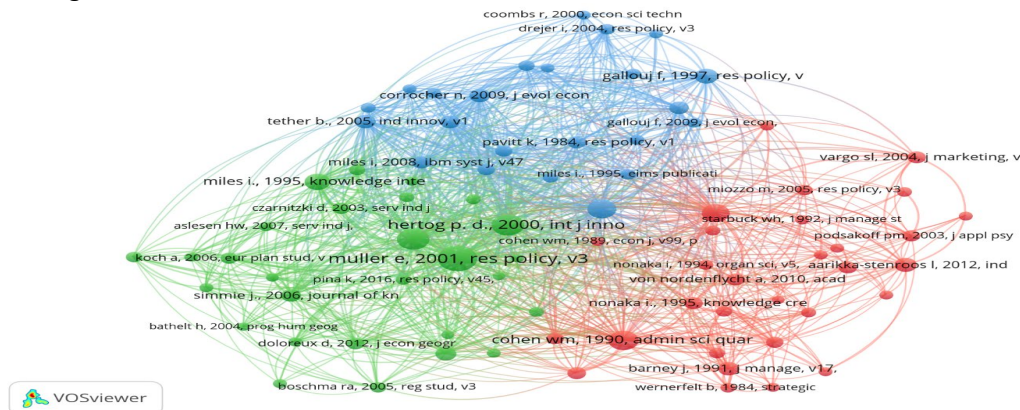
The list is led by two Canadian authors, Doloreux D and Shearmur R, both of whom have the most published articles and highest TLS value. The next two authors stand out because, having only one article, they obtained a high number of citations (475 citations), but the h-index is much lower compared to other authors. Also worth of mention is author Bettencourt LA, who with only 1 article obtained 409 citations. We can then conclude that the most productive authors are not always the most influential ones. 5 of the 10 authors with more publications are not included in the list when the classification is based on the number of citations and the value of TLS.

**Analysis of co-citations**

A co-citation exists when two references appear together in the same publication. The occurrence of two publications more than once in the reference list of an article can be an indicator of similarity in an empirical discipline, methodology, theory, and theme (Barbosa & Ferreira-Lopes, 2021). The advantage of using co-citation analysis is that in addition to finding the most influential publications, academics can also discover thematic clusters. Here, the thematic clusters are derived based on the cited publications. A scientific limit of 20 articles was set and in the end 82 references remained for analysis.

As shown in the figure below, the analysis results in three clusters featuring high correlation between them. Subsequently, the 5 most cited articles were identified by the Vosviewer software to ensure high quality articles in the analysis of each cluster. This analysis resulted in three themes: absorptive capacity and coproduction with the customer, the role of KIBS in innovation, and types and modes of service innovation.

**Thematic Categorization: Clusters**



**Figure 2:** Co-citation of documents

**Cluster 1- Absorptive capacity and coproduction with the customer**

The first cluster addresses customer relations and the ability to absorb new information. The focus of the economy is shifting from tangible to intangible resources such as skills, information, and knowledge, and therefore knowledge is becoming the fundamental source of competitive advantage for companies. To achieve this competitive advantage, a critical factor is the relationship between the service company and its customer. The exchange of knowledge between these two agents allows for service customization and consequently increases the probability of project success and customer satisfaction. The company's ability to absorb external information is also paramount. The ability to tap into external knowledge sources is in effect a critical component of the capacity to innovate.

**Cluster 2: The role of KIBS in innovation**

In this second cluster, innovation is the key theme. KIBS contribution to the innovation of companies is indeed a much studied topic. KIBS play an important role in creating and disseminating knowledge, and they primarily represent a source of innovation. Considered "innovation bridges", KIBS become specialized problem-solving actors in providing complementary knowledge inputs, which facilitate the development of innovation. Muller & Zenker (2001) have proven that interacting SMEs and KIBS are more innovation-oriented than non-interacting firms.

### Cluster 3: Types and modes of service innovation

The third cluster focuses primarily on the types and modes of innovation in the service sector. Service firms provide non-material knowledge-intensive services to firms and may generate new knowledge as a result of interaction with customers. This relationship creates a source of innovation, as does cooperation with other service firms. Services, particularly those organizationally oriented towards innovation activities, are more likely to obtain new technologies via collaboration processes with customers and suppliers, or by acquiring external intellectual property. According to Gallouj & Weinstein (1997), there are 6 modes of innovation: radical innovation, improvement-based innovation, incremental innovation, ad hoc innovation (innovation for tackling a particular problem), recombinative innovation (new combination), and innovation by formalization.

### Keyword Analysis

The technique of word co-occurrence analysis examines the actual content of the publication itself (Donthu et al. 2021). Academics generally perform co-occurrence analysis, as it is an effective method to address research trends regarding a specific topic (Shi & Li, 2019). The keyword co-occurrence network was observed in the keywords that co-occurred more than 10 times in the set of 579 articles, which means that keywords will appear on the bibliometric map when two keywords occur together more than 10 times in a document (Khatib et al. 2021).

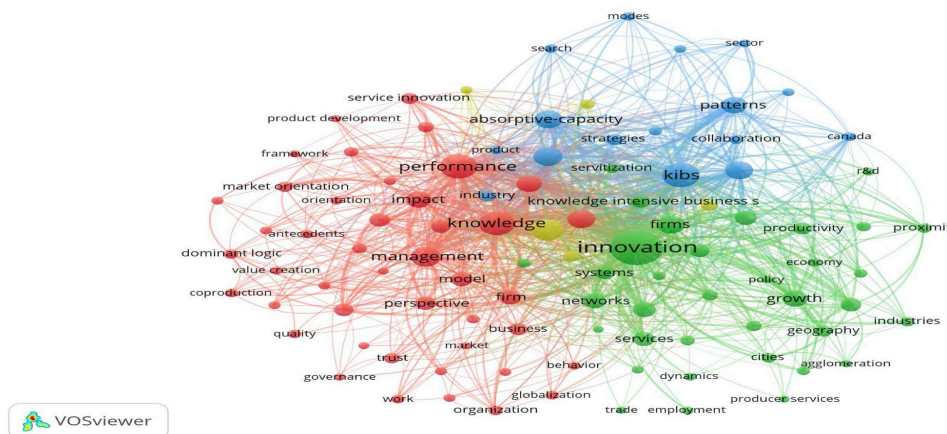


Figure 4: keyword co-occurrence

A set of 2,327 keywords, with the minimum number of occurrences of a keyword defined at 10, resulted in a set of 100 keywords under study. The result of the keyword co-occurrence map (Figure 4) shows that KIBS are mainly focused on innovation (232 occurrences, 98 links). Next appear the words performance, KIBS and knowledge, with 116, 114 and 104 occurrences, respectively. The word internationalization (20 occurrences, 49 links) only appears in position 37 of the list of most frequent keywords. This implies that internationalization associated with KIBS is still an emerging theme.

## 5. Conclusions

Understanding the role and contribution of KIBS in the learning-based economy has received increasing attention in the last two decades. In this economy, internationalization has been identified as a paramount factor for the expansion and growth of firms. In this vein, this study performed a bibliometric analysis on KIBS and internationalization using a set of 579 articles from the Web of Science database to characterize the field and identify research trends.

The bibliometric approach highlighted the recent growth of the field of KIBS in the last decade via an increasing number of articles and citations. The Service Industries Journal stands out with the largest number of published articles, and Research Policy as the journal with the most citations. The study of KIBS is mainly addressed in categories such as Management, Business and Economics, but it is already starting to cover distinct areas such as Environmental Studies and Applied Psychology. Since these distinct areas have not yet received much attention, it may be a starting point for new studies. Doloureux D stands out as the author with both the largest number of published articles and the largest number of citations. The geographical dispersion of the articles showed that Europe is the most influential and productive region, followed by the USA and Canada. Only in

Africa there is no record of any publication. As for international collaboration, the results show that there is a growing trend of collaboration between countries, mainly by England, France and the USA.

Three key themes emerged from the co-citation analysis: absorptive capacity and co-production with the client; the role of KIBS in innovation; and types and modes of service innovation. It can be concluded that the process of internationalization is still not very relevant in the area of KIBS, and it would be pertinent to further explore this aspect, given that it plays such a critical role for companies and even for the economy.

Finally, among a set of 100 keywords, the following themes stood out: innovation, performance and knowledge. It is clear, then, that innovation is a central theme when associated with KIBS.

This study presents an overview of the extant research in the area of KIBS and internationalization, providing some interesting directions for future research and a complementary approach to the more traditional literature review. One limitation of this study regards data extraction, since the data was only extracted from the Web of Science database and no additional information was considered from other databases. Therefore, in the future, the bibliometry can be significantly extended by including other databases. Conducting new studies in the remaining databases will allow further analysis of the observed changes in research trends over time.

## **Acknowledgements**

The authors gratefully acknowledge financial support from FCT- Fundação para a Ciência e Tecnologia (Portugal), national funding through project UIDB/04728/2020.

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