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THE PROFILE OF ACADEMIC RESEARCH IN TECHNOLOGY SUPPLY

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ABSTRACT

The aim of this article is to analyze the profile of academic research regarding the supply of technology. Among the many aspects, this involves identifying the demands for technology to ascertain the alignment of these demands with the development of technologies to solve problems in the market. In this context, the present scientometric analysis involved the following procedures: (1) definition of the most suitable terms for extraction of data from articles related to the theme of interest; (2) search for and extraction of relevant information from the databases used; (3) clean-up and organization of the names of the authors, institutions and countries; and (4) analysis of the final data. The main results show that the theme is of global interest and is present in a wide range of areas, such as medicine and engineering, and that interest has been growing in recent years with the entry of new authors. On the other hand, the area is still immature, since the relationship network among authors is weak.

Keywords: *Technology Supply, Research Profiling, Scientometrics*

INTRODUCTION

Brazil's domestic companies are classified by a large part of the specialized literature as having low propensity to innovate and labor forces lacking in technical training (Zawislak and Dagnino, 1997; Mota and Rosenthal, 1998; Zawislak, Fracasso and Nascimento, 1998; Bezerra and Bursztyn, 2000; Dias and Dagnino, 2007; Lima and Fernandes, 2009; Romaniello and Rezende, 2011; Prado et al., 2013). Despite the efforts by the Brazilian government to establish a legal framework conducive to improvement in technological research, the results have so far fallen shy of the goals (Dias and Dagnino, 2007; Lima and Fernandes, 2009; Romaniello and Rezende, 2011; Prado et al., 2013).

One way to change this picture of technological inefficiency is to discuss the supply and demand for various technologies. In this sense, technological demand is the need for a new technology when the old one is outmoded or facing problems (Lima and Fernandes, 2009; Lima et al., 2000; Passos et al., 2002), or even when there is total absence of a previous generation. According to Zawislak and Dagnino (1997), technological demands are situations that are outside the routine and that generate problems, thus requiring new technologies to reestablish the routine of the productive chain.

Nevertheless, there are cases where demands for technological advance exist that go largely undetected. For Rosenthal and Mota (1998), in these cases the developers of new technologies have to identify the demands to satisfy them, by means of new processes or products. There are also cases where intermediary agents assume this responsibility, such as the IEL (Evaldo Lodi Institute) in the state of Bahia (Passos et al., 2002; Dias et al., 2003) and the Observatory for Prospection and Diffusion of Technology of the National Industrial Training Service in the state of Paraná – SENAI/PR (Souza et al., 2006). The latter agent, however, places more emphasis on analysis of possible future technologies, through technology assessment, foresight, forecasting and roadmapping. These fall outside the scope of this study.

For Dias et al. (2003), the supply (or offer) of technology comes from scientific and technological research. In turn, the demand results from economic activities. Therefore, the supply of technology involves innovations that aim to satisfy needs of the market for technical solutions to problems or shortcomings.

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According to Lima and Fernandes (2009), the study of the supply of technologies is directly associated with the study of the demand for technologies. Likewise, Narayanan (2001) established the importance of alignment between technological demand and supply and noted that companies obtain competitive advantages by creating new products, improving the quality of existing products, improving the efficiency of productive processes and developing new ways to provide services to customers, among others.

Because of the importance of technology supply, it is also relevant to understand the dynamics in this field, since indicators of scientific production "depict the degree of development of a field of knowledge" (Machado, 2007, p. 4). Therefore, by analyzing the dynamics of scientific output it is possible to map what has already been produced on a theme and identify the possibilities for future advances.

In this line, the aim of this article is to analyze the profile of academic research on technology supply, and more specifically, the participation of Brazilian researchers and institutions in this scientific production. The article is divided into five sections including this introduction. The second section presents the method used and the third sets out the methodological procedures, leading to the analysis and interpretation of the data in the fourth section. The fifth section concludes.

METHOD

According to Vanti (2002), scientometrics, bibliometrics, informetrics (or infometrics) and webometrics are sub-fields of the science of information and are ways to assess scientific research efforts. Informetrics is the broadest term, encompassing all the others, each of which has particularities and varied intersections with the others (Vanti, 2002), as presented in Figure 1.

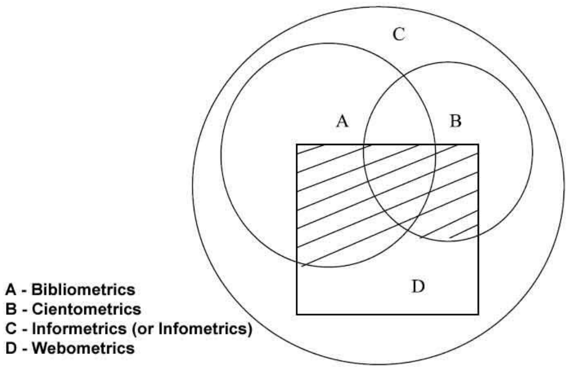

Figure 1: Diagram of the interrelationship of the four sub-fields
Source: Vanti (2002).

The differences and common areas of the sub-fields are summarized in Figure 2, produced by William McGrath and cited by Macías-Chapula (1998), Vanti (2002) and Bufrem and Prates (2005).

Typology/Sub-field	Bibliometrics	Scientometrics	Informetrics/Infometrics	Webometrics
Subject of study	Books, documents, magazines, articles, authors, users	Disciplines, subjects, fields of science and technology, patents, dissertations and theses.	Words, documents, databases, informal communications (including in non-scientific settings) and WWW homepages	WWW sites (URL, title, type, domain names, size and links), search engines
Variables	Number of loans (circulation) and citations, frequency of words, length of sentences, among others.	Factors that distinguish sub-disciplines, how scientists communicate.	Measures of recovery, relevance and revocation	Number of pages per axis, number of lines per axis, number of links that lead to the same site, "citations", search strategies

Methods	Ranking, frequency, distribution	Analysis of correspondence sets, co-occurrence of themes, expressions, keywords	Vector space model, Boolean models of recovery, probabilistic models, processing of language, knowledge-based approaches, thesauruses	Web impact factor (WIF), density of links, “citations”, search strategies
Objectives	Allocate resources (people, time, money)	Identify domains of interest, understand how and to what extent scientists communicate	Increase the efficiency of information recovery, identify relations among various information systems	Assess the success of determined sites, detect the presence of institutions and researchers on the web and improve the efficiency of information recovery engines

Figure 2: Comparison of the applications of the distinct quantitative methods.
Source: McGrath, cited in Macías-Chapula (1998), Vanti (2002) and Bufrem and Prates (2005).

Based on Figure 2, this study falls in the scientometrics category, because our objective is to study scientific articles to identify domains of interest and how scientists communicate with each other. According to Macias-Chapula (1998), scientometrics is employed to provide information about the scientific literature, whether national or international. The most important and widely used indicators are: (1) number of published works; (2) number of citations; (3) participation as author/co-author; (4) number of patents; (5) number of citations of patents; and (6) maps of scientific fields and countries. The details of each indictor are given in Figure 3.

Indicator	Description
Number of works	Separates the works by type of document, such as number of books or articles published.
Number of citations	Reflects the impact of the articles or subjects cited
Participation as author/co-author	Shows the degree of collaboration among authors
Number of patents	Shows the approximate degree of technological development and investment in research and development (R&D)
Number of citations of patents	Measures the technological impact, i.e., the larger the number of citations, the greater the impact of that technology
Maps of scientific fields and countries	Helps ascertain the relative positions of different countries in global scientific cooperation

Figure 3: Scientometric Indicators.
Prepared by the authors based on Macias-Chapula (1998).

The next sections of the article are based on the method presented in this section.

METHODOLOGICAL PROCEDURES

We employed four steps in this study, described below. This method was adapted from Motta and Quintella (2012), as also used by Motta, Garcia and Quintella (2014) and Ferreira et al. (2012).

We extracted the data on June 24, 2014, using the Web of Science (WoS), a database belonging to Thomson Reuters, because it has the broadest scientific scope and geographic coverage (Anastasiadis, Albuquerque and Albuquerque, 2009; Chen et al., 2010; Thompson and Nahata, 2012; Chen, 2013) and because it can be accessed without charge by researchers at Brazilian public research institutions (Motta and Quintella, 2012).

The search criterion in WoS was by Topic, which involves the fields Titles, Abstracts and Keywords. The search terms used were: "technolog*supply" and "technolog* offer", both combined with the Boolean operator "OR", which gathers the search results without considering repeated hits. The asterisk symbol (*) was used to consider variations of the word technology, such as its plural form. The quotation marks (" ") were used to limit the search to instances where the words appear in the same sequence.

We thus considered as the scientific production on technology supply the documents extracted by using the terms described in this section ("technolog* supply" OR "technolog* offer"), in the WoS database. Therefore, all mentions of scientific production on supply (offer) of technology refer to those extracted from this database. This delineation is important, because a substantial part of the scientific output on the theme was not reached by this study due to these criteria.

After extracting the data with the criteria described, we cleaned and organized the names of authors and countries and standardized the data, using the VantagePoint V.8 software.

The scientific production was analyzed by means of: (1) number of articles published; (2) authorship of the published articles; (3) co-authorship network; (4) most commonly cited authors; (5) overall areas of knowledge; (6) institutions of the authors' affiliation and their types; (7) countries where the authors work; and (8) network of scientific collaboration among countries.

PRESENTATION AND ANALYSIS OF THE DATA

The organization of the data as described in the previous section led to the results described in this section.

All told, we found 567 published articles in the WoS database using the search terms, in the period from 1975 (year of the first publication) to 2013. We eliminated results for 2014 because it was in course at the time of gathering the data, to avoid possible bias due to incomplete data. The distribution of the publications over time can be observed in Figure 4.

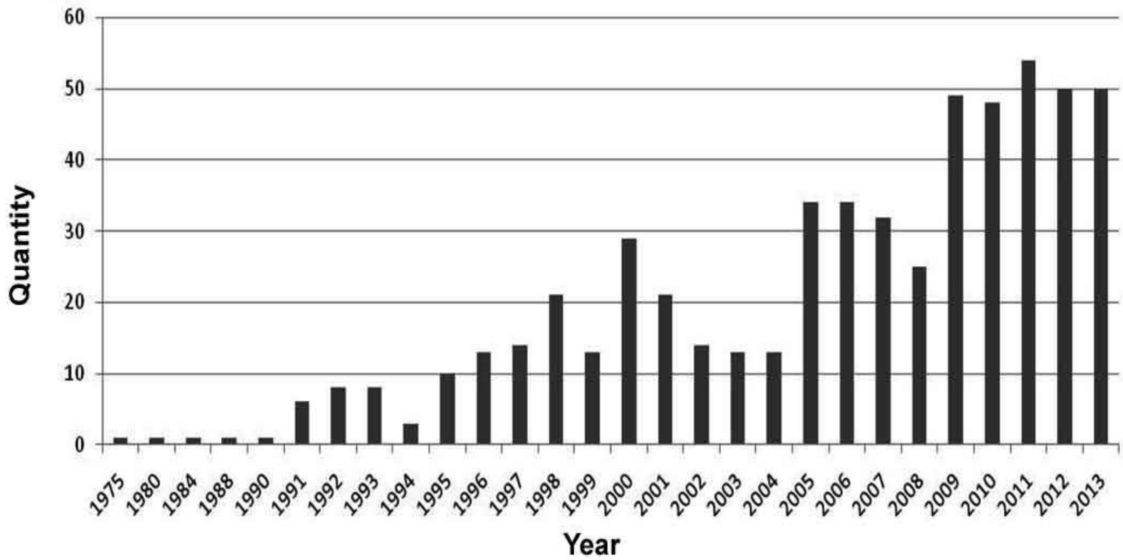

Figure 4: Evolution of publication of articles on the theme "technology supply (or offer)" until 2013
Prepared by the authors based on the research data, using VantagePoint v.8.

As can be seen in Figure 4, the number of articles published on the theme "technology supply/offer" in general grew. In the 1990s there was consistent growth except for 1994 and 1999. In 2000, there was a sharp increase in the number of publications, followed by decline and leveling off until 2005, when there was another large increase. The number then held steady in 2006 and 2007, but fell in 2008, and increased again in 2009, since when the numbers remained steady with small variations until 2013.

With respect to the authors of articles on the theme in question, we found 1,926 authors. However, we did not find any particular author standing out regarding the number of published articles. The maximum number of publications by any one author is three, as indicated in Figure 5, which shows the 20 authors that lead the list. The two most prolific authors published in the areas of engineering (Hepbasli, Arif) and medicine (Wolf, Markus).

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Author	Number of Publications	Author	Number of Publications
Hepbasli, A.	3	Coops, N. C.	2
Wolf, M.	3	Deye, J. A.	2
Aiello, A.	2	Evans, C. H.	2
Barnes, C. H. W.	2	Guitart-Tarres, L.	2
Batarliene, N.	2	Gunerhan, H.	2
Bauer, S.	2	Haug, S.	2
Chang, J. S.	2	Hernandez, J.	2
Chen, C. H.	2	Iyengar, S. S.	2
Clemente, P. J.	2	Kim, J. H.	2
Coleman, C. N.	2	Shimizu, A.	2

Figure 5: Authors with the most publications on the theme “technology supply/offer”.
Prepared by the authors based on the research data, using VantagePoint v.8.

We found citations referring to works by 14,306 authors, among which the most cited are presented in Figure 6.

Ranking	Authors	Number of Citations
1	Cohen, W. M.	10
2	Li, H.	7
3	Porter, M. E.	7
4	Foster, I.	6
5	Latour, B.	6
6	Margulies, M.	6
7	Roschelle, J.	6
8	Zhang, Y.	6
9	Foucault, M.	5
10	Lave, J.	5

Figure 6: Most-cited authors
Prepared by the authors based on the research data, using VantagePoint v.8.

It can be seen from Figures 5 and 6 that the most-cited authors are not the same as those with the largest number of published papers. None of the referenced authors (Figure 6) appear on the list of authors with the most publications on supply of technology. This can indicate that the theme is based on knowledge developed in less specific form.

The areas with the most publications associated with the theme of supply of technology are engineering, medicine and biology. The social sciences area, which includes administration, sociology and behavior, among others, is in fifth place in the ranking, with 77 publications. Figure 7 shows the themes and numbers of publications by area.

Areas	Quantity
Engineering	155
Medicine	154
Biology and Ecology	108
Others	94
Computer Science	77
Social Sciences	67
Communication	57
Instruments and Materials	51
Education	22
Pharmaceuticals	15
Food and Nutrition	12
Transportation	8

Figure 7: Areas of Publication
Prepared by the authors based on the research data, using VantagePoint v.8.

Regarding Figure 7, it should be noted that a publication can be related to more than one area. Therefore, the sum of the numbers per area is greater than the total number of articles analyzed. Figure 8 depicts the areas found to be most relevant. The size of the circles represents the number of articles per year.

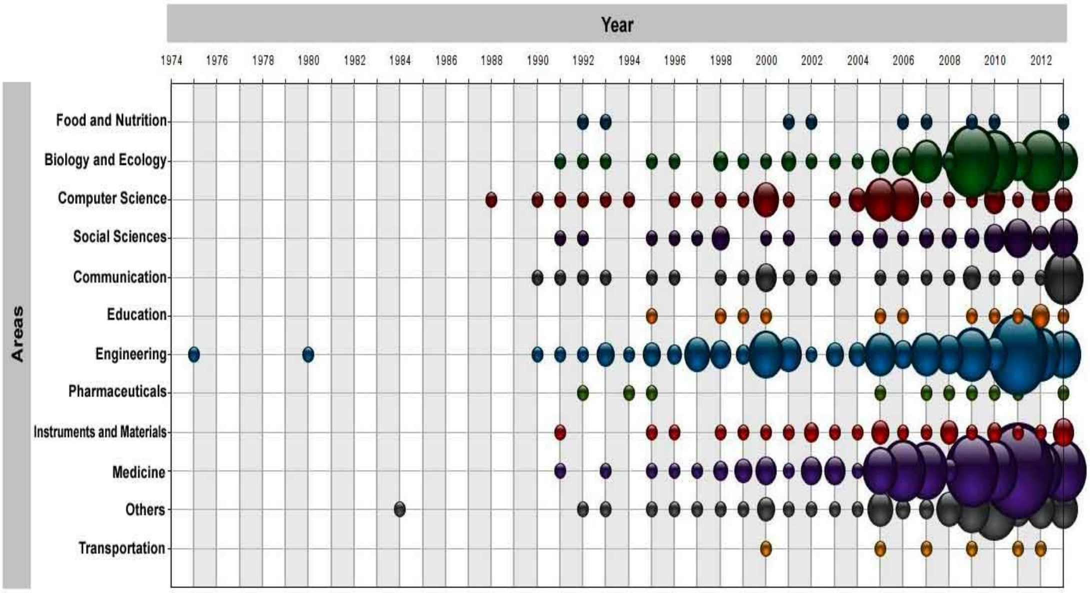

Figure 8: Relevance of the areas by year
Prepared by the authors based on the research data, using VantagePoint v.8.

As can be seen in Figure 8, the areas with greatest relevance in recent years are biology and ecology, engineering and medicine, and interest in these areas started to grow in 2004.

The co-authorship networks with more than one article published about supply of technology are analyzed next, separated by the main areas identified before: engineering, computer science, medicine and social sciences.

The network involving medicine, depicted in Figure 9, is composed of 11 components (sub-networks that have no interrelationship). This absence of connection is due to the many specializations in medicine, such as the network in which Anne Murray acts as the central node, on the specific subject of immunology. The medical network also has the largest number of authors in a network publishing on the theme of technology supply.

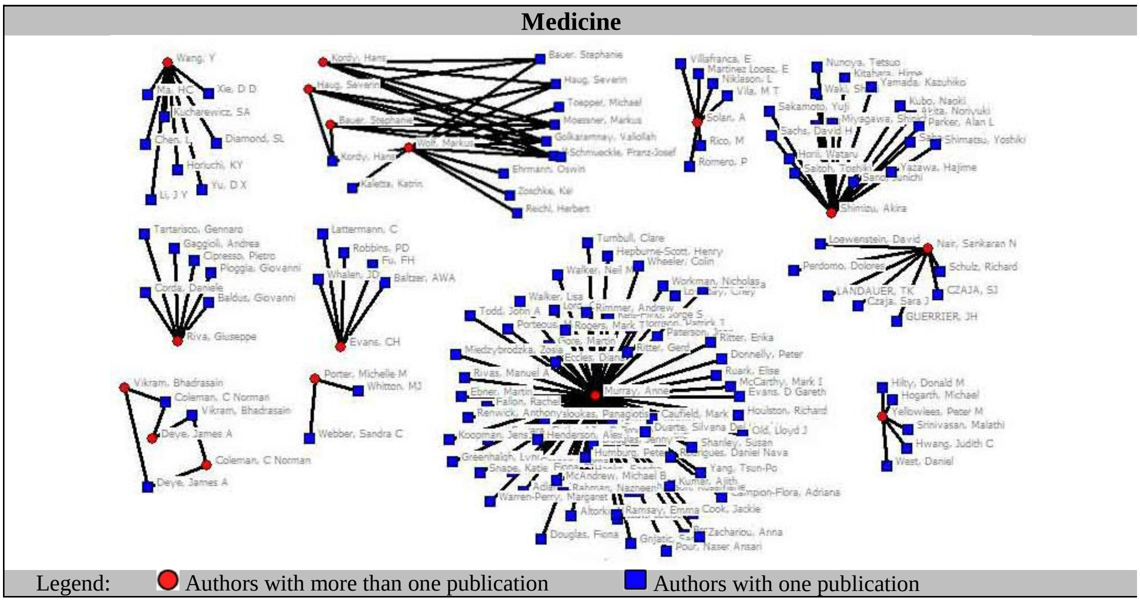

Figure 9: Collaboration network in the area of medicine.
Prepared by the authors based on research data, using UCINET V6.

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The collaboration networks in engineering (Figure 10) and computer sciences (Figure 11) contain smaller numbers of authors than the medicine network, and also a lower number of articles published. The engineering network, like the medicine network, is formed by six components. Again, this is due to the various types of specialized engineering fields, so that each component has a different focus.

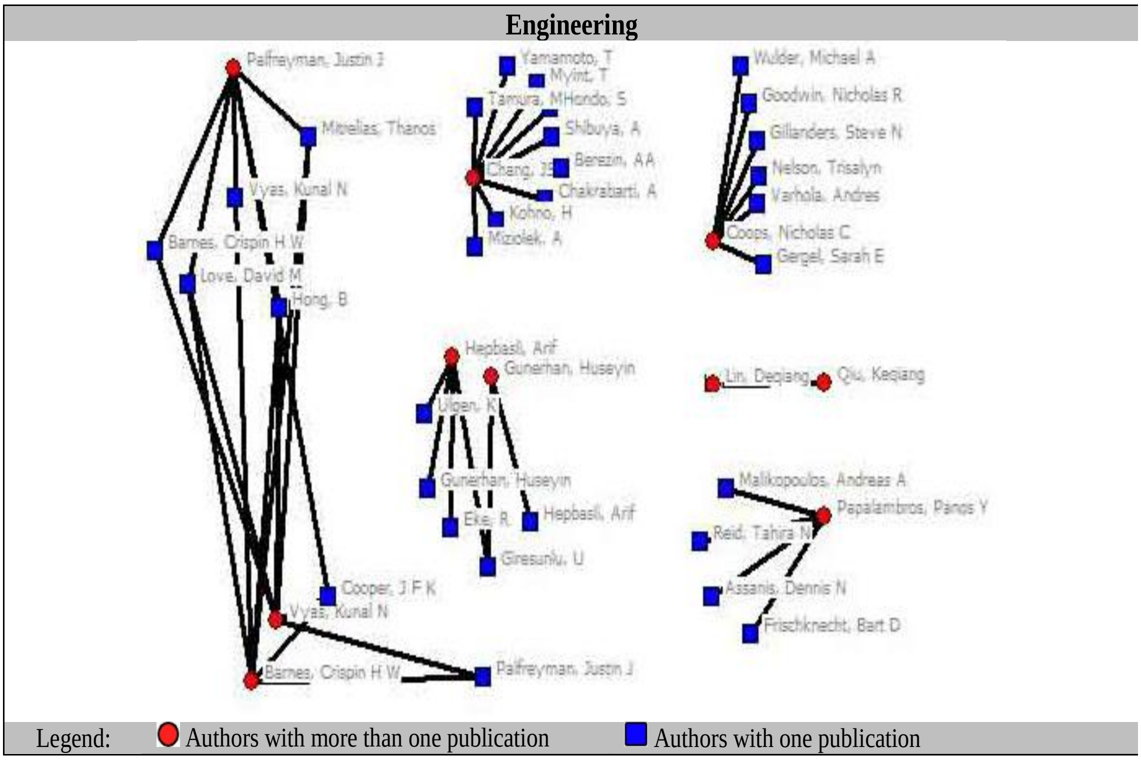

Figure 10: Collaboration network in the area of engineering.
Prepared by the authors based on research data, using UCINET V.6.

The computer science network (Figure 11) presents five components. Again the reason is the varied areas of specialization.

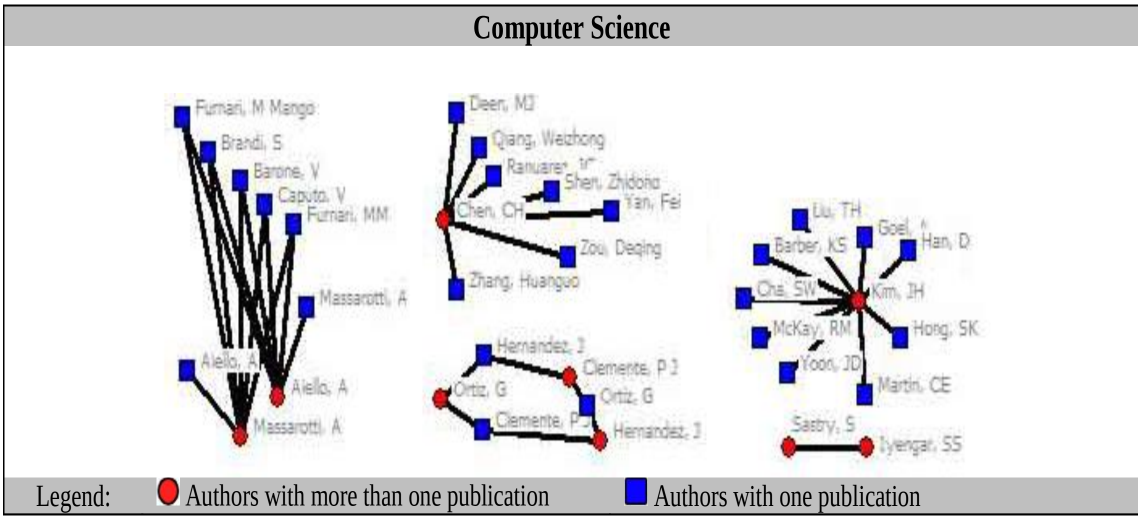

Figure 11: Collaboration network in the area of computer science.
Prepared by the authors based on research data, using UCINET V.6.

The network with the smallest number of authors and greatest simplicity is the social sciences, represented by Figure 12.

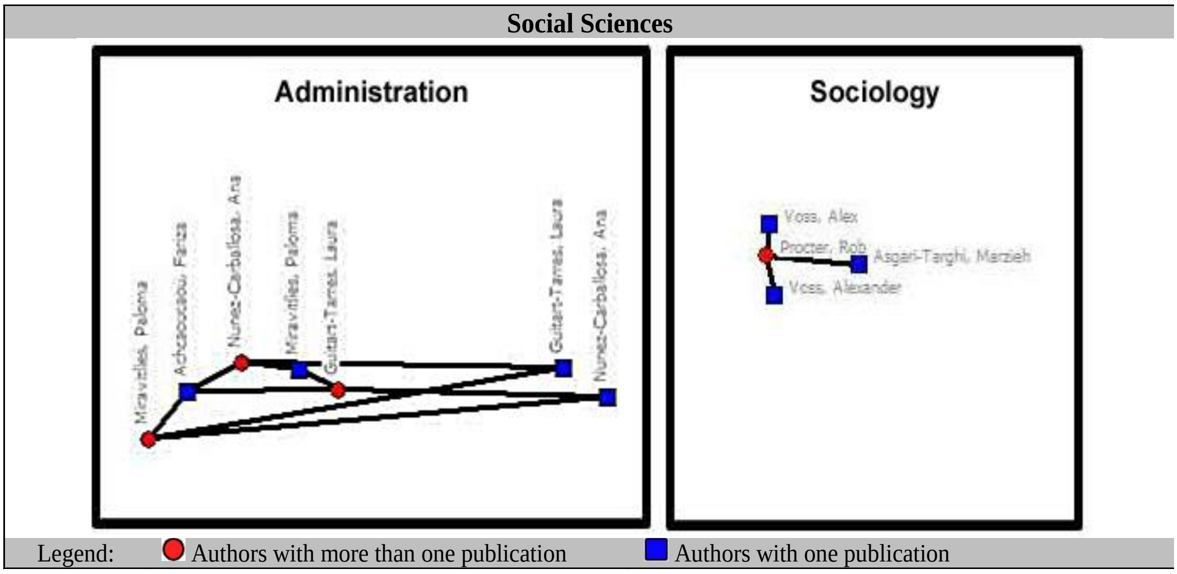

Figure 12: Collaboration network in the area of social sciences.
Prepared by the authors based on based on research data, using UCINET V.6.

The social sciences network (Figure 12) presents two clear divisions: the first component is focused on administration and the second on sociology. In the area of administration, the following authors stood out with two publications together: Guitart-Tarres, Laura; Miravitlles-Matamoros, Paloma; Nunez-Carballosa, Ana; and Achcaoucaou, Fariza, with one publication. All these authors are affiliated with the University of Barcelona in Spain. This university does not figure among the leaders in number of publications: indeed it only appears in 98th place, with just two publications.

It should be noted that there are authors that published alone, who are not represented in the networks presented here.

The institutions with the most publications to which the authors are associated are presented in Figure 13.

Institution	Number of Publications	Country of Origin
Univ. Texas	9	USA
Univ. Manchester	7	USA
Chinese Acad. Sci.	6	CHINA
Indiana Univ.	6	USA
Stanford Univ.	6	USA

Figure 13: Institutions with the largest number of publications.
Prepared by the authors based on the research data, using VantagePoint v.8.

It is noteworthy that 66% of the institutions with articles published on the theme of technology supply are teaching institutions, while business organizations account for 16% and governmental organizations represent 12%, with the rest not being identified. According to Motta and Quintella (2012), business interest in the theme is strong.

The United States was the standout country in number of publications related to supply of technology, with 227 publications, or 47% of the total in the study period, followed by the United Kingdom (141 publications, 25%) and Germany (70 publications, 12%). Brazil ranks 36th, with only two articles published (in 1998), one in the area of instruments and materials and the other in the “others” category (agriculture).

Among the first three countries, Germany started publishing on the theme the earliest, in 1988, with the United States and United Kingdom appearing starting in 1991. Since that date, the United States stands out each year, reaching a peak of publications in 2011 (28 publications), as shown in Figure 14.

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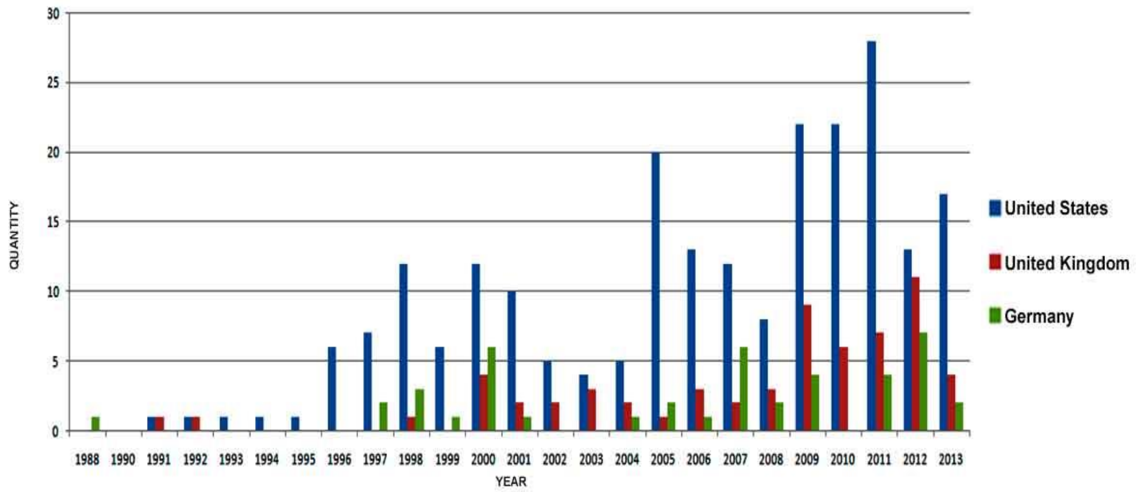

Figure 14: Publications by researchers in the United States, United Kingdom and Germany.
Prepared by the authors based on the research data, using VantagePoint v.8.

In Figure 14 it can also be observed that the United States stands out in all years as of 1996, rising from one publication in 1995 to six publications in 1996.

Another important observation is that over the entire period studied, the average number articles published by these three countries (13.28 articles per year) is greater than the average for all other countries in the world (9.79 articles per year).

The relevance of the theme can also be shown by the number of countries with researchers publishing on the subject. In Figure 15, the non-cumulative indicator shows the number of countries in each year, while the cumulative indicator shows the total sum of all previous years. From the non-cumulative standpoint, the trend of the number of countries is generally upward, indicating an increase of interest in the theme.

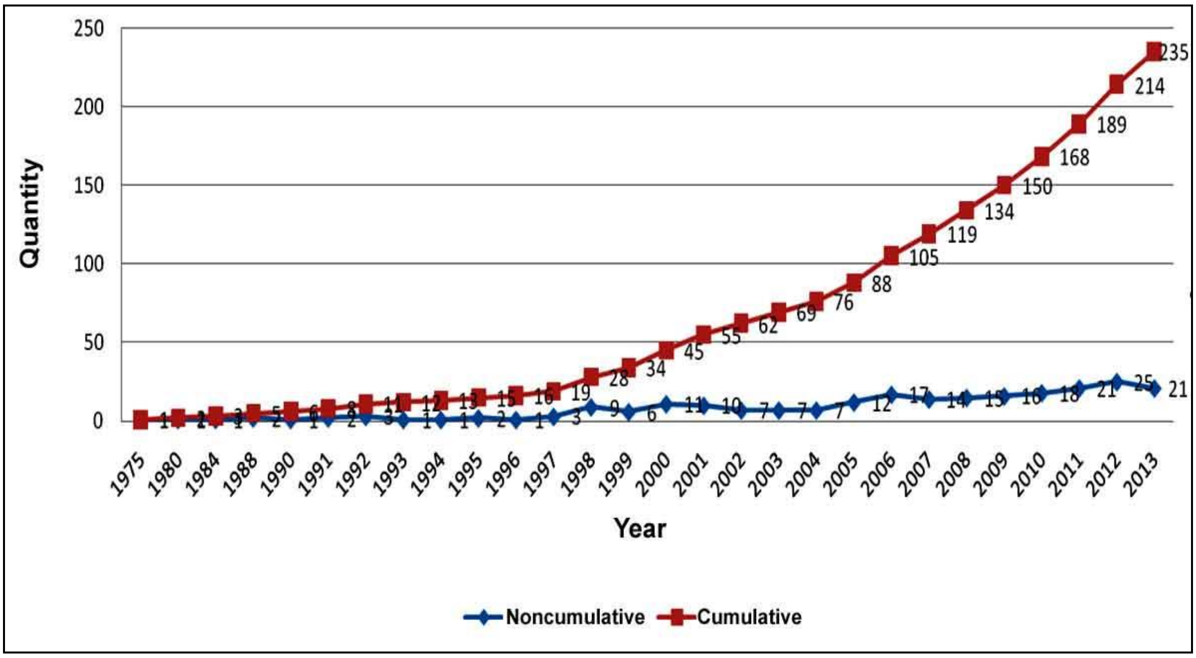

Figure 15: Evolution of countries whose researchers produced articles on the theme of technology supply.
Prepared by the authors based on the research data, using VantagePoint v.8.

By cross-referencing the publications among countries, it was possible to identify networks of international cooperation, i.e., countries from which researchers collaborated in publishing articles, as presented in Figure 16. The intensity of the lines represents the number of joint publications of the nodes (counties) linked by them.

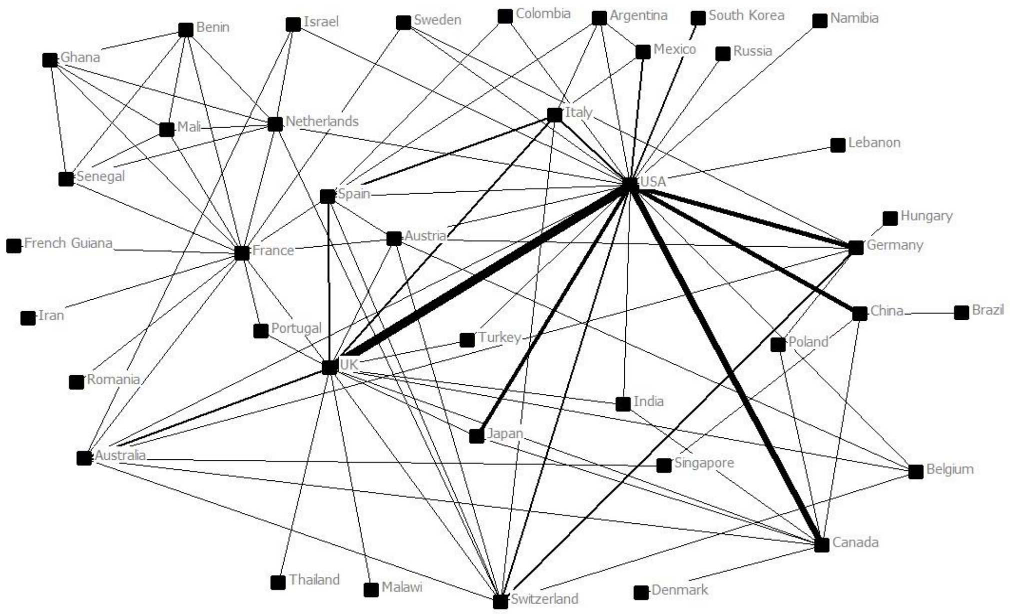

Figure 16: Network of collaboration between countries.
Prepared by the authors based on research data, using UCINET V.6.

In Figure 16, a strong interaction can be noted between various countries, with the strongest being between the United States and, respectively, the United Kingdom, Canada, China and Germany.

Brazil presents only one connection, with China. The institutions involved in this partnership are the Chinese Academy of Sciences, Jilin University and Paraná Federal University. The article was published in the *Journal of Nanoscience and Nanotechnology*.

CONCLUSION

The aim of this study was to analyze the profile of research on the theme of technology supply, and more specifically, the participation of Brazilian researchers in this scientific production. Based on the data presented in the preceding sections, it is possible to make some final considerations.

First of all, the theme of technology supply is broad and covers a large number of areas of knowledge, with the standouts being medicine, engineering, computer science and social sciences (mainly administration and sociology).

Within these the broad knowledge areas, there is low interaction among authors and no interaction of the various networks. Therefore, research into technology supply can be considered relatively immature. Another indicator in this respect is the absence of a single author of studies among those referenced acting as a link. Instead, the citations are dispersed among various authors with less specific interests.

The theme is of global interest and presents a degree of interaction among countries, with the standouts being the United States as the country with the most active researchers in terms of number of publications. The publications are distributed among a wide range of authors and institutions with which they are affiliated, led by teaching institutions. The pattern of authorship does not show particular authors that stand out as references in the various areas of knowledge. The growth in the number of published articles is due to new authors and new countries with publications on the theme.

The main limitation of this study is that we used only one database to obtain data, Web of Science (WoS), which does not contain references to all the articles published on the theme of technology supply. Another limitation is that we only used one language (English) in the search, thus excluding works written in other languages. Because of these two limitations, it is not possible make draw generalizations.

As avenues for future research we can suggest replication of this study considering new databases, and other studies applying the same method focused in a specific area of knowledge, such as medicine.

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REFERENCES

Anastasiadis, A. D.; Albuquerque, M. P.; Albuquerque, M. P. (2009). A characterization of the scientific impact of Brazilian institutions. Brazilian Journal of Physics, 39(2a), 511-518. doi:10.1590/S0103-97332009000400031.

Bezerra, M. C. L.; Bursztyn, M. (2000) Ciência e Tecnologia para Desenvolvimento Sustentável, Ministério do Meio Ambiente; Instituto Brasileiro do Meio Ambiente e dos Recursos Naturais Renováveis; Consórcio CDS/UNB/Abipti: Brasília.

Bufrem, L., & Prates, Y. (2005). O saber científico registrado e as práticas de mensuração da informação. *Ciência da Informação*, 34(2), 9-25.

Chen, X. (2013).The Declining Value of Subscription-based Abstracting and Indexing Services in the New Knowledge Dissemination Era. *Serials Review*, 36(2). doi:10.1080/00987913.2010.10765288.

Chen, H. L.; Cai, D. Y.; Shen, W. Q.; Liu, P. (2010). Bibliometric Analysis of Pressure Ulcer Research: 1990–2009. Journal of Wound, Ostomy & Continence Nursing. 37(6), 627–632. doi: 10.1097/WON.0b013e3181f90d2b.

Dias, R.; Dagnino, R. (2007). A política científica e tecnológica brasileira: três enfoques teóricos, três projetos políticos. *Revista de Economia*.

Dias, C. C., Passos, F. U., Neto, A. D. C., Santos, F. N., & Soares, R. L. D. (2003). Demandas tecnológicas versus perfil tecnológico: uma análise em empresas do complexo químico, petroquímico, de petróleo e gás natural da economia baiana. In: *XXVII ENCONTRO ANUAL DA ANPAD* (2003: Atibaia). Anais... Atibaia/SP: ANPAD.

Ferreira, M. A.; Motta, G. S.; Quintella, R.G. (2012). O Uso de Indicadores Cientométricos e Patentométricos na Avaliação de Tecnologias Emergentes por Fundos de Capital Semente. In: *CASI - Congresso de Administração, Sociedade e Inovação*, 2012, Volta Redonda. Anais.... Volta Redonda: UFF.

Lima, M. A. B., Ruffoni, J. P., &Zawislak, P. A. (2000). Condições para a melhoria da competitividade do setor metal-mecânico gaúcho fornecedor para a cadeia automotiva do Rio Grande do Sul. Porto Alegre: NITEC/PPGA/UFRGS.

Lima, J. P. R., & Fernandes, A. C. (2009). Demandas e Ofertas Tecnológicas em Economias Retardatárias: anotações a partir de dois segmentos econômicos no Nordeste brasileiro. *Revista Brasileira de Inovação*, 8(2) (July-December), 303-340.

Machado, R. N. (2007). Análise scientometric dos estudos bibliométricos publicados em periódicos da área de biblioteconomia e ciência da informação (1990-2005). *Perspectivas em ciência da informação*, *12*(3), 2-20.

Macias-Chapula, C. A. (1998). O papel da informetria e da cienciometria e sua perspectiva nacional e internacional. *Ciência da informação*, *27*(2).

Mota, T. L. N. G.; Rosenthal, D. (1998). Aumentando a Capacidade Tecnológica das Pequenas Firmas Nordestinas: O Caso do PGTEC do Ceará. In: *III Encontro de Economistas de Lingua Portuguesa* v. I, pp. 190-208.

Motta, G. S., & Quintella, R. H. (2012). Assessment of Non-Financial Criteria in the Selection of Investment Projects for Seed Capital Funding: the Contribution of Scientometrics and Patentometrics. *Journal of Technology Management & Innovation*, 7(3), 172-197.Doi: 10.4067/S0718-27242012000300015.

Motta, G. S., Garcia, P. A. A. & Quintella, R. H. (2014), Apatento-scientometric approach to venture capital investment prioritization. *Journal of the Association for Information Science and Technology*. doi: 10.1002/asi.23205.

Narayanan, V. K. (2000). *Managing Technology and Innovation for Competitive Advantage*. Prentice Hall.

Passos, F. U., Neto, A., Dias, C., & Soares, R. (2002). Demandas tecnológicas das empresas da cadeia automotiva baiana–um perfil diferenciado. *Gestão & Planejamento-G&P*, *1*(6).

Prado, H. A.; Nobre, M. K.;Ferneda, E.; Nehme, C. C.; Hedler, H. C. (2013). Sinergias entre Gestão do Conhecimento e Planejamento Tecnológico: um estudo de caso. *Perspectivas em Gestão & Conhecimento*, v. 3, n. 2, pp. 92-111.

Romaniello, M. M.; Rezende, T. M. (2011). Dinâmica da cadeia produtiva do café: um estudo sobre a gestão interinstitucional do Consórcio Brasileiro de Pesquisa e Desenvolvimento do Café. Interface - *Revista do Centro de social sciences Aplicadas*, v. 8, n. 1, art. 5, pp. 86-110.

Rosenthal, D., &Mota, T. L. N. G. (1998). Enhancing technology awareness in NIE’s small firms: The case of PGTEC in Ceará, Brasil. In *TTI’98-Conference on Technology Transfer and Innovation in Small Firms–Conference Proceedings*–Day 3–Wednesday 8 July 1998.

Souza, M., Tacla, I. C. W., Kavinski, H., Hinça, H., Ruthes S., Scroch, K., (2006). Prospecção Tecnológica: Os Setores Portadores de Futuro para o Paraná. In: *XXIV Simpósio de Gestão da Inovação Tecnológica* (2006: Gramado). Anais... Gramado/RS: ANPAD.

Thompson, D. F.; Nahata, M. C. (2012). Pharmaceutical science faculty publication records at research-intensive pharmacy colleges and schools. *Am J Pharm Educ*.,76(9). doi: 10.5688/ajpe769173.

ISSN: 2047 - 0398
SPECIAL ISSUE – V|4|N|5|, January | 2015

Vanti, N. A. P. (2002). Da bibliometrics à webometria: uma exploração conceitual dos mecanismos utilizados para medir o registro da informação ea difusão do conhecimento. *Ciência da Informação 31*(2), 152-162.

Zawislak, P. A., &Dagnino, R. P. (1997). Metodologia para identificação imediata de demandas tecnológicas de setores industriais: o caso de três setores gaúchos. *XXI ENANPAD*, *21*.

Zawislak, P. A.; Fracasso, E. M.; Nascimento, L. F. M. (1998). Competitividade industrial e rodadas de cooperação: proposta de metodologia para ramo industrial. In: *XXII ENCONTRO ANUAL DA ANPAD* (1998: Foz do Iguaçu). Anais... Foz do Iguaçu: ANPAD.