Qualitative and Quantitative Methods in Libraries (QQML) Special Issue
Bibliometrics and Scientometrics: 93- 103, 2015

The Relevance of Publications on the Subject of Innovation in the Portuguese Language over the Last 30 Years: A Bibliometric Contribution

Janete Saldanha Bach Estevao[1] and Walter Shima[2]

[1]Federal University of Paraná – University Library – Reference Librarian
[2]Federal University of Paraná – Post Graduation Program on Public Policy

Abstract: This study presents the results of bibliometric research on the subject 'innovations and (neo) Schumpeterian approaches'. Specifically, the study intends to show the relevance of the publications in Portuguese over the last thirty years. On a different study into the same subject and period of coverage (Fagerberg, Fosaasa, & Sappraserta, 2012), it could be seen, as a result of repeated research, that there were not many publications in English and there was a lack of methodology to indicate better criteria for searching, content analysis, and research patterns when distinct databases were used.

Keywords: Innovation. Bibliometrics. Database research. Bibliometric Research – methodology.

1. Introduction

Although the subject 'innovations and Schumpeterian approaches' is fairly addressed by graduate programs in economics, business, sociology and development, in Brazil, the volume of publications on this subject in Portuguese is surprisingly limited, basically irrelevant in comparison to the volume of publications in English. The bibliometric survey shows a scientific production well below expectations, given the professors' vast background in the referred program. It is important to emphasize here that many Brazilian professors are qualified in the main centers that deal with innovation in Europe and the United States. The resources, which come from the information science, for bibliometric research are widely used in various fields of knowledge with the aim of measuring the results of academic/scientific production in each area.

Received: 23.1.2014 Accepted: 30.11.2014 ISSN 2241-1925

At the other hand, the literature of information science includes the production of bibliometric research, the details that concern the implementation of such research, the researchers' decisions regarding the use of searching strategies, and the use of terms adopted as well as the possibilities of advanced features provided by different databases that have still to be defined in a systematic way. Therefore, the aim of this paper is to present a comparative research, in English, on the evolution of the theoretical neo-Schumpeterian conception throughout the last thirty years (Fagerberg, Fosaasa, & Sappraserta, 2012), reproduced with the same terms in Portuguese in order to indicate a methodological way for the bibliometric research results.

2. The Relevance of the Innovation Studies

Fagerberg, Fosaasa and Sappraserta (2012) published an important article about the relevance and growth of innovation studies. The authors reviewed the most referenced publications about innovation issues and evaluated their academic production. According to Figure 1 from Fagerberg and Verspagen (2009), the authors demonstrate that this field has grown rapidly in recent years and several thousand academics worldwide are currently researching such issues.

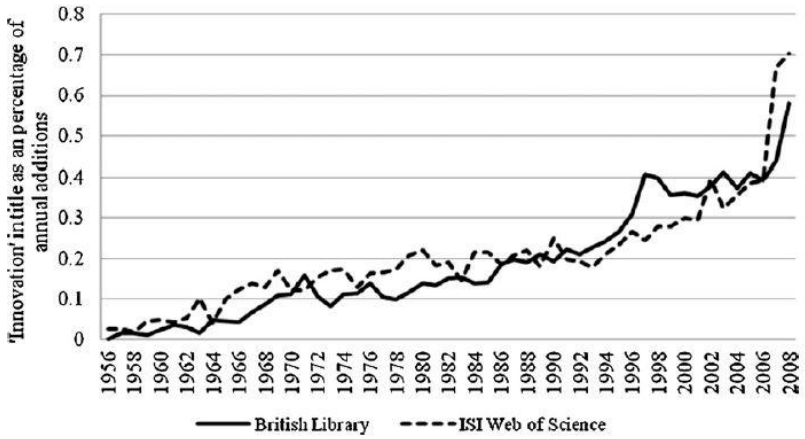

Figure 1 - Growth of the literature on innovation (Fagerberg & Verspagen, 2009)

The authors also demonstrate in

Economics	Nelson, R.R., 1959. The simple economics of basic scientific research. *Journal of Political Economy* 67, 297-306.
	Schmookler, J., 1966. *Invention and Economic Growth*. Harvard University Press, Massachusetts

	Arrow, K., 1962. Economic welfare and the allocation of resources for invention. In: Nelson, R.R. (Ed.), *The Rate and Direction of Inventive Activity: Economic and Social Factors*. Princeton University, Princeton.
Management	Burns, T., Stalker, G., 1961. *The Management of Innovation.* Tavistock, London.
Sociology	Rogers, E.M., 1962. *Diffusion of Innovations.* The Free Press, New York.
	Coleman, J.S., Katz, E., Menzel, H., 1966. *Medical Innovation*. Boobs-Merril, New York.

Table 1: First important publications: academic perspective (Fagerberg, Fosaasa & Sappraserta, 2012)

that the word innovation in the title of publications has rapidly grown from 60s but mainly from the 90s. Therefore, as it can be seen, the academic interest for innovation studies is relatively recent (from 60s on). At the beginning of XX century the only author to address innovation as a dynamic force that causes continuous transformation of social, institutional and economic structures and consequently suppose that social agents drive the economic development was Schumpeter in *The Theory of Economic Development* (1912) and *Capitalism, Socialism and Democracy* (1942). Just from II World War, there was an important attention to innovation from the policy makers to boost military technologies and afterwards civil technologies. In an academic perspective the first important publications were:

Economics	Nelson, R.R., 1959. The simple economics of basic scientific research. *Journal of Political Economy* 67, 297-306.
	Schmookler, J., 1966. *Invention and Economic Growth*. Harvard University Press, Massachusetts
	Arrow, K., 1962. Economic welfare and the allocation of resources for invention. In: Nelson, R.R. (Ed.), *The Rate and Direction of Inventive Activity: Economic and Social Factors*. Princeton University, Princeton.
Management	Burns, T., Stalker, G., 1961. *The Management of Innovation.* Tavistock, London.
Sociology	Rogers, E.M., 1962. *Diffusion of Innovations.* The Free Press, New York.
	Coleman, J.S., Katz, E., Menzel, H., 1966. *Medical*

Innovation. Boobs-Merril, New York.

Table 1: First important publications: academic perspective (Fagerberg, Fosaasa & Sappraserta, 2012)

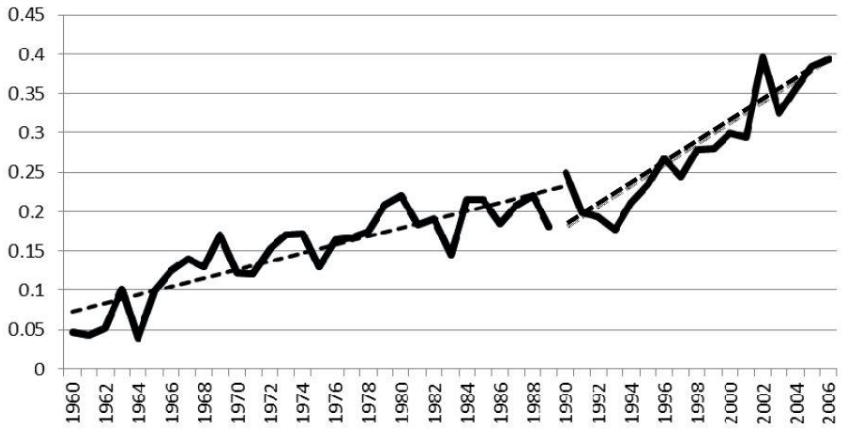

Figure 2 - Growth of publications whose title has the word innovation, 1960-2006 % of all publications (Fagerberg, Fosaasa & Sappraserta, 2012)

Before the 70s, the main feature of those contributions is the lack of interactions between them in terms of subject. For example, Fagerberg, Fosaasa and Sappraserta (2012) assert that Rogers (1961) refers to American rural sociology; Burns and Stalker (1962) is a premature attempt to produce a handbook about innovation management, and Arrow (1962) is a traditional perspective about the allocation of resources for R&D. The basic foundations about innovation are different among them, since they are the first important academic production about innovation.

At the same time, there is an important interest by researchers on innovation coming from private sectors due to a link made by academics. Nelson used to work for RAND Corp. while working the economics of R&D; Freeman used to work in a private research institute maintained by British industry and research, the R&D dynamic inside British firms. Also important is the NBER (National Bureau for Economic Research), in the US and Europe, as one of the first institution to fund research about R&D in economics. Therefore, over time it has been developed an important new area for economic research with a massive volume of publications and emerged many worldwide references for the academic production in the area of innovation.

3. Research Procedures

The article published by Fagerberg, Fosaasa and Sappraserta (2012) is a bibliometic survey consisted of the following: through surveys and many Web searches for the most referenced publications on innovation, the authors identified 11 important handbooks on innovation issues comprising 277 chapters with different approaches. The handbooks are on **Σφάλμα! Το αρχείο προέλευσης της αναφοράς δεν βρέθηκε.**. From those 11 handbooks, there are top 20 references that taken together, cover a wide range of relevant topics on innovation.

In general, those references address three directions: 1) innovation inside the firm, focusing on business and management; 2) economic and social change, focusing on economics and social science; and 3) sectorial change, focusing on the relationship between economic and social agents from many sectors and referring to an intermediary approach between the firm and economic change.

According to Fagerberg, Fosaasa and Sappraserta (2012), from all those contributions, the most important comes from Nelson & Winter (1982). The book focuses on the combination of the Schumpeterian, evolutionary approach, theories of organization and of human behaviour to develop a theory about the knowledge intra-firm, its strategies and output. Actually, as being a broad theoretical alternative to the traditional economic theory, the authors assert that it is based in a completely unreal viewpoint about the human behaviour. Human beings are not able to calculate the consequences of all possible actions and choose the best one as the economists are used to suppose. The world is very complex, the volume of information is huge, and cognitive skills of humans and organizations are very limited to make those decisions. In reality, the firm adopts a less demanding and simpler mechanism of decision based on routines that are reproduced and modified over practice and are stored in the organizational memory or knowledge. Those are technical routines about the prevailing routine of production, contracts, strategies, marketing, hiring, R&D, sales, etc. Routine is related to the gene insofar as the firm behaves today according to its decisions or practices from the past.

At the end of the 80s a new holistic approach came out with Nelson (1993), Lundval (1992), and Freeman (1987) in the perspective of National System of Innovation (NSI). Influenced by OECD, this perspective points out the role played by politics, governance and institutions for innovation. Freeman asserts that a NSI is a network of institutions in the public and private sector whose activities and interactions begin, change and disseminate new technologies. This first idea was exposed in the book *Technology Policy and Economic Performance: Lessons from Japan*, about the Japanese NSI. Inside the Schumpeterian perspective, Freeman saw economic growth as a result of innovations and diffusion of technologies. Differently from Schumpeter, Freeman was interested in the skills of different nations to explore innovation for its own benefit and it could be supported by politics. The word system refers

to national factors that would explain the differences between countries. In a strict approach, Lundvall was interested in innovation as an interactive process between users and producers inside the NSI. This approach was exposed in the book *Towards a Theory of Innovation and Interactive Learning* (Lundvall, 1992). According to Metcalfe, the NSI is a set of distinct institutions that jointly and individually contribute to the development and diffusion of new technologies in addition to providing the framework within which governments formulate and implement policies to influence the innovation process. As such, the NSI is a system of interconnected institutions to create, store and transfer the knowledge, skills and artifacts which define new technologies.

A more holistic approach on innovation comes from Dosi (1982) with the idea of technological paradigms and technological trajectories. Specifically, the author points out that a technology, in a given moment of time, belongs to a limited set of several current technological possibilities that aim future advances. Therefore, a technology incorporates a body of knowledge that belongs to a given technological paradigm. A technological paradigm means a model or a standard solution for selected technological problems based on selected principles derived from natural sciences and selected material technologies. Selection has to do with the choice of a way of solving problems within several possibilities within a given technological paradigm. This selection is defined due to a set of economics and technological previous variables. A technological paradigm provides strong norms about the direction of technical change which must be sought and also neglected.

For Freeman & Perez (1988), the technological paradigm means new technological systems in a perspective of waves of growth. To the extent that new technologies are propagated, there is a prolonged period of economic growth based on high profits and increasing productivity. But gradually, as the set of applications is more or less completed and through successive incremental improvements, the borders of the best practices are targeted, the forces that determine prosperity waves decrease. The limits to growth are found in more and more sectors of the economy, profits decrease and productivity growth is reduced. At this moment, there is a long wave of M & A, various forms of speculation and effort to substitute labor for capital, whilst there is a persistent search for a viable set of technologies that can be promising in terms of profit. In the economic paradigm, there is a new rule: permanent reduction of costs (relative costs follow a predictable trend in whole economy: unlimited supply; potential influence of the dominant technology in all economic sectors that changes qualitatively the equipment, working process, management, etc).

After the 90s, there was a large change, from firm and sector to the whole economy focusing on the roll of institutions and politics as a tool to spillover innovation in the economy. Four of the top 5 contributions from 1990 to 2008 focus on macro issues related to regional, national and international level and Freeman was the most important author responsible for this changing focus

resulting from his insistence that innovation should be seen in systemic perspective.

Therefore, over time and from economic and technical change, the focus of the literature has been changed. For example, Figure 3 reports the number of new articles added to the ISI Web of Science each year between 1996 and 2008 with the combination of words 'innovation and system', 'innovation and industry' and 'innovation and firm', respectively in the title. The results clearly confirm that the 'system' literature has grown much faster than the other combination confirming the growing of a holistic approach on the innovation studies.

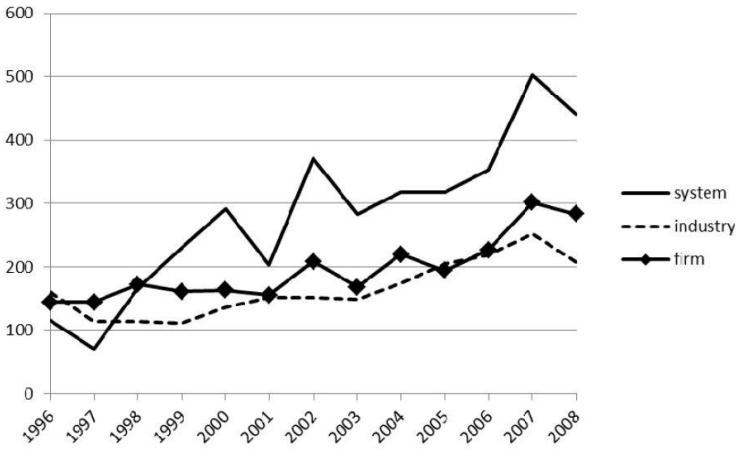

Figure 3 - Recent trends in innovation research (calculations based on data from ISI Web of Science

Considering those bibliometrics measures on publications about innovation issues, the next sections address the same aspects on publications in the Portuguese language. If these publications in English have grown exponentially since the beginning and innovation has been one of the main issues in economic development literature, has the literature in Portuguese been growing at the same pace?

4. The Portuguese language research scope

The bibliometric survey of Fagerberg, Fosaasa and Sappraserta (2012) identified the core literature on innovation studies analyzing two knowledge bases shared by practitioners in the field. Firstly, the references cited in the chapter of handbooks, considering these references are the most important scholarly contributions of relevance to the subject according to the experts in the area. And secondly, the core literature influence within and outside the innovation studies field, identifying how that literature is perceived among others specialties and disciplines by the analysis of these citations in the Web of Science (ISI-Thomson Reuters) database.

This bibliometric survey will be partially reproduced with Portuguese language publications, measuring the scholarly contributions only available online. The Schumpeterian innovation approach will be analyzed in Portuguese publications focused on academic theses and dissertations, as well as articles published in the main open access multidisciplinary databases in Brazil. The references cited in an applied social sciences database will be also analyzed, considering the Schumpeter influence on innovation originated in economic studies. We measured the total of these scholarly contributions over the last 30 years.

5. Methodological Aspects

Since it is necessary for a search procedure that would allow achieving the needs and purpose of the researcher, the 6 steps of Nacher (2007) were followed, specifying a methodology for conducting the research in Table 22.

Nacher (2007) Methodology	Step 1 - Select a subject - identify an information need	Step 2 - Define strategies for information finding - search in databases	Step 3 - Select the documents - recognize ways that are important to achieving the search results	Step 4 - Extract information - find information and access them	Step 5 - Information found: processing	Step 6 - Write it
Nacher (2007) Applied on this paper	**Subject:** the Schumpeter approach in Innovation Studies **Scope:** published in Portuguese language, over the last 30 years. **Documents:** Articles, Thesis and Dissertations	**Databasis selected:** CAPES Portal, BDTD and EbscoHost Portal. The search **strategy** was Innovation and Schumpeter* (1) keywords searched in Topic/subject search field or Absctract search Field. (2)	**Organizing references**: the references were organized using the MyEndNote web service (3).	The **results** from CAPES, BDTD and EBSCO*Host* (4) search were registered into a spreadsheet , allowing the comparison and evaluation	From spreadsheet was created an **outcome table** and the graphs inserted in the paper	The **main results** were were **highlighted** in the paper

Table 2 - Nacher Methodology Applied on this paper (Adapted from Nacher, 2007)

(1) Schumpeter* refers to all variables of Schumpeter nomination or his ideas, for example: Schumpeterian work, *Schumpeterians* ideas, *Schumpeteriano, Schumpeteriana* or *Schumpeterianas* (in Portuguese language);
(2) Schumpeter can be cited in a document but not necessarily. This document REFERS to the Schumpeter approach, this is why the subject and abstract search fields were chosen;
(3) This is the easiest way to register, access, manage, and share references found;
(4) Databases: CAPEs is an open database. EBSCOHost is an applied science database, with government access provided.

6. Results on scholarly contributions

The Figure 4 shows the results of the searched topics 'innovation and Schumpeter*' in the key-word search field in Capes Database. There are 12.863 Thesis and Dissertation on 'innovation' and 115 on 'innovation AND Schumpeter*' approach over the last 25 years. In the same pace of **Figure 1** academic research on innovation in the Portuguese language has also grown exponentially. However, with the association between the word innovation AND Schumpeter the number of thesis and dissertation are irrelevant, i.e. despite those theses and dissertations having innovation as subject, they do not necessarily discuss innovation in an economic Schumpeterian approach.

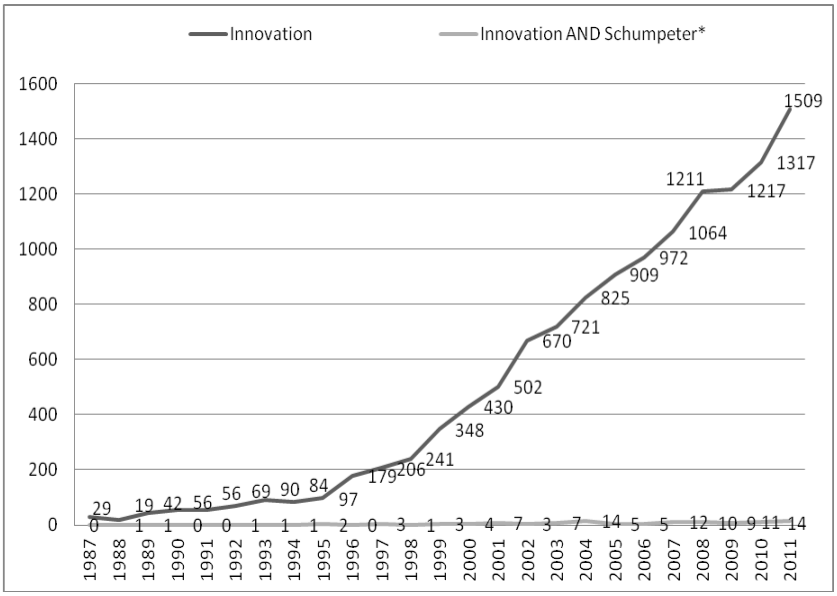

Figure 4 - Portuguese Thesis and Dissertations in CAPES Portal

Despite the growing number of theses and dissertations, they are not proportionally being published as articles in relevant journals. The rhythm of publication on innovation has grown exponentially but the absolute numbers are low (265 in 2007 for articles compared to 1211 for theses and dissertations). The total of published articles in Portuguese on the topic of innovation is 386, only 20 with peer review, and on the topic of innovation AND Schumpeter*, there are 14 articles, with 6 of them peer reviewed.

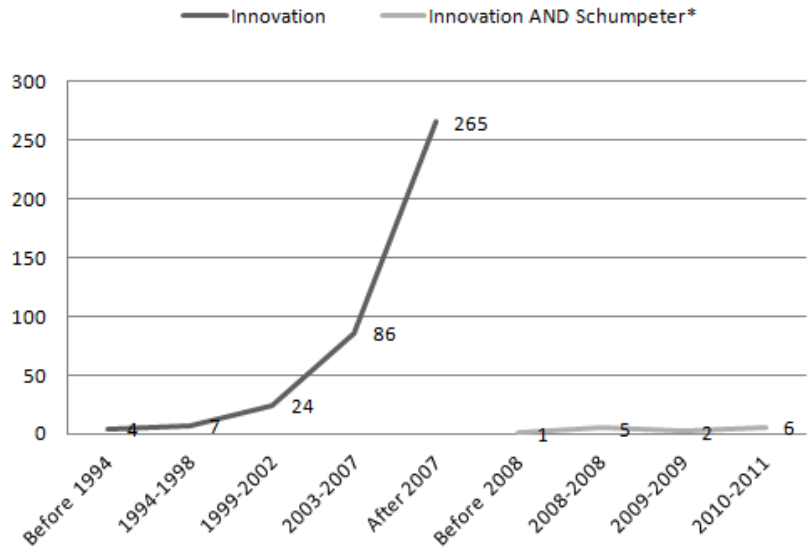

Figure 5 - Portuguese articles on CAPES Portal – Innovation and Schumpeter* Key-Words

7. Conclusions

It is quite obvious that the main language for scientific international publication is English. As discussed by Fagerberg, Fosaasa and Sappraserta (2012), the literature on innovation in English language has grown exponentially through the years, and also has changed from the focus on firms to a holistic approach of systems. The subject Schumpeterian innovation is quite known in the Brazilian academy and as seen above, the number of theses and dissertations in the Portuguese language has also grown exponentially. It is also known that the impact of publications in Portuguese language is irrelevant compared to publications in English language.

The objective of this article was to measure the enormous gap between the publications on innovation in those two idioms. Moreover, the gap between the relevance of publications in English language and Portuguese language increases when only peer reviewed articles are considered. While all the articles in English are peer reviewed, an important part of the articles in Portuguese language are not peer reviewed. Also, the massive volume of research on innovation in Portuguese language is not known through published articles in journals, but only through theses and dissertations, which are seldom being transformed into articles for journals. New researchers are not giving enough importance to publishing their research in journals (even in the Portuguese language).

References

Dosi, G. (1982). Technological Paradigms and Technological Trajectories - A Suggested Interpretation of the Determinants and Directions of Technical Change. *Research Policy*, 11: 147-162.

Fagerberg, J., Fosaasa, M., & Sappraserta, K. (2012). Innovation: Exploring the Knowledge Base. *Research Policy*, 41: 1132– 1153.

Fagerberg, J.; Fosaasa, M. & Sappraserta, K. (2011). National innovation systems: The emergence of a new approach. *Science and Public Policy*, 38(9): 669–679.

Freeman, C. (1987). *Technology Policy and Economic Performance: Lessons from Japan.* London: Pinter Publishers.

Lundvall, B-Å. (1992). *National Innovation Systems: Towards a Theory of Innovation and Interactive Learning*. London: Pinter Publishers

Nacher, C. (2007). Journée d'étude des URFIST. In C. Nacher. *Evaluation et validation de l'information sur internet: Formation des étudiants de licence à l'Université Sorbonne nouvelle - Paris*, 3, 31. Paris, Amphitéatre Poincaré, Ministère de la recherche.

Nelson, R.R. (1993). *National Innovation Systems: A Comparative Analysis*. University of Illinois at Urbana-Champaign's Academy for Entrepreneurial Leadership Historical Research Reference in Entrepreneurship.

Pavitt, K. (1984). Sectoral Patterns of Technical Change: Towards a Taxonomy and a Theory. *Research Policy*, 13: 343-73.