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Innovation and business models: a bibliometric study of scientific production on *Web of Science* database

Inovação e modelos de negócio: um estudo bibliométrico da produção científica na base Web of Science

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Abstract: This paper analyzed the characteristics of publications related to the topics Innovation and Business Models. The research was conducted in the Web of Science from ISI Web of Knowledge database seeking to identify the major themes, authors, areas, types of documents, and the sources, title, year of publication, institutions, countries, and languages of these publications, as well as "hot topics" related to the topic "Innovation and Business Models". The study listed the most cited publications with authors who publish on the topic searched. Data analysis was based on the index calculations h-b and m. According to the results of this study, the number of publications has increased significantly over the period analyzed, with focus in the United States, with 97% of the publications written in English and the main source periodical - WIT Transactions on Ecology and the Environment. Among the 20 topics combined with the subjects studied, Market, Management, Strategy, R&D, and Industry presented an index of $m \geq 2$, being classified as unique topics to reach not only in their own area of research. Results also show that the ten publications with the highest number of citations, and a reference in the subject researched, do not belong to the authors who publish on the subject.

Keywords: Innovation; Business models; Bibliometric search.

Resumo: *Este artigo analisa as características das publicações relacionadas aos temas Inovação e Modelos de Negócios. A pesquisa foi realizada na base de dados Web of Science da ISI Web of Knowledge, procurando identificar as principais áreas temáticas, os autores, os tipos de documentos, o título das fontes, o ano das publicações, as instituições, os idiomas e países destas publicações, assim como a identificação dos "hot topics" relacionados ao tópico "Innovation and Business Models" e relacionou as publicações mais citadas com os autores que mais publicam sobre a temática pesquisada. A análise dos dados teve por base os cálculos dos índices h-b e m. De acordo com os resultados deste estudo, o número de publicações cresceu de forma significativa no período analisado, concentrando-se nos Estados Unidos, com 97% das publicações escritas no idioma inglês, e tendo como principal fonte o periódico WIT Transactions on Ecology and the Environment. Dentre os 20 tópicos combinados com os temas pesquisados, os temas Mercado, Gestão, Estratégia, P&D e Indústria apresentaram índice $m \geq 2$, podendo, então, ser classificados como tópicos exclusivos com alcance não apenas na sua própria área de pesquisa. Constatou-se ainda que as dez publicações com o maior número de citações, sendo uma referência na temática pesquisada, não pertencem aos autores que mais publicam sobre o tema.*

Palavras-chave: *Inovação; Modelos de negócios; Pesquisa bibliométrica.*

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1 Introduction

Development and diffusion of innovation in the global economic context is characterized as a subject that deeply marks the end of the twentieth century and the beginning of this current one. This evidence highlights this subject in the center of changes associated with the pattern of capital accumulation, understood as Information Society / Knowledge Society. In this context, innovation shows an important role and significant influence in the competitiveness of countries, regions and organizations. This theme presents increasing evidence, both in the organizational as the academic and scientific contexts.

Innovation process is one of the fundamental tools in the growth strategies aimed to new markets entrance, to magnify the market power and allow to organizations competitive advantage. Motivated by increased competition in global markets, companies have begun to understand the importance of innovation, since the change of technology and the intense global competition erode the added value of goods and services hitherto existing (Gunday et al., 2011).

According to the Oslo Manual (OCDE, 2007), studies on innovation and policy discussions emphasize the importance of considering innovation in a broad perspective. A knowledge-based vision focuses on the interactive processes through which knowledge is created and exchanged within and between organizations.

In the same sense, concept of business model has been used to address a number of research questions in different contexts and management areas. Researchers have used the same term to explain and solve different phenomena, such as types of e-business, value creation and capture of value by companies, and how innovation and technology work (Zott et al., 2010). Chesbrough (2007, p. 34) corroborates it, stating that "[...] today, innovation should include business models rather than just technology and R&D."

Since the 1990s, the issue involving business models has been the focus of substantial attention from academics and professionals, resulting in an increasing number of targeted case studies. With this brief background, this study aimed to analyze the association of the themes innovation and business models, pointing out the characteristics of publications from the Web of Science database, in corresponding period of 2004 to 2013. In this introductory section, paper presents a brief review of the concepts of Innovation and Business Models, also presenting study method, analysis, discussion of results and concluding remarks.

2 Innovation

At the expense of conceptual breadth that involves innovation, it is noted that several thinkers deal with the issue according to its epistemological genesis, not having a single theoretical approach to the subject. Schumpeter's work influenced the theories of innovation. According to their statements, economic development is driven by innovation through a dynamic process in which new technologies replace the old ones, calling it "creative destruction" (Schumpeter, 1982), and later expanded by neo-schumpeterian to the socio-institutional framework.

Assumptions of Schumpeter (1982) suggest that economic development takes place by combining actions of innovative process with: (i) introduction of new products; (ii) introduction of new production methods; (iii) opening of new markets; (iv) development of new suppliers of raw materials and other inputs; and (v) creation of new market structures in an industry. In his theory, Schumpeter conceptualized development as a spontaneous and discontinuous change that changes the *status quo* of the production flow, in an irreversible way.

The term innovation was defined by Bessant & Tidd (2009) as a process of translating ideas into products, services or processes that are usable and useful. Innovation can be shaped by two levels of intensity: incremental or radical. Incremental generates small improvements in existing products, processes or services, improving the way of doing something that was previously done. In turn, radical innovation begets more intense ruptures, causing a deep change in services, products or processes.

For Gunday et al. (2011), innovation is considered as an evolution and new applications, in order to launch novelty to the market. It can be conceived as the transformation of knowledge into commercial value. Innovation has great commercial importance because of its potential to increase efficiency and profitability of companies. Therefore, innovation plays a significant role for creating differences in performance and competition between companies, regions and even countries.

Perez (2004) points out that technologies are developed in a systematic way, that is, in systems capable of grouping technical innovations in raw materials, products and processes and innovations in management and organizational fields. Freeman, Clark & Soete (1982) defined technological systems as innovation constellations, economically related techniques, which affect several productive segments. These systems are dependent on paradigms that emerge as trajectories, which Dosi (2006) characterizes as the normal pattern of activity of problem solving on the basis of a technological paradigm. Perez

(2004) concludes that long-waves, term created by the Russian economist Kondratiev in the 1920s and irradiated by Schumpeter's assumptions, are directly related to the coherence of the system together. These waves are the result of large paradigms exchange processes experienced by techno-economics spheres, having a duration which can vary between five and six decades.

After this brief background regarding innovation, the emergence of a new theme associated with innovation, business model, is reported in the 1990s, inspired by business world and academic environment, complementing the traditional subjects process, product and organizational innovation and involving new forms of networks.

2.1 Business models

The term business model is not something new in practical reality of business, being full of examples in traditional sectors of the economy. However, in the Academy, its origin is still debated by researchers. DaSilva & Trkman (2014) state that Bellman et al. (1957) published the paper "On the construction of a multi-stage, multi-person business game", the first one to mention business models. In turn, Markides (2013) clarifies that the term was first mentioned a few years earlier, in the theoretical essay "Insurance Research" from Frank Lang (1947). To Magretta (2002), the origin is in the questioning of Peter Drucker (who is the customer? what creates value for customer?), which would be part of the process of performance self-assessment of any organization. However, there is a point of agreement among thinkers: the term has acquired prominence with the development of information and communication technologies (ICT) and e-business in the early 1990s.

As well as its origin, definition of business model, according to the analysis of Zott et al. (2010, p. 1019), reveals that "[...] scholars do not agree on what a business model is and that literature is developing in large part, in a piecemeal way, according to the research interests". In a bibliometric research on business models, Shafer et al. (2005) found twelve definitions in academic publications between the years 1998 and 2002, however, reflecting different perspectives (e-business, strategy, technology and information systems). This range is because the concept of business model is relatively new, and its place and role in organizations is still subject to full academic debate (Osterwalder et al., 2005).

Baden-Fuller & Morgan (2010) feature a great many definitions of business models, in addition to the proposed focus on analysis and examples of organizations studied by leading researchers on the subject (Chart 1). It is noteworthy that these researchers were part of the special issue of the journal Long Range Planning in 2010, demonstrating the importance of expression to the Academy.

It is observed, in Chart 1, correlation between innovation and business models, both in definition and/or focus analysis. This finding is reinforced by statements such as "[...] technological innovation does not guarantee business success, new efforts of product development must be accompanied by a business model." "[...] new business models can represent a form of innovation" (Teece, 2010, p. 174 and p. 186).

Baden-Fuller & Morgan (2010), questioning usefulness of business models, found that they have a multivalent character as models, such as: a) provide means of description and rating for organizations; b) operate as sites for scientific research of business; c) act as an indicator for innovation. In this same line of thought, Chesbrough & Rosenbloom (2002) presented the main functions of a business model: a) articulate the value proposition; b) identifying a market niche; c) define the value chain structure; d) estimate projected costs structures and expected margins; e) set the company's position in the value network and; f) formulate the organization's competitive strategy.

Although its definition has received multiple meanings by Academy, business model continues to be an important notion precisely to create and capture value. Moreover, the business models are at the center of innovation in different ways:

> [...] 1) new technologies create opportunities for new business models; 2) appropriate business models are required to translate the technical success in commercial success; 3) business models are themselves subject to innovation involving discontinuous change [...]. (Sako, 2012, p. 24).

Davila et al. (2006) conclude, stating that the integration of a solid business model to business mindset results in a balance between business and technological innovations.

3 Study method

3.1 Study type

This study was developed from a bibliometric research, aiming to increase knowledge related to publications related to the theme Innovation and Business Models.

According to Silva (2004), bibliometrics has the purpose for analyzing the scientific or technical activity through quantitative study of publications.

Complementing this idea, Rostaing (1997) states that the bibliometric study is the application of statistical or mathematical methods on the set of references. To Macedo et al. (1999), bibliometrics helps to know the stage where a research in a certain area is located.

The study has a quantitative approach, considering the effort to quantify some variables related to scientific production on Innovation and Business Models.

3.2 Sample definition

Data for this research was collected in the Web of Science's base of Institute for Scientific Information (ISI). Web of Science consists of a multidisciplinary database that indexes the most cited journals in their respective fields, allowing the identification of citations received, the references used and the related records, and also the analysis of the scientific production with calculation of bibliometric indexes and the percentage of self-citations, as well as the creation of rankings by numerous parameters. Currently, it has more than 12,000 indexed journals (CAPES, 2012).

References of all indexed items were extracted, and the interface of the cited references showed all quotes to the works of an author, regardless of the items listed are indexed by Web of Science or not (Bar-Ilan, 2008).

Therefore, from the Web of Science's search engine, using keywords Innovation and Business Models, delimiting search for the period from 2004 to 2013 (10 years), the resulting publications were surveyed for further analysis.

3.3 Conceptual model

To perform the bibliometric analysis, this study aimed to identify the variables set forth in Chart 2.

The h index was proposed by Hirsch (2005), in his research named "An index to quantify an individual's scientific research output", as a way to characterize the scientific outcomes of a researcher. Hirsch (2005) assumes that the quantification of the impact and relevance of individual scientific

Chart 1. What is a business model?

Authors	Definition	Focus of analysis	Included examples
Teece (2010)	"How does a company adds value to customers and convert payment in profits"	Refers innovation of the business model for technological innovation.	fridges Swift, containers Land Sea, online DVD rentals Netflix
Zott & Amit (2010)	"[...] A system of interdependent activities that transcends the focal company and extends its boundaries".	Emphasizes interdependencies beyond firm boundaries. Good design requires: Content (what), Structure (links) and Governance (who does what).	Ebay, Inditex (Zara), First Data Corp, FriCSo (startup in lubrification)
Williamson (2010)	"Cost business model innovation offers advantages in radically new ways meaning more for less".	Business models of low cost of China (and India).	Shanghai Zhenhua Port Machinery, Haier refrigeração, carro Tata Nano
Gambardella & McGahan (2010)	"Business model is a mechanism to turn ideas into income at a reasonable cost".	Innovation of the business model in high technology sectors that allows small businesses to take advantage of their ideas.	Google, Apple, Ideo, Yogitech + biotechnology startups
Itami & Nishino (2010)	"[...] Business model is a profit model, a business delivery system and a learning system".	Learning at the limelight, the rating firm systems.	Toyota & Google
Yunus et al. (2010)	"A values system plus a constellation of value".	A social business model that is between profit and charity.	Grameen Bank + Telenor, Veoila & Danone's collaborations
Casadesus-Masanell & Ricart (2010)	"Logic of the company, how it works and how it creates value for its stakeholders".	Interfaces between the business model, strategy and tactics.	Ryan Air Telmore / TDC
Demil & Lecocq (2010)	"The activities of form and resources are used to ensure the sustainability and growth".	Business model dynamics that change over time.	Arsenal FC

Source: Baden-Fuller & Morgan (2010, p. 158), adapted by authors.

production are often necessary for the evaluation of researchers and comparison purposes.

Thereafter, Banks (2006) proposed the h-b index as an extension of the h-index, which is obtained by the number of citations of a topic or combination in a given period, listed in descending order of citations. The h-b index is found in publications that have obtained a number of quotes equal to or greater than its position in the ranking. Banks (2006) also explains that calculation of m index is the result of division of h-b index for the amount of years related to the wished information. Analysis of h-b and m indexes were performed using definitions of Banks (2006). Criteria for analyzing the m index are shown in Chart 3.

3.4 Steps for data collection

Development of the research took place in five stages. Initially, the words Innovation and Business Models were inserted up for searching at Web of Science database, delimiting the period between 2004 to 2013. Then, it was obtained information regarding amount of publications, thematic areas, types of documents, year of publication, authors, title of sources, institutions, funding agencies, countries and languages.

In the second stage, from a brief analysis of publications still found in the first stage, 20 topics (related to innovation) were listed, to be combined with themes Innovation and Business Models. For the selection of topics, relationship with searched terms was used as the main criterion.

In the third stage, a combination was made with each one of the topics related to the terms of Innovation and Business Models, in the same period of ten years (2004 to 2013). Then, in the fourth stage, it was performed the classification of publications, identifying hot topics by calculation of h-b and m indexes. In the fifth stage, a comparative analysis was made, concerning the most cited publications and authors who have published over the same period. Thus, according to the steps presented, a bibliometric analysis was performed, which is presented in the next section.

Chart 2. Conceptual model for bibliometric analysis.

General features of publications	Number of citations of each publication
√ Total of publications	√ h-b index
√ Thematic areas	√ m index
√ Types of documents	√ Authors *versus* citations
√ Year of publications	
√ Authors	
√ Title of sources	
√ Institutions	
√ Funding agencies	
√ Countries	
√ Languages	

Souce: Authors (2014).

Chart 3. Definitions for hot topics classification.

m index	Topic / combination
$0 < m \leq 0.5$	It may be of interest to researchers in a specific field of research, usually a small community.
$0.5 < m \leq 2$	Probably it can become a hot topic as research area, in which the community is large or the topic / combination presents very interesting features.
$m \geq 2$	It is considered a hot topic, exclusive topic that reaches not only their own research area and is likely to have the application effects or unique features.

Source: Banks (2006).

4 Analysis and discussion of results

As result, 3,706 publications related to the theme Innovation and Business Models were found on the Web of Science, based on proposed time period. Next, general characteristics of the publications are presented, also with the hot topics related to the theme, and, finally, the confrontation between the number of publications by author and the number of citations.

4.1 Features of publications

General characteristics of publications related to the topic are presented, according to the following categories: thematic areas, types of documents, year of publication, authors, title of sources, institutions, funding agencies, countries and languages.

4.1.1 Thematic areas of publications

Chart 4 shows the top twenty thematic areas related to the theme, according to the number of publications.

Regarding the areas of knowledge that encompasses the theme of Innovation and Business Models, it was evidenced that Business Economics, Engineering, Computer Science, Operations Research and Information Science are those that had the highest number of publications. According to Teece (2010, p. 176), "[...] the study of business models is an interdisciplinary theme [...] it has not an intellectual home in the social sciences or in the business studies."

Areas that occupy the top positions in the presented ranking of publications suggest an obvious concern

Chart 4. Thematic areas on the study about Innovation and Business Models.

Thematic areas	Number of publications
1. Business Economics	2,342
2. Engineering	831
3. Computer Science	763
4. Operations Research	517
5. Information Science	274
6. Public Administration	219
7. Telecommunications	111
8. Ecology & Environmental Sciences	107
9. Education & Educational Research	99
10.Social Sciences	96
11.Mathematics	45
12.Science & Technology	45
13.Energy & Fuels	44
14.Health Sciences	38
15.Government Law	35
16.Psychology	35
17.Geography	34
18.Pharmacology	33
19.Systems, Automation & Control	32
20.Agriculture	27

Source: Web of Science (2014).

of the business environment to innovation, consisting of an emerging approach in studies related to innovation and business models. Zott et al. (2010) conducted a survey of 1,253 articles published in academic journals from 1975 to 2009, which went through a selection process through their own criteria, resulting in a sample of 103 publications, having as one of its main conclusions perception that literature involving the business models are evolving largely in divisions according to the phenomena of interest to researchers, highlighting the following identified areas of interest: 1) e-business and use of information technology in organizations; 2) strategic issues such as the creation of value, competitive advantage and performance of the company; and 3) innovation and technology management.

4.1.2 Types of documents

Chart 5 shows the types of documents related to found publications. Most of these publications are papers in journals and papers in conference proceedings, emphasizing its scientific character.

4.1.3 Publications per year

Findings show that the number of publications has gradually increased over the period between 2004 and 2013. Figure 1 illustrates the evolution of publications per year related to the theme Innovation and Business Models.

Chart 5. Classification of publications by type.

Types of publication	Frequency	Percentage
Papers in journals	2,132	57.5
Papers in conference proceedings	1,504	40.5
Reviews	108	2.9
Editorial material	43	1.1
Book chapter	5	0.13
Editorial correction	2	0.05
Reprint	2	0.05
Total	**3,796***	**100%**

* Papers were classified into more than one type, thereby the total is greater than the total number of publications. Source: Web of Science (2014).

Comparing the amount of publications from 2004 to 2013, it is evident that the number of publications related to the research topic reveals a significant growth, demonstrating the emergence of studies that address this issue, with a view to finding solutions that help innovation management with development of new business models. Arend (2013), in his research on the usefulness of business models, found a significant increase in publications involving the issue since the 1990s, with few studies of large scale, and almost all qualitative. Zott et al. (2010) note that, despite the overall increase in the literature on business models, researchers do not agree on what a business model is and often adopt idiosyncratic definitions that fit the purposes of their studies, but they are difficult to reconcile with each other, resulting in a barrier to the cumulative progress of knowledge on the subject.

4.1.4 Main authors

Chart 6 shows the top ten authors who have published on the topic Innovation and Business Models, disregarding unsigned publications.

There is a multiplicity and diversity regarding the authorship of the work, as a small portion of these authors published a large number of articles on the subject. The author who leads, with 12 publications related to the topic researched, is Henry Chesbrough, Ph.D. in Business Administration at University of California, Berkeley, in U.S. He studied MBA at Stanford University and graduated from Yale University, and he is, nowadays, Executive Director of the Center for Open Innovation at the University of California, Berkeley, and he is also Associate Professor at the same institution. Another author

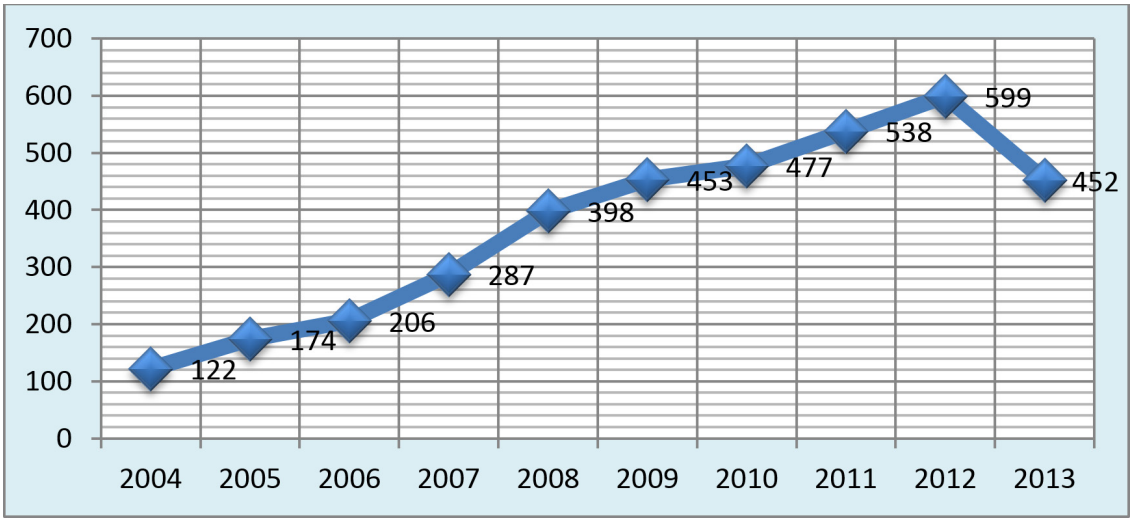

Figure 1. Publications per year.

Chart 6. Quantity of published papers by author.

Author	Published papers
1. Chesbrough, H.	12
2. Shyu, J. Z.	9
3. Birkinshaw, J.	7
4. Dismukes, J. P.	7
5. Pironti, M.	7
6. Song, M.	7
7. Wu, X. B.	7
8. Diao, Z. F.	6
9. Kraemer, K. L.	6
10.Li, Y.	6

Source: Web of Science (2014).

Chart 7. Main sources of publications.

Title of source	Amount of papers
1. Procedia Social and Behavioral Sciences	79
2. Technovation	64
3. Journal of Product Innovation Management	47
4. Industrial Marketing Management	45
5. Technological Forecasting and Social Change	41
6. International Journal of Technology Management	37
7. Asia Pacific Business Innovation and Technology Management Society	36
8. Research Policy	36
9. Industrial Marketing Management	35
10. International Journal of Technology Management	32

Source: Web of Science (2014).

who stands out with 9 publications is Joseph Z. Shyu, researcher and professor at the Institute of Technology Management at National Chiao Tung University, Hsinchu City, Taiwan.

4.1.5 Titles of sources

Chart 7 shows the main sources of publications related to the theme Innovation and Business Models.

Most studies concerning the subject was published in the journals Proceeding Social and Behavioral Sciences, Technovation, Journal of Product Innovation Management and Industrial Marketing Management. Among the journals with the highest number of publications, the highlight is those that deal with issues related to social, behavioral, technological and management innovation, which demonstrates the relevance of this theme associated with the concerns inherent to innovation and business models. According to Zott et al. (2010), the growing literature on business models is young and highly dispersed, and only recently began to make inroads to the major management journals.

4.1.6 Main institutions

Institutions that publish more papers related to Innovation and Business Models theme are highlighted in Chart 8.

Institutions that stood out regarding publications related to Innovation and Business Models were: University of California, Berkeley, based in the U.S., and University of London and University of Manchester, both located in the U. K.

4.1.7 Main funding agencies, countries and languages

Regarding funding agencies that cover the researched topic, those with highest number of publications are: National Natural Science Foundation of China, National Science Foundation and National Science Council of the Republic of China, Taiwan. Chart 9 shows the main countries with related publications to the researched topic.

Concerning the number of publications by country, U.S. lead the ranking of publications, followed by the Republic of China and England. Thus, it can be inferred that in these countries are located most of the institutions that have research related to Innovation and Business Models. It is noteworthy that Brazil occupies the 23th position in the ranking of publications related to the researched topic. English language stands with 3,630 publications, totaling 97.9% of all published studies, corroborating, this way, the countries that publish on the subject.

Chart 8. Main institutions.

Institution	Amount of papers
1. University California System	60
2. University of London	41
3. University of Manchester	39
4. Aalto University	34
5. Pennsylvania Commonwealth System of Higher Education	34
6. University of California Berkeley	33
7. Zhejiang University	29
8. Harvard University	28
9. University of Pennsylvania	28
10.Wuhan University of Technology	27

Source: Web of Science (2014).

Chart 9. Main countries.

Country	Amount of publications
1. United States of America	826
2. Republic of China	524
3. England	316
4. Spain	248
5. Taiwan	237
6. Germany	171
7. Australia	144
8. Netherlands	143
9. Italy	140
10.Canada	110
11.Finland	103
12.Sweden	87
13.France	83
14.South Korea	73
15.Japan	69
23.Brazil	39

Source: Web of Science (2014).

4.2 Innovation, business models and hot topics

At this stage of research, it was investigated publications on Innovation and Business Models and the main topics related to this theme, as shown in Chart 10.

Arend (2013), based on recent literature, found that the important empirical research on innovative business models have emerged from isolated practical issues. This author thinks that research involving the subject, in great majority, has the following characteristics: a) main studies reflect the practice of business models; b) they present the preliminary theoretical value of its concept, along with concerns that limit this value and; c) they highlight many interesting research questions related to their current usage.

Chart 10. Topics related to themes Innovation and Business Models (2003-2012).

Thematic area	Amount of publications
1. Information	1,007,122
2. Management	810,097
3. 3Strategy	693,782
4. Services	384,634
5. Engineering	285,631
6. Difusion	261,136
7. Industry	236,802
8. Market	235,572
9. Research and Development	218,023
10.Prototypes	103,354
11.Economic Development	65,721
12.Cooperative	61,260
13.Public policies	51,243
14.Sustainability	40,006
15. Governance	37,651
16. Stakeholders	31,387
17.Technology Products and Processes	20,472
18.Operational Research	14,007
19.Entrepreneurship	8,405
20.Intrapreneurship	87

Source: Web of Science (2014).

Subsequently, a combination was made for each topic listed in Chart 10 with the term Innovation and Business Models, then it was calculated total of publications for each combination (related topic), h index and m coefficient m (Chart 11).

From the calculation of h and m indexes, it is possible to measure the performance of the surveyed topics / combinations based on the number of citations that they had (Kelly & Jennions, 2006). Guided by considerations of Banks (2006), hot topics can be classified as thematic combinations between Innovation and Business Models with topics Market, Management, Strategy, Research & Development and Industry.

Thus, it is seen that these five topics related to the theme Innovation and Business Models are hot topics, because they have $m \geq 2$, and may be classified as exclusive topics to reach not only in their own research area, probably, having application effects or unique features.

Other combinations that exhibit m index between 0.5 and 2 can be considered emerging hot topics as research areas. In turn, topics with m index lower than 0.5 may be of interest to researchers in specific fields of research.

In this sense, it denotes that the issue involving Innovation and Business Models is emerging, with major challenges regarding the development of studies that address, mainly, the management areas and those related to the research process and quest for knowledge.

4.3 Relationship between authors with more publications and most cited publications

Based on research on Innovation and Business Models themes held in Web of Science base, the ten most cited publications and related authors with more publication, shown in Chart 6, were selected.

Preparation of Chart 12 aimed to verify the relationship of the most cited publications with authors who have published in the same period shown in Chart 6. Given the comparative framework, it was found that only two of the authors that published the period (Kraemer & Birkinshaw) have their work among the top ten cited in the same time period analyzed.

It can be concluded that the publications with the highest number of citations, which are possibly references in the researched topic, do not belong to authors who publish on the same subject. With this comparison, it is observed that the authors with a large number of publications are not those who produce studies of greater impact and relevance to the particular area of knowledge.

Chart 11. Hot topics on the theme's study.

Topics	Amount of publications	h-b index	m index
Market	1313	44	4.400
Management	1516	41	4.100
Strategy	1089	39	3.900
Research & Development	844	36	3.600
Industry	1137	35	3.500
Information	954	33	3.300
Services	974	29	2.900
Difusion	314	27	2.700
Entrepreneurship	285	24	2.400
Technology Products and Processes	230	21	2.100
Economic Development	298	17	1.700
Governance	132	17	1.700
Engineering	209	13	1.300
Stakeholders	159	13	1.300
Sustainability	155	12	1.200
Public Policies	93	12	1.200
Operational Research	62	8	0.800
Cooperative	43	7	0.700
Intrapreneurship	10	6	0.600
Prototypes	33	3	0.300

Source: h-b index (Web of Science, 2014).

Chart 12. Relationship of top 10 cited publication in the period between 2004 to 2013.

Author / title / journal / year	Amount of citations 2004 to 2013
Knight, G. A., & Cavusgil, S. T. (2004). Innovation, organizational capabilities, and the born-global firm. *Journal of International Business Studies*, 35(2), 124-141.	302
Zhu, K., & Kraemer, K. L. (2005). Post-adoption variations in usage and value of e-business by organizations: cross-country evidence from the retail industry. *Information Systems Research*, 16(1), 61-84.	208
London, T., & Hart, S. L. (2004). Reinventing strategies for emerging markets: beyond the transnational model. *Journal of International Business Studies*, 35(5), 350-370.	195
Raisch, S., & Birkinshaw, J. (2008). Organizational ambidexterity: antecedents, outcomes, and moderators. *Journal of Management*, 34(3), 375-409.	182
Hauser, J. R., Tellis, G. J., & Griffin, A. (2006). Research on innovation: a review and agenda for Marketing Science. *Marketing Science*, 25(6), 687-717.	171
Meuter, M. L., Bitner, M. J., Ostrom, A. L., & Brown, S. W. (2005). Choosing among alternative service delivery modes: an investigation of customer trial of self-service technologies. *Journal of Marketing*, 69(2), 61-83.	168
Jones, M. V., & Coviello, N. E. (2005). Internationalisation: conceptualising an entrepreneurial process of behaviour in time. *Journal of International Business Studies*, 36(3), 284-303.	164
Klepper, S., & Sleeper, S. (2005). Entry by spinoffs. *Management Science*, 51(8), 1291-1306.	161
Teece, D. J. (2010). Business models, business strategy and innovation. *Long Range Planning*, 43(2-3), 172-194.	159
Bruner, G. C. 2nd, & Kumar, A. (2005). Explaining consumer acceptance of handheld Internet devices. *Journal of Business Research*, 58(5), 553-558.	152

Source: Web of Science (2014).

5 Closing remarks

Analysis of publications on Innovation and Business Models on the Web of Science database showed 3,706 publications related to these issues, especially considering the thematic areas Business Economics, Engineering, Computer Science, Operations Research and Information Science.

The finding is that most publications found are papers. In the period between 2004 and 2013, the scientific production related to the theme gradually increased over these ten years analyzed. Most of the studies were published in the journal Procedia Social and Behavioral Sciences, Technovation, Journal of Product Innovation Management and Industrial Marketing Management, which stand out with the highest number of publications.

It is also found that the United States lead the ranking of countries that published on the subject, and English is the predominant language of publications. It was revealed, as the main hot topics, Innovation and Business Models combinations with topics Market, Management, Strategy, Research & Development and Industry.

In search of a framework comparing authors who published versus most cited articles in the period analyzed, the finding is that the publications with the largest number of citations, which are possibly references in the researched topic, do not belong to authors who most publish on the same combined themes.

These results show that the researched theme is emerging, given the identification of the hot topics. A check of several emerging topics suggests that there is a large field of study for the development of research that relates innovation and business models. Osterwalder (2004) corroborates on this sense, stating that research on business model is a very young research area and has yet to prove its relevance, especially with new technologies, since there are relatively few academic concepts that can explain and theoretically contribute with the tools used in organizational reality. Business model is a new theme of innovation, complementing the traditional issues of process, product and organizational innovation and involves new forms of cooperation and collaboration (Zott et al., 2010). Eckhardt (2013) concludes, stating that research on business models can be used as a framework for the advancement of research in the formation of other conjectures.

As study limitation, it is highlighted its achievement using only a specific database. For this reason, it is

suggested that future studies of this nature may have a greater range, covering, for example, national and international academic events, scientific journals and other significant scientific databases.

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