INNOVATION MANAGEMENT: A SYSTEMATIC LITERATURE ANALYSIS OF THE INNOVATION MANAGEMENT EVOLUTION

Ana Paula Vilas Boas Viveiros Lopes; Kumiko Oshio Kissimoto; Mario Sergio Salerno; Marly Monteiro de Carvalho; Fernando José Barbin Laurindo

University of São Paulo (USP) - São Paulo, SP, Brazil

Abstract

Innovation management has been received increasing attention in the operations management field during the last years. Academics and managers have long been discussing the innovation nature and its importance for the organization’s growth and competitive advantage. However, one issue that remains unclear is how to recognize what type of innovation management is necessary for each company or situation. One of the reasons for this issue is the different dimensions to which innovation can be addressed – technological, organizational, process and product, among others. Moreover, the differences between incremental and disruptive innovation lead to different ways of management. This paper examines the literature on innovation management in the last 38 years (1975 – 2013) aiming at identify and classify innovation management models. The methodological approach encompasses bibliometric and content analysis. The results show seven models’ categories: project management, organizational strategy, knowledge management, product management, types of innovation, technological innovation, and open innovation.

Keywords: Innovation, Innovation Management, Innovation Management Model

1. INTRODUCTION

Advances in information technology are rapidly changing the market environment, and companies cannot rely only in their internal resources and knowledge anymore. They have to look outside and try to identify new skills and knowledge to complement their own. In this context, the ability to innovate, combining internal and external knowledge is becoming one of the most critical components that lead to a sustainable competitive advantage (Stanko et Calantone, 2011). For many organizations, innovation is not just an alternative to present new products or increase their production capacity by changing their internal processes, but a way to influence and change the industry they belong.

There is neither a unique formula for innovation nor an innovation model that fits to all companies. Innovation carries multiple facets and definitions and this characteristic turn its understanding difficult, mainly to recognize which innovation model should be adopted for each situation or company (Boer et During, 2001). Also, there are many business aspects that influence the way innovation is conducted in the companies.

Innovation can be classified into four types (OECD, 2005), as follows: product innovation (introduction of a new product or significantly improved); process innovation (introduction of a method of producing new or significantly improved); organizational innovation (introduction an organizational method that has not been previously used by the company and is the result of strategic decisions); marketing innovation (introduction of a new marketing method).

Another typology classifies innovation into four types (Henderson et Clark, 1990), being: incremental innovation (products with improvements that make use of existing technologies); modular innovation (similar to radical about the concepts required); architectural innovation (similar to incremental about the concepts required); radical innovation (introduction of a new technology). A third typology classifies innovation according to the technological
uncertainty in low, medium, high and very high (Shenhar et al., 1995).

A final typology classifies innovation in open and closed (Chesbrough, 2003). The term open innovation is opposed to the concept of closed innovation, where the innovation process, from conception of the idea to the marketing happens internally in the organization. One of the pillars of closed innovation is the profit generated by the price premium achieved by pioneering innovation in the market. In open innovation, it involves not only the internal environment of the organization, but also the external environment, consisting, for example, customers, suppliers, competitors, universities.

In this context, this paper aims to analyze the innovation management evolution. This article contains the following sections: section 2 examines some definitions and the scope of the literature associated with innovation management; section 3 explains the methodology and the bibliometric techniques applied, and also content analysis; section 4 presents the result of the study; section 5 presents some conclusions as well as some possible directions for future studies in the subject.

2. INNOVATION MANAGEMENT

Within the literature, innovation management is referred in many ways, routed in different theories that include: technological innovation (Dosi, 1982; Shea, 2005; Nambisan et Nambisan, 2008), process innovation (Tidd et al., 1997), open innovation (Sawhney et Prandelli, 2000; Chesbrough et al., 2006), and new product development (Cooper, 1990; Wheelwright et Clark, 1992). As a first step, Table 1 highlights a sample of definitions associated with the concept of innovation and the possible antecedents.

<table>
<thead>
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<th>Table 1 - Sample of definitions of innovation management.</th>
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<tr>
<td>Definition</td>
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<tr>
<td>Innovation in industrial products can be carried out by means of a carefully planned innovation process that can be divided in different steps: objective formulation, potential product search, license search or product development, negotiation and finally market introduction.</td>
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<td>Product innovation is a continuous and cross-functional process involving and integrating different competencies inside and outside the organizational boundaries. It is the process of transforming business opportunities into tangible products and services.</td>
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<td>Innovation management in turbulent environments requires from the companies the ability to turn the development process flexibility into a life-cycle flexibility, which is characterized by the ability to introduce innovations during the life cycle.</td>
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<td>Industrial technological innovation can be seen as a process including technical, design, manufacturing, management and commercial activities involved in the marketing of a new or improved product or the first use of a new or improved manufacturing process or equipment.</td>
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<tr>
<td>Innovation is related to changes in what a firm offers the world (product/service innovation), the ways it creates and delivers those offerings (process innovation), how a new product or service is introduced in an established market (market position innovation) and how new challenges and opportunities are seen (business model innovation).</td>
</tr>
<tr>
<td>Innovation is driven by the ability companies have to establish connections, to spot opportunities and to take advantage of them, both opening up new markets and also offer new ways of serving established and mature markets. Innovation can go from incremental to radical and have four dimensions that is called ‘innovation space’: paradigm (mental model), product (service), position and process.</td>
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</table>

The lack of a common definition of innovation is partly explained because of its multidisciplinary origin that influences the theory on innovation management. Innovation can be treated as a new product development process since the idea generation (conception of the product) until the market introduction. Similarly, authors incorporate the project management processes for new product development in the innovation management context (Cohen et Levinthal, 1990; Wheelwright et Clark, 2003).

Acquisition and knowledge management also influenced the innovation management field, mainly when the cultural aspects are considered when talking about innovation and the process of creating and sustaining innovation (Nonaka, 1994; Nonaka et Takeuchi, 1995; Chiesa et al., 1996).
3. RESEARCH METHOD

The research method used is a bibliometric study with content analysis. The bibliometric study involves a series of techniques that provide quantitative and qualitative analysis of the literature (Ikpaahindi, 1985). One of the ways to run a bibliometric study is the publications analysis that allows the identification of the relevant set of journal, the evolution of the publications along the years and the related subject areas (Prasad et Tata, 2005). Some bibliometric works also analyze the citations, from where the main works, most cited authors and also the potential research trends can be identified (Neely, 2005).

In this work, besides the usual technique of searching the publications through the use of keywords, the snow ball (or bibliographic coupling technique) was also applied. It allowed the retrieve of books and works from other sources, as well as the works that are relevant for the subject but do not use the keywords used in the first search engine, as mentioned in the works of Fink (1995a, 1995b). The analysis of articles and bibliographic references, based on citation networks, enables one to determine the existence or absence of bibliometric clustering, which can reveal a cluster of a given research stream (Kessler, 1963).

3.1 Sample

Data was collected from the ISI Web of Science database. This database was chosen because of its comprehensiveness and for the embedded resources that provide different publication analysis regarding to authors, citations, sources, year of publication, countries, and references among others. The journal performance metrics or the Journal Citation Reports (JCR) that evaluate the performance of the indexed journals comparing each one with others in the same subject area was also considered.

Using the keyword ‘innovation management’ in the topic, the search resulted in 1,208 works split in 653 proceedings papers, 492 articles, 35 book review, 32 editorial materials, 26 reviews, 5 meetings abstracts and 1 note. For this study, only the 492 articles were analyzed. These articles come from 57 different countries, 182 journals in 37 research areas. The Figure 1 presents the articles’ search and analysis plan.

To analyze this set of articles, three methods were applied:

• Method I: analysis of the publications - publications between 1975 and 2013 were analyzed in order to identify the journals with the highest number of publications, publications over time, and related subject areas. Since the timeframe is long, to facilitate the analysis, it was divided in three quartiles of ten years and one quartile of nine years, as follows: Q1 (1975-1984), Q2 (1985-1994), Q3 (1995-2004), Q4 (2005-2013).

• Method II: analysis of the citations - considering that the number of the citations of one article is directly related to the importance of the work to the research area, an analysis of the most cited articles were made (Culnan, 1987; Culnan et al., 1990; Ramos-Rodriguez et Ruiz-Navarro, 2004; Neely, 2005). To the citation network, the bibliometric software Sitkis 2.0 (Schildt, 2002) was used to extract the data from the ISI database and the social network analysis program, Ucinet for Windows – Version 6.289 (Borgatti et al., 2002) was used to build the network.

• Method III: content analysis - Each paper included in the sample was registered individually using Mendeley software and a Microsoft Access file that contained the metadata generated by Sitkis software. For the content analysis, papers were classified according to the innovation management models.

4. FINDINGS

This section presents the results of this research.

4.1 Method I: analysis of the publications

The 492 papers were published in 182 journals, which underpin the multidisciplinary nature of the theme. Table 2 lists all the publications per journal and per quartile, considering only the 21 journals that published at least 4 articles.
Table 2 - Publications by journal and quartile.

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<td>DYNA</td>
<td></td>
<td>3</td>
<td>11</td>
<td></td>
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</tr>
<tr>
<td>International Journal of Technology Management</td>
<td></td>
<td>22</td>
<td>30</td>
<td>52</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Journal of Product Innovation Management</td>
<td></td>
<td>1</td>
<td>10</td>
<td>27</td>
<td>38</td>
<td></td>
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<tr>
<td>Technovation</td>
<td></td>
<td>2</td>
<td>13</td>
<td>22</td>
<td>37</td>
<td></td>
</tr>
<tr>
<td>R &amp; D Management</td>
<td></td>
<td>3</td>
<td>5</td>
<td>14</td>
<td>22</td>
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<tr>
<td>Research Policy</td>
<td></td>
<td>1</td>
<td>6</td>
<td>7</td>
<td>14</td>
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<tr>
<td>Research-Technology Management</td>
<td></td>
<td>2</td>
<td>11</td>
<td>13</td>
<td></td>
<td></td>
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<tr>
<td>Technological Forecasting and Social Change</td>
<td></td>
<td>4</td>
<td>8</td>
<td>12</td>
<td></td>
<td></td>
</tr>
<tr>
<td>IEEE Transactions on Engineering Management</td>
<td></td>
<td>5</td>
<td>4</td>
<td>9</td>
<td></td>
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<tr>
<td>Journal of Technology Transfer</td>
<td></td>
<td>9</td>
<td>9</td>
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<tr>
<td>Technology Analysis &amp; Strategic Management</td>
<td></td>
<td>3</td>
<td>6</td>
<td>9</td>
<td></td>
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<tr>
<td>Journal of Engineering and Technology Management</td>
<td></td>
<td>4</td>
<td>4</td>
<td>8</td>
<td></td>
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<tr>
<td>California Management Review</td>
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<td>6</td>
<td>7</td>
<td></td>
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<tr>
<td>International Journal of Production Economics</td>
<td></td>
<td>6</td>
<td>1</td>
<td>7</td>
<td></td>
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<tr>
<td>Creativity and Innovation Management</td>
<td></td>
<td>6</td>
<td>6</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Innovation Management Policy &amp; Practice</td>
<td></td>
<td>5</td>
<td>5</td>
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<tr>
<td>Organization Science</td>
<td></td>
<td>5</td>
<td>5</td>
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<td></td>
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<tr>
<td>Total Quality Management &amp; Business Excellence</td>
<td></td>
<td>5</td>
<td>5</td>
<td></td>
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<tr>
<td>Health Care Management Review</td>
<td></td>
<td>1</td>
<td>3</td>
<td>4</td>
<td></td>
<td></td>
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<tr>
<td>Industrial management Data Systems</td>
<td></td>
<td>4</td>
<td>4</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>International Journal of Operations &amp; Production Management</td>
<td></td>
<td>3</td>
<td>1</td>
<td>4</td>
<td></td>
<td></td>
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<tr>
<td>Service Industrial Journal</td>
<td></td>
<td>4</td>
<td>4</td>
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</tbody>
</table>

Note. Periodical publications in descending order of total.

Only seven journals are responsible for the 69% of the published articles: “International Journal of Technology Management”; “Journal of Product Innovation Management”; “Technovation”; “R&D Management”; “Research Policy”; “Research-Technology Management” and “Technological Forecasting and Social Change”. They are academic and management journals that encompass all facets of technological innovation, research and development, new products development, innovation management and technology management.

Although the first publication occurred in 1975, it is only from 1995 that the publications regarding to innovation started to grow – part because of the overall growth on publications and part because of the researchers’ interest in the subject of innovation.

Subject areas such as business economics, engineering, operations research management science, public administration, and computer science are the most cited ones. Figure 2 lists the publications by country, considering only the 16 countries that published at least 10 articles.
The country that most published was USA, followed by Germany, Netherlands and England. Brazil published 10 articles between 2001 and 2013 in the following journals: “Health Research Policy and Systems”; “Plos One”; “R&D Management”; “Revista Brasileira de Gestão de Negócios”; “Revista de Saúde Pública”; “Technological Forecasting and Social Change”; “Technology Analysis & Strategic Management”; and “Texto & Contexto Enfermagem”.

4.2 Analysis of citations - Method II

Table 3 lists the 28 works that received more than 40 citations. The result shows that although there is no authors’ concentration, it is possible to identify some influential works that received more than two hundred citations (Chen et al., 1998; Hobday, 1998). Their works constitute a significant foundation for the innovation subject. The content analysis of the most cited articles led to the identification of models of innovation management in 14 of them.

<table>
<thead>
<tr>
<th>Article</th>
<th>Journal</th>
<th>Citations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Smits (2002)</td>
<td>Technological Forecasting and Social Change</td>
<td>52</td>
</tr>
<tr>
<td>Francis et Bessant (2005)</td>
<td>Technovation</td>
<td>48</td>
</tr>
</tbody>
</table>
The articles to reference network (Figure 3) generated a list of 93 publications (12 books and 81 articles). All the 93 works from the network were analyzed in order to identify the antecedents of the innovation management models. Note. The circles represent the references and the squares represent the articles. The models were identified in articles in bold, according to Table 4.

It was observed that academics and managers interested in innovation management are directly influenced by practices from organizational strategy, project management, knowledge management, innovation typology and technological innovation, as shown in Figure 4.

### Table 4: Model classifications and number of articles that mention them

<table>
<thead>
<tr>
<th>Reference</th>
<th>Journal/Publication</th>
<th>Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Coates et al., (2001)</td>
<td>Technological Forecasting and Social Change</td>
<td>46</td>
</tr>
<tr>
<td>Mikkola (2001)</td>
<td>Technovation</td>
<td>46</td>
</tr>
<tr>
<td>Huizingh (2011)</td>
<td>Technovation</td>
<td>45</td>
</tr>
<tr>
<td>Toivonen et Tuominen (2009)</td>
<td>Service Industries Journal</td>
<td>44</td>
</tr>
<tr>
<td>Kohler et al., (2009)</td>
<td>Technovation</td>
<td>43</td>
</tr>
<tr>
<td>Adamides et Karacapilidis (2006)</td>
<td>Technovation</td>
<td>42</td>
</tr>
</tbody>
</table>

To facilitate the understanding about the different models that influence the innovation management practice, it was established a codification according to the main objective and the model purpose. Analyzing the documents, in 37 of the publications among books and articles, there is some mention about models. Each of them was classified under one model classification. Table 4 lists the models codifications and the number of the articles that mention them.
Figure 3 - Citation network of articles to references (minimum of ten citations).
Table 4 - Classification codes of the models.

<table>
<thead>
<tr>
<th>Codes</th>
<th>Classification of models</th>
<th>Articles</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>Project Management</td>
<td>Wheelwright et al. (1992); Gales et al.; Mansour-Cole (1995); Chiesa et al., (1996); Tidd et al., (1997); Hobday (1998); Cormican et al. (1999); Slaughter (2000); Luthje et al. (2004); Cooper et al. (2007); Oke (2007)</td>
</tr>
<tr>
<td>B</td>
<td>Organizational Strategy</td>
<td>Miles et al. (1978); Russell et al. (1992); Drejer (1996); Boer et al. (2001); Karkkainen et al. (2001); Tidd (2001); Bond et al., (2004); Francis et al. (2005); Teece (2010)</td>
</tr>
<tr>
<td>C</td>
<td>Knowledge Management</td>
<td>Cohen et al. (1990); Dougherty (1992); Nonaka et al. (1994); Nonaka et al. (1995); Bartezzaghi et al., (1997); Van der Bij et al., (2003); Adamides et al. (2006); Hidalgo and Albors (2008)</td>
</tr>
<tr>
<td>D</td>
<td>Product Management</td>
<td>Brown et al. (1995); Boer et al., (2001); Costa et al. (2006)</td>
</tr>
<tr>
<td>E</td>
<td>Types of Innovation</td>
<td>Henderson et al. (1990); Griffin et al. (1996); Mikkola (2001)</td>
</tr>
<tr>
<td>F</td>
<td>Technological Innovation</td>
<td>Shea (2005)</td>
</tr>
<tr>
<td>G</td>
<td>Open innovation</td>
<td>Sawhney et al. (2000)</td>
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</table>

Following, the models will be presented and discussed according to their codes and the chronological order in which they emerged.

Project Management Models – Code A

Wheelwright et al. (1992): the authors presented the “funnel model” as an innovation model, where ideas are being filtered through the funnel and become products that can be sold on the market. The phases of the funnel are: input of ideas, development goals, project planning, project management, execution, learning, improved post-project.

Gales and Mansour-Cole (1995): they presented “the user involvement model” that focuses on customer involvement in innovation projects regarding: design features, stage design, interdependence, external environment, frequency of interactions and project performance.

Chiesa et al., (1996): their innovation management model is called “process-based model”. The model identifies four main processes: concept generation, product development, innovation and technology acquisition.

Tidd et al., (1997): proposed the “capacity distribution of the innovation model”, that follows the same logic of the funnel model. This model argues that, despite variations that may exist between the companies, there are common processes for innovation: demand (analysis of internal and external scenarios), selection (decision taking into account the strategic vision), and implementation (phase which is divided in knowledge acquisition, project execution, launching innovation, long-term sustainability and learning).

Hobday (1998): the emerging of a “complex product system research project model” led the author to investigate the relationship between product complexity and coordination of innovation.

Hobday et al. (1999): continuing the work started in 1998, Hobday and Rush presented the “CoPs web of innovation model”, an integrative model of innovation encompassing: customer, government, suppliers and others.

Jagle (1999): following the same logic of the Stage Gate and Funnel models the author proposed the “stage gate approach model”, a model that combines the logic of the stage gate model with the logic of the funnel, which enables to transform uncertainty into measurable risk.
Slaughter (2000): also following the same logic of the Stage Gate model, the “implementation stages for innovations model” was presented, focusing innovations in construction, consisting of six stages: identification, evaluation, commitment, detailed preparation, effective use and evaluation of post-use.

Cormican et O’Sullivan (2004): proposed a “basic model of product innovation management”, a variant of the stage gates model, which includes five relevant activities in the management of product innovation: environmental analysis and identification of opportunities, generation of innovation, project planning, project prioritization, implementation of an innovation plan.

Luthje et Herstatt (2004): with a slightly different focus, the authors developed the “process of the lead user method”, which focus of research was the lead user method in systems of innovation management. The method consists of four stages: initiation of the lead user, identification of needs and trends, identification of lead users, design concept.

In 2007 two models have been proposed, and that one following the logical the stage gate model and the other the logical model of the funnel model:

Cooper et Kleinschmidt (2007): developed the “business’s new product performance model”, where the authors identified four critical success factors in projects of new product development: quality of product development processes, the existence of new product strategy, the adequate utilization of human resources and financial resources, adequate investment in R&D.

Oke (2007): proposed the “innovation types and management practices model” that investigates the influence of type of innovation in the performance of organizations considering three phases: idea generation, selection and implementation, which are influenced by human resource management and innovation strategy.

Organizational Strategy Models – Code B

Miles et Snow (1978): the authors presented the “adaptive cycle model” that shows that the innovation strategy depends on the solution of three problems: business (product and market definition), engineering (choice of technology) and administrative (choice of structure and process innovation).

Russell et Russell (1992): fourteen years later, they proposed the “initial model of corporate entrepreneurial strategy” which analyzes the relationship between business strategies and the uncertainties of the external environment in innovation strategy.

Drejer (1996): the “reasons for failure of traditional approaches to MOT model” emerged, a model that relates technology management with the strategic management of the organization.

Boer et During (2001): proposed the “process-based contingency model of innovation” where the authors found that for each type of innovation (product, process and organizational), there is a more appropriate form of management. They proposed a model composed of three parts: problem solving, internal diffusion and organizational adaptation.

Karkkainen et Elfvingren (2001): proposed the “links between customer’s need assessment, product development processes and strategic planning processes model”. This model presents ten tools related to customer’s needs during product development: the need to evaluate the draft; creative group interview; tools for the interviews; trace of the matrix chains for business; interpretation table’s voice client, analysis of competitive position; QFD; table concept selection, source evaluation, assessment of future competitiveness.

Tidd (2001): also in 2001, the “effect of uncertainty and complexity on the management of innovation model” was presented. The author argues that the contingencies of the environment (uncertainty and complexity) influence the organization and innovation management.

Bond et al., (2004): developed the “antecedents of reputational effectiveness model”, a model of effective inter-personal relations. The authors concluded that access to information; resources and proximity to the people who favor the success of innovation management.

Francis et Bessant (2005): they proposed the “diamond diagram model” that analyzes the relationship of innovation with: product performance, process performance, positioning the company’s products, the company’s dominant paradigm and presented a model that provides indications of how and where to build an innovation agenda.

Teece (2010): presented the “elements of business model design”, a cyclic model that encapsulates both the financial and organizational architecture. The phases are: selection of the technology product / service, determination of benefits for consumers, identification of the market, disposable income, and value capture.

Knowledge Management Models – Code C

Cohen et Levinthal (1990): proposed the “model of absorptive capacity and R&D incentives”, a model that recognizes the influence of investment in R&D in obtaining knowledge. The “absorptive capacity” is what leads to differentiation in the development of new projects in R&D.

Dougherty (1992): developed the “cycles of market knowledge creation model”, a model that suggests three
cycles of knowledge generation: definition, selection and retention.

Nonaka (1994) and Takeuchi (1995): the “knowledge creation model” emerged. In the next year, Nonaka and Takeuchi proposed a similar “knowledge creation model”, that concluded that success in knowledge creation increases the degree of innovation.

Bartezzaghi et al. (1997): proposed the “multi-level learning model”, which considers that the ability of companies to innovate their products effectively encourages the acquisition of competitive advantage.

Van der Bij et al. (2003): developed the “potential antecedents of the level of knowledge dissemination model”, that argue that the dissemination of knowledge is crucial for strategic planning of new products.

Adamides et al. (2006): linking knowledge with innovation, the authors proposed the “basic structure of knowledge breeder model” where consider innovation as an ongoing process of problem solving. They presented a model which relates knowledge generation with innovation and product development. The authors concluded that innovation is considered a process that depends on people for the generation of knowledge and requires analysis stages, which is similar with the stage gate model. Hidalgo et al. (2008)

Hidalgo et al. (2008): proposed the “management of technological innovation model” that analyzes various techniques for managing innovation relating them to knowledge management and performance.

Product Management Models – Code D

Brown et al. (1995): presented the “communication web model of product development”. This model shows the factors that affect the success of a product development process (team leadership, customers and suppliers). These factors were grouped into three research areas: product development, networking and problem solving.

Boer et al. (2001): developed the “knowledge and continuous innovation model”, a model to support companies in gaining competitive advantage by concentrating efforts in the various phases of the lifecycle of the product, facilitating the generation of knowledge and innovation.

Costa et al. (2006): presented the “product design stage model” that investigates the influence of the consumer in the development of new products.

Types of Innovation Models – Code E

Henderson et al. (1990): presented the “defining innovation model”, a model that divides into four quadrants categories of innovations: incremental, modular, architectural and radical.

Griffin et al. (1996): they proposed the “project strategy typology model” that analyzes the factors that influence success in the project of new product development.

Mikkola (2001): developed the “R&D project portfolio model”, where the author proposed a matrix of project portfolio management as a tool that assists the innovation management.

Technological Innovation – Code F

Shea (2005): the author presented the only one model in this classification - the “contingency model of the effect of nanotechnology-based innovation on firms” – that is based on the contingency model for innovation.

Open Innovation Model – Code G

Sawhney et al. (2000): these authors presented the “communities of creation model”, that recognizes the importance of social interactions to create a community of innovation. Transfer the location of the creation of innovation to the external environment, but draws attention to the need to create mechanisms that provide a balance between chaos (open environment) and stable (closed). The concept of open innovation is based on the funnel model. However, this model does not explain how the selection, development and dissemination of the innovation occur.

In the open innovation model category it is worth to highlight that although Chesbrough is the most known author explaining the model, in this work it did not appear. The keyword “innovation management” used and the focus of the study probably contributed for this point.

5. CONCLUSIONS

Ensure sustainable competitive advantage in a highly changing environment with reduced time lead, reduction in the new products development costs and the increasing pressure for innovation are a challenging task for organizations. Innovation is not just about new products or services but it encompasses other aspects like new organizational methods, management models and new production (Oslo Manual, 2005).

Considering that innovation is a multidisciplinary topic, this research analyzed the publications in the last
38 years, identifying that areas such as organizational strategy, knowledge management, project management, technological innovation and product management might be considered innovation management antecedents.

There is a lack of concentration of works and also in particular authors, so, in order to identify the group of articles and authors that are relevant to the innovation field it was necessary analyze the most cited references of the primary set of articles.

The research methodology used by the authors from the analyzed sampling reveals a slight predominance of literature review, what can indicate that innovation does not have a consolidated or unique model. Since innovation is highly dependent of the environment, company objectives, strategy and culture, many studies are made in order to try to understand and find some ways that can help identify the innovation management models that better suit for each context.

Project management, organizational strategy, and knowledge management are a subject area that according to the literature review influences the innovation management models. It might indicate that innovation is still strongly related to the process of development of a new product. Companies try to understand, implement and measure innovation with product development logic and metrics. However, in many situations innovation cannot be measured, implemented or understood as a project or product development. Innovation encompasses situations of uncertainty and complexity that is not related to a product or project development. The link with subject areas like organizational and knowledge management might reflect this complexity. In newer works, strategies like open innovation, which opens the R&D department for external participants, are mentioned, indicating the emergence of new ways of dealing with innovation that will have a strong influence in internal processes.

The subject of innovation management and its impact on operation management are still in an evolutionary stage. A better understanding regarding the subject and its effect in the internal processes and organizational strategy is needed, mainly if it is considered the emergence of new models like open innovation and the increased advances in technology.

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