Implementing an Open Innovation Strategy: The role of Information Technology and Knowledge Management

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Abstract

Although the popularization of open innovation’s concept, companies and academics are still trying to understand the best way to implement this practice. Through a case study in a multinational company established in Brazil, it was investigated how information technology and knowledge were applied to develop the open innovation practice.

Keywords: Open Innovation; Collaboration; Knowledge; Information Technology

Introduction

The uncertainties and the increasing complexity of the current marketplace are affecting the way organizations deal with new products development. Companies are forced to identify, capture and leverage external knowledge sources due to the shortening of the products life cycle and the need to be constantly innovating. In this environment, companies that are able to develop the ability to work in a collaborative way, combining the internal and external knowledge, have bigger chances to assure a competitive advantage (Caloghirou et al., 2004; Fuller et al., 2011).

Collaboration can be seen as a powerful tool to achieve the established objectives in a wider, agile and flexible way (Aron et al., 2006). The collaboration quality may affect the organizational performance (Nosek and Mcmanus, 2008), and this quality is also associated to the organization’s ability to develop the absorptive capacity (Christensen et al., 2005; Cohen and Levinthal, 1990). Many collaboration aspects are being discussed among researchers in the last years. Authors like Bjorn and Ngwenyama (2009) and Nosek and McManus (2008) discuss the dynamic among virtual team members. In the same direction, Kock (2008) and McNamara et al. (2008) analyze how the quality of the information exchanged among team members affects decision process. Considering that companies should start to search for complementary knowledge and new technologies in the external environment, Chesbrough (2003) presents the open innovation concept, in which external entities may contribute in a companies’ innovation process.
However, implementing an open innovation initiative is not a trivial task. It has to be fully understood, administrated and adapted to the organizations’ objectives. This task is particularly tough to those companies that have a strong and established internal structure. In many cases, the marketing structure becomes the responsible for the open innovation initiative, with no concern to align this initiative to internal processes and business units’ objectives. From this perspective, two research questions arise: (1) How to put in place the open innovation concepts, considering a company with a well-established process and business model? (2) How to determine which way to pursue to enable the open innovation?

To answer to these questions, it is necessary first to understand the open innovation dimensions that are: “how” (process), “what” (content) and “when” (context) (Huizingh, 2011). The first dimension, the How, analyzes the processes that lead to open innovation. The second and third dimensions, respectively the What and When, depend on the organizational strategy and the context where it is inserted.

Another aspect that should be considered are the influencing factors, that may vary from company to company, according to the type of the company, the industry it belongs, the products, demographic aspects and even government regulations. However, authors like Huizingh (2011) has highlighted the importance of the knowledge management, focusing on the internalization and application of learning in the internal processes, as a common factor among examples of open innovation initiatives.

This paper analyzes through a case study in a company in the industrial sector, established in Brazil for more than 100 years, how the knowledge acquired in previous open innovation initiatives and the use of new technology are shaping the new open innovation initiatives. The study analyzes two open innovation initiatives, launched in different moments, identifying the differences between them and highlighting how the learning process in one, determined the new open innovation platform that is currently being used.

**Building the theoretical background**

A search in the ISI Web of Science data base, using the keyword “open innovation” revealed that although the concept was introduced in 2003, is just from 2006 that it gained a bigger attention in the publications (Figure 1). Analyzing research areas, subjects like Business, Engineering and Operations Management are the ones that are more related to the theme open innovation (Figure 2).
Figure 1. Number of publications per year, about Open Innovation, from 2003 to 2012 (Source: ISI Web of Science, August 2012)

Figure 2. Research areas with concentration in studies about Open Innovation (source: ISI Web of Science, August 2012)

Using the bibliometric softwares Sitkis and UCINET, a co-citation network was generated to understand what were the research areas that were more strongly related to the term open (Figure 3).
According to co-citation network, the terms “Innovation”, “Product Development”, “Firms”, “Knowledge”, “R&D” and “Performance” are the ones that are more strongly related. However, since Open Innovation is a relatively new concept, it was necessary to understand the evolution of the concept in the research areas. Using the software CiteSpace II (Chen, 2006) the analysis were sliced in time periods from 2006 to 2012. The summary of this analysis is described in the Table 1.

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<th>Time Period</th>
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| 2006-2006   | *R&D, innovation, knowledge, technology, product development, firms, absorptive capacity, strategic alliances, strategy and communities*                                                                                          | • Top ranked citations are R&D, innovation, knowledge and technology.  
• Open innovation is still a weak tie in the network. It appears in the net only because the search was based in this term.                                                                                                                                                     |
| 2007-2007   | *Performance, industry, intellectual property, competitive advantage, alliances, determinants, markets, dynamics, nih-syndrome, industries*                                                                                     | • The term “open innovation” begins to appear in more evidence in the network. Two major clusters are generated, but the one that is directly related to the term “open innovation” is the cluster named “external technology commercialization”;  
• Within this cluster, the terms “performance”, “intellectual property” and “determinants” are the top ranked citations.  
• The term “Empirical Analysis” begins to appear in the network, indicating the increase of the empirical researches about open innovation.                                                                 |
| 2008-2008   | *Intelectual property; Technology transfer; Firms; Management; Knowledge;*                                                                                                                                                   | • Publications about open innovation starts to focus on questions related to knowledge.                                                                                                                                 |

Figure 3. Co-citation network showing the relevant research areas related to open innovation. Consolidated view of the publications between 2006 to 2012. (Source: ISI Web of Science Database, August 2012. Bibliometric Software Sitkis and Ucinet)
### Table

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| 2009-2009   | *Open innovation, open source software, empirical analysis, systems, users, toolkits, performance, commercialization, design, innovation* | - There is a focus of open innovation studies in open source software area;  
- It begins to appear terms like systems and toolkits indicating that specific technology tools are been created to support the open innovation initiatives. |
| 2010-2010   | *Open Innovation; Performance; R&D; Technology; Innovation; Perspective; Market; Firms; Industry; Knowledge* | - “Open Innovation” is established as the most relevant knot in the network;  
- “Performance”, “R&D” and “Technology” are the top ranked cited terms in the network. |
| 2011-2011   | *Open Innovation; R&D; Technology; Organization; Innovation; Absorptive Capacity; Firms; Product Development* | - “Open innovation” remains to be the most relevant knot in the network;  
- The biggest cluster in the network, containing 21 members can be labeled as “evolution”, “open innovation” or “firms model”, what indicates the tendency to relate open innovation with organizational strategy. |
| 2012-2012   | *Open Innovation; Technology Transfer; Performance; R&D; Innovation; Absorptive Capacity; Networks; Knowledge; Industry; Model* | - The biggest cluster is labeled “strengthening competency linkage” and the top ranked cited terms “technology transfer” among others, confirms the tendency in the strategic sphere as well as in the knowledge transfer. |

Open innovation is about enabling the innovation process, by sharing ideas, processes and technology aiming to produce innovative products in a more quick, flexible and lower costs (Chesbrough, 2006). Innovation is related to the creation of new possibilities by combining different set of knowledge that can be found in an organization’s internal environment or by searching in the external environment. Highly specialized knowledge groups has been created around the globe and to build a strategy that can identify and create a relationship with them are ranked as one of the top priorities to many companies (Gassmann, 2006; Porter and Stern, 2001; Tidd *et al.*, 2008).

**The Knowledge cycle shaping the open innovation practice**

The more complex and sophisticated are the technologies and business processes, the more companies tend to concentrate their efforts in the core competencies and rely on third parties, areas that traditionally were operated inside. The knowledge availability and the appearance of venture capitals are fostering the emergence of start ups and small companies specialized in developing new ideas and technologies. All this scenario contribute to the increase of the open innovation practice among companies (Goffin and Mitchell, 2010).

The open innovation practice is based in concepts of excellence regarding to collaboration, cost and resources optimization, all of them aligned with the nowadays market dynamism. However, taking a closer look to the practice, what is observed is that many companies are facing difficulties, mainly the traditional ones. Academics and managers are
raising discussions around of “how to implement open innovation”, that represent the first dimension to be understood in order to succeed in this task (Huizingh, 2011; Mortara and Minshall, 2011).

According to Chesbrough et al. (2006) open innovation can be distinguished in two models: (i) inbound and (ii) outbound. In the first model, companies establish relationships with some companies in order to access their competencies to improve the internal innovation capability. This form is the most observed model seen in the marketplace among traditional and mature companies, that do not have the flexibility to modify their internal processes and culture in a necessary speed. In the second model, companies search in the market, companies that own a business model that is more suited to commercialize a specific technology, exploring together new opportunities in the marketplace (Chesbrough and Crowther, 2006; Chiaroni et al., 2011).

Whatever is the adopted open innovation model, it demands a significant organizational and cultural change. Shifting the organizational boundaries to a more permeable one, where it is allowed the flow of ideas, innovations and people between the internal and external environment is a significant disruption of old organizational paradigm. A sense of urge in modifying the way companies operate, communicating internally and externally the new vision and the importance of working in a more collaborative way consists in one of the first steps companies should take (Dodgson et al., 2006; Kotter, 1995). Once this step is established, many companies go to a step that are called as experimentation phase, where different open innovation models are put in practice, usually in a limited scope. Chiaroni et al. (2011) highlight the importance of this experimentation phase because is during this step that the knowledge is acquired by identifying the positive and negative points that will improve the following steps or initiatives.

Knowledge plays a central role in open innovation, demanding an efficient knowledge management system that allows the sharing of experiences inside and outside companies’ boundaries. This sharing is possible when the right information technology (IT) is used, observing the operational and strategic aspects that will support the open innovation initiative (Kirschbaum, 2005; Piller and Walcher, 2006). The IT architecture should be built to be robust, dynamic, flexible and adjustable to allow quick changes according to the market demand. The analytical observation capability is a necessary resource to scan the changes in the marketplace to generate information that will help managers to formulate forecasts and a new hypothesis, that will further generate new knowledge (Prahalad and Krishnan, 2008).

Open innovation is intense in knowledge and better the absorptive capacity, bigger the chances to achieve the open innovation strategic objectives. The IT architecture enables the external searches for new knowledge, operationalize the internal management of this new knowledge and allow the open innovation processes to work. This set is inserted in the organizational context, that is also inserted in the marketplace. This two domains – the organizational and the marketplace context – will determine the what (product) and when (in which moment) of open innovation.

Methodological Procedures

To achieve the objectives, a case study was adopted, with a qualitative, descriptive and longitudinal approach. According to Yin (2005) a case study approach is suited in those cases in which the phenomenon is relatively new and the context where it is inserted matters. The study
was developed in a traditional company, in the industrial sector, established in Brazil for more than 100 years and present worldwide for more than 160 years.

The criterion to select the company where the study was developed was established according to the literature that addresses open innovation in mature companies, which own an active R&D department. In a study conducted by Chesbrough and Crowter (2006) the more usual way of open innovation found in the companies are the inbound model. In these cases, the management involvement to determine how open innovation will help to cover the internal gaps in order to fit to the market demands is a key requirement to integrate the open innovation tasks with the internal R&D department tasks. Based on the literature, the selection criterion were:

- Mature company in which open innovation was established as priority in the organization strategy;
- Company that owns a business unit responsible for innovation strategy;
- Company that is known in the marketplace as having a consolidated knowledge management structure; and
- The R&D division is active.

The first interview occurred in September of 2011 and the second one in April of 2012, where it was investigated the differences between initiatives occurred in each year and what was the role of the knowledge and technology. The questionnaire was semi-structured and in both occasions, the manager responsible for the new technologies and innovations were interviewed.

The Case Study

Company background

The studied company is a high technology company, existing for more than 160 years. It is present in more than 190 regions and employing more than 400,000 workers around the world. Their focus is in energy, industry, health and recently was created a business unit with focus in Cities & Infrastructure. Innovation is one of the key strategies to pursue for sustainable growth, as highlighted in the company’s strategy for the next years. They are also known as having a extremely well established knowledge management system. Regular meetings occur between business units, sometimes involving other regions and also key partners, in order to exchange knowledge and improve the business performance.

Open innovation initiative

In Brazil, the adopted approach for open innovation was in the contest model. The first ones was launched in 2005/2006 and again in 2008. The first one was launched together with a business partner with the objective of capturing embedded electronic projects. 200 projects were evaluated and the target group was graduation students, engineers and technicians from the electronic and mechanic sectors. In 2008, the second contest was launched, challenging the public to present innovative ideas related to the smart grid technology.
Although open innovation contests were a global initiative, at Brazil, they were still isolated initiatives. Once in that time, the company did not have a business unit responsible for innovation, the open innovation contest occurred under marketing department. The interface with the participants was made through a web page in the corporate site and collaboration among participants did not exist. Regarding to the results, in the first case, once there were a third part partner involved, they took the projects and some of them were incorporated in their products. But in the second case it was seen as a marketing initiative only to create awareness in the market.

In the end of 2010, an innovation business unit was created for the Brazilian market and the open innovation initiative was reactivated. However, this time, during the planning sessions, the team members restored the previous initiatives processes and results and with this knowledge, they looked around other regions where the company has activities and looked for those that have similar market characteristics to verify how they were launching the open innovation initiatives.

In the second half of 2011 they launched again a new context, but this time, based on a collaborative platform where the participants could interact with other participants, creating a community with more than 4000 participants. More than 400 projects were submitted and 15 of them were selected to be presented to a jury composed by company’s business units’ managers, engineers, specialists and marketing staff that evaluated innovation, availability and the applicability of the projects. In the end three of them were selected.

The learning cycle

Despite the differences between the first ones and this last initiative, the overall result was not so positive for the company. One of the identified causes was that although business managers were involved in the evaluation phase, once the requirement did not originated from them, there were no commitment to include in their projects the new ideas generated by the contest.

In the end of 2012 the company decided to launch another open innovation contest, but this time in a more focused way, splitting it in three phases. In the first one, a strategic planning round was done with the business units in order to identify the existing gaps that could be filled with externally generated ideas. After, they scanned the market to identify possible start ups and small companies, owing specific knowledge and skills that could develop new technologies to be funded by them. These companies were invited to submit their business plan that were evaluated by a jury composed by the global venture capital coordinator and business units managers. The end of this process is foreseen to occur during the first half of 2013.

Discussions

The need to adopt an open innovation initiative came from the market. R&D high maintenance costs and the increasing pressure to shortening a product development time cycle are forcing companies to seek for new ways to deal with this new reality. However, the way companies are adopting open innovation initiative are remarkably different from region to regions based on the local market characteristics. Among the lessons learned by the studied company may be listed:

- Business units should be the main interested and the demand should arise from them;
• A collaboration platform with friendly functionalities is key to attract the public. Create a community that is connected with the main social networks like Facebook, Twitter among others are powerful motivators;
• The acceptance and success of the initiative depends on the economical maturity, participants´ technical level and local cultural aspects;
• The economical maturity, culture and organizational structure directly affect the open innovation model to be adopted, in other words, if the inbound or outbound model will be adopted.

Conclusion and further researches

The objective of this study was to investigate how the studied company is using the learning cycle to improve the open innovation initiative. To achieve this objective a case study was conducted during one year and half and this study should continue during 2013. Having chosen a traditional company that have a consolidated internal processes helped in the identification of the difficulties they are facing in implementing the open innovation strategy.

The results of this study can not be generalized, once it was concentrated in only one company. But the findings can help in new studies or to compare differences between industries and regions. Open innovation is more about processes than a strategy in itself. It is a process that will complement the organizational strategy, giving agility and flexibility in critical company’s areas. This is a recent initiative that demands more studies to present new models and processes that will help to dismiss the existing paradox between open and closed innovation.

Acknowledgements

We acknowledge the company and respondents that participated in this study and to FAPESP (Fundação de Amparo à Pesquisa do Estado de São Paulo), CNPq (Conselho Nacional de Desenvolvimento Científico e Tecnológico) and Capes (Coordenação de Aperfeiçoamento de Pessoal de Nível Superior) that are funding the present research.

References


