

Classification of the Open Innovation Practices: the Creativity Level

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Abstract. The body of knowledge in open innovation (OI) has been growing and, nowadays, it is one of the most popular and debated concepts in innovation management. However, the literature on OI is fragmented, many definitions have been used across the studies and in each paper different characteristics of open innovation are assessed. This issue creates many “flavors” of OI, which in turn creates obstacles for managers to implement open innovation practices. Also, this problem is an impediment for creating a unified body of knowledge. Thus, this paper addresses part of the problem by proposing a class of open innovation practices. This class encompasses all the OI “flavors” that answer the same question, “what should we innovate?”. Further, this class of OI practices is included in the current framework: inbound, outbound and coupled. This provides, in the product development context, a mindset that helps managers to be able to innovate more quickly, therefore the development of this classification can help companies to achieve competitive advantage.

Keywords. Open Innovation, Innovation Management, Product Development Process.

Introduction

Nearly all companies depend on innovation activities to achieve competitive advantage [1][2] and long-term survival [3]. And the product development activities are the main form of innovation in a firm. However, during the product development process firms have been facing challenging obstacles, such as shorter product life cycle and higher innovation costs [4][5]. Another important complication that companies are facing in the past few years is that many products are becoming more complex every release [5]. Also, working patterns have changed, nowadays some employees seek “portfolio careers” on behalf of “job-for-life with single employer”, consequently, some talents are lost due to mobility and companies require to access them externally [6]. Nowadays, in many companies, R&D departments must face these challenges daily and it is critical to overcome them, so the stockholder’s demands are satisfied.

A strategy endorsed by many companies in order to face these new product development complications is the open innovation approach [7][8]. Which has been defined by Chesbrough [9] as “the use of purposive inflows and outflows of knowledge to accelerate internal innovation, and to expand the markets for external use of

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innovation, respectively". Dahlander and Gann [6] showed that the concept is getting popular in the academia, furthermore, practitioners acknowledge it, and its usage has been reported in many different segments [10][11].

Many empirical studies showing that the innovation performance is positively related to the openness of the R&D department have been published in the past ten years. For instance, Laursen and Salter [12] established, using data from the UK Community Innovation Survey, which open search strategies (widely and deeply) contribute to the innovation performance, nonetheless, it's important to note that openness is beneficial until certain point, where additional search becomes unproductive. Other authors (e.g. [13][14][12][15][16][17][18]) studied this phenomenon empirically in different contexts, but, overall, the results agreed that open innovation has a positive effect on innovation performance.

A distinguished example of the open innovation approach is Procter & Gamble that reported an outstanding performance after the development and usage of an open innovation model called *connect and develop*. It was reported, in 2006, that more than 35% of their products have elements from the outside along with an increase in R&D productivity by 60% [19]. Regarding R&D investments, it has fallen from 4.8% of the sales in 2000 to 3.4% of the sales in 2006 [19].

The evidence shows positive results from open innovation initiatives, however, in most companies the process is much more similar to trial and error than to a formal routine [11]. According to Huizingh [20], "what is missing is a decent cookbook, an integrative framework that helps managers to decide when and how to deploy which open innovation practices".

This integrative framework requires a profound understanding of the possible roles that open innovation can perform at any firm. It is required to know why open innovation activities are conducted and, also, how they are conducted. The literature provides many case studies that may answer the first inquiry (i.e. why open innovation activities are conducted). The same literature may also provide an answer to the second inquiry (i.e. how open innovation activities are conducted). But for the second inquiry we already have a framework that indicates how open innovation activities are conducted. This framework, presented by Enkel and Gassmann [21], divides open innovation in three parts (inbound, outbound and coupled). But it does not contemplate "why open innovation activities are conducted".

Thus, based on this theory gap, we reviewed the current literature and we identified one of these "why's", later we connected it with Enkel and Gassmann framework [21]. We labeled this "why" as the creativity level.

The present paper is divided as follows. In the following section we present how the review was conducted and briefly discuss the approaches used by researchers to study the application of open innovation in firms. Next, we explain the creativity level of open innovation and, afterwards, we exemplify the creativity level for each of the three structures of the current framework (inbound, outbound and coupled). Finally, we discuss how this classification can help the development of open innovation body of knowledge and how it is applicable by practitioners.

1. Review

A systematic review of the literature was conducted in the open innovation topic in order to summarize and classify the dominant procedures adopted by the practitioners.

First, it was searched in the ISI Web of knowledge and Scopus database for articles, in the English language, in the areas of social sciences and containing the word “open innovation” in the title, abstract or as a keyword. These databases were chosen because they embody most of the relevant journals in fields of social sciences. Then, in the review we elected the articles that presented a practical experience in open innovation in any business segment, though, articles studying open innovation in a non-business context were excluded from the analysis (e.g. [22]). The procedure followed the routine presented in Figure 1.

In the review we searched for practical experiences in open innovation, so it favored case studies over large scale empirical studies. And among these articles we found two main types of analysis: the *solution focus* and the *company focus* studies. An explanation of each of these types is given below:

- *Solution focus*: these are the case studies that generally bring a company requirement and then a pursuit to solve the problem utilizing open innovation practices. It is, in a simple description, an example of open innovation utilization.
- *Company focus*: these are the case studies that bring the whole company perspective on the open innovation matter. Some of them even present maturity levels (e.g. [23]). However, usually they are not as specified as in the *solution focus*. In some cases, the *company focus* studies are multiple case studies, therefore, they are even less specified, and present just general trends (e.g. [24]).

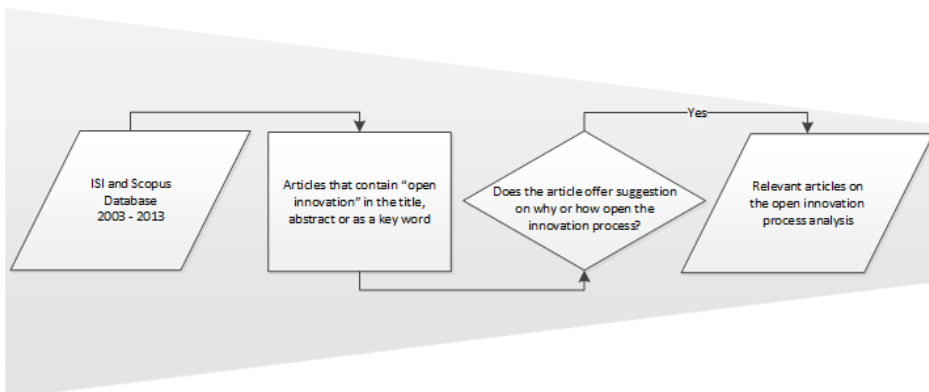


Figure 1. Articles selection process.

To further differentiate these forms of analysis and as way to exemplify the encountered practices in the literature, consider Table 1 and Table 2. In Table 1 there are examples of solution focus studies, while in Table 2 there are some company focus studies. Both approaches have its merits and they are complementary – a solution focus has a deeper analysis than a company focus, while a company focus has a broader analysis than a solution focus. However, it is important to highlight that some of these studies adopt a hybrid view, with a clear *company focus* illustrated by examples (*solution focus*).

Table 1. Examples of solution focus articles.

Company	Segment	Case/focus	OI practices	Authors
General Electric	Clean energy business	General Electric managers faced shorter development life-cycles in certain technology developments. Also, it was confronting areas that were at an early development stage, therefore it was important to keep a portfolio of potential future technologies.	General Electric organized the "GE Ecomagination Challenge", aiming to bring breakthrough ideas related to electrical grid efficiency, smartness and cleanness, as well as innovations that could bring these technologies faster.	[25]
SAP	Software	Pursuit of greater speed of transformation, innovativeness.	Outside ideas were obtained from people that were dealing with SAP software through a competition called SAPIens.	[26]

Table 2. Examples of company focus studies.

Company	Segment	Overview of the reported OI practices	Authors
Procter & Gamble	Diversified	P&G developed an open innovation process called Connect and Develop. It was reported that P&G adopts the following OI practices: evaluation of consumer needs, identification of adjacent products, licensing, university-industry collaborations, joint-developments and knowledge brokers.	[19]
Deutsche Telekom	Telecom	Open innovation takes many different forms in Deutsches Telekom. The practices reported covered: consumer integration activities, joint developments, spin-offs, university-industry collaborations, consortiums, workshops and forums.	[27]

2. The Creativity Level

As stated previously in this paper, open innovation is a broad field of study and is used by companies in many different circumstances. However, the aim here is not to present all possible purposes of open innovation, instead we intend to show a class of open innovation practices that answer a similar set of questions.

Thus, based on our review, we found a recurrent use of open innovation when an R&D department faces questions such as "where should we focus our efforts on?" or "what should we innovate?". These are similar questions that can be summarized simply by "what should we do?" regarding innovation. It usually happens in the very beginning of the product development process, and the answers are at the core of the product development activity. Since the nature of these inquiries are highly related to creativity, we labeled the open innovation practices that help answering them as the: creativity level of open innovation. Also, it is important to emphasize that the correct

answer for these questions is fundamentally important for the success of any product development endeavor.

In the following pages we present some of the practices found in the review processes on how companies face these challenges using the open innovation paradigm. We also connect the creativity level with the current framework (inbound, outbound and coupled) illustrated in Figure 2 [21]. Our extension of this framework is the introduction of the class of open innovation problems that we labeled as the creativity level of open innovation, illustrated in the Figure 3. These practices are further explained and exemplified in the next sections.

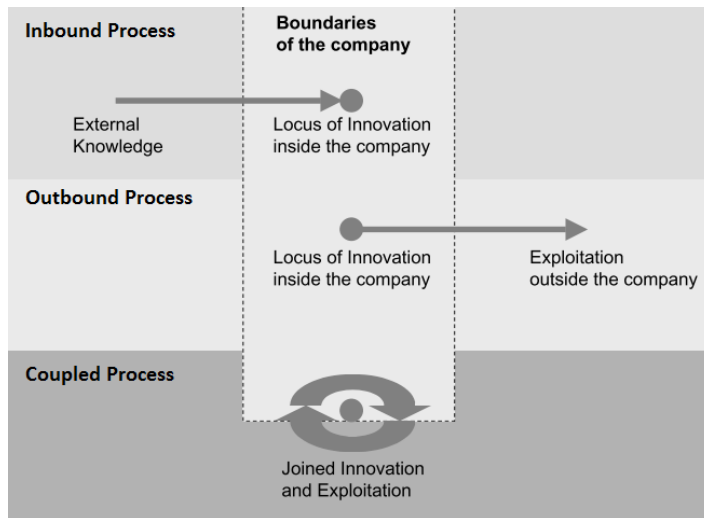


Figure 2. Inbound, outbound and coupled framework. (Source: [21])

	Inbound	Outbound	Coupled
Creativity Level	Customer needs Foresight and forecast companies Contests	Spin-off	Partnerships Contests Real options

Figure 3. The creativity level classification. Inside the blocks are important related topics.

2.1. Creativity level – inbound

A creativity inbound happens when a company does not know what to innovate. One way to find these answers is outside. Based on the review, this situation seems to be common, especially customer integration methods. For instance, Rohrbeck et al. [27] presented the case of Deutsche Telekom, where the customer insights are collect by observing them at their own environment with techniques like empathic design and

day-in-the-life-visit. Another example is Procter & Gamble's innovation model (i.e. connect and develop) that, once a year, identify the top ten customer needs for each business unit and this information acts as guidance for further research and development [19].

The SAPIens initiative was another way to harvest user ideas for innovation, it was conducted within the SAP University Competence Center (UCC). In the initiative the students teams (mentored by Lecturers and UCC employees) could submit ideas to improve SAP products or process in exchange for prizes (money prizes and non-cash prizes) [26]. This example has two main differences from the previous illustrations, first, it was not the final consumer that was consulted (it was the students of SAP UCC), yet it was a user. The second difference to be noted is that the initiative was carried out in the form of a contest, with prizes to encourage and boost participation.

Most of the outcome obtained from inbound open innovation activities at the creativity level play an important role planning the roadmap of the innovation. Based on this need some companies offer services that foresight, forecast and evaluate outcomes of innovation [28]. And this type of open innovation plays an important role in many business segments.

2.2. Creativity level – outbound

Occasionally, the R&D department develops new technologies or know-how that does not fit into the current business model of the company. And the company that owns the technology does not know how to market it (the question is “what to do with this know-how?”). Therefore, many projects that do not find their way to market inside the company end up suppressed by new ones and the investment is lost. But, as pointed out by Chesbrough [29], these developments can flourish outside the firm that developed them, usually, they also need to be marketed by an innovative business model (i.e. a business model different from the parent company). In the Chesbrough's open innovation seminal book [8] he assessed many cases, including thirty-five projects at Xerox that departed from the company by means of spin-offs. Eleven of these projects succeed and, together, surpassed Xerox's market value by a factor of two. One of these cases is the Ethernet networking protocol, developed at PARC (Palo Alto Research Center) from Xerox. In favor of reducing costs, Xerox leased the protocol technology to a former employee, who co-founded a spin-off named 3Com. At Xerox, the protocol had its use limited to serve the company's scope (copying machines), while, on the other hand, in the spin-off, it was able to create much more value, based on a new strategy to market it, offering solutions to a wider range of applications.

2.3. Creativity level – coupled

The creativity coupled process aims to answer the same question as the creativity inbound, though using different methods. The coupled processes require a partnership, formal or informal. An example of this model was the *Ecomagination Challenge* that happened at General Electric in 2010. GE invited the society (e.g. companies, universities, research institutes, NGOs, individuals) to submit their breakthrough ideas or projects “to create a smarter, cleaner, more efficient electric grid, and to accelerate the adoption of more efficient grid technologies” [25]. After the submission, a committee evaluated all the contestants and some were selected. As a prize, these winners received investments or a commercial relationship was set. The main reasons

for GE to establish these partnerships, was that not all the best ideas would be in the company, some (or most) of them would be outside, and, because smart grid is a fast growing new business, it was not clear for them which approach would be successful. So *Ecomagination Challenge* was a way to have a portfolio of approaches to the smart grid business [25]. As both companies, GE and winners, exploited these partnerships, it could be said that the process was coupled.

3. Discussion

The open innovation concept is popular between scholars and practitioners as well, however, as pointed out by Dahlander and Gann [6], the literature on open innovation is fragmented, “inhibiting our ability to build a coherent body of knowledge”. Each empirical research recognizes open innovation by their respective view, this creates many “flavors” of the concept in the literature. Therefore, managers lack an integrative framework that could assist them in the decisions regarding when and how to use the open innovation approach [20]. Thus, we examined the current literature on how the open innovation is adopted by practitioners and then organized some of these concepts in a single mindset crossed with Enkel and Gassmann framework (inbound, outbound and coupled) [21].

By all means this study is not all inclusive, many of the open innovation practices were intentionally left aside in order to have a concise look at just those practices that answer the question “what should we innovate?” and, in the end, we create a single class of practices that have a singular objective. Defining classes of open innovation practices modularize the concept and can help the development of a coherent framework.

The classification presented in this paper provides a mindset (a perspective) on open innovation, allowing managers to better assess how the concept can help them in their product development activities. This better assessment may bring several benefits, including: a faster time-to-market and a better decision making regarding innovation efforts. And these benefits encompass some of the prominent concerns during the product development process.

Yet this classification can help managers, it is far from our goal, which is an integrative framework. There are a lot of research opportunities in the subject in order to fulfill the integrative framework objective. The classification here presented is one step of many needed to be taken before we accomplish our goal. Other classifications must be developed so we can confine open innovation in “boxes” that subsequently may be used in an integrative framework.

Also, despite the importance of open innovation to the current innovation management theory, many related topics lack appropriate assessment. For instance, the above-mentioned *Ecomagination Challenge* can also be discussed in terms of real options. This is one of many examples of concepts that are linked with open innovation. This particular link (between real options and open innovation) was previously studied by Vanhaverbeke et al. [30], and, as pointed out by the author, this kind of research helps to better understand the open innovation. In the end of the road, all these related topics must be cohesive and coherent with open innovation body of knowledge.

4. Conclusion

In this paper, through a review of the current usage, we assessed part of the practice of open innovation and, later, we developed a classification that encompass all the practices that attempt to answer a similar set of questions, that can be summarized by “what should we innovate?”. This classification can help practitioners set their open innovation roadmap.

We believe that further advancements in the theory must acknowledge the fact that open innovation is not readily applicable by managers, the lacking integrative framework is required, so that the process becomes as straightforward as possible.

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