Inside the Box of Open Innovation: Actual Implementation in Large Firms

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Résumé :

Since Chesbrough (2003)'s seminal work, "open innovation" (OI) is a buzzword that many companies and academics constantly refer to. This paper addresses the question of implementation of outside-in open innovation, and analyzes how companies adopting this approach implement it in terms of partnership development and internal organization. To do so, we rely on OI and strategic alliances literature. We then conduct a multiple case study analysis on 18 companies famous for their OI practices. We study what impact OI approaches had on their innovation methods, their way of managing partners, and their internal organization. We thus show that OI approaches are not always based on an extensive openness of external partnerships, and that companies can choose among three OI strategies: topic-oriented OI, partner-oriented OI or fully open approaches, which are not mutually exclusive. We also show they face a trade-off between breadth and depth of partnerships, which evolves over time. As for internal organization structures to handle OI approaches, we find that companies usually dedicate staff and budget resources to the project at the beginning of the process. When this new culture is widely developed and the OI approaches mature enough, it does no longer require any specific staff or department.

Mots-clés : Open Innovation, Business practice, Partnership, Partner-oriented Open Innovation, Topic-oriented Open Innovation

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INTRODUCTION

Since Chesbrough coined the concept of "open innovation" (OI) in 2003 and companies started communicating about the way they integrate external competences and resources in their innovation and creativity processes, word has spread about this new practice. A decade later, OI research has been booming. Nevertheless, there are still many unanswered theoretical and empirical questions about OI (Ollila and Elmquist, 2011; Vanhaverbeke et al, 2014; West et al, 2014).

With globalization and intensified market competition, companies try to stimulate creativity and innovation, and to optimize these processes. Companies consider they can no longer only be creative and innovate by themselves. They have to rely on a large network of companies and competences to be more creative and to innovate better and quicker. The OI paradigm suggests that companies can use both internal and external ideas and knowledge to develop new models for creating and commercializing innovations (Chesbrough, 2007). While OI paradigm undoubtedly provides a useful framework for companies to leverage knowledge beyond their boundaries and foster their innovation, the actual implementation of OI raises several unanswered questions.

Interestingly, collaboration with external organizations is not new (Mowery, 1983). For many years, companies have been working and developing through alliances and networks (Gulati, 1998) where they cooperate with their suppliers, clients, and all types of companies, large and small. Also, from the outset, strategic alliance research and practice saw inter-firm collaboration as a way to access new externally located resources and develop creativity and innovation. These partnerships are defined as "link alliances" (Hennart, 1988), a specific case of collaboration giving birth to new product or new business development. Later on, strategic alliance research extensively studied the impact of collaboration on creativity and innovation (Dyer and Singh, 1998; Zheng, Anand and Mitchell, 2005; Vanhaverbeke, Duysters and Noorderhaven, 2002; Duysters and Lokshin, 2011; Xu, Fenik and Shaner, 2014). These

papers have also shown limits and difficulties in managing alliances, often leading to observed high failure rates (Dyer, Kale & Singh, 2001).

In this context, acknowledging OI is a complex and extended form of link alliances, and after a decade of OI practice and research, we want to step back and analyze how OI actually works though the observation of 18 pioneering cases. Our purpose is to open the box of OI and understand how it is actually implemented.

To address this question, we interviewed 18 companies among the most communicative in the area of OI so as to understand what impact OI approaches have had on their innovation methods, their way of managing partners, and their internal organization. This paper is structured as follows. First, we provide a literature review on OI and strategic alliances, focusing on implementation of OI and highlighting existing gaps. Then, we present our field study from which we draw framework and propositions that could be tested in the future. Finally, we conclude and suggest paths for future research.

1 THEORETICAL FRAMEWORK

Most research on OI focuses either on internal or external view of a company practicing OI (Elmquist & Ollila, 2011). In the first case, the authors regret that there is little research about how OI is actually managed (e.g. Mortara and Minshall, 2011; Minshall et al, 2014). We address this question and analyze the inside view of OI, studying what OI really means in term of practices and organizational structure.

1.1 DEFINITION AND CHARACTERISTICS OF OPEN INNOVATION

Today, most executives are aware that the diversity, costs and hazards of innovation make almost impossible innovation strategies only based on in-house policies (Di Minin, Frattini and Piccaluga, 2010). OI means the opening up of the innovation processes in order to foster the creation of new concepts and ideas (Chesbrough, Vanhaverbeke and West, 2006). But the need for a clear definition of OI is still widely shared (Dahlander and Gann, 2010; Linstone, 2010; Di Benedetto, 2010). In this paper, we adopt Chesbrough and Bogers' new definition of OI (2014) as a "*distributed innovation process that involves purposively managed knowledge flows across the organizational boundary, using pecuniary and non-pecuniary mechanisms in line with each organization's business model.*"

This opening of the knowledge flow can go two ways (Chesbrough, 2003): (1) "Bringing Outside Inside", that is acquiring knowledge from 'outside' partners and integrating them into the internal innovation flow; (2) "Bringing Inside Outside", that is providing internal knowledge to external actors of the business environment. In addition to those two categories, Gassmann and Enkel (2004) add a third type, namely "coupled OI process", which implies coupling external knowledge sources and commercialization activities (Chesbrough and Bogers, 2014). In this paper, we focus on the first part, that is the "outside in" side of OI.

Laursen and Salter (2006) characterize the openness of the innovation process with the number of external leveraged sources of innovation. Many external actors may be involved (Hargadon, 2003; Neyer, Bullinger and Moeslein, 2009): (1) Individuals, such as experts or thought leaders, or even larger crowds in crowdsourcing approaches (Surowiecki, 2005; Howe, 2008). (2) Academics and research organizations, including universities, research institutes and labs - such partnerships being probably the true origins of the OI concept (Allen, 1977; Mowery, 1983; Cohen and Levinthal, 1990; Perkmann and Walsh, 2007). (3) Business partners, such as suppliers and clients in co-creation approaches (Prahalad and Ramaswamy, 2004). Thirty years ago, Von Hippel (1986) underlined how lead users can be a source of innovation and, more recently, developed the concept of user innovation (Von Hippel, 2005). (4) Last but not least, companies can also engage their competitors in their innovation processes.

Beyond the number and type of partners and the nature of collaboration, the degree of openness also needs to be addressed. OI concept tends to prone unlimited openness assuming that a fully open company will provide a higher potential for innovation. Overall, high diversity in the type of partners, very large to unlimited number of partners as well as variety in the nature of partnership make OI a very specific and emerging case of alliance management. Previous research on strategic alliances (Kale and Singh, 2009) show they are all the more complex to manage as they involve many heterogeneous partners and pursue multiple objectives. Such context tends to increase the risk of alliance failure. Major causes of failure include opportunistic behavior and key resource leakage (Kale and Singh, 2009). In this context, we wonder whether the level of openness can be limited and how it is managed. Indeed, Dahlander and Gann (2010) see openness and closeness as in a continuum rather than mutually exclusive.

1.2 MANAGEMENT OF COLLABORATION AND OPEN INNOVATION

As demonstrated by previous research on strategic partnerships, developing specific capabilities for alliance management significantly increases their success rate (Gulati, 1998; Anand and Khanna, 2000; Kale, Dyer and Singh, 2002). The development of capabilities for alliance management comes from three major mechanisms: previous experience in alliance, a dedicated function to alliance management and organizational process to increase learning and leverage alliances. Again, those mechanisms and organizational structure are all the more complex to set up and manage as alliances involve a large panel of heterogeneous partners. The case of OI management is therefore particularly interesting to study. Also, it is still in its infancy in understanding the right organizational patterns and needed capabilities to ensure success.

In order to achieve collaboration with such different types of partners, OI involves several departments within the company (Huizingh, 2011): R&D, marketing, and supply chain. Their respective involvement varies with the nature of partners: (1) Because of the higher and higher R&D investments necessary to innovate, it is often too costly to rely only on in-house R&D. However, research shows that external partners cannot substitute for internal capabilities to attract potential partners (Rosenberg, 1990) and to ensure the absorptive capacity of the firm (Cohen and Levinthal, 1990). (2) When OI processes include co-creation with clients (Von Hippel, 2005), marketing departments become key actors in the process. This practice is quite different depending on whether the clients are companies or individual consumers. (3) The relationship with suppliers is one of the most affected by the development of OI practices. They cover a wide range of companies, by size (start-ups, SMEs, large companies) and activities --suppliers of raw materials and parts, but also packaging, services and consulting. In some cases, suppliers are the primary source of innovation (Chesbrough, 2003).

With OI, companies have access to an unlimited pool of potential partners, which also generates huge operational challenges (Ollila and Elmquist, 2011). First, firms have to find and choose which partners to collaborate with. Some research says that the breadth and the diversity of the network (number and type of companies) have favorable impact on the outcome of cooperation, specifically in terms of creativity enhancement (Baum, Calabrese and Silverman, 2000; Faems, Van Looy and Debackere, 2005; Nieto and Santamaria, 2007; Dell'Era and Verganti, 2010; Duysters and Lokshin, 2011). According to Simard and West

(2006), deep networks mostly drive incremental innovations. Besides, long-term relationship drives supplier involvement (Di Benedetto, 2009). However, breadth and diversity also raise complexity and uncertainty as demonstrated by research on portfolio of alliances (Kale and Singh, 2009). They are subject to a learning process where time plays a key role (Love, Roper and Vahter, 2014). The question is how to handle such diversity and complexity. Is it better to build on existing partnerships, broadening them towards other fields, or to establish new ones with new partners? Duysters and Lokshin (2011) show that a broad and complex portfolio of partners and alliances is difficult to manage within the firm as it faces cognitive limits to complexity management. There are a few models on how firms use external sources of innovation: acquisition, assimilation, transformation and exploitation (Zahra and George, 2002); strategy, sourcing, integration and metrics (Chesbrough and Crowther, 2006); want, find, get and manage (Slowinski and Sagal, 2010). Gassman, Enkel and Chesbrough (2010) underlined that the internal OI process is still often a trial and error process.

Overall, OI partner management raises several trade-offs that include the classical exploration/exploitation dilemma (March, 1991) that has been evidenced in the general case of strategic alliances (Lavie and Rosenkopf, 2006). While high number and diversity of partners provide huge opportunities for exploration, exploitation is needed to get the benefits out of these newly sourced ideas and knowledge and to integrate them into the organization. Our research should help to understand how OI contributes to balance exploration and exploitation.

2   METHODOLOGY

In order to understand the complexities and dynamics of OI practices, this research is based on a qualitative survey through a multiple case study analysis (Stake, 2000; Yin, 2009). This exploratory method is best suited to investigating new processes (Eisenhardt, 1989) and understanding how things evolve over time and why they evolve in particular ways (Langley, 1999). We conducted 19 semi-structured interviews with persons in charge of OI in their company. Each interview was conducted face to face or through telephone conferencing for distant managers, and lasted 60 to 90 minutes. Our interview guide is provided in Appendix 1. The sample has been selected from large international companies (Table 1) for whom innovation is a priority and which have extensively communicated on their OI practices for several years. Our sample is consistent with the fact that OI adopters are larger firms (Keupp

and Gassmann, 2009; Van de Vrande, De Jong, Vanhaverbeke and de Rochemont, 2009). Those companies are mature enough in OI to be able to assess its impact on their innovation practice. A wide number of industries is represented in our sample because OI is no longer restricted to the high-tech sector (Chesbrouh & Crowther, 2006; West & Bogers, 2014). Our case studies range from the food industry (Danone, General Mills, Kraft...) and Fast Moving Consumer Goods (Unilever, Procter & Gamble, Beiersdorf...) to chemistry, pharmaceuticals and telecommunications (Alcatel-Lucent, GE, Merck...). We all chose them in industries related to tangible goods so as to exclusively cover manufacturing innovation. Consequently, our article does not deal with the specific questions related to service innovation. The size and variety of this qualitative sample allows us to reinforce the robustness of our study and to highlight some contextual differences (Yin, 2009).

Table 1: List of case studies

FIRM	INDUSTRY
Danone Baby food	Fast Moving Consumer Goods
Danone Waters	Fast Moving Consumer Goods
ARLA Foods	Fast Moving Consumer Goods
General Mills	Fast Moving Consumer Goods
Kraft Foods	Fast Moving Consumer Goods
Beiersdorf	Fast Moving Consumer Goods
Logoplaste	Fast Moving Consumer Goods
Kimberly-Clark	Fast Moving Consumer Goods
Unilever	Fast Moving Consumer Goods
Coloplast	Fast Moving Consumer Goods
P&G	Fast Moving Consumer Goods
L'Oréal	Fast Moving Consumer Goods
DSM	Chemical
AkzoNobel	Chemical
Merck	Chemical
Alcatel Lucent	Communications & High Tech
TDF	Communications & High Tech
General Electric	Communications & High Tech
Philips	Communications & High Tech

This study focuses on cooperation with external companies, mostly for creativity and innovation development and to a lesser extent for new product launch. We seek to understand what lessons are learnt from those experiences and how firms capitalize on the results of OI

projects, mostly focusing on outside-in approaches. The internal appropriation of OI outcomes and approaches are key challenges in generalizing OI. Overall, our empirical analysis allows us to open the "black box" (Rosenberg, 1994) of OI and better understand how it works in leading companies.

3   KEY FINDINGS ON OPEN INNOVATION IMPLEMENTATION

3.1   THREE TYPES OF OPEN INNOVATION

Looking at the potential sources for external knowledge and ideas, our research highlights the dramatic increase in the number of external sources that a company can potentially tap into. For each of its researchers, a company estimated that there are 200 scientists or engineers elsewhere in the world who fit with their objectives -- a total of perhaps 1.5 million people whose talents could be used. Besides, many of the companies practice OI with several types of partners: clients, suppliers, R&D public and private centers, etc. These different type of partners are not exclusive, quite the contrary.

Our study shows that OI is a cross-functional exercise that may be a way to tackle partner diversity. Many departments may be involved in the process: procurement, supply chain/logistics, marketing/sales, R&D, legal/finance. Showing an integration of several companies' departments, company B established 'triangles' around each partnership, including people from procurement, R&D and marketing. This practice, based on close cooperation between representatives from each function, provides a new dimension to their respective divisions, since it trains them to work continuously in an interconnected way. However, although it involves many internal departments, companies usually pick one department to lead the process and cooperate with other departments. The lead department depends on the industry, the cross-departmental power structure in the company and the business targets.

One key decision to be made by companies when defining a partnership strategy is related to the level of openness the companies should adopt, concerning both the profile of partners and the topics to cover through open innovation. Based on our observations, we have identified four partner approaches (Figure 1). (1) Classical inter-firm cooperation corresponds to long-term partnerships on specific topics. This approach has been followed for decades by companies working with a public lab or a well-known supplier on a specific topic. This approach differs from OI in the sense that it is not open but restricted to a narrow range of

topics and long term partnerships. (2) Companies trying to find the most competent partners to collaborate on targeted issues follow a topic-oriented OI approach. Their search is open to any partner profile, whether the company has previously worked with these partners or not. The criterion for choosing from among potential partners is related to the topic they are seeking ideas and solutions for and to the types of competences and solutions to provide. For instance, company A has adopted this approach, based on a first strategic analysis of innovation objectives and priorities, and then on an open search for potential partners that can help the company achieve these objectives. They call it an "open but focused" innovation approach. (3) When companies connect with partners with whom they have already collaborated and whose specific skills they value, and expect them to come up with new ideas and projects, we talk about partner-oriented OI. For instance, company P has a portfolio of "intimate strategic innovation partners". (4) Finally, only companies who welcome any partner (already known or totally new) who has any suggestion (whether the ideas are in line with their strategic priorities or not) are fully open. Since the first approach is not open, we consider that OI can lead to the three other approaches, as mentioned in Proposition 1. We propose in below matrix a new typology of the level of openness in OI.

Figure 1: Open Innovation Matrix
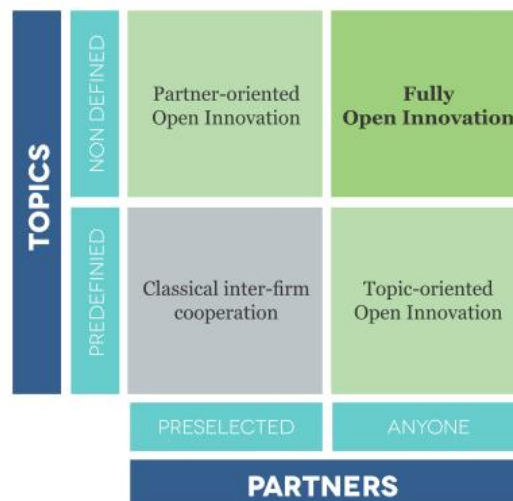
OI is not synonymous with full openness. In our sample, almost 70 percent of the companies interviewed implement topic-oriented OI, defining specific innovation objectives and priorities and then looking openly for external partners. In the chemical and pharmaceutical industry, OI appears to be more topic-oriented, despite the lengthy OI experience of some of the firms involved. This might be a consequence of the extreme complexity and technicality

of knowledge in these industries. Because of the capital and labor intensity of knowledge creation in their fields, pharmaceutical and chemical companies are perhaps more careful in fully opening up their processes. Partner-oriented OI and fully-open OI respectively account for almost one half and one third of the companies studied. In the high-tech industry, OI is often fully open reflecting the network and culture features of this industry as illustrated by open source software development. Also, as exemplified through network externalities (Katz and Shapiro, 1985), high-tech industry has experienced for long the benefits of fully open approaches and developed required capabilities accordingly.

Our observations reveal all types of OI practices co-exist, both among different companies and sometimes within the same company. A quarter of our sample practices several types of openness, entering two or three categories.

Proposition 1: Three open innovation strategies are identified: topic-oriented, partner-oriented or fully open approaches, which are not mutually exclusive.

3.2   THE KEY ROLE OF PARTNER MANAGEMENT

Whatever the type of openness, most companies aim at ending up with deep strategic partnerships where the partners not only provide ideas or supply parts, but commit on a medium- or long-term basis to cooperate with the company on one or even several innovation projects. This is true for R&D projects as well as for cooperation with suppliers, which are expected to make a commitment in terms of manufacturing capacity. However, achieving such objective requires some trade-offs in setting up of the process as it appears to be difficult to build deep relationships with a very large number of partners. As a consequence, companies have to choose between enlarging the group of partners (partnership breadth) and deepening relationships with a limited group of partners (partnership depth).

Their OI approach can be built around two alternative objectives. The first one deals with a broader network of partners as a first priority with a reasonable level of depth. Major reasons for such a choice include broadening the pool and diversity of competencies so as to stimulate creativity, mitigating risk, diminishing uncertainty, and being the first to launch a new idea on the market. Crowdsourcing and co-creation with end consumers fall into this category in the sense that long-term commitment and deep cooperation is not intended, while the key objective is to mobilize temporarily a very large network of partners. The second one consists in fewer partners with deeper relationships. In this case, companies are aiming at efficiency and favor a long term deep relationship in order to develop very specific and valuable

capabilities. For instance, a Director says that "*40 percent of the partnerships we have involve multiple deals, multiple transactions, or multiple projects, so we do feel there is a scale benefit from using partners for multiple deals.*" Companies have often deliberately decreased the number of their partners in order to be able to better handle these relationships. However, as shown through the split between these two approaches in our sample, OI currently targets the number of partners more than the depth of the relationships. We could interpret such observation by a priority given to exploration vs. exploitation, at least as a first step. Interestingly, we observed that some companies are moving over time from one approach to the other (Figure 2), evidencing dynamic management of OI cooperation. Specifically, they can afford to broaden the scope once they have accumulated valuable experience with a limited number of partners and try to replicate good practices with the new ones. Other companies are opening up their approaches in the first step of the process in order to get as many valuable ideas and competences as possible. As a second step, they are selecting only a few partners to deepen the partnership and implement OI. Actually, half of our sample is now prioritizing deeper relationships rather than broadening their network. Different strategies evidence different ways of balancing exploitation vs. exploration.

Figure 2: The breadth/depth trade-off for partnerships to balance exploration and exploitation
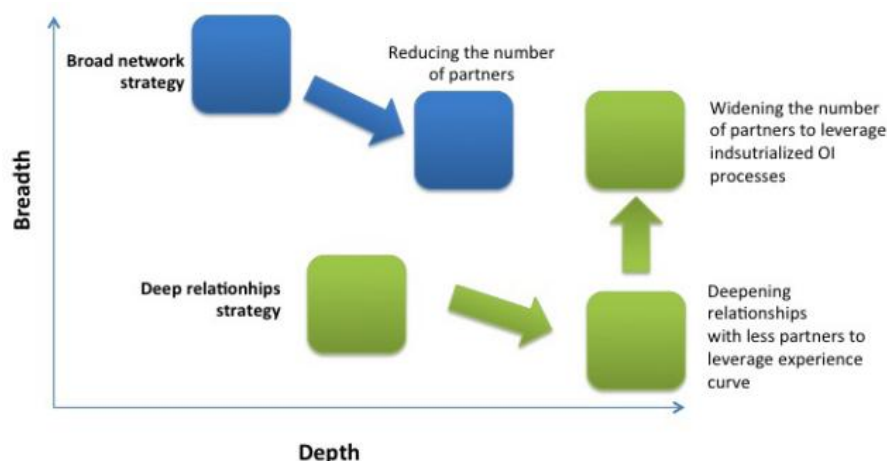
The trade-off between breadth and depth is also often related to the type of OI to be implemented. Companies practicing partner-oriented OI are aiming at deepening their relationships with existing partners by extending the number of topics and innovation projects to collaborate on. Their approach is clearly towards depth more than a larger number of partners. Companies which practice topic-oriented OI are more oriented towards breadth and

diversity of partners. However, they usually leverage a targeted, limited number of partners, whether business or academic partners. This approach allows them to focus internal resources on specifically targeted needs as well as on achieving successful learning and gaining experience with a limited number of partners before extending these successful practices to a broader network when they have reached the required level of maturity and experience. Such finding tends to corroborate the importance of learning process in partnership management (Anand and Khanna, 2000; Kale, Dyer and Singh, 2002) in the specific case of OI. We translate these results in the following proposition:

Proposition 2: Open innovation generates a breadth/depth trade-off for partnerships.

3.3 INTERNAL SET-UP: HOW DIFFERENT IS THE ORGANIZATION?

Having discussed how to handle external partners, let's now turn to the way of implementing OI projects within the company. Indeed, several questions regarding organization and human resources arise about whether or not to dedicate people to OI and how this should mesh with "traditional innovation" processes; choosing the department to be "in charge" or creating a new one; devoting sufficient energy to change management and finding the proper IT tools.

Our data suggest three different organizational models: (1) a centralized dedicated structure where one department is in charge of OI; (2) decentralized staff dedicated to OI practices but spread out in each division; or, (3) no dedicated staff and everyone expected to integrate OI in their projects, as part of their day to day activity. In our sample, the majority of companies have adopted or advocated dedicating staff to promote OI, while a third consider OI to be a corporate culture to be spread throughout the company. Some companies have champions in each division who promote OI practices on a decentralized basis. Others have a "hub-and-spoke" setup: a focused group of people -- the hub -- hold expertise on how to implement OI practices, while in the business units -- the spokes --, people take advantage of those capabilities.

Differences in organizational structures can be explained by top management's willingness to allocate resources to OI, the maturity stage of OI practices, and the company's size and sector. The number of dedicated staff -- when any -- varies from a few people in companies where OI approaches is quite recent, to up to 25 experts in mature companies. The staff is larger in high-tech industries where a large number of researchers are dedicated to OI research projects, as opposed to non-technological activities.

Based on our observations, at the early start of OI, dedicating people seems to be the right approach to secure focused resources, management attention and drive internal adoption. In the medium term, however, OI tasks and responsibilities should be infused throughout the company, so that OI becomes a natural part and an ongoing way of practicing innovation. For instance, Company Q closed its dedicated structure to spread OI throughout the entire structure. They decided to put an end to the polarization between those who are inside and those who are outside OI practices. As newly returned CEO of P&G used to say, "*To succeed, companies need to see open innovation not as something special that only special people can do, but as something that can become routine and methodical, taking advantage of the capabilities of every employee.*" (Lafley and Charan, 2008)

Proposition 3: At the beginning of their open innovation processes, companies usually dedicate staff and budget resources. When this new culture is more widely developed, it does no longer require any specific staff or department.

Companies need to make sure that the organization will truly embrace the new OI paradigm over time. OI implies a major change in the way of seeing innovation key success factors and viewing the external world. A daring change in culture is often necessary. Cultural and organizational impacts are key success factors as much as processes. OI projects thus require that special means be introduced in order to facilitate implementation, such as top management sponsorship and involvement, significant means to meet objectives or positive communication campaigns. Companies are used to keeping their innovative ideas and R&D projects very secret. Furthermore, employees are generally reluctant to adopt and integrate ideas, products, services or processes with external origins; this is the "Not Invented Here" (NIH) Syndrome. To shift a company's attitude from resistance to NIH innovations to enthusiasm for those "Proudly Found Elsewhere", new human resources approaches are needed. The recruitment funnel has to be broadened with new profiles. New innovation practices demand new employee profiles: many OI managers recommend redesigning staff needs to focus on versatile profiles with multiple competencies and ensure their integration in order to make them fit well in the organization. In an OI context, it may be more useful to recruit people who know a little on many topics and where to find information, than experts. This might be a major cultural shift, especially for R&D departments. A few years ago, Company G made strong efforts to hire the best people from whom they expected idea generation and innovation enhancement. They opened up to various profiles and then

efficiently stimulated cultural change within the company. For instance, Company L wants to have talent in the procurement department that understands the business, other functions, and will know to "scout" for innovations.

4   DISCUSSION

In this research, our purpose was to better understand OI from the inside and how it is implemented. Our analysis of 18 pioneering companies from different industries provides new insight into partnership and partner management as well as organizational structure to support OI. Dalhander and Gann (2010) list some examples of empirical studies on openness. Many of them focus on specific industries, such as consumer electronics (Christensen, Olesen and Kjaer, 2005) or manufacturing firms (Laursen and Salter, 2006). Our study is original thanks to its cross-industry panel, even if it is not exhaustive. We contribute to highlight slight differences across industries in terms of degrees of openness for instance. Furthermore, the two multiple industries studies listed by Dalhander and Gann focus on outbound OI whereas we are interested in inbound OI.

Our research attests a general trend towards OI across industries. The existence of collaborative practices to enhance creativity and innovation traces back in time (Linstone, 2010; Trott and Hartmann, 2009). However, in recent years, companies started intensifying OI and implemented organizational change for this purpose. Our research argues that OI has prompted a shift from rather random/experimental approaches of partner cooperation to a manageable end-to-end process. OI is stated a systematic and structured effort related to the organizational structure, behavior, processes and tools that companies are mobilizing to "bring outside inside". Tapping into an almost unlimited number of external sources generates huge operational challenges to manage the various collaborations and to make it accepted by the entire firm. Although OI basically has the same goal with all types of partners – i.e. acquiring external knowledge and stimulating idea generation -- the ways of practicing it can be quite different in each case. Contrary to Gassman, Enkel and Chesbrough (2010), our results show that OI is more and more a professionally managed process. We also complement recent research evidencing different types of OI (Wikhamn, 2013).

We address the organizational consequences of practicing OI. Positioning the OI strategy on the right openness scale is the first strategic move towards OI implementation. We identified three types of OI approaches: topic-oriented, partner-oriented and fully open, that can be

followed simultaneously by certain firms. Contrary to Dalhander and Gann (2010) who present the various OI practices as a continuum of openness, we identify two variables, topic and partner, which shape three different inbound openness strategies and impact the kind of platforms and organizational learning. We participate in knocking holes in the idea that practicing OI necessarily implies to collaborate with anyone about anything. Defining the right balance between depth, deepening relationships with a limited group of partners, and breadth, enlarging the group of partners tackles a structuring trade-off. Partner management is a key dimension of the OI process. As a result, all companies have more or less structured identification, attraction, and retention processes (Zahra and George, 2002; Chesbrough and Crowther, 2006; Slowinski and Sagal, 2010).

Fighting against the NIH syndrome appears as one of the most significant challenges for implementing OI. Shifting a company's attitude from resistance to NIH innovations to enthusiasm for those "proudly found elsewhere" (PFE) is anything but straightforward. It requires major resource allocation in terms of organization, skills, tools and governance to make OI happen, at least at the early start of the implementation. Dedicating resource should ensure top management strong support and drive internal adoption up to the general infusion of OI tasks and responsibilities throughout the company. The end is that OI culture becomes a natural part and a recurring way of practicing innovation.

When analyzing firm profiles, it appears that the most mature companies in the OI process and specifically those which started OI early and set-up successful tools like online platforms are also those with the greatest degree of openness. We show that companies usually first begin by experimenting with a reduced level of openness as a way of testing and developing new cultural, managerial and organizational practices, before opening up the process once they have reached a desired level of experience, expertise and confidence in the first stages. Such attitude confirms recent research (Duysters and Lokshin, 2011) showing that firms face certain cognitive limit in terms of the degree of complexity they can handle when managing a portfolio of partnerships dedicated to innovation. Our results are also consistent with the view that opening to external knowledge sources is subject to a learning process that occurs over time (Love, Roper & Vahter, 2014). Indeed, firms are introducing complexity in terms of partners and topics more gradually to ensure better innovative and creative performance. Our results also confirm the benefit of previous experience, learning by doing and capability building up in the success of OI as a specific and complex case of strategic alliances (Annand and Khanna, 2000; Kale, Dyer and Singh, 2002; Kale and Singh, 2009).

CONCLUSION AND MANAGERIAL IMPLICATIONS

Beyond the popularity of the OI rhetoric, many firms are changing their way of innovating and are adopting a systematic approach using external partners and competences that can help them innovate more, faster and greener. As we learnt from our observations, bringing external knowledge to the company must not be seen as a substitute for internal practices based on the knowledge held in the company, but rather as a complement to internally developed knowledge. To take the full benefit of innovation processes based on the involvement of external partners, companies should combine these external resources with their own specific competences. Our work provides a new typology for the management of openness. It also shows that OI practices follow a learning curve both in partner management and internal organizational structure to deal with OI.

Our research shows that companies which have a certain maturity with OI set themselves up to make OI part of normal business. Because of the management complexity of being "fully open" and the length of the internal change management process for OI acceptance, one of the managerial implications of our work is to recommend opening up innovation processes gradually. Our study also highlights other interesting practices regarding partner identification and reflecting different maturity levels. In companies that are beginning their OI practices, identification is precisely targeted, usually towards already existing partners, and does not require specific tools, but rather the involvement of relevant internal teams. In approaches targeted at suppliers, procurement and purchasing departments are key actors in identifying relevant partners for OI based on their knowledge of each partner's capabilities, related to both their cooperation skills and more technical ability. The companies which are opening up their OI practices are gradually experimenting with new tools and new partners. Finally the most mature OI companies are using several tools and processes to identify partners. They can afford to widen the scope and variety of partners as they have developed suitable organizational routines (Nelson and Winter, 1982) for building successful partnerships and want to benefit from the richness and reach of a fully open network. Our research highlights a learning curve with the most advanced companies widening the scope and variety of partners, as for the degree of openness.

This work also helps to renew the perspective on inter-firm cooperation aimed at fostering innovation. OI offers a concrete case for the management of alliance portfolio. Therefore, it

provides guidance on how to manage them and specifically how to balance exploitation and exploration, and the type of benefits brought. Specifically, our study shows that OI offers a possible organizational structure to manage the complexity of portfolio of alliances. It provides a new perspective to the strategic alliance paradigm and widens the spectrum of possible number of partners: OI introduces the opportunity of an unlimited number of partners. Alliance management becomes a continuum from the classical dyad perspective to infinite number of partners.

Finally, we give first arguments that OI provides the structure and context to deal with the exploration / exploitation dilemma (Lavie and Rosenkopf, 2006) in a decoupled way, where alliances with start ups, entrepreneurs, individuals (being experts, consumers, retirees…) allow new idea generation and exploration that are exploited through the market power, scale and influence of large multinational companies. Also, our study confirms that firms gradually balance exploitation and exploration overtime (Lavie and Rosenkopf, 2006) as they experiment degree of openness in terms of partners and topics before widening the scope of OI practices.

While our empirical results are interesting, they cannot be generalized due to the methodological nature of our study. Our research is based on top managers' statements. We did not triangulate the organizational impacts or the effective reduction of time to market. However, our study offers a fruitful ground for further research conducted with methods that allow statistical generalization to understand how multinational firms implement and monitor OI. Furthermore, SMEs are increasingly practicing OI activities (Van de Vrande and al, 2009). Some studies would analyze if their OI implementation is specific and how they collaborate with multinational firms. In this paper, we provide a renewed typology of OI and several propositions on partners and partnership management that should be tested in the future through a large sample of companies of different sizes and belonging to various industries. Future research should help to confirm our proposed framework and see whether some of our identified OI practices actually relate to organizational structure, previous experience or industry. Also, future research on OI could further dig into its drivers for success and how OI results can be assessed.

REFERENCES

Allen, T.J. (1977) Managing the flow of technology: Technology transfer and the dissemination of technological information with the R&D organization. MIT Press Cambridge, MA.

Anderson, N., Potočnik, K., Zhou, J. (2014) Innovation and Creativity in Organizations: A State-of-the-Science Review, Prospective Commentary, and Guiding Framework. Journal of Management, 40 (5), 1297-1333.

Anand, B. N., Khanna, T. (2000) Do Firms Learn to Create Value: the Case of Alliances. Strategic Management Journal, 21(3), 295-315.

Baum, J.A.C., Calabrese, T., Silverman, B.S. (2000) Don't Go It Alone: Alliance Network Composition and Startups' Performance in Canadian Biotechnology. Strategic Management Journal, 21, 267-294.

di Benedetto, A. (2010) Comment on "Is open innovation a field of study or a communication barrier to theory development?". Technovation, 30, 557-557.

Chesbrough, H.W., Vanhaverbeke, W., West, J. (2006) Open innovation: Researching a new paradigm. OUP Oxford.

Chesbrough, H.W. (2003) Open innovation: The new imperative for creating and profiting from technology. Harvard Business Press.

Chesbrough, H.W. (2007) Why companies should have open business models. MIT Sloan Management Review, 48, 22-28.

Chesbrough, H.W., Bogers, M. (2014) Explicating Open Innovation: Clarifying an Emerging Paradigm for Understanding Innovation. In Chesbrough, H.W., Vanhaverbeke, W. and West, J. (eds.), New Frontiers in Open Innovation, Oxford University Press, Oxford.

Chesbrough, H.W., Crowther, A.K. (2006) Beyond high tech: early adopters of open innovation in other industries. R&D Management, 36 (3), 229-236.

Christensen, J.F., Olesen, M.H. and Kjaer, J.S. (2005) The industrial dynamics of Open Innovation: Evidence from the transformation of consumer electronics. Research Policy, 34(10), 1533-1549.

Cohen, W.M., Levinthal, D.A. (1990) Absorptive capacity: a new perspective on learning and innovation. Administrative Science Quarterly, 128-152.

Dahlander, L., Gann, D.M. (2010) How open is innovation? Research Policy, 39, 699-709.

Dell'Era, C. and Verganti, R. (2010) Collaborative strategies in design-intensive industries: Knowledge diversity and innovation. Long Range Planning, 43(1), 123-141.

Duysters, G., and Lokshin, B. (2011) Determinants of Alliance Portfolio Complexity and Its Effect on Innovative Performance of Companies. Journal of Product Innovation Management, 28(4), 570-585.

Dyer, J.H., Kale, P., Singh, H. (2001) How To Make Strategic Alliances Work. MIT Sloan Management Review, 42(4), 37-43.

Dyer, J. H., and Singh, H. (1998) The Relational View: Cooperative Strategy and Sources of Interorganizational Competitive Advantage. Academy of Management Review, 23(4), 660-679.

Eisenhardt, K. (1989) Building Theories from Case Study Research. The Academy of Management Review, 14, 532-550.

Faems, D., Van Looy, B., Debackere, K. (2005) Interorganizational Collaboration and Innovation: Toward a Portfolio Approach. Journal of product innovation management, 22, 238-250.

Gassmann, O. and Enkel, E. (2004) Towards a theory of open innovation: Three core process archetypes. Proceedings of the R&D Management Conference (RADMA), Lisbon, Portugal, July 6–9.

Gulati, R. (1998) Alliances and Networks. Strategic Management Journal, 19(4), 293-317.

Hargadon, A. (2003) How breakthroughs happen: The surprising truth about how companies innovate. Harvard Business Press.

Hennart, J.-F. (1988) A Transaction Costs Theory of Equity Joint Ventures. Strategic Management Journal, 9(4), 361-374.

von Hippel, E. (1986) Lead users: a source of novel product concepts. Management science, 791-805.

von Hippel, E. (2005) Democratizing innovation. MIT Press.

Howe, J. (2008) Crowdsourcing: How the power of the crowd is driving the future of business, Random House, London, UK. Howells, J., Gagliardi, D., Malik, K. (2008) The growth and management of R&D outsourcing: evidence from UK pharmaceuticals. R&D Management, 38, 205-219.

Huizingh, E.K.R. (2011) Open innovation: state of the art and future perspectives. Technovation, 31, 2-9.

Kale, P. and H. Singh (2009) Managing Strategic Alliances: What Do We Know Now, and Where Do We Go From Here? Academy of Management Perspectives, 23(3), 45-62.

Keupp, M.M., Gassmann, O. (2009) Determinants and archetype users of open innovation. R&D Management, 39, 331-341.

Lafley, A.G., Charan, R. (2008) The Game Changer: How you can drive revenues and profit growth with innovation, Crown Business, New York.

Langley, A. (1999) Strategies for theorizing from process data. Academy of Management Review, 24, 691-710.

Laursen, K., Salter, A. (2006) Open for innovation: the role of openness in explaining innovation performance among UK manufacturing firms. Strategic Management Journal, 27, 131-150.

Lavie, D., Rosenkopf, L. (2006) Balancing Exploration and Exploitation in Alliance Formation. Academy of Management Journal, 49(4), 797-818.

Linstone, H.A. (2010) Comment on "Is open innovation a field of study or a communication barrier to theory development?" Technovation, 30, 556-556.

Love, J.H., Roper S., Vahter P. (2014) Learning from Openness: The Dynamic of Breadth in External Innovation Linkages, Strategic Management Journal, 35, 1703-1716.

Mahnke, V., Wareham, J., Bjorn-Andersen, N., (2008) Offshore middlemen: transnational intermediation in technology sourcing. Journal of Information Technology, 23, 18-30.

March, J. G. (1991) Exploration and Exploitation in Organizational Learning. Organization Science, 2(1), 71-87.

di Minin, A., Frattini, F., Piccaluga, A. (2010) Fiat: open innovation in a downturn (1993–2003). California Management Review, 52, 132-159.

Minshall, T., Kouris, S., Mortara, L., Weiss, D. (2014) Developing infrastructure to support Open Innovation: case studies from the east of England. International Journal of Innovation and Technology Management, 11(1), 144-.

Mortara, L., Minshall, T. (2011) How do large multinational companies implement open innovation? Technovation, 31, 586-597.

Mowery, D.C. (1983) The relationship between intrafirm and contractual forms of industrial research in American manufacturing, 1900-1940. Explorations in Economic History, 20, 351-374.

Nelson, R.R., Winter, S.G. (1982) An evolutionary theory of economic change. Belknap press.

Neyer, A.-K., Bullinger, A.C., Moeslein, K.M., (2009) Integrating inside and outside innovators: a sociotechnical systems perspective. R&D Management, 39, 410-419.

Nieto, M.J., Santamaría, L. (2007) The importance of diverse collaborative networks for the novelty of product innovation. Technovation, 27, 367-377.

Ollila, S., Elmquist, M. (2011) Managing open innovation: exploring challenges at the interfaces of an open innovation arena. Creativity and Innovation management, 20 (4), 273-283.

Perkmann, M., Walsh, K. (2007) University-Industry relations and Open Innovation: Towards a Research Agenda. International Journal of Management Reviews, 9 (4), 259-280.

Prahalad, C.K., Ramaswamy, V. (2004) The future of competition: co-creating unique value with customers. Harvard Business Press.

Rosenberg, N. (1990) Why do firms do basic research (with their own money)? Research Policy, 19, 165-174.

Rosenberg, N. (1994) Exploring the Black Box: Technology, Economics and History. Cambridge University Press, Cambridge.

Scotchmer, S. (2004) Innovation and incentives. The MIT Press.

Simard, C., West, J. (2006) Knowledge networks and the geographic locus of innovation. Oxford University Press, Oxford, UK.

Stake, R. (2000) The Art of Case Study Research, edn. Thousand Oaks, CA: SAGE Publications.

Surowiecki, J. (2005) The wisdom of crowds: why the many are smarter than the few. Abacus, London, UK.

Teece, D.J. (2007) Explicating dynamic capabilities: the nature and microfoundations of (sustainable) enterprise performance. Strategic management journal, 28, 1319-1350.

Trott, P., Hartmann, D. (2009) Why 'open innovation' is old wine in new bottles. International Journal of Innovation Management 13, 715-736.

Van de Vrande, V., De Jong, J.P., Vanhaverbeke, W., De Rochemont, M. (2009) Open innovation in SMEs: Trends, motives and management challenges. Technovation, 29, 423-437.

Vanhaverbeke, W., Duysters, G., Noorderhaven, N. (2002) External Technology Sourcing Through Alliances or Acquisitions: An Analysis of the Application-Specific Integrated Circuits Industry. Organization Science, 13(6), 714-733.

Vanhaverbeke, W., West, J. Chesbrough, H.W. (2014) Surfing the New Wave of Open Innovation Research. In H. Chesbrough, W. Vanhaverbeke and J. West, eds., New Frontiers in Open Innovation, Oxford: Oxford University Press.

West, J., Bogers, M. (2014). Leveraging External Sources of Innovation: A Review of Research on Open Innovation. Journal of Product Innovation Management, 31 (4), 814-831.

West, J., Salter, A., Vanhaverbeke, W., Chesbrough, H.W. (2014) Open innovation: The next decade. Research Policy, 43 (5), 805-811.

Wikhamn, B.r.R. (2013) Two Different Perspectives on Open Innovation - Libre versus Control. Creativity and Innovation Management, 22(4), 375-389.

Yin, R. (2009) Case study research: Design and methods. Beverly Hills, CA: Sage Publishing.

Zheng, Z., Anand, J., Mitchell, W. (2005) A Dual Networks Perspective on Inter-Organizational Transfer of R&D Capabilities: International Joint Ventures in the Chinese Automotive Industry. Journal of Management Studies, 42(1), 127-160.

Appendix 1: Key topics discussed in Open Innovation study Interview guide

I. <u>Type of Open Innovation in your company</u>

- When and why did your company start Open Innovation?

- How open are you on the type of innovation handled through Open Innovation?

II. <u>Your partners for practicing Open Innovation and management of partners</u>

- Which type of external partners do you have today?

- Are they Individuals or organizations (private, public)? Are they existing or new partners? Do you practice crowdsourcing?

- How would you define your openness towards collaborating partners

- Since you have developed OI projects, have you had more or less partners?

- How do you establish and manage relations with Open innovation partners (select, attract, retain,..)?

III. <u>Implementation and organizational impacts of launching Open Innovation</u>

- Which departments collaborate in Open Innovation practices in your company?

- Which department(s) is in charge of the project?

- What type of organizational changes has been made in order to set up Open Innovation?

- Do you have a dedicated organization or person to lead Open Innovation? If so, how many FTEs?

- Did you need particular support?

- Did your organization change or did the role of existing departments change?

- What are main difficulties which you have had to face related to Open Innovation?

- Key Success Factors of Open Innovation's implementation

IV. <u>Your experiences and feed-back of Open Innovation</u>

- Please provide details on open collaboration examples

- Based on Your experiences for further practice what would you change in order to avoid or better manage Open Innovation?