

UNIVERSITE DE DROIT, D'ECONOMIE ET DES SCIENCES D'AIX MARSEILLE
AIX MARSEILLE UNIVERSITE
INSTITUT D'ADMINISTRATION DES ENTREPRISES

CENTRE D'ETUDES ET DE RECHERCHE
EN GESTION D'AIX MARSEILLE

ORGANIZATIONAL ASPECTS
OF OPEN INNOVATION*

*Daniel BAGEAC***
*Emmanuelle REYNAUD****
*Sergio FORTUN*****

W.P. n° 941

June 2014

***This paper was presented at the R&D Management Conference, Stuttgart, Germany, 3-6 June 2014**

***Docteur, CERGAM (EA 4225), IAE Aix-en-Provence, Aix Marseille Université, Clos Guiot, Chemin de la Quille, CS 30063, 13540 PUYRICARD Cedex, France.*

****Professeur en Sciences de Gestion, , CERGAM (EA 4225), IAE Aix-en-Provence, Aix Marseille Université, Clos Guiot, Chemin de la Quille, CS 30063, 13540 PUYRICARD Cedex, France.*

*****Docteur, CERGAM (EA 4225), IAE Aix-en-Provence, Aix Marseille Université, Clos Guiot, Chemin de la Quille, CS 30063, 13540 PUYRICARD Cedex, France.*

Toute reproduction interdite

L'institut n'entend donner aucune approbation, ni improbation aux opinions émises dans ces publications : ces opinions doivent être considérées comme propres à leurs auteurs.

Institut d'Administration des Entreprises, Clos Guiot, Puyricard, CS 30063
13089 Aix-en-Provence Cedex 2, France
Tel. : 04 42 28 08 08.- Fax : 04 42 28 08 00

Organizational aspects of open innovation

Abstract

This article addresses the issue of the organizational aspects of open innovation. The motivation of such a study lies in the lack of knowledge about the organizational side of open innovation. The first objective of this study is to suggest a more specific definition of inbound open innovation. The second objective is to document modifications in the deep structure (organizational culture) and formal or surface structure of a company (centralization, formalization, specialization) resulting from the implementation of open innovation. We study these changes in 9 firms using primary data collected through 24 semi-structured interviews and secondary data consisting of firms' annual reports. The definition of inbound open innovation we suggest emphasizes three main aspects: the relationship with the general innovation strategy of the firm, the systematic and the frequent use of collaborations with various actors in the innovation process. This study offers a proposition of a contingency model of open innovation at firm level and a deep understanding of how open innovation impacts the firm.

Key words

open innovation, organizational structure, deep structure, centralization, specialization, formalization, content analysis, similarity analysis

1. INTRODUCTION

If we look at the themes upon which most of the recent theoretical debate on innovation management has relied, it is clear that open innovation should be considered as a key topic. Proposed by Henry Chesbrough in early 2003, the reaction to open innovation was mixed: for some authors (Chesbrough and Crowther, 2006; Maula, Keil and Salmenkaita, 2006; Perkmann and Walsh, 2007), open innovation was clearly a theoretical advance in the study of the innovation process, providing a more integrated and broader perspective about the players involved and the locus of innovation. For others, such as Trott and Hartmann (2009), open innovation was a less spectacular theoretical perspective, or “old wine in new bottles”. Only time has made it possible to establish if open innovation was a new managerial fad (see Miller, Hartwick and Le Breton-Miller, 2004) or a genuine new perspective in innovation management. Following a look at most of the handbooks and courses on innovation management published in recent years, one can clearly identify open innovation as a consistent and standalone topic. A significant number of contributions, both theoretical and applied, have contributed to improving the understanding of collaborative ways to innovate, thus responding to the need expressed by Chesbrough and other authors to unveil more aspects of open innovation. Among the themes orienting research, we could mention, along with Huizingh (2011), the content (the concept of openness, the inbound-outbound dimensions), the context (internal and external context characteristics) and the process of open innovation (how a firm opens its innovation process). Significant progress has been made in each of these directions. Nevertheless, our survey of the literature identified two areas in which existent studies provided relatively poor insights: first, the way open innovation is defined in order for the definition to become operational, and second, the study of modifications in the internal structure of a firm when it implements open innovation practices. In the next section of this article, we will further develop these two areas and position our research objectives. In Section 3, we will continue with the presentation of the methodology and data analysis. Section 4 is dedicated to the presentation of our results and the discussion. Finally, in the last section, we will present some conclusive remarks.

2. LITERATURE REVIEW

We will focus this literature survey on two relevant topics for our article: the first concerns the way open innovation has been defined and the second refers to the organizational aspects of open innovation.

2.1. Definition of open innovation

In regard to the manner open innovation has been defined, we have noticed that most of the research articles adopted Chesbrough's original definitions such as: "Open innovation is the use of purposive inflows and outflows of knowledge to accelerate internal innovation and expand the markets for external use of innovation, respectively" (Chesbrough, 2006: 1). Considered by many authors as a very broad definition, efforts have been made to elaborate a more precise definition of the concept of open innovation. We can organize these efforts along two main axes: the first is related to the concept of openness. What does the term "open" specifically refer to, given the fact that it is at the same time a rather simple word and a concept which has a long history in other fields such as political philosophy (the concept of open society), humanities (the concept of open work) or computer science (the concept of open software)? In this stream of research, we can include theoretical contributions such as those by Pénin (2008), whose research provided a much "stronger" definition of open innovation than the "weaker" one of Chesbrough. Pénin (2008: 16) proposed three elements characterizing his definition: voluntary knowledge disclosure by firms, openness of knowledge (meaning knowledge remains available for all, without discrimination, even if access to it is not free of charge) and ongoing interactions among stakeholders. Although we welcome his efforts to bring more clarity in the way open innovation is understood, we have identified some weaknesses in his argumentation, especially concerning his second condition – knowledge "must remain open, but not necessarily free of charge, if the price of access is reasonable". At this point, an equity problem arises: by which means should one consider the cost to access knowledge to be reasonable? Is it because it was established in a free market? Or is it because we trust the firm that established it? In the absence of a clear answer to these questions, we consider this definition at most as operational as the one provided by Chesbrough.

The second axis, which is not completely isolated from the first, concerns the question of establishing degrees in openness, since it is impossible to conceive and find examples of pure closed or open innovation. We could mention here two examples of research that have investigated the continuum between closed and open innovation and that have established typologies of open innovation modes and of innovators: Lazzarotti and Manzini (2009) and Barge-Gil (2010).

Lazzarotti and Manzini (2009) distinguished four modes of open innovation: closed innovation, open innovation, specialized collaborators and integrated collaborators. These modes were created by crossing two criteria: first, partner variety and second, the number of phases in the innovation process open to collaboration by a given firm. In these authors' vision, the open innovation mode is characterised by partnerships with a great number of players which occur in all of the phases of the innovation process. On the other hand, a closed innovation model is defined by cooperation with few partners (a dyad is the most common form) in single, specific phases of the innovation process.

The Barge-Gil study (2010) remained on the same issue and established three categories on the continuum between closed and open innovators: closed, semi-open and open innovators. A closed innovator is depicted as a firm that innovates by its own internal efforts. No knowledge or technology is acquired from the outside and the firm does not engage in external collaborations. By semi-open innovator, Barge-Gil (2010) designates a firm that engages in some external collaboration or buys some knowledge or technology, but develops its innovations internally. Finally, an open innovator represents a firm whose products or process innovations are developed through collaboration with external partners.

A common quality of these definitions – and of the way in which open innovation is defined – is that they are basically conceptual, deductive definitions. On one hand, as some authors recognize, these definitions have the advantage of being quite broad and allow research in this field to progress. On the other hand, the problem with defining a phenomenon vaguely is that it prevents the definition from being fully effective and operational. If open innovation refers to such a diversity of phenomena as, for example, user lead innovation, specific business models, or distributive innovation, it becomes obvious that such a definition cannot be operational.

Our first objective was to study how firms define open innovation and propose a definition that could be more precise and operational than those previously proposed. Our different and more inductive approach will start by analysing the way companies refer to open innovation and then refine a definition from it.

2.2. Organizational aspects of open innovation

The second topic that interests us is the organizational side of open innovation. In their literature surveys, authors such as Elmquist, Fredberg and Ollila (2009) and Huizingh (2011) insisted on the fact that this topic was of great importance among the existent studies on open innovation. Concerning the internal context of open innovation, as named by Huizingh (2011: 4), previous studies looked at diverse variables related both to demographics (e.g. age of the company and number of employees, size, location) and strategy (strategic orientation, incumbents and new entrants) that could affect the performance of open innovation. Very few studies put an emphasis on the organizational structure and the way it is impacted by the implementation of open innovation practices. To our knowledge, the works by Chiaroni, Chiesa and Frattini (2009; 2010) are among the very few that investigate the process of adoption of open innovation. In their first study of 2009, they examined the adoption of open innovation in pharmaceutical biotech. A first result of their study is that the use of inbound and outbound open innovation practices is dependent on the different phases of the development process of drugs. While inbound open innovation is used in the first phases of this development process (target identification, pre-clinical tests), outbound open innovation is more relevant for the late stages of the drug development process (clinical tests and post-approval activities). In their 2010 study, they explored the same process of adoption of open innovation in Italian firms in mature, asset-intensive industries such as steel pipes, automotive, cement and concrete and adhesives and sealant for buildings. They identified three stages in the adoption of open innovation, namely unfreezing, moving and institutionalizing. Unfreezing is defined by an active role of top management in triggering the change process and the creation of specialized units dedicated to open innovation. In the moving stage, changes in the structure of organization are deepened and a more formalized evaluation of the innovation process is introduced which seeks to assess the potential of external sources of knowledge. In the third stage, institutionalizing, one can observe the emergence of new organizational roles (for example, the gatekeepers in charge of scouting activities) and the introduction of formal evaluation procedures of the company and its innovation activities.

Although they represent a first step in bringing to light what happens to the organization when open innovation practices are introduced, these two studies are some of the few that address this issue. Thus, the second objective of this paper is to analyse how the implementation of open innovation impacts the organization by looking at both the surface

and deep modifications in its organizational structure.

Deep organizational structure most commonly points to the concept of organizational culture consisting of the values and core beliefs of the members of the organization (Tushman and Romanelli, 1985; Gersick, 1991; Heracleous and Barrett, 2001: 774). Authors such as Detert, Schroeder and Mauriel (2000) and Fitjar and Rodriguez-Pose (2009) found that deep structures play an important role in the innovation performance of a firm. For Dougherty (2002) and Khazanchi, Lewis and Boyer (2007), a permanent oscillation between the values of flexibility and control favours an effective culture of innovation. More related to open innovation, the contributions of Chesbrough and Crowther (2006), Lichtenthaler and Ernst (2006), West and Gallagher (2006) examined the importance of the NIH syndrome as an obstacle to the establishment of open innovation policies.

Surface or formal organizational structure refers to centralization, formalization and specialization. Centralization refers to the level where decisions are made in an organization and to the concentration of the decision making power (Damanpour, 1991; Jansen, Van Den Bosch and Volberda, 2006). Traditionally, centralization is considered to be an obstacle to innovation (Sheremata, 2000), although Huber (1984) considered it to be beneficial in all the stages of the innovation process. Formalization designates the existence of precise rules and procedures governing the activity of an organization. Although formalization had traditionally been regarded as an obstacle to innovation (Hage, 1974; Rousseau, 1978), more recent studies (Jansen, Van Den Bosch and Volberda, 2006) have found that formalization positively influences incremental innovation.

Finally, specialization “refers to the subdivision of the tasks performed by organizations” (Hall, 1991: 72). For Huber (1984), the initiation of innovation requires more specialization. He mentions a specific form of specialization, specialization by acquisition mode, that he finds characteristic of the modern firm. The literature on open innovation quite often mentions this form of specialization: the Connect & Develop innovation strategy established in 2001 by Procter & Gamble was accompanied by the creation of a specialized unit, the Technology Acquisition Group (TAG) whose role was to identify new technologies exploitable for P&G (Dodgson, Gann and Salter, 2006).

The second objective of this study was to place open innovation in an organizational context and to identify modifications in the organizational structures determined by the implementation of open innovation practices in a firm.

3. RESEARCH METHODOLOGY

In order to achieve our objectives, we used a qualitative research methodology that we present in this section. A qualitative research strategy is appropriate given the fact that we wanted to gain insights from companies on how the opening of their innovation process impacted their organizations.

We first constituted a sample of nine French and international companies based in France on the criteria of the existence of a formal, public discourse regarding open innovation. These companies are Air Liquide, Électricité de France (EDF), Gemalto, IBM France, Microsoft France, Orange France, PSA Peugeot-Citroën, SAP France and STMicroelectronics. We then identified the key people responsible for the innovation strategy in these companies. Table 1 lists the employees interviewed in these companies.

Table 1. Employees interviewed in all nine firms

Position	Company	Industry
Innovation Manager-Scouting&Partnering	Air Liquide	Industrial Gases
Open Innovation Manager	Air Liquide	Industrial Gases
Head of Open Innovation	EDF	Electric Utility
Open innovation manager	EDF	Electric Utility
Innovation and Business Development Manager	Gemalto	Digital Security
Business Innovation Process Coach	Gemalto	Digital Security
Europe IBM Innovation Centers Leader	IBM France	Technology
Vice President	IBM France	Technology
Senior Innovation & Business Development Manager	Microsoft France	Computer Software
Business Director Europe	Microsoft France	Computer Software
R&D Lab Deputy	Orange France	Telecommunications
VP Open Innovation, Orange Labs	Orange France	Telecommunications
Research Director, Arc Bretagne Atlantique, Orange Labs	Orange France	Telecommunications
Director, IT Collaborative Solutions	PSA Peugeot Citroen	Automotive
Customer innovation principal	SAP France	Enterprise Software
Customer innovation principal	SAP France	Enterprise Software
Senior Researcher	SAP France	Enterprise Software
Advanced technology & Innovation Director	STMicroelectronics	Semiconductor
Group VP, Head of Corporate Strategy Development	STMicroelectronics	Semiconductor
Corporate Licensing-Intellectual, Property Business Unit Director	STMicroelectronics	Semiconductor
Director, System Platforms and Tools	STMicroelectronics	Semiconductor
R&D strategy and Partnership Director	STMicroelectronics	Semiconductor
Director External Innovation	Anonymous	-
Director External Partnerships	Anonymous	-

3.1. Data collection

This study uses primary data obtained through 24 semi-structured interviews with the mentioned employees and secondary data represented by annual reports issued by the companies between 2003 and 2013. In this section we detail the way we collected all of this data.

Interviews are considered as one of the most used data collection techniques in management (Romelaer, 2005: 102; Gavard-Perret et al. 2012: 112). Semi-structured interviews represent a good balance between keeping the research structure and giving respondents a certain degree of liberty in their answers (Romelaer, 2005: 104).

Prior to conducting the interviews, an interview guide was created by the authors and tested on three experts whose work and expertise is related to innovation: a senior professor from a French university, a chief director of a business consulting firm specialized in collaborative issues and an expert in free software managing a program dedicated to scientific modelling software. This test allowed us to insure that all of the themes were pertinent and that the questions were properly formulated.

Most of the interviews were conducted by phone and, in only two cases on site, depending on interviewee availability. We asked our interviewees if they accepted that the interview be recorded and if we could use the names of their companies in the study, as well as their job titles. All of them but three accepted that the interview be recorded and two of the three denied us permission to use the company's name. We respected interviewee demands and kept those firms' data anonymous. In all other cases, we transmitted interviewees a digital copy of the interview. Interview duration was an average of 30-40 minutes (range: 20 to over 120 minutes). All of the interviews were transcribed prior to analysis.

The secondary data we used consisted of annual reports issued by the firms between 2003 and 2012. Our interest in analysing these annual reports was to gain insight into the way companies equated themselves with the concept of open innovation. We wanted to see how a theoretical concept proposed by academia was reflected by the professional world. Not all of the annual reports made an explicit reference to open innovation. While all of them discussed specific innovation policies, only a few of them made an explicit mention of the concept of open innovation. A few others referred to other concepts related to open innovation such "collaborative innovation" or "co-innovation". We decided to keep all of the reports that mentioned "open innovation" or one of these related concepts for further analysis.

3.2. Data analysis

We used two methods to analyse the data: similarity analysis for the annual reports and content analysis for the interviews. We detail hereafter these two methods. Content analysis refers to “systematic classification and counting of text units to distil a large amount of material into a short description of some of its features” (Bauer, 2000: 132-133). This classification refers, in our case, to identifying common themes among all of the interviews aiming to structure understanding of the studied phenomena. Following Bernard (2000: 464), we defined a list of themes derived from the literature (a priori coding) that allowed us to gain some understanding of the interviews. We then enriched this list with new themes emerging from the interviews (a posteriori coding). At this point, we defined a coding scheme containing 156 codes (themes) for all the interviews (433 text units). We then gave the list and all the text units to a researcher experienced in qualitative research to evaluate our coding work. This researcher kept the same codes for 372 text units and proposed modifications in coding for 61 text units. The resulting percentage of agreement was 85.9%, indicating that our coding scheme was robust. Concerning the second coding, we accepted suggestions to change the codes for 25 text units. We removed the codes for three text units and kept our initial coding for 33 text units. This content analysis was performed via NVivo 10 software.

Similarity analysis is an exploratory data analysis technique formalized in the 1960s by the Frenchman Claude Flament in the field of social psychology. Its scope is exploratory, meaning that it identifies how concepts in a discourse or document are related to one another. For Marchand and Ratinaud (2012: 688), the objective of similarity analysis is to graphically represent “the proximity and the relationships between the elements of a data set in the form of a concepts tree. Similarity analysis seeks to reduce the number of all of the relationships in the concepts tree in order to obtain a connected and acyclic graph.” By connected, it is understood that all the points on the graph are interrelated. Acyclic refers to the fact that it is impossible to come back to the starting point on the graph. This analysis was performed using IRAMUTEQ v. 0.6 alpha 3 software.

4. RESULTS AND DISCUSSION

4.1. A definition of inbound open innovation

Before performing the similarity analysis, we looked at all of the annual reports issued by the nine firms between 2003 and 2012. Year 2003 was taken as an starting point given that it was in early 2003 that the concept of open innovation was proposed by Chesbrough in his book “Open innovation: the new imperative for creating and profiting from technology”. Year 2012 is the last year we had available annual reports for all of the companies involved in the study.

Although all 90 reports had sections presenting company efforts towards innovation and describing their innovation policies, not all of them made reference to open innovation. A vast majority (61 reports) did not mention open innovation or any other similar concept at all. Only 29 annual reports mentioned open innovation or a similar concept such as collaborative innovation or co-innovation. Table 2 below summarizes the presence of the open innovation concept in all of the annual reports.

Table 2. Mentions of open innovation in the nine firms' annual reports

	2012	2011	2010	2009	2008	2007	2006	2005	2004	2003
Air Liquide	●	●	●	●						
Orange	●			●	●					
STMicroelectronics	●	●		○						
IBM	●								○	
PSA Peugeot Citroën	●	○								
SAP	○	○	○	○	○	○				
EDF	○		○	○	○					
Microsoft	○	○	○	○						
Gemalto						○				

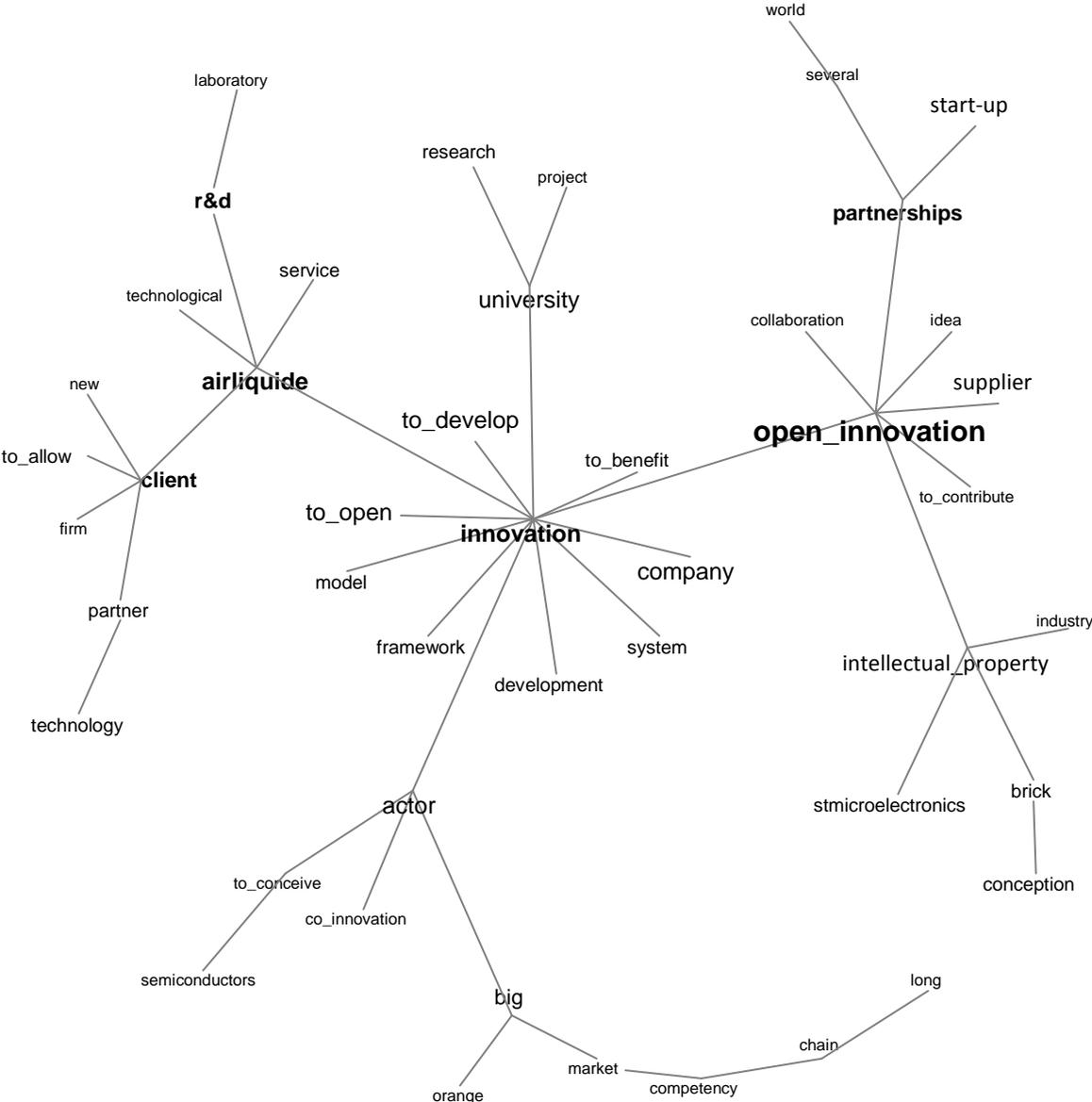
Legend:

- Full dots (●) indicate the explicit presence of the term “open innovation” in the annual reports.
- Empty dots (○) indicate the presence of terms related to open innovation such as “collaborative innovation” or “co-innovation” in the annual reports.

We focused the similarity analysis on the 11 annual reports that made explicit reference to open innovation: Air Liquide (2012, 2011, 2010, 2009), Orange (2012, 2009, 2008), STMicroelectronics (2012, 2011), IBM (2012), PSA Peugeot Citroen (2012). We extracted from these reports all of the fragments mentioning open innovation. Given the size

of the obtained text corpus, we decided to keep the extended results tree. For more consistent texts to analyse, a researcher has the possibility to set a threshold that allows visualizing only the most relevant relationships in the results tree. Figure 1 below presents the results of the similarity analysis.

Figure 1. Similarity analysis



The obtained graph is structured around three main axes: the most important one is the “innovation” axis. The “open innovation” and “airliquide” axes are related to it. The latter did not surprise us given the fact that most of the annual reports analyzed were issued by Air Liquide. Taking a closer look at the open innovation axis, we noted concepts such as collaboration, partnerships, supplier, intellectual property. These concepts enabled us to propose a more precise definition of open innovation.

First, the concept of collaboration: the origin of this noun is the Latin verb *colaborare* which means “working together”. This Latin word is composed of the prefix *col-* (with) and the verb *laborare* meaning, among others, “to work”, and “to cultivate the land”. The distinguishing feature of the word “collaboration” from synonyms such as “cooperation” is that the former has a subtler meaning that implies frequent and systematic work. This subtle meaning is quite obvious in that Italian, which is closer to Latin than any other language, defines collaboration: “*Dare un contributo di lavoro frequente o sistematico...*” (Lo Zingarelli, 1997).

The key element in the definition of open innovation by the retained firms is the idea of establishing closer ties with the external players and integrating them in the firm’s internal innovation process. Therefore, the concept of partnership is frequent in the official discourse, as well as the concept of collaboration, as can be seen in the Orange 2012 Annual Report (pp.2): “*Within the context of open innovation, we are also developing numerous partnerships with the most important players in the digital world, as well as with start-ups and universities*”.

Another aspect emerging from the way these companies refer to open innovation is the idea of the sharing of ideas, knowledge or technology. This is essential in all of the collaborations since it makes it possible to establish and preserve an equilibrium indispensable to maintaining the relationship between the company and its larger innovation community or ecosystem. Although sharing can take multiple forms, it is not disorganized but takes place in specific frameworks owing to intellectual protection issues.

The interviews were also focused on the topic of the definition of open innovation. The most important thing mentioned by the respondents at this level was the emphasis on the relationship between open innovation and the company’s strategy. According to them, the success of the policy of openness depends extensively on making it a part of the firm’s innovation strategy. The absence of this strong articulation between open innovation and the firm’s strategy makes open innovation part of a discourse without much interest in and impact on the company’s innovation process.

The weak articulation between the discourse about the need to open up the innovation process and the effective integration of the openness into the innovation strategy creates two issues: first, it makes employees responsible for making open innovation effective and second, it leads the participants to have doubts about the true benefits of openness: *“At the group level [and in respect to] the outward-looking spirit, I think there are at the same time a real expectation and a fictional belief that solutions are outside the company, and that by opening up to the outside world we will magically save ourselves...what I do not know is what the ‘real’ results of this policy are, is it meaningful? I do not have an answer to this question...”* (Innovation Manager-Scouting & Partnering, Air Liquide).

The interviews made it clear that making openness an explicit dimension of a firm’s innovation strategy is beneficial and necessary since it makes it possible to reinforce the credibility of the more general discourse about open innovation and it also legitimizes concrete efforts towards the implementation of open innovation practices in the firm.

The three dimensions of open innovation identified in the analysis of the interviews and annual reports – the strategic dimension, the frequent and systematic dimension and the player dimension –enabled us to formulate the following definition of inbound open innovation: *inbound open innovation designates an innovation strategy defined by frequent and systematic appeal to a variety of internal and external sources, for ideas, knowledge and technologies in the creation, by a firm, of its products and/or services.*

4.2. Impact of the implementation of open innovation on the deep structure of a company

As we have seen in our literature review, opening up a company to the wider world involves changes in the organizational culture of the firm. One much mentioned obstacle is the NIH syndrome by which a company systematically rejects what originates outside its walls in a gesture mixing both pride (our company is the best expert in the field) and fear (exterior technology threatens our internal position).

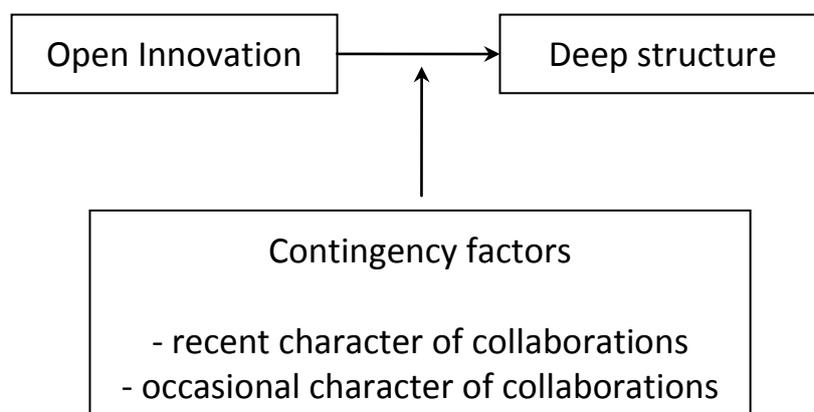
What came out of the interviews was that cultural changes in a company are an important issue when trying to open up its innovation process. As the VP of Open Innovation at Orange Research Labs explained to us: *“We are experiencing a shift from a culture in which I would say, at the risk of oversimplifying, we had an “ivory tower research centre” culture to a new one in which there is a R&D centre open to partners, developers, citizens,*

communities and students, and whose contributions enrich us”.

The Innovation Manager from Air Liquide also insisted on the centrality of cultural issues in implementing open innovation: *“For me, the danger in the implementation of open innovation is that if it is not culturally accompanied, if it is only dedicating a financial budget to it, the day when the money runs out, this process will be dead”.*

Although the impact of implementing open innovation on organizational culture exists, its magnitude is differently perceived: for more experienced companies in the field of working with other players, the impact is weaker than in companies where the openness is either recent or punctual. In the latter, the implementation of open innovation is equivalent to a cultural shock or a radical change. We could be tempted, on this point, to consider that the nature of the industry greatly influences the culture of innovation in these companies and their organizational culture. In this sense, in very turbulent industries, as in the case of semiconductors or the software industry, the connection between the various players would be more natural. What we found through the interviews goes in a different direction. On this point, we can take a closer look at the example of three software companies: IBM, Microsoft and SAP. In the case of the first two, the opening of innovation has not been accompanied by strong cultural changes, which is not the case for SAP. We found out that what influenced more strongly the different perceptions that interviewees hold about cultural changes resides in (a) the recent or older character of collaborations with outside innovation players, and in (b) the occasional or more regular character of collaborations. Figure 2 below summarizes these findings.

Figure 2. Impact of open innovation on deep structure

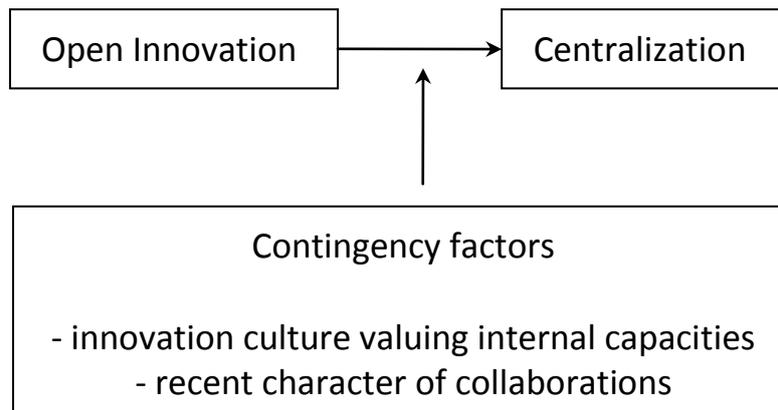


4.3. Implementation of open innovation: top-down and bottom-up approaches

Another aspect that caught our attention is how an open innovation practice was implemented in order to understand if it was closer to a top-down, centralized, or rather a bottom-up approach. Interviews and documentary studies enable us to distinguish the existence of the two approaches, although top-down is more frequently mentioned in the interviews. On this point, some interviewees expressed the idea that the top-down approach was desirable because it reinforced the legitimacy of these approaches. This appears to be in line with the previously identified gap between the discourse on the benefits of open innovation and an innovation strategy where open innovation appears to be a secondary concern. Another reason for the existence of a top-down approach is related to the novelty of such an organization of the innovation process: since an open innovation organizational culture needs time to take root, a more thorough accompaniment from the higher management is required.

If more decentralized approaches exist, they are mostly dependent on the existence of an organizational culture valuing liberty and autonomy or on the existence of strong top managers, capable of sustaining an open innovation project for enough time for it to gain recognition at the corporate level. For example, we can cite the Business Innovation Garage (BIG), a business incubator established in 2008 by Gemalto in order to allow employees to develop their personal projects. For Gemalto, the benefits in the creation of BIG are twofold: on the one hand, it gives the possibility of transforming the projects incubated by BIG in products or services if they correspond to the firm's strategic line. On the other hand, if the project is viable but diverges from the company's strategy, it can transform it into a start-up and further sustain its growth. If BIG is today part of the Gemalto's innovation strategy, its existence in its early days is due to the efforts and determination of its creator, a top official from Gemalto. Figure 3 shows the impact of open innovation on centralization.

Figure 3. Impact of open innovation on centralization



4.4. The impact of the implementation of open innovation on specialization

The implementation of open innovation is accompanied by the creation of specific structures assuring functions such as knowledge transmission or providing a specific expertise. In most cases, the organizational units dedicated to open innovation are small (for example, size ranged from three employees in the case of Air Liquide Scouting & Partnering Team to fifteen employees in the case of Orange France) mainly owing to the need for responsiveness and flexibility as mentioned in the interviews: *“We really need a flexible, agile structure capable of interfacing these two worlds [the big company and the start-up].”* (Open Innovation Manager, Air Liquide).

Regarding the roles played by these structures, the interviews allowed us to identify the three most important ones: (a) establishment of a connection between the organization and the exterior world, (b) steering and technical support of other units in issues related to open innovation; and (c) management of specific open innovation projects.

The first role is important for firms where collaborations with young businesses are the key element of their open innovation policy. In this case, establishing small structures is considered necessary since these small structures are considered more appropriate to discuss and work with small start-ups.

The second role is to promote openness in the organization and to assist the internal players (employees or other departments) in their collaborative projects. This assistance refers to offering very diversified expertise in legal, technical or commercial terms. This cross-field

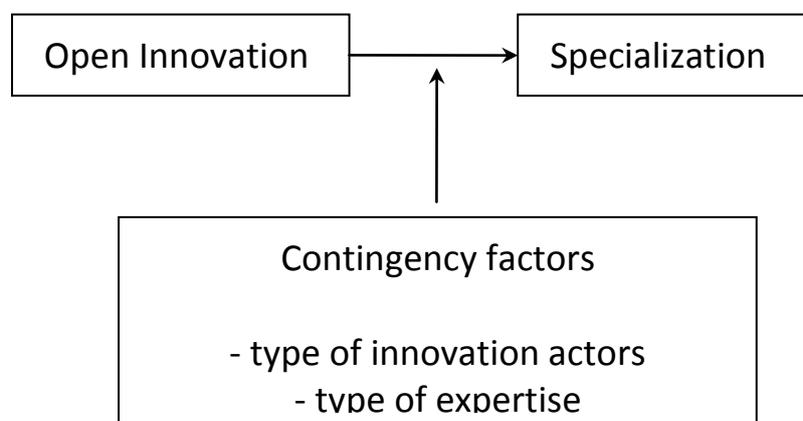
experience is made possible by the internal composition of these units: they bring together employees from various professional fields.

“[...] we have an organisational, catalytic role in explaining why open innovation is important and in operationally providing help regarding legal issues, intellectual property issues, commercial issues. Nevertheless, all of the R&D teams are experts in their technical field and work on their specific projects” (VP of Open Innovation, Orange Research Labs)

Finally, the third role is to manage very complex collaborative projects such as those financed by the European Commission, which, because of their complexity, exceed the scope of a single department.

We also asked our respondents to discuss the issues of maintenance of these open innovation units over time: were they permanent or were they temporarily established structures meant to disappear in the future? Most of the respondents appreciated that these structures were meant to be maintained – for example, the BIG initiative is continuing today and has increased in terms of the number of people employed and in terms of incubated projects. Figure 4 offers summarizes these findings.

Figure 4. Impact of open innovation on specialization

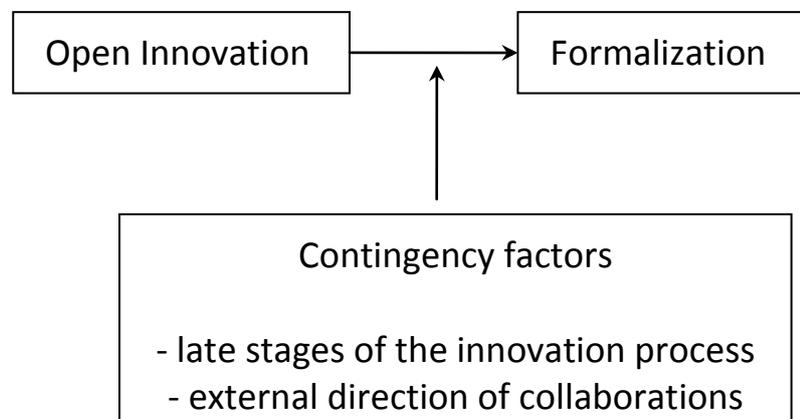


4.5. The impact of the implementation of open innovation on formalization

The fact that open innovation is a recent phenomenon in these companies can explain the rather weak degree of formalization in most of them. Interview analysis showed that

formalization is first related to the direction of openness: while the firm opens its innovation process to its internal players (other employees and departments), formalization is less present than in the case of collaborations with external players. In the case of increased internal collaborations, informal exchanges are considered to be more important. It then depends on the level of the innovation process: in the early stages of the innovation process (idea generation), formalization is less strong than it is in the late stages (product/service development) of this innovation process. Figure 5 shows the impact of open innovation on formalization.

Figure 5. Impact of open innovation on formalization



5. CONCLUSION

In 2003, Henry Chesbrough insisted on the necessity to deepen the theoretical aspects of open innovation. Since then, many research efforts have explored new theoretical territories of open innovation. Our own study is part of these efforts to clarify the content of open innovation and delineate its scope.

This study's first objective was to provide a more precise definition of inbound open innovation. Adopting a rather counterintuitive perspective, we studied 11 annual reports issued by companies that made efforts to adopt open innovation practices. The results of this approach allowed us to identify key elements that enabled us to come up with a newer definition of inbound open innovation. According to this definition, inbound open innovation is conceptualized as an explicit innovation strategy in which collaborations with internal and

external players are frequent and systematic. This takes us further away from the occasional work that firms do in cooperation with various external partners.

The second objective of this study was to provide insight to the organizational aspects of open innovation. We positioned open innovation in its organizational context and documented modifications in the organizational structure of the firm that accompanied the implementation of collaborative practices in the innovation process. While a number of previous studies have shed light on certain organizational issues, they focused almost exclusively on the relationship between open innovation and a firm's dynamic and absorptive capabilities. Paradoxically, the organization remained a major unknown element. By unveiling modifications in the deep and formal structure of the organization and the contingency factors influencing them, this research has established a point of departure to further develop research in this domain. Deep structure was impacted by the adoption of open innovation practices by a company. The impact on this structure was not dependent on the nature of industry but on two contingency factors, the occasional and recent character of collaborations. For companies involving external players in their innovation process on a rather regular and permanent basis, the change produced by the implementation of open innovation is weak, independently of the industry on which they function.

A limitation to this study is related to the nature and size of the companies that form our sample. All of the companies studied are big multinational groups selected according to the criteria of existence of a formal discourse on open innovation. One way to overcome this limitation would be to further incorporate data from smaller, more varied and numerous companies.

Despite these limitations, this study provides implications for organizations adopting open innovation policies. One of the main practical contributions of this study is that it offers a more precise definition of open innovation, thereby helping managers and employees to find a unified framework of understanding of this phenomenon. As shown in the literature review, various concepts involving the word "open" are a source of confusion when referring to open innovation.

This research also showed that the strategic dimension of open innovation is essential to its successful operational deployment. A weak articulation between a strong discourse toward open innovation and an inconsistent integration of openness in the innovation strategy could then be a source of failure in adopting open innovation practices.

6. REFERENCES

- Barge-Gil, A. (2010) Open, semi-open and closed innovators. Towards an explanation of degree of openness. *Industry and Innovation*, **17**, 6, 577-607.
- Bauer, M.W. (2000) Classical content analysis: a review. In: Bauer, M.W. and Gaskell, G.D. (eds), *Qualitative researching with text, image and sound: a practical handbook for social research*, London, Thousand Oaks, New Delhi, Sage Publications, pp 131-151.
- Bernard, H.R. (2000) *Social Research Methods: Qualitative and Quantitative Approaches*. Thousand Oaks, CA, London, New Delhi, Sage Publications, Inc.
- Chesbrough, H. W. (2006) Open Innovation: A New Paradigm for Understanding Industrial Innovation. In Chesbrough, H., Vanhaverbeke, W., and West, J. (eds) *Open Innovation: Researching a New Paradigm*, Oxford, Oxford University Press.
- Chesbrough, H. and Crowther, A.K. (2006) Beyond High Tech: Early Adopters of Open Innovation in Other Industries. *R&D Management*, **36**, 3, 229-236.
- Chiaroni, D., Chiesa, D. and Frattini, F. (2010) Unravelling the Process from Closed to Open Innovation: Evidence from Mature, Asset-Intensive Industries. *R&D Management*, **40**, 3, 222-245.
- Chiaroni, D., Chiesa, D. and Frattini, F. (2009) Investigating the adoption of open innovation in the bio-pharmaceutical industry. *European Journal of Innovation Management*, **12**, 3, 285-305.
- Damanpour, F. (1991) Organizational Innovation: A Meta-Analysis of Effects of Determinants and Moderators. *Academy of Management Journal*, **34**, 3, 555-590.
- Detert, J.R., Schroeder, R.G. and Mauriel, J.J. (2000) A framework for linking culture and improvement initiatives in organizations. *Academy of Management Review*, **25**, 4, 850-863.
- Dodgson, M., Gann, D. and Salter, A. (2006) The Role of Technology in the Shift towards Open Innovation: The Case of Procter & Gamble. *R&D Management*, **36**, 3, 333-346.
- Dougherty, D. (2002) Organizing for innovation. In Clegg, S.R., Hardy, C. and Nord W.R. (eds) *Handbook of organization studies*, Reprinted. First published in 1996, London, Thousand Oaks, New Delhi, Sage Publications, pp. 424-439.
- Elmquist, M., Fredberg, T. and Ollila, S. (2009) Exploring the field of open innovation. *European Journal of Innovation Management*, **12**, 3, 326-345.
- Fitjar, R.D. and Rodriguez-Pose, A. (2009) Innovating in the periphery: firms, values, and innovation in Southwest Norway. Working Paper 2009/13. Working papers series in

- economics and social sciences. Madrid, Spain: IMDEA - Instituto Madrileño de Estudios Avanzados. <http://repec.imdea.org/pdf/imdea-wp2009-13.pdf>.
- Gersick, C.J.G. (1991) Revolutionary Change Theories: A Multilevel Exploration of the Punctuated Equilibrium Paradigm. *Academy of Management Review* **16**, 1, 10-36.
- Hage, J. (1974) *Communication and organizational control: cybernetics in health and welfare settings*. New York, Wiley.
- Hall, R.H. (1991) *Organizations: structures, processes and outcomes*. Fifth edition. Englewood Cliffs, New Jersey, Prentice Hall.
- Heracleous, L. and Barrett, M. (2001) Organizational change as discourse: communicative actions and deep structures in the context of information technology implementation. *Academy of Management Journal*, **44**, 4, 755-778.
- Huber, G.P. (1984) The nature and design of post-industrial organizations. *Management Science*, **30**, 8, 928-951.
- Huizingh, E.K.R.E. (2011) Open innovation: state of the art and future perspectives. *Technovation* **31**, 1, 2-9.
- Jansen, J.J.P., Van Den Bosch F.A.J, and Volberda, H.W. (2006) Exploratory innovation, exploitative innovation and performance: effects of organizational antecedents and environmental moderators. *Management Science* **52**, 11, 1661-74.
- Khazanchi, S., Lewis, M.W. and Boyer, K.K. (2007) Innovation-supportive culture: the impact of organizational values on process innovation. *Journal of Operations Management* **25**, 871-84.
- Lazarrotti, V. and Manzini, R. (2009) Different Modes of Open Innovation: A Theoretical Framework and an Empirical Study. *International Journal of Innovation Management*, **13**, 04, 615-636.
- Lichtenthaler, U. and Ernst, H. (2006) Attitudes to Externally Organising Knowledge Management Tasks: A Review, Reconsideration and Extension of the NIH Syndrome. *R&D Management* **36**, 4, 367-386.
- Marchand, P. and Ratinaud, P. (2012) L'analyse de similitude appliquée aux corpus textuels: les primaires socialistes pour l'élection présidentielle française (September-October 2011). In *Actes des 11eme Journées internationales d'Analyse statistique des Données Textuelles*, 687-699. Liège.
- Maula, M., Keil, T. and Salmenkaita J.P. (2006) Open Innovation in Systemic Innovation Contexts. In Chesbrough, H., Vanhaverbeke, W., and West, J. (eds) *Open Innovation: Researching a New Paradigm*, Oxford, Oxford University Press, pp. 241-257.

- Miller, D., Hartwick, J. and Le Breton-Miller, I. (2004) How to detect a management fad and distinguish it from a classic. *Business Horizons* **47**, 4, : 7-16.
- Pénin, J. (2008) More Open than Open Innovation? Rethinking the Concept of Openness in Innovation Studies. Document de Travail 2008 - 18. Strasbourg: Bureau d'économie théorique et appliquée (BETA), Université Louis Pasteur, Strasbourg 1. <http://www.beta-umr7522.fr/productions/publications/2008/2008-18.pdf>.
- Perkmann, M. and Walsh, K. (2007) University–industry relationships and open innovation: Towards a research agenda. *International Journal of Management Reviews*, **9**, 4, 259-280.
- Rousseau, D.M. (1978) Characteristics of departments, positions, and individuals: contexts for attitudes and behavior. *Administrative Science Quarterly*, **23**, 4, 521-540.
- Sheremata, W.A. (2000) Centrifugal and centripetal forces in radical new product development under time pressure. *Academy of Management Review*, **25**, 2, 389-408.
- Trott, P. and Hartmann, D. (2009) Why “open innovation” is old wine in new bottles. *International Journal of Innovation Management*, **13**, 4, 715-736.
- Tushman, M.L. and Romanelli, E. (1985) Organizational Evolution: A Metamorphosis of Convergence and Reorientation. *Research in Organizational Behavior*, **7**, 171-222.
- West, J. and Gallagher, S. (2006) Challenges of open innovation: the paradox of firm investment in open-source software. *R&D Management*, **36**, 3, 319-331.
- Zingarelli, N. (1997) *Lo Zingarelli. Vocabolario della lingua italiana*. 12th edition. Bologna: Zanichelli editore S.p.A.