Managing open innovation between competitors: what challenges?

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Résumé :

L'open innovation (Chesbrough, 2003) décrit un écosystème d'entreprises ouvertes les unes aux autres qui conduit leurs processus d'innovation en dehors des frontières des entreprises. Pour innover, les entreprises peuvent collaborer avec tous les types d'acteurs, et notamment avec des concurrents. D'une part, la littérature sur l'open innovation n'a pas étudié en détail les relations d'innovation entre concurrents. D'autre part, dans la littérature sur la coopétition, les concurrents peuvent collaborer pour innover et leur permettre d'améliorer leur compétitivité (Brandenburger et Nalebuff, 1996). Cette littérature est axée sur la relation entre seulement deux concurrents. La littérature n'analyse pas en détail les relations de coopération entre plusieurs concurrents et partenaires. Cependant, étant une approche paradoxale, elle génère des tensions et des conflits, notamment en raison du transfert de connaissances et des effets d'apprentissage asymétriques. La gestion est un élément clé du succès de ces projets (Fernandez *et al.,* 2014). Pour montrer que les chercheurs peuvent avoir intérêt à étudier l'open innovation entre concurrents et son management dans l'industrie spatiale, nous avons mis en place une méthode exploratoire. Cette dernière est basée sur 25 entretiens dans l'industrie spatiale avec des experts de l'industrie et des chefs de projet. Grâce à cette méthode exploratoire, nous avons pu découvrir les enjeux, les bénéfices, les tensions possibles et le management de certains projets d'open innovation entre concurrents. Avec ce papier, nous essayons de montrer que l'open innovation entre concurrents est un sujet qui mérite une attention particulière.

Mots-clés : open innovation, coopétition, management, industrie spatiale

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INTRODUCTION

To fight against American competition, in the 1970s, three European competitors specializing in aeronautics (Sud Aviation, Hawker Siddeley Aviation and Deutsche Aviation) decided to collaborate by jointly creating what would become the Airbus A300. This program allowed the Airbus consortium to become one of the European leaders. It is not uncommon for competitors to work together to design a revolutionary product. These projects often made between two competitors can represent significant amount of money. These relationships of simultaneous cooperation and competition are analyzed through the concept of coopetition. Coopetition is indeed the paradoxical phenomenon where two or more companies will cooperate while simultaneously competing (Bengtsson and Kock, 2014). Most of the time, the literature on coopetition and on the management of coopetition has focused on the problems of dyadic coopetition, in particular through the success of innovation between two competitors like Sony and Samsung (Gnyawali and Park, 2011), Sanofi and BMS (Bez *et al*., 2014), SAP and Oracle (Pellegrin-Boucher *et al.,* 2013) and Thales Alenia Space and Airbus Defense and Space (Fernandez *et al.,* 2014). However, it seems that the literature is not studied in detail multi-partner's coopetition, i.e. open innovation between competitors. Then, open innovation can be described as a deliberate and intentional process where companies will be able to exchange knowledge with counterparties (financial or not) (Chesbrough and Bogers, 2014). Looking at the literature on coopetition and the literature on open innovation, we find that, on the one hand, the literature on coopetition and on the management of coopetition has rarely addressed the issue of innovation relationship between multi-partners. On the other hand, the literature on open innovation does not address the competitive dimension between companies involved in collaborative innovations. Indeed, it would be interesting to understand how companies can lead open innovation projects with several competitors and how they can manage this relationship. So, our research question will be: **could be open innovation between competitors managed as innovation between two competitors? What are the specificities of the management of open innovation between competitors?** To answer this research question, we have chosen to set up an exploratory

method in the space industry in order to understand the management and issues associated with innovation projects between several competitors. Thus, among all the projects observed in the industry, we chose to select four projects of open innovation between competitors: Galileo (European GPS), the Satellites for 5G initiative, the University Space Center at Montpellier and the weather satellite: MTG. This method allowed us to understand that in the space industry, there is not only innovation projects between two competitors but also innovation projects between several competitors, i.e. open innovation projects between competitors. We saw that although these projects can provide some benefits (becoming a market leader, becoming independent, fighting competition etc.), they can be a source of difficulties and tensions. Management is thus seen as the keystone of these innovation projects between several competitors. Thus, this paper has the vocation to show why the literature has interest to study the open innovation between competitors and its management.

1. LITTERATURE REVIEW

1.1. FROM CLOSED TO OPEN INNOVATION, A PARADIGM EVOLUTION

1.1.1. Definitions of open innovation

Definitions of the concept of open innovation have evolved (West et al., 2014). The first definition states that: *"a paradigm that assumes that firms can and should use external ideas as well as internal ideas, and internal and external paths to market, as the firms look to advance their technology"*. (Chesbrough, 2003, p. 24). A few years later, open innovation will be described as: *"An open innovation model uses a wide range of actors and external sources to help them reach and support innovation."* (Laursen and Salter, 2006, p. 131). The same year Chesbrough (2006) states that 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"* (p. 1). To emphasize the link between the internal and the external in open innovation, several authors have tried to redefine the concept. Open innovation is then seen as *"a distributed innovation process based on purposively managed knowledge flows across organizational boundaries, using pecuniary and non-pecuniary mechanisms in line with the organization's business model"* (Chesbrough and Bogers, 2014, p. 3). Thus, internal and external resources can be combined in many ways to increase the firm's innovation capacity. But what are the notorious differences with closed innovation ?

1.1.2. Differences between open innovation and closed innovation

Firms that focus their effort on internal R&D pursues a logic of vertical and cyclical integration that pushes them to want to control everything: "*from design to product manufacturing, sales, service and support*" (Chesbrough, 2003, p. 29). It is then that Chesbrough (2003) refers to this concept as closed innovation. By controlling the entire process, the boundaries of the firm become hermetic to the external environment (Chesbrough, 2003). There is no interaction with the environment if it is not with the market. There is only one possibility for an idea or technology to enter in the organization and only one possibility for it to be put on the market (Chesbrough, 2003). The open innovation model is therefore opposed to the closed innovation model. Firms are no longer concentrating their R&D efforts internally but opening up to their external environment to find new sources of knowledge. In contrast to closed innovation, the key to firm competitiveness is not the protection of innovation. Rather, it is about creating value from a multitude of sources of knowledge. Cooperation with the various partners becomes a key factor in the success of innovation. By opening up businesses to their external environment, firms have access to new resources.

1.1.3. Characteristics of open innovation

Open innovation describes an ecosystem of firms open to each other that drives their innovation processes outside the boundary of the firms (Mowery, 2009; West *et al.*, 2014). Firms involved in an open innovation approach do not give up their internal R&D activities. They integrate external financial, human and technological resources into their internal innovation activities. To do so, open innovation is an approach that can be based on three different processes that are: outside-in, inside-out and coupled innovation (Enkel *et al.*, 2009). The first process, the outside-in, is to enrich the internal knowledge of the firm through interaction with external partners such as suppliers, customers or other external actors (Laursen and Salter, 2006; Lettl *et al.*, 2006; Piller and Walcher, 2006; Enkel *et al.*, 2009) like the importation and the buying of knowledge (Dahlander and Gann, 2010). In the second process, inside-out, firms manage to gain profits by putting their internal ideas on the market, like the exportation and the selling of knowledge (Dahlander and Gann, 2010). Through this process, in addition to having more benefits, firms can also market their ideas more quickly (Enkel *et al.*, 2009). Finally, the last process, coupled innovation, is the co-construction of

innovations between complementary partners. Through alliances, cooperation or the creation of joint ventures, firms will combine the two processes outlined (inside-out and outside-in) to create successful innovations (Enkel *et al.*, 2009). In the open innovation model, firms need to understand the issues associated with their internal technologies and those related to external technologies. It's not just about being able to innovate internally, but also about exploring new ideas. Open innovation mixes cooperation and competition: 1) cooperation to create value. This value comes mainly from input and output exchanges of knowledge (Peng and Bourne, 2009). And 2) competition to appropriate a part of the value created (Khanna, 1998). In the process of open innovation, these two dimensions are called value creation for the cooperative part and value appropriation for the competitive part (Van Burg *et al.*, 2017).

1.1.4. Gains and performances of open innovation

The opening of innovation processes can enable firms to develop technical innovations and achieve a certain level of economic performance (Chesbrough, 2003, 2006; Cassiman and Veugelers, 2006). Open innovation makes it easier to have access to information on the market (such as customer needs for example) or production techniques (Le Roy and Chesbrough, forthcoming). This is also possible because firms are no longer relying only on their internal R&D but open themselves to wider sources of information and innovations (Le Roy and Chesbrough, forthcoming). Open innovation allows firms to gain a number of advantages: better results, higher revenues through intellectual property rights and the discovery of new markets, shorter time to market and optimizing risk sharing (Chesbrough, 2006). However, the link between open innovation and its effects on business performance has not been widely studied in the literature (Du *et al.*, 2014) and has shown different results. Indeed, some authors have shown that open innovation can have positive effects on business performance (Laursen and Salter, 2014), while others have shown that it can have neutral and even negative effects (Campbell and Cooper, 1999; Lhuillery and Pfister, 2009; Un *et al.*, 2010).

Moreover, in the literature of open innovation, we do not see if firms can innovate with their competitors. In fact, open innovation literature then rarely addresses the competitive dimension in the development of open innovation, while coopetition, a relationship of innovation between competitors, can be a relevant strategy for developing new innovations.

1.2. COOPETITION, A WAY TO INNOVATE

1.2.1. Definitions of coopetition

Bengtsson and Kock (2000, p. 412) define coopetition as the "*dyadic and paradoxical relationship that emerges when two firms cooperate in a few activities, and at the same time compete for other activities*." Dagnino and Padula (2002) describe it as a system of actors that interact on the basis of a "*partial congruence of interests and objectives*" (p. 2). For Gnyawali and his co-authors (2008, p. 386), coopetition is "*simultaneous cooperation and competition between different individual or organizational actors*". The multitude of definitions of coopetition comes from the fact that researchers do not use the same theoretical basis to analyze the phenomenon (Bengtsson and Kock, 2014). To try to unify the definitions on coopetition Bengtsson and Kock (2014) conclude that coopetition is "*a paradoxical relationship between two or more actors simultaneously involved in cooperative and competitive interactions, whether their relationship is horizontal or vertical*" (p182). In coopetition, firms cooperate to create common value and compete with one another to capture the largest part of the value created (Ritala and Hurmelinna-Laukkanen, 2009).

1.2.2. Differences between coopetition and alliances

Coopetition is often compared with the creation of alliances between competitors. Since alliances between competitors are two-sided pieces, some authors have focused on studying the face of cooperation (Meschi, 2006; Fjeldstad *et al.*, 2004), while others have focused on the face of competition. (Hamel *et al.*, 1989; Hamel, 1991). But coopetition is a principle that simultaneously mixes "*two opposing forces*" (Das and Teng, 2000, p. 85). Coopetition is differentiated from alliances between competitors because it wants to take advantage of competition and cooperation by combining them to gain a competitive advantage, not to limit conflicts related to the existence of these two dimensions like the alliances between competitors (Chiambaretto, 2013). Contrary to alliances between competitors, the aim of the coopetition is to overcome the paradox by creating a whole new framework of analysis that does not separate competition from cooperation, but associates them (Chen, 2008; Chen and Miller, 2011; Luo *et al.*, 2006).

1.2.3. Gains and performances from coopetition

In the coopetition, firms cooperate to create common value and compete to have the largest part of value created (Ritala and Hurmelinna-Laukkanen, 2009). In this sense, coopetition should enable firms to achieve higher levels of performance, especially in terms of innovation (Ritala and Saino 2014; Brandenburger and Nalebuff 1996; Walley 2007). Competitors work together because it gives them access to new resources (Lado *et al.*, 1997; Bengtsson and Kock, 1999, 2000). However, we must maintain a certain tension to motivate them to be creative in order to differentiate themselves and to avoid complacency (Park *et al.*, 2014b; Quintana-García and Benavides-Velasco, 2004; Raza-Ullah *et al.*, 2014; Robert *et al.*, fothcoming). However, not all authors agree that coopetition has a positive effect (Luo *et al.*, 2007; Peng *et al.*, 2012; Belderbos *et al.*, 2004; Neyens *et al.*, 2010; Tomlinson, 2010; Bouncken and Kraus, 2013). Some authors have even shown that coopetition has a negative effect on performance (Kim and Parkhe, 2009; Nieto and Santamaría, 2007; Un *et al.*, 2010), and a neutral effect (Knudsen, 2007; Miotti and Sachwald, 2003; Santamaria and Surroca, 2011). In light of these differences, new studies have highlighted the need to moderate variables in order to measure the effect of coopetition on performance (Le Roy *et al.*, 2016; Ritala, 2012; Sanou *et al.*, 2016; Wu *et al.*, 2010). Coopetition is a strategy that must bring greater value to the client (Brandenburger and Nalebuff, 1996). Technology-based coopetition is positioned in this dynamic as it allows firms to develop and deliver new products to customers (Fernandez *et al.*, 2014; Gnyawali and Park, 2011). Market-oriented coopetition, can enable firms to achieve a higher level of performance when they succeed in selling a product at a high price and quickly (Robert *et al.*, forthcoming).

1.2.4. Tensions and management

Coopetition is an object of research that deserves to be studied because it mixes two logics that are usually contrary (Dorn *et al.*, 2016). Due to its paradoxical nature, coopetition generates tensions and conflicts, notably because of knowledge transfer and asymmetrical learning effects (Tidstrom, 2014; Fernandez *et al.*, 2014). Tensions will intensify and become more complex as cooperation and competition increase (Clarke-Hill *et al.*, 2003). Fernandez and his co-authors (2014) have put forward a typology of tensions following coopetition or called paradoxical tensions of coopetition (Gnyawali and Park, 2011). Thus, tensions can appear at several levels of the organization: at the inter-organizational level (De Rond and

Bouchikhi, 2004), at the intra-organizational level (Luo *et al*., 2006) and even at the level of the individual (Tsai, 2002). To ensure the success of the project, these tensions must be managed. The literature o the management of coopetition, we have observed that certain principles such as separation (Bengtsson and Kock, 2000; Pellegrin-Boucher and Fenneteau, 2007; Fernandez and Le Roy, 2013; Fernandez *et al*., 2014), integration (Chen, 2008; Das and Teng, 2000; Fernandez *et al*., 2014; Oshri and Weber, 2006; Seran *et al*., 2016) or co-management (Le Roy and Fernandez, 2015), have been studied. In addition to these management principles, some authors of the current have highlighted that coopetition was not managed not only through these management principles but also through a project structure (Fernandez and Le Roy, 2015; Bez, 2017; Fernandez *et al*., 2017).

2. THEORITICAL GAP

Some recent studies have begun to study the competitive relationship between firms in an open innovation context (West *et al*., 2014; Belderbos *et al*., 2014; Von Hippel, 2005; Lauren and Salter, 2014; Kwanghui *et al*., 2010; Le Roy and Chesbrough, forthcoming). Even, Le Roy and Chesbrough (forthcoming) try to define open coopetition as coopetition evolving between not only two competitors (i.e. dyadic coopetition) but evolving between two competitors and a third party, or even in a network or an ecosystem. But, we notice that the literature on coopetition and on the management of coopetition has rarely addressed the issue of innovation relations between several competitors. Indeed, this literature focuses primarily on dyadic relationships. The literature on open innovation, for its part, does not almost address the competitive dimension between firms and its management. To answer our questions, some answers are partially available in the literature of alliances and the network with the notion of "network coopetition" (Dagnino and Padula, 2002), the notion of "multiple coopetition" (Gnyawali *et al*., 2008), ecosystems (Gueguen, 2008), the notion of the triad (Depeyre and Dumez, 2010; Park *et al*., 2014; Wu *et al*., 2010), the concept portfolio of alliances (Fernandez and Chiambaretto, 2016; Wu, 2014; Park *et al*., 2014), the notion of cluster (Madhavan *et al*., 2004) and the notion of network (Sanou *et al*., 2016; Lazzarini, 2008). For example, for Gomes-Casseres (1996), an alliance network is the set *of "separate companies linked through collaborative agreements,"* though *"not all the companies in a group have to be linked directly to all the others"*. Lazzarini (2008) supports the transition

from an alliance network to multilateral alliances. He also shows that the big difference between the two comes from the formalization or not of their approach. In an alliance network, cooperation between several companies is not governed by formal terms, although some relationships may be more formal (Lazzarini, 2008). Multilateral alliances are governed by "*the adoption of common and standardized exchange procedures*" (Lazzarini, 2008, p. 22). For Kleymann (2005), multilateral alliances are like "*a system of interdependence*" (p. 135). This logic of multilateral alliances can then move closer to the logic of clustering (Madhavan *et al.,* 2004). Indeed, clustering is the result of a cooperation strategy between three companies in a triad (Madhavan *et al.,* 2004). To continue, Sanou and his co-authors (2016) show how the place of a company in a "coopetitive network" can have consequences on its performance and its competitive actions. A "coopetitive network" can be formed thanks to the alliance between several firms belonging to the same intra-industrial network (Gnyawali *et al.,* 2006). To go further, we can briefly discuss the notion of ecosystems and coopetition. Gueguen (2008) highlights the coopetition relationships in an ecosystem but also by several ecosystems. Although some works in the literature of alliances deal with the management of alliances, strategic alliances, multilateral alliances or portfolios of alliances, however, there is a lack of knowledge about innovation projects between several competitors, particularly on the determinants, the processes, the implications and especially the management of these.

There is therefore a theoretical gap on the management of open innovation between competitors. It would be interesting to explore and understand in more detail the management of multi-partner's coopetition, i.e. the management of open innovation between competitors.

3. METHOD

3.1. RESEARCH DESIGN

To respond to this gap, we have set up an exploratory research method because the relation between coopetition and open innovation is a recent field of research. In our case, it can help us to "*mark a reality to study*" (Trudel *et al.,* 2007, p. 39). The exploratory study aims to understand the complexity of the subject and to understand the issues related to open innovation practices between competitors. This exploratory study allows us to understand the management of these relationships, which is presented as the determining factor of innovation between competitors. We chose to focus this exploratory study on a case study. According to

Langley and Royer (2006), the case study is *the "study of at least one case, a case being a limit system"* (p. 81). Thanks to the combination of modes of data collection, the case study allows to generate new theories (Eisenhardt, 1989). The latter are then easily verifiable thanks to the assumptions made and verified during the theoretical construction process (Eisenhardt, 1989). Then, through the case study, new theories can be empirically valid (Eisenhardt, 1989). The new theories generated by the case studies are likely to be close to reality because they are based on elements from real research fields (Eisenhardt, 1989). Therefore, in choosing the case study, the goal is to *"enrich and generalize theories and not enumerate frequencies"* (Yin, 1984, p. 21).

3.2. EMPIRICAL BACKGROUND

Regarding the empirical study, our attention was focused on a high-tech industry. Indeed, these industries represent a favorite context for studying innovation practices between competitors (Gnyawali *et al.,* 2008). Our attention has turned to the space industry because it allows firms, whether or not to help a third-party actor, to engage with other external authors in order to jointly develop innovations and then exploit them (Van Burg *et al.,* 2017).

According to GIFAS, in 2014 the total turnover of the French space industry (satellite design activities, launcher design and satellite orbiting) was 8 035 million euros, with 6 295 million euros for the civil sector and 1 740 million euros for the military sector[1]. In Europe, the European space industry generated 7.25 billion[2] euros in 2014, of which 3.5 billion euros for the construction of commercial satellites and 1.3 billion euros for the scientific market. Given the important financial stakes of space program developments, it soon became clear that the space field is governed by a certain degree of European cooperation and even international cooperation. But this cooperation not only represents a cost-cutting and cost-sharing advantage, it also enriches the skills and knowledge base of the actors in the dynamics of shared learning. In the industry, there are historically two prime contractors: Airbus Defense and Space (ADS, formerly Astrium) and Thales Alenia Space (TAS) but, since 2010, OHB has made a place among these space popes. Even if these three actors participate ardently in the development of the industrial fabric of space, they are not alone. Indeed, they can count

1 In our case, we want to focus on the commercial market because it is a market where the economic stakes can have serious consequences in the industry.
2 Rapport BSI Economics – « L'économie spatiale : vers l'industrie et au-delà… »

on a large number of subcontracting firms revolving around these major contractors (equipment manufacturers, engine manufacturers, specialized service providers). The space industry can then be seen as a large ecosystem with a lot of innovative firms.

3.3. DATA COLLECTION

Our exploratory research method relies on the collection of primary and secondary data. Primary data are collected from individual and semi-structured interviews (25) with experts in the chosen sector, institutional and project manager (See Table 1). We interviewed several types of actors because we worked by effect of "*snowball*" (Miles et Huberman, 2003). Indeed, the space industry is a difficult industry to contact because of the industrial secrecy and confidentiality of certain projects. So, we chose to get in touch with institutions such as CNES (French space agency), ESA (European space agency) or Aerospace Valley to meet manufacturers next. The majority of these interviews were conducted face to face. Some interviews were done by teleconference due to geographical distance. They were then all transcribed and analyzed. These interviews allow us a more detailed exploration and facilitate "*the free exchange of information*" (Malhorta, 2011).

- INSERT TABLE 1 -

Regarding the secondary data, we used different sources. First of all, we did a documentary search on the industry, in particular via the general press and the space industry. We also used the activity reports of institutional structures such as GIFAS, Xerfi studies and reports from CNES and the Ministry. We then used newspapers from the specialized press to get more details on the industry and identify some potential projects. In addition, to better understand the impact of innovation projects on the 3 European prime contractors (OHB, TAS, ADS) we looked at the activity reports of the latter over a period from 2000 to 2016. Finally, we also had access to internal documentation including presentations of the projects studied.

3.4. DATA ANALYSIS

The collection of primary and secondary data allowed us to discover some innovation projects between several actors, nine in total. After reviewing the content of the data collected, we chose to focus on four projects, because for us these four projects were truly open innovation projects between several competitors. To analyze our primary and secondary data, we used a coding method to highlight the important themes of the selected cases. Thereby, we have seen

that several themes emerge: open innovation in the space industry, the benefits, the tensions that these projects generate, the possible management principles and the project structures that companies put in place to manage projects but also to manage tensions. Then, data analysis was done according to Miles and Huberman's method (1991, 1994). The latter is composed of three interactive, cyclical and continuous stages that are "*data condensation, data presentation and conclusion checking*" (p. 28). Indeed, we have attempted to consolidate primary and secondary data to verify our findings.

4. RESULTS

4.1. INNOVATION OR OPEN INNOVATION IN THE SPACE INDUSTRY?

In the space industry, a large number of actors are present and collaborating together. But can this cooperation be between competitors? At our stage, we have been able to detect some open innovation projects carried out between competitors.

Galileo is a program from the European Union that consists to develop a unique European satellite positioning system program in order to give Europe its independence from the US GPS. Galileo's costs of 13 billion euros, including 2.4 billion euros for France, make it one of the largest European space programs. This satellite positioning system program was also manufactured by several competing manufacturers namely OHB, Airbus Defense and Space, Thales Alenia Space, Surrey Satellite Technology (SST), SpectraTime, Arianespace, Spaceopal. OHB with the help of Airbus Defense and Space and Thales Alenia Space, was responsible for constructing most of the satellites for an amount of approximately 821 million euros between 2010 and 2012.

Created in 2011 at Montpellier, The University Space Center (USC) is a technology platform of the University of Montpellier to develop Nano-satellite projects. Indeed, it is the first university space center in France where both academic (University of Montpellier) and industrial (3D Plus, Airbus Defense and Space, Latécoère, Zodiac Data Systems (Zodiac Aerospace), Omicron, Oceasoft, Soderfi, Spherea) innovate together to develop Nano-satellites. Through a foundation, i.e. Van Allen foundation, companies finance (about 350,000 euros / year) the center and play a role of privileged partners to develop projects jointly. Most of the time, companies will use the USC for an upstream part of their project: the design of an innovative product or test an idea. One of the respondents told us "*we are working, too, as a*

test bench for them. That is to say, they want to launch an activity on a big satellite but before he tests it on a small satellite. " The USC also allows for several manufacturers to work together, especially during a call for projects, industry can form consortia through the USC: *"We are a little central point of the star"*.

MTG is an innovative space program that started six years ago between OHB and TAS and one hundred actors, including ADS. This program consists of developing a meteorological satellite. It is driven by € 1.5 billion in funding from ESA for a European meteorological data provider, Eumetsat. The program then represents 6 new third generation meteorological satellites.

In addition, there are other cooperative initiatives among competitors. An example is the Satellite for 5G initiative. This project was initiated by ESA with the aim of bringing, over the 2016-2020 period, together 16 aeronautics and space industry competitors[3] to develop 5G in Europe. To develop 5G by satellite, firms will conduct tests and experiments of 5G satellite service in some priority sectors such as security, recreation, transportation or the media. To do so, this initiative receives support from the European Union via Horizon 2020 funding of 8.3 million euros.

4.2. BENEFITS AND TENSIONS OF THE DIFFERENT PROGRAM

Such important projects have advantages but also their lots of difficulties and even tensions. In the case of Galileo, cooperation between European manufacturers was needed to develop a single European system. The lack of the latter could have crucial consequences for the European industry. Galileo allows companies to have privileged access to unique and strategic data in the development of their business, with the aim of improving their commercial positioning. However, being a long and expensive project, the collaboration between the various actors has not been easy. For Galileo, relations seem indeed to be litigious. First, in 2003-2005, a consortium of eight manufacturers was created to promote public-private financing, but this initiative failed. This failure causes the program to lose 3 years. A few years later, in 2010, the German OHB is preferred to ADS or TAS to build all satellites. However, OHB does not have the technological capabilities to build them on time and on cost. The European Union and ESA intervene by calling on ADS and TAS to help

3 Airbus Communication Intelligence Security, Airbus Defense and Space, Avanti Communications Group, Echostar Mobile Limited, Eutelsat, Hispasat, Inmarsat, Intelsat, LeoSat, Network Access Associates, Newtec Cy, SatixFy UK, SES, Telesat Canada, Thales Alenia Space, ViaSat

OHB. Throughout the development of Galileo, the program suffers of technical and industrial problems which has resulted in a total delay of 12 years. This delay then had some consequences for the budget. Indeed, the total cost of the program is 13 billion euros, but the initial budget was 4.6 billion euros, almost 3 times the initial budget.

For the USC, we can say that it stands out from other university space centers because it is the first and only one to this day that has achieved a technical feat: launch into orbit a Nano-satellite. Thanks to this, the USC of Montpellier is the leader of French USC. They succeed, thanks to the collaboration of industrialists, to have a sharp expertise and a scientifically innovative technique. During our interviews, we noticed that several areas of friction and tension could appear. First, there are tensions due to the technical difficulty of product design. Indeed, the projects present in the USC are essentially research projects that have a strong technological level. This level of technology then generates significant uncertainty as to the achievement and results of the initial project. One of our respondents illustrates our remarks by saying *"So you make an investment, without knowing what you will have on return. So, there is risk taking."* When different entities work together within the USC, there are also tensions regarding planning that may arise. Indeed, the USC, a university platform, has a special agenda with some administrative slowness. Companies with heavy structures and a large organization can understand this particularity. However, companies with small structures and more agility, cannot always understand it. This difference in understanding comes then from a certain difference in the organization but also in the corporate culture. Thus, tensions can appear following this cultural difference.

For the MTG program, the benefits are not minimal. The new satellites built will allow better coverage of the European area and thus a better reliability of weather forecasts. This reliability is due to the fact that the program develops innovative instruments that allow a greater performance. Moreover, the MTG program brings together a large number of partners, so there are some tensions that may appear among them. First, there are difficulties due to the lack of competence of certain partners. Given that the project's leading companies share the risks and are globally responsible for the project, if one of the actors does not have the necessary skills, this can create possible difficulties. The MTG program is a very innovative program and constant search for unprecedented performance. Thus, it can have technical problems such as problems of design, process problems or even technology. It is true that the

MTG program is at a high technological level, so it is possible that some partners cannot design or develop a product as innovative as expected, which can create friction between the partners. Moreover, since MTG is a project with a wide range of partners, there are as many interfaces to manage as partners. This management of interfaces can then be a difficult exercise: "*The more companies come to work together, the more complicated it is*." Finally, in the MTG program some partners are competitors. There may be a risk that competing partners will not prioritize the program compared to their own program. We have seen that ADS is part of the MTG program leads by OHB and TAS. Being a direct competitor of the two project leaders, it may have tensions regarding the priority of the program of the actors.

To finish, even though the Satellites for 5G initiative is only at its beginning, it already has potential benefits but also some challenges. The actors concerned by this initiative wish to develop 5G by satellite to not only improve the means of communication of individuals but specially to get to connect more objects. With the development of satellite 5G, manufacturers wish to accelerate the development of "*the company of the future*", as one of the respondents said. However, this initiative brings together 16 manufacturers, which caused some tensions during the negotiation of the joint agreement to take the initiative. One of the respondents said that it was even a *"delicate equilibrium"* to find, especially because of the divergent interests between the 16 competitors.

4.3. IDEAS OF MANAGEMENT

Finally, to overcome these tensions, some management principles or project structure have been put in place. We know that in the case of Galileo, the two giants (ADS and TAS) have made part of their workforce available to OHB to help it to catch up in the production of satellites. It can be assumed that, temporarily, a project team was created to support the transfer of knowledge or that the technicians were integrated into the OHB teams or that the latter instead had just a mentoring and advisory role. In the case of the University Space Center, to manage the tensions and the associated projects, they set up a certain number of tools. First, to secure their relationship and protect themselves, they enter into contracts called collaborative research contracts. In these, each partner will determine his contribution and what he will do in a "*work packages*". In these work packages, the partners will describe in detail what they will do and what they will bring to the project: "*We contract everything. NDA always, whatever you do, we always start with an NDA. Contracts are written every*

day, sent out." Contracting is therefore an upstream phase of the project. When the project starts, the teams interact together. As the teams are relocated, they work remotely via teleconferences, email exchanges and weekly meetings. They also set up a follow-up with a shared file: "*And in fact, what we have is a typical file, an Excel spreadsheet. There is an Excel spreadsheet where you list all the tasks that everyone has to do, you explain all the tasks, you do all the tasks, you give a date and you give the person who executes the task.* " However, if the project is too important, the USC has already given access to its computer server to the partner in question. So, they shared part of their server to be able to exchange information more easily. It is important to emphasize that the USC used to work with this company. This is the reason that motivated them to share part of their server. However, in this server, only useful and secondary information to the project is communicated. Our interlocutor says: "*In general it's pretty light things. All that is really sharp discussion is different*. "And *"if it's really very strategic, we can have a meeting*". In the case of MTG, to prevent these friction and potential tension, certain management methods are put in place. First, at the beginning of the program, all partners are invited at a meeting. This meeting aims to involve them and show the issues of the program: "*We hold plenary meetings where we present the program as a whole with all the industry to motivate them, so that they understand what is the purpose what they are doing"*. Concerning the tensions related to the lack of know-how or technical skills of one of the partners, one of the leaders of the project will help him by making a transfer of knowledge: "*So, we put in place people to us who knew how to help them. For a number of years, skills are available and they put staff around them.* ". This transfer of knowledge is essentially through the integration of teams, but not only. They can also develop co-engineering where the partners will do the same thing together. Thus, by developing a task force, the partners will work together. In this team, the tasks are made jointly, without disempowerment. The goal is to learn and build a partner's skills. However, the actor who gives his skills does so while knowing the associated risks. One of our respondents said, "*We are probably creating tomorrow's competitor, but at the same time we need the program to go well into the future*". But, project leaders can also learn from other partners. Seeing how they build an element of the satellite, they learn too. In some cases, these exchanges are then in a win-win situation. Then to manage and avoid conflicts, the partners developed the same work organization. They will all create disciplinary teams and

each person in charge of a function will exchange with his counterpart. Then, most of the partners are relocated geographically. As a result, they often exchange by traditional tools such as email and videoconferencing but, they can also exchange and communicate information via a dedicated information system. However, depending on the importance or urgency of the exchange, the partners move and physically meet: "*There are meetings where you have to be there physically because there are so many of you and it's easier to communicate and solve the problems*. " Finally, in the case of the Satellites for 5G initiative, on the one hand, tensions were resolved through the intervention of ESA, which played the role of third party and moderator in the discussions. On the other hand, the initiative provides for different project structures. The initiative can be considered as a federation of projects in which several companies can create a joint project, or a company can develop its own project or even several companies can participate in several projects. To verify that manufacturers respect the principles imposed by the agreement, a person from ESA can be present in each project.

5. DISCUSSION

5.1. MAIN FINDINGS

In the literature, we have chosen to define open innovation as a deliberate and intentional process of innovation where actors exchange knowledge flows with or without a financial counterpart (Chesbrough and Bogers, 2014). Through our case study on the space industry and more specifically through the observed cases, we can see these projects can be qualified as open innovation projects. The cases observed are indeed characterized by internal and external resource exchanges. Then, we could see that the companies could call on 3 different logics of open innovation: the outside-in; inside-out and coupled innovation (Gassman and Enkel, 2004; Enkel *et al*., 2009). Indeed, we assume that we can bring the creation of a space program such as Galileo closer to the co-creation of innovation between several companies, which is close to coupled innovation. But in this same project, if we consider that thanks to the intervention of ADS and TAS, OHB has enriched its base of internal knowledge, we can possibly speak of outside-in. In the case of the University Space Center, with the collaboration with academics and manufacturer, especially upstream of one project, and the MTG satellite, can be closer to the process of inside-out and outside-in, whereas the Satellites

for 5G initiative could, according to the projects that the manufacturers will develop, include the 3 types of logics of open innovation. Moreover, the cases observed are not some project from a simple collaboration between supplier-customers or partner companies. On the contrary, these are open innovation projects carried out between several competitors, namely coopetition projects. In fact, coopetition is the phenomenon in which two or more companies compete and collaborate simultaneously (Bengtsson and Kock, 2014). Coopetition is a paradoxical relationship because it mixes two opposing elements: competition and cooperation. It thus generates tensions and conflicts, notably because of the transfer of knowledge and asymmetric learning effects (Tidstrom, 2014; Fernandez *et al.*, 2014), as we have just seen in the cases observed. In the literature, we have seen that these tensions can appear on several levels (Fernandez *et al.*, 2014). In the observed cases, we can assume that emerging tensions appear to be inter-organizational. However, this does not exclude that intra-organizational and inter-individual tensions may exist. Finally, to manage these tensions and to set up an efficient organization favoring innovation, the companies of the observed cases seem to have put some management principles like integration (MTG, Galileo), separation (USC, Satellites for 5G initiative) and co-management (MTG).

5.2. MANAGERIAL CHALLENGES

Researchers have begun to look at open innovation processes among competitors, but many questions remain open. As West (2014) points out, open innovation opens interesting research field to generate knowledge about new open innovation practices. While coopetition has advantages for innovation, it is not without risk. Firms expose themselves to risks of plunder and must protect their know-how. Many tensions emerge within the teams (Fernandez *et al.*, 2014). This raises a number of questions relating to the implementation of open innovation practices between competitors. So, we wanted to understand and explore **could be open innovation between competitors managed as innovation between two competitors? What are the specificities of the management of open innovation between competitors?** To answer of this question more in details, we would like to purpose a research agenda about the management of open innovation between competitors and its issues.

Firstly, this vision raises a number of questions about the determinants of the relationship. Much of the literature has studied cases of dyadic coopetition (Gnyawali and Park, 2011; Bez *et al.*, 2014; Pellegrin-Boucher *et al.*, 2013; Fernandez *et al.*, 2014) where we can clearly

identify the actors involved. We have seen that recently, Le Roy and Chesbrough (fortcoming) are trying to define open innovation between competitors, but finally what is really open innovation between competitors? Do firms ally themselves with multiple competitors or are they in a relationship with a competitor and surrounded by other actors?

In the literature on coopetition and on the management of coopetition, we have been able to understand that companies have been motivated to cooperate with competitors in order to have access to complementary resources (Luo *et al.*, 1997; Bengtsson and Kock, 1999, 2000). But what are the different reasons that encourage competitors to open up with not only one competitor but multiple partners? Why firms need to ally themselves with multiple competitors? Secondly, multi-partner relationships raise questions about the implementation of the relationship and its management. In the literature on the management of coopetition, we have seen that several management principles are applicable when two competitors collaborate. The literature on open innovation has highlighted that companies can put different logics in place: outside-in, inside-out and coupled innovation (Gassman and Enkel, 2004; Enkel *et al.*, 2009; Dahlander and Gann, 2010; Piller and West, 2014) but how can competitors set up successful open innovation processes? What are the difficulties encountered and how to manage them? What resources must be shared to create value and which ones must be protected to maintain the competitiveness of firms? How to manage the risk of opportunism of the partner? How are firms organized? How do managers integrate these new sources of external knowledge? How are internal conflicts and tensions managed?

Thirdly, we can question the implications of these open innovation relationships between competitors. What kind of innovation can they develop? How these innovations are used by firms? Who benefits from it? The literature on coopetition has shown that coopetition can enable competitors to generate huge financial rents (Fernandez *et al.*, 2014; Bez *et al.*, 2014). Can this positive dynamic be found when multiple competitors cooperate? Are the gains multiplied? The dyadic coopetition allows a certain synergy with the firms (shared costs and risks and multiplication of skills for example). Moreover, we have seen that for some authors the coopetition can have positive effects on innovation, but can we suppose that the effects are also greater when more than two competitors cooperate? Or, on the contrary, are the effects more harmful? Finally, what are the implications for the firms involved?

Dyadic coopetition can enable companies to achieve a high level of performance but what are the impacts and effects of open innovation practices on business performance? What is the added value of open innovation between competitors compared to dyadic coopetition? What is the final potential of open innovation between competitors? Is open innovation between competitors really a win-win relationship?

CONCLUSION

Open innovation between competitors raises important questions including its reason of being, its form, its implementation, its implications, and its effects on the performance. These questions are valid both empirically and theoretically. The relationship between competitors is a paradoxical logic that should be well managed to allow firms to achieve a higher level of performance. Thus, we can suppose that the management of open innovation between competitors can also be a key element in the success of these multi-partner's projects. The questions that we have raised here show the complexity and specificity of this research fields.

With our approach, we wanted to show that open innovation between competitors exists in the space industry. Indeed, our results are intended to contribute to the literature by showing that the space industry is not only governed by dyadic coopetitive behaviors but also by open innovation projects between competitors. Through our exploratory approach, we also wanted to show and emphasize the importance of management in open innovation projects between competitors. The literature has shown interest in studying management in these projects. Our work is part of this dynamic to show the community that management is indeed a key element in dyadic project success but that it can also be the keystone for open innovation projects.

However, we are aware that our work has certain limits. First limit is the profile and the number (25) of respondents. Indeed, at this point, we were able to meet with only 25 people who are most of the time experts and industrialists. We had the opportunity to meet some managers involved in open innovation projects but not all. To make a generality, it would be necessary to interview more actors. Our case deals voluntarily with one industry, the space industry and some projects in this industry. Thus, our results may be true in this limited context but be different in another industry.

To overcome these limits, it seems interesting to continue research on the subject by expanding the research field of management coopetition and opening the management of open

innovation between competitors. The deep observation of one or more projects of open innovation between competitors could eventually allow us to explore and understand in detail these projects in order to answer certain questions that the subject raises.

ANNEXES

Table 1: List of interviews

	PROJECT	ACTORS	POSITION	MODALITY	DURATION
1	**Copernicus**	Institutional	Head of Earth Observation Mission	Face to face	01h53
2	**Galiléo**	Institutional	Navigation manager	Face to face	01h32
3	**Copernicus**	Institutional	Coordinator	Face to face	01h16
4	**Satellites for 5G**	Institutional	Head of division	Teleconference	01h30
5	**Cassini-Hugens**	Institutional	Program manager	Face to face	01h55
6	**Galileo**	Institutional	R&D Business Manager	Face to face	01h01
7	**MBDA System**	Firms	Director of Programs	Face to face	01h00
8	**Galileo**	Institutional	President	Face to face	00h26
9	**CSU**	Firms	Director	Face to face	00h53
10	-	Firms	Director of European Programs	Face to face	03h47
11	-	Firms	Director of Operations and Transformation	Face to face	01h52
12	**MTG**	Firms	Program manager	Face to face	01h46
13	-	Firms	Account manager	Face to face	00h45
14	**CSU**	Firms	Development and Sponsorship director	Face to face	01h01
15	-	Institutional	Research and Technology Projects Manager	Face to face	01h25
16	**Satellite for 5G**	Institutional	Head of division	Teleconference	01h10
17		Institutional	Expert	Teleconference	01h10
18	**CSU**	Firms	Technical director	Face to face	01h25
19	**Satellite for 5G**	Firms	Program director	Face to face	01h25
20	**MTG**	Firms	Project manager	Teleconference	01h57
21	**Stratobus**	Firms	Project manager	Teleconference	00h45
22	-	Firms	Director of Transformation and Performance	Teleconference	1h15
23	**Cleansky**	Firms	Director	Teleconference	1h40
24	**MTG**	Firms	Project manager	Face to face	3h00
25	**MTG**	Firms	Product manager	Teleconference	1h10

Références

Afuah, A. (2004), Does a focal firm's technology entry timing depend on the impact of the technology on co-opetitors? Research Policy, 33(8), 1231–1246.

Ancarani, F., et Costabile, M. (2010), Coopetition Dynamics in Convergent Industries: Designing Scope Connections to Combine Heterogeneous Resources, in Yami, S., Castaldo, S., Dagnino, G.B. and Le Roy, F., eds., Coopetition: Winning Strategies for the 21st Century, Edward Elgar: Cheltenham.

Baumard, P. (2010), La logique de l'avantage coopétitif, In: Stratégies de coopétition : rivaliser et coopérer simultanément, Méthodes et Recherches, Bruxelles, DeBoeck, 81-100.

Becker.W et Dietz.J. (2004), R&D cooperation and innovation activities of firms—evidence for the German manufacturing industry. Research Policy 33 209-233

Belderbos, R., Carree, M., Lokshin, B., (2004), Cooperative R&D and firm performance. Research Policy 33, 1477–1492.

Belderbos, R., Faems, D., Leten, B., Looy, B.V., (2014), Co-ownership of intellectual property: exploring the value-appropriation and value-creation implications of co-patenting with different partners. Research Policy 43 (5).

Bengtsson M., et Kock S. (1999), Cooperation and Competition in Relationships Between Competitors in Business Networks. The Journal of Business & Industrial Marketing, Vol. 14(3), pp. 178-91.

Bengtsson M., et Kock S. (2000), Co-opetition in Business Networks – to Cooperate and Compete Simultaneously, Industrial Marketing Management, Vol. 29(5), pp. 411-426.

Bengtsson, M., et Kock, S. (2014), Coopetition — Quo vadis? Past accomplishments and future challenges. Industrial Marketing Management, 43(2), 180–188.

Bez MS. (2017), La coopétition technologique : pourquoi et comment partager sa technologie avec son concurrent ? Innovations

Bez M. S., Le Roy F., Pellegrin-Boucher E., Goursaud P. (2014), Le patient anglais, In Coopétition: les liaisons dangereuses, ED. J. Granata, P. Marques, 125-153, Pearson, Paris

Bonel E., et Rocco E. (2007), Coopeting to Survive; Surviving Coopetition. International Studies of Management & Organization, Vol. 37(2), pp. 70-96.

Bouncken, R.B., et Kraus, S. (2013), Innovation in knowledge-intensive industries: The double-edged sword of coopetition. Journal of Business Research, 66(10): 2060– 2070.

Brandenburger A.M, et Nalebuff B.J. (1996), Co-Opetition. Doubleday Currency, New York

Breznitz, D. (2009), Globalization, coopetition strategy and the role of the state in the creation of new high-technology industries, in Dagnino, G.B. and Rocco, E., eds., Coopetition Strategy: Theory, Experiments and Cases, Routledge: New York; London.

Campbell. A, et Cooper. RG (1999), Do Customer Partnerships Improve New Product Success Rates? Industrial Marketing Management. Volume 28, Issue 5, 507-519

Cassiman, B., et R. Veugelers. (2006), In search of complementarity in innovation strategy: internal R&D and external knowledge acquisition. Management Science 52: 68-82.

Chen, M.-J (2008), Reconceptualizing the Competition— Cooperation Relationship A Transparadox Perspective, Journal of Management Inquiry, 17(4), 288–304.

Chen, M.-J., et Miller, D. (2011), The Relational Perspective as a Business Mindset: Managerial Implications for East and West, The Academy of Management Perspectives, 25(3), 6–18.

Chesbrough H. (2003), Open Innovation: The New Imperative for Creating and Profiting from Technology. Harvard Business School Press Books, Boston.

Chesbrough H. (2006), Open Business Models: How to Thrive in the New Innovation Landscape. Harvard Business School Press Books, Boston.

Chesbrough, H et Bogers, M. (2014), Explicating Open Innovation: Clarifying an Emerging Paradigm for Understanding Innovation in Henry Chesbrough, Wim Vanhaverbeke, and Joel West, eds. New Frontiers in Open Innovation. Oxford: Oxford University Press, Forthcoming (pp. 3-28).

Choi, T. Y., Wu, Z. H., Ellram, L., Koka, B. R. (2002), Supplier–Supplier relationships and their implications for buyer–supplier relationship. IEEE Transactions on Engineering Management, 49(2), 119–130.

Clarke-Hill, C., Li, H., Davies, B. (2003), The paradox of co-operation and competition in strategic alliances: towards a multi-paradigm approach, Management Research News, 26(1), 1–20.

Dagnino, G.B., Padula, G. (2002), Coopetition strategy - A new kind of interfirm dynamics for value creation, in EURAM – The European Academy of Management, Stockholm.

Dahlander, L., Gann, D.M., (2010), How open is innovation? Research Policy 39 (6), 699–709.

Das, T.K., et Teng, B.-S. (2000), A Resource-Based Theory of Strategic Alliances, Journal of Management, 26(1), 31–61.

Depeyre, C. et Dumez, H. (2010), The role of architectural players in coopetition: the case of the US defense industry, in Yami, S., Castaldo, S., Dagnino, G.B. and Le Roy, F., eds., Coopetition: Winning Strategies for the 21st Century, Edward Elgar: Cheltenham, 124.

De Rond, M., et Bouchikhi, H. (2004), On the dialectics of strategic alliances, Organization Science, 15(1), 56–69.

Dorn.S, Schweiger.B, Albersc.S. (2016), Levels, phases and themes of coopetition: A systematic literature review and research agenda. European Management Journal. Volume 34, Issue 5, 484-500

Du.J, Bart Leten.B, Wim Vanhaverbeke.W. (2014), Managing open innovation projects with science-based and market-based partner. Research Policy 43 (2014) 828–840

Dubois, A., et Fredriksson, P. (2008), Cooperating and competing in supply networks: Making sense of a triadic sourcing strategy. Journal of Purchasing & Supply Management, 14(3), 170–179.

Eisenhardt, K. (1989), Building theories from case study research. Academy of Management Review, 14(4), 532–550.

Enkel, E., Gassmann, O., Chesbrough, H., (2009), Open R&D and open innovation: exploring the phenomenon. R&D Management 39 (4), 311–316.

Faems, D., de Visser, M., Andries, P., Van Looy, B., (2010), Technology alliance portfolios and financial performance: value-enhancing and cost-increasing effects of open innovation. Journal of Product Innovation Management 27 (6), 785–796.

Fernandez, A.-S., et Le Roy, F. (2013), Comment coopérer avec ses concurrents ? L'avènement de l'équipe-projet coopétitive, Revue française de gestion, 232(4), 61–80.

Fernandez A-S., F. Le Roy, D., Gnyawali, (2014), Sources and Management of Tension in Coopetition Case Evidence from Telecommunications Satellites Manufacturing in Europe, Industrial Marketing Management 43: 222-235.

Fernandez A-S. et Chiambaretto.P. (2016), Managing tensions related to information in coopetition. Industrial Marketing Management, 53: 66-76.

Fernandez, A.-S., Le Roy, F, Chiambaretto.P. (2017), Implementing the right project structure to achieve coopetitive innovation projects, Long Range Planning

Fjeldstad, Ø.D., Becerra, M., Narayanan, S. (2004), Strategic action in network industries: an empirical analysis of the European mobile phone industry, Scandinavian Journal of Management, 20(1–2), 173–196.

Gassmann, O., et Enkel, E., (2004), Towards a theory of open innovation: three core process archetypes. In: Proceedings of the R&D Management Conference, Lisbon, July 2004, pp. 6–9.

Guegen.G. (2008), Coopétition et écoystèmes d'affaires dans le secteur des technologies et de l'information : le cas des Terminaux Mobiles Intelligents". Conférence de l'AIMS

Gnyawali, D.R., et Madhavan, R. (2001), Cooperative Networks and Competitive Dynamics: A Structural Embeddedness Perspective, Academy of Management Review, 26(3), 431–445.

Gnyawali D.R., J. He, R. Madhavan. (2008), Impact of Co-opetition on firm competitive behavior: an empirical examination, Journal of Management, Vol. 32 No. 4, 507-530

Gnyawali D.R., J. He, R. Madhavan. (2008). Co-opetition: Promises and Challenges, In C. Wankel (Ed), 21st Century Management. Thousand Oaks, CA, 386-398

Gnyawali, D.R., et Park, B.-J. (2009), Co-opetition and Technological Innovation in Small and Medium-Sized Enterprises: A Multilevel Conceptual Model, Journal of Small Business Management, 47(3), 308–330.

Gnyawali, D.R., et Park, B.-J. (2011), Co-opetition between giants: Collaboration with competitors for technological innovation, Research Policy, 40(5), 650–663.

Gnyawali, D. R., Madhavan, R. M., He, J., Bengtsson, M. (2012), Contradictions, dualities and tensions in cooperation and competition: A capability based framework. Annual Meeting of the Academy of Management, Boston, MA.

Gronlund, J., Sjodin, D.R., Frishammar, J., (2010), Open innovation and the stage-gate process: a revised model for new product development". California Management Review 52, 106.

Hamel, G., Y. Doz, C.K. Prahalad. (1989), Collaborate with your competitors and win. Harvard Business Review 67: 133-139.

Hamel, G. (1991), For Competence and Interpartner Learning within International Strategic Alliances, Strategic Management Journal, 12, Special Issue: Global Strategy, 83-103.

Henkel.J, Schöberl.S, Alexya.O. (2014), The emergence of openness: How and why firms adopt selective revealing in open innovation. Research Policy. Volume 43, Issue 5, 879-890

Inkpen, A.C. (2000), Learning Through Joint Ventures: A Framework Of Knowledge Acquisition, Journal of Management Studies, 37(7), 1019–1044.

Jacobides, M.G., Knudsen, T., Augier, M. (2006), Benefiting from innovation: Value creation, value appropriation and the role of industry architectures, Research Policy, 35(8), 1200–1221.

Kim, J., et Parkhe, A. (2009), Competing and cooperating similarity in global strategic alliances: an exploratory examination. British Journal of Management, 20(3): 363– 376.

Khanna, T. (1998), The Scope of Alliances, Organization Science, 9(3), 340–355.

Kleymann. B. (2005), The dynamics of multilateral allying: a process perspective on airline alliances. Journal of Air Transport Management. Vol 11, 3, 135-147

Knudsen, M.P., (2007), The relative importance of interfirm relationships and knowledge transfer for new product development success. Journal of Product Innovation Management 24, 117-138.

Kwanghui L., H. Chesbrough, R. Yi. (2010), Open innovation and patterns of R&D competition", International Journal of Technology Management, 52: 295-321.

Lado A., Boyd N., Hanlon S. (1997), Competition, Cooperation and the Search for Economic Rents: A Syncretic Model. Academy of Management Review, Vol. 22(1), pp. 110-141.

Langley.A, et Royer.I (2006), Perspectives on Doing Case Study Research in Organizations, M@n@gement (Vol. 9), p. 81-94.

Laursen, K., et Salter, A. (2006), Open for innovation: the role of openness in explaining innovation performance among UK manufacturing firms. Strategic Management Journal, 27, 2, 131–150.

Laursen, K., et Salter, A., (2014), The paradox of openness: appropriability, external search and innovation collaboration. Research Policy 43 (5),

Lettl, C., Herstatt, C., Gemuenden, H.G. (2006), Users' contributions to radical innovation: evidence from four cases in the field of medical equipment technology. R&D Management, 36, 3, 251–272.

Lhuillery, S., et Pfister, E., (2009), R&D cooperation and failures in innovation projects: empirical evidence from French CIS data. Research Policy 38, 45–57.

Le Roy, F., Yami, S., Dagnino, G.B. (2010), La coopétition : une stratégie pour le XXIe siècle, in Stratégies de Coopétition: Rivaliser et Coopérer Simultanément, De Boeck: Bruxelles.

Le Roy F., et Fernandez, AS (2015), Managing coopetitive tensions at the working-group level: The rise of the Coopetitive Project Team. British Journal of Management, 26: 671–688.

Le Roy, F., et Czakon, W. (2016), Managing coopetition: the missing link between strategy and performance. Industrial Marketing Management, 53, 3–6.

Le Roy F., M. Robert, F. Lasch (2016), Choosing the best partner for product innovation: Talking to the enemy or to a friend? International Studies of Management Organisation, 46.

Le Roy.F, Fernandez.AS, Chiambaretto.P, (2017), Managing Coopetition in Knowledge-Based Industries, in S. Sindakis, P. Theodorou (ed.) Global Opportunities for Entrepreneurial Growth: Coopetition and Knowledge Dynamics within and across Firms (Advanced Strategies in Entrepreneurship, Education and Ecology, Volume) Emerald Publishing Limited, pp.187 – 198

Lazzarini. SG, (2008), The Transition from Alliance Networks to Multilateral Alliances in the Global Airline Industry, BAR, Curitiba, v. 5, n. 1, art. 2, p. 19-36

Le Roy F., Chesbrough H. (forthcoming), "Open Co-opetition", in Fernandez A-S., Chiambaretto P., Le Roy F., Czakon W. (eds), The Routledge companion to coopetition strategies, Routledge, London.

Luo Y., Slotegraaf R.J., Pan X. (2006), Cross-Functional "Coopetition: The Simultaneous Role of Cooperation and Competition Within Firms. Journal of Marketing, Vol. 70, pp. 67-80.

Luo Y. (2005), Toward Coopetition within a Multinational Enterprise: A Perspective from Foreign Subsidiaries. Journal of World Business, Vol. 40, pp. 71-90.

Luo Y. (2007), A Coopetition Perspective of Global Competition. Journal of World Business, Vol. 42, pp. 129-144.

Luo, X, Rindfleisch, A., Tse, D.K. (2007), Working with rivals: the impact of competitor alliances on financial performance. Journal of Marketing Research, 44(1): 73–83.

Madhavan, R., Gnyawali, D. R., He, J. (2004), Two's company, three's a crowd? Tri-ads in cooperative competitive networks. Academy of Management Journal, 6(47), 918–927.

Meschi, P.-X. (2006), Réseaux inter organisationnels et survie des alliances, Revue française de gestion, 32(164) 33–54.

Miles, M., et Huberman, A. (1991), Analyse des données qualitatives : recueil de nouvelles méthodes. Editions du Renouveau pédagogique ; De Boeck,

Miles, M., et Huberman, A. (1994), Qualitative data analysis: An expanded sourcebook of New Methods (2nd ed.). Thousand Oaks: Sage.

Miles, M. B. et A. M. Huberman (2003), Analyse des données qualitatives, Paris, De Boeck.

Miotti.L et Sachwald.F. (2003), Co-operative R&D: why and with whom? An integrated framework of analysis. Research Policy 32. 1481-1499

Mowery, D.C., (2009), Plus ca change: industrial RD in the third industrial revolution Industrial and Corporate Change 18 (1), 1–50.

Neyens, I.; D. Faems; L. Sels. (2010), The impact of continuous and discontinuous alliance strategies on start-up innovation performance. International Journal of Technology Management 52: 392-410.

Nieto M.J., et Santamaria M. (2007), The importance of diverse collaborative networks for the novelty of product innovation. Technovation 27: 367-37

Oliver, A. L. (2004). On the duality of competition and collaboration: Network-based knowledge relations in the biotechnology industry. Scandinavian Journal of Management, 20, 151–171.

Oshri, I. et C. Weber. (2006), Cooperation and competition standards-settings activities in the digitization area: the case of wireless information devices, Technology Analysis and Strategic Management, 18, pp. 265–283.

Oxley, J., et Sampson, R. (2004), The Scope and Governance of International R&D Alliances, Strategic Management Journal, 25(8/9), 723-749.

Padula, G., et Dagnino, G. B. (2007), Untangling the rise of coopetition. International Studies of Management & Organization, 37(2), 32–52.

Park.BJR, Srivastava.MK, Gnyawali.D, (2014b), Walking the tight rope of coopetition: Impact of competition and cooperation intensities and balance on firm innovation performance". Industrial Marketing Management.Volume 43, Issue 2, 210-221

Peng T.-J.A., et Bourne; M. (2009), The coexistence of competition and cooperation between networks: implications from two Taiwanese healthcare networks, Br. J. Manag., 377–400.

Peng, T-JA, Pike, S, Yang, JC-H., Roos, G. (2012), Is Cooperation with competitors a good Idea? An example in practice. British Journal of Management, 23(4): 532–560.

Pellegrin-Boucher, E., et Fenneteau, H. (2007), Le management de la coopétition : Le cas du secteur des ERP, Revue française de gestion, 33(176), 111–124.

Pellegrin-Boucher, E, Le Roy, F, Gurău, C. (2013), Coopetitive strategies in the ICT sector: typology and stability. Technology Analysis & Strategic Management, 25(1): 71–89.

Piller, F, et Walcher, (2006), Toolkits for idea competitions: a novel method to integrate users in new product development, R&D Management

Piller, F., et West, J., (2014), Firms, users, and innovation: an interactive model of coupled open innovation. In: Chesbrough, H., Vanhaverbeke, W., West, J. (Eds.), New Frontiers in Open Innovation. Oxford University Press, Oxford.

Quintana-García C., et Benavides-Velasco C.A. (2004), Cooperation, Competition, and Innovative Capability: A Panel Data of European Dedicated Biotechnology Firms. Technovation, Vol. 24, pp. 927-938.

Raza-Ullah, T., Bengtsson, M., Kock, S. (2014), The coopetition paradox and tension in coopetition at multiple levels. Industrial Marketing Management, 43(2): 189–198.

Ritala P., et P. Hurmelinna-Laukkanen. (2009), What's in it for me? Creating and appropriating value in innovation related coopetition. Technovation 29: 819-828.

Ritala, P. (2012), Coopetition Strategy – When is it successful? empirical evidence on innovation and market performance. British Journal of Management, 23(3): 307– 324.

Ritala.P, et Sainio LM. (2014), Coopetition for radical innovation: technology, market and business-model perspectives, Technology Analysis & Strategic Management, 26:2, 155-169

Robert.M, Chiambaretto, P., Mira, B., Le Roy, F. (in press). "Better, Faster, Stronger: The impact of market-oriented coopetition on product commercial performance". M@n@gement.

Rusko, R. (2011), Exploring the concept of coopetition: A typology for the strategic moves of the Finnish forest industry, Industrial Marketing Management, 40(2), 311–320.

Santamaria, L., et J. Surroca. (2011), Matching the goals and impacts of R&D collaboration. European Management Review 8: 95-109.

Seran, T., Pellegrin-Boucher, E., Gurau, C. (2016), The management of coopetitive tensions within multi-unit organizations. Industrial Marketing Management, 53, 31–41.

Sanou.FH, Le Roy.F, Gnyawali.D. (2016), How Does Centrality in Coopetition Networks Matter? An Empirical Investigation in the Mobile Telephone Industry. British Journal of Management, Vol. 27, 143–160

Teixeira J., et Tingting L (2014), Collaboration in the open-source arena: The WebKit case. ACM SIGMIS CPR 2014. 52nd ACM conference on Computers and people research. Singapore: ACM. pp. 121—129.

Tomlinson, P.R. (2010), Co-operative ties and innovation: some new evidence for UK manufacturing. Research Policy 39: 762-775.

Trudel.L, Simard. C, Vonarx.N. (2007), La recherche qualitative est-elle nécessairement exploratoire ? Recherches qualitatives. Hors Série – numéro 5 – pp. 38-45.

Tsai W. (2002), Social Structure of "Coopetition" within a Multiunit Organization: Coordination, Competition, and Intraorganizational Knowledge Sharing. Organization Science, Vol. 13(2), pp. 179-190.

Thiétart, RA. (2014), Méthodes de recherche en management. 4ième édition. Dunod,

Tidström, A. (2014.), Managing tensions in coopetition. Industrial Marketing Management, 43(2): 261–271.

Un, C.A., Cuervo-Cazurra, A., Asakawa, K., (2010), R&D collaborations and product innovation. Journal of Product Innovation Management 27, 673–689.

Van Brug.E, Giannoppa.C, Reymen, I. (2017), Open innovation in the European space sector: Existing practices, constraints and opportunities, Acta Astronautica 141 (2017) 17–21

Von Hippel.E. (2005), Democratizing innovation: The evolving phenomenon of user innovation, Journal für Betriebswirtschaft. Volume 55, Issue 1, pp 63–78

Walley K. (2007), Coopetition. An Introduction to the Subject and an Agenda for Research, International Studies of Management & Organization, Vol. 37(2), pp. 11-31.

Wang Y., et Krakover S. (2008), Destination Marketing: Competition, Cooperation or Coopetition? International Journal of Contemporary Hospitality Management, Vol. 20(2), pp. 126-141.

West, J., et Bogers, M., (2014), Leveraging external sources of innovation: a review of research on open innovation. Journal of Product Innovation Management 31 (4)

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

West, J., (2014), Challenges of Funding Open Innovation Platforms: Lessons from Symbian Ltd;. In: Chesbrough, H., Vanhaverbeke, W., West, J (Eds.), New Frontiers in Open Innovation. Oxford University Press, Oxford.

Wu.J. (2014), Cooperation with competitors and product innovation: Moderating effects of technological capability and alliances with universities, Industrial Marketing Management, 43, 199-209

Wu, Z., Choi, T.Y., Rungtusanatham, M.J. (2010), Supplier–supplier relationships in buyer–supplier–supplier triads: Implications for supplier performance, Journal of Operations Management, 28(2), 115–123.

Yin, R. (1984), Case study research: Design and methods. Beverly Hill