Knowledge Management: a Lever for Cluster Governance in Dynamizing SME's Open Innovation

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Abstract

Firms increasingly practice open innovation through a collaborative approach. Most studies so far have concentrated on larger firms, leaving aside SMEs while they increasingly use collaborative innovation to overcome their liability of smallness. However, their limited resources impede their capacity to enter or develop networks. Innovation clusters might be privileged space to favour the building of collaborative networks for SMEs and to enhance their knowledge potential and absorptive capacity, facilitating therefore their ability to assimilate external knowledge and create new "collaborative" knowledge.

In this paper, we propose to analyse the role of cluster governance as a potential intermediary in dynamising SMEs' openness through knowledge management practices. Our analysis compares 4 main knowledge brokering practices within three French innovation clusters, and how they foster and sustain open innovation patterns. Our study confirms the importance of cluster governance as a powerful intermediary in enhancing SMEs absorptive capacity and supporting their ability to integrate collaboration networks. We also find that these practices rely on the capacity of the cluster governance to build strong cohesion links between heterogeneous members through differentiated approaches of socialization and/or formalization. This work provides critical lenses for cluster managers to adopt adequate knowledge management practice to foster collaborative innovation dynamics for its members.

Key words: collaborative innovation, cluster governance, knowledge broker, SME, openness

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1. INTRODUCTION

After more than 10 years of research in Open Innovation (OI), the challenge for academics is to highlight the diversity of implementation approaches, particularly in innovation collaborative networks (West, Salter, Vanhaverbeke, & Chesbrough, 2014). Recent statistics show that 78% of European and American companies increasingly practice collaborative innovation (Chesbrough & Brunswicker, 2013). According to different authors (Demil & Lecocq, 2012; Ketchen, Ireland, & Snow, 2007), collaborative innovation is the establishment of innovations across firm boundaries through the sharing of ideas, knowledge, expertise, and opportunities. Studying the implementation of open innovation through network collaborative dynamics allows us to consider two main factors influencing the mechanisms of a sustainable approach of innovation: **size** and **spatial** dimension (Gassmann, Enkel, & Chesbrough, 2010). In this sense, innovation clusters are privileged space to observe inter-organizational collaborative dynamics and to favor the building of collaborative networks for SMEs. Clusters are defined as "*geographic concentrations of interconnected companies and associated institutions in a particular field*" (Porter, 1998, p.78). They are increasingly recognised as a major determinant of SME's innovative performance (Folta, Cooper, & Baik, 2006; Freel & Harrison, 2006).

This approach overcomes the limited attention that SMEs have received in OI researches (Gassmann et al., 2010). Most studies on OI have investigated its process in large companies (Chesbrough and Brunswicker 2013). However the few existing studies confirm the importance of SMEs in the collaborative innovation landscape (Bianchi, Cavaliere, Chiaroni, Frattini, & Chiesa, 2011; Spithoven, Clarysse, & Knockaert, 2011) and the fact that smaller companies increasingly and extensively do practice open innovation activities in order to overcome their "liability of smallness" (Gassmann et al., 2010; Van de Vrande, De Jong, Vanhaverbeke, & De Rochemont, 2009). Indeed, their limited resources impede the building and maintaining of collaborative networks (Huizingh, 2011; Lee, Park, Yoon, & Park, 2010). Another obstacle to open and collaborative innovation for SMEs is their limited capacity to absorb and exploit external knowledge and therefore to effectively share knowledge within innovation

collaborative projects. A new understanding in knowledge management posits that knowledge sharing cannot be stimulated by imposing structures but by social interaction and immersion in practices (Hislop, 2005). Innovation clusters can therefore constitute interesting places for SMEs to stimulate and enhance their knowledge potential (Bahlmann & Huysman, 2008). Recent but few studies have particularly questioned the role and impact of cluster governance in the construction of specific networks for collaborative innovation and knowledge sharing (Bahlmann and Huysman, 2008; Bell et al., 2009; Castro Gonçalves, 2015).

This research aims at analyzing the role of innovation cluster governance in dynamizing SMEs openness through knowledge management practices defined as "organizational practices that facilitate and structure knowledge sharing among knowledge workers" (Bahlmann and Huysman, 2008, p.304).

To answer this gap, we suggest to combine cluster governance literature (Berthinier-Poncet, 2012) with knowledge brokering literature (Hargadon, 1998, 2005) in order to highlight how these intermediary structures contribute in developing KM practices to build SMEs' absorptive capacity (Lee *et al.*, 2010) facilitating therefore their open innovation practices. In particular, we explore how they support and encourage different outside-in and inside-out collaboration of SMEs in sustainable collaborative innovation approach.

2. THEORETICAL BACKGROUND

2.1. THE ROLE OF CLUSTERS IN FACILITATING SME'S COLLABORATIVE INNOVATION

According to Davis and Eisenhardt (2011) and Ketchen and *al.* (2007) collaborative innovation refers to inter-organizational relationships focused on the joint development of innovation using collaborative approach that involves combining knowledge, technologies and other resources across organizational boundaries. In the same vein, the main purposes of open innovation model are to accelerate internal innovation and accumulate additional value through the market by using both outside-in and inside-out movements of knowledge and technologies between different actors (Chesbrough & Crowther, 2006). This collaborative mode allows partners to benefit simultaneously of open process using external sources and closed model based on property protection and exploitation.. Researchers have successfully synthesized different concepts and have attracted attention from managers, academics and policy-makers to the open processes. Demil and Lecocq's (2012) analysis concludes that collaborative innovation is

generally assimilated by open innovation: since 2000 the first term seems to have been removed, following the success of the work of Henry Chesbrough.

Huang and Rice (2013) underline the complementarity of the clusters' and collaborative innovation's notions. In fact, clusters take a benefit of the inter-organizational network effects, knowledge flows and spillovers as well as of the collaboration within groups of firms, and between firms and other institutions. Especially, Link et al. (2007) and Engel (2015) show the essential role of the cluster's governance in creating the necessary conditions for successful integration of SMEs in the external collaboration. However, other than the work of Cooke (1998, 2001) who explicitly studied the relationship between collaborative innovation, clusters and regional innovation systems, there has been limited research around this issue so far.

2.2. CLUSTER GOVERNANCE LEVERS FOR DYNAMISING OPENNESS

Cluster governance is a relatively new and rich concept. Stemming from various and successive streams of literature – from corporate to network through public governance – cluster governance builds its specificity by considering the territorial and institutional components of regional clusters (Alberti, 2001; Bell et al., 2009; De Propris & Wei, 2007).

In the context of French clusters characterized by a top-down development policy and a strong implication of the State and the regions, the footprint of institutional (1) and political (2) dimensions is important (Torre & Rallet, 2005). The first institutional dimension shows how clusters build effective communication and collaboration through shared values and representations between actors, while the political one emphasize coordination, control and regulation of the co-located actors (Berthinier-Poncet, 2015).

However, in this research, we are particularly interested in a third cluster governance dimension: the *cognitive* one. For the recent research stream of the "Knowledge-Based-View of Clusters" (Arikan, 2009; Bahlmann & Huysman, 2008; Maskell, 2001), learning and knowledge exchanges between cluster's organizations constitute the main strategic asset of clusters. Emphasis is placed on inter-firm knowledge exchanges. The complexity and heterogeneity of actors in innovation clusters – institutional players, large and small firms, private and public research units, education – make knowledge management much more complex than it is within a corporate context. Creating and exploiting flows of knowledge for the benefit of the cluster lay beyond the responsibility of a single player like one of the leading

firms in the cluster. An effort from clusters to identify and understand the needs of the different players are essential to facilitate OI dynamics and ensure the durability and the competition of the territorial networks. The SMEs are particularly concerned by this process due to their lack of resources, knowledge and information access, their small size and limited R&D activities (Gassman et al. 2010), and their insufficient organizational adaptation ability and lack of managerial experience (Traitler, Watzke, & Saguy, 2011).

How can cluster governance, defined as a steering and managing structure in charge of the coordination and the regulation of the inter-organizational relations within the cluster, effectively manage knowledge creation processes as well as knowledge transfer and diffusion necessary to the competitiveness of the innovation cluster? Do cluster governance act as a "*social architect*" (Corno, Reinmoeller, & Nonaka, 1999) or more precisely as a "*knowledge broker*" (Hargadon, 1998) ? And how the knowledge brokering activities of the cluster governance might influence the cluster dynamic in terms of collaborative innovation?

2.3. KNOWLEDGE BROKERING ACTIVITIES IN CLUSTERS

The concept of knowledge broker has been studied through network studies (Gould & Fernandez, 1989) and innovation studies (Hargadon, 1998). A broker is an actor who connects producers and users of knowledge (Meyer, 2010). By acting on the flow of resources between these different unconnected actors (Shi, Markoczy, & Dess, 2009), they contribute to the interpretation, translation and recreation of knowledge (Pawlowski & Robey, 2004; Perrin, 2013).

A first theoretical perspective of this concept was described and discussed by Hargadon (1998) through new product development processes within industrial enterprises. The objective was to show how knowledge brokers combine knowledge of the markets and technologies for applications in untapped areas through four main activities (Hargadon, 1998):

- Activity 1. Give **access** of existing knowledge to new companies and new situations of knowledge share;
- Activity 2. **Learning** from the variety of knowledge to consider new uses;
- Activity 3. **Link** complementary teams and people; and
- Activity 4. **Implement** innovation by transforming concepts in real products and organizations for new uses

This mission is associated with the need to develop a strong strategy to maintain the continuity of innovation activities (Hargadon, 2005). Our objective is to understand how the governance units of clusters develop these activities in operational and strategic level of their innovation activities.

In the context of innovation clusters, two main researches offer a reflection on this issue. Dussuc and Geindre (2012) identified specific templates of brokering actions in a French cluster emphasizing the importance of the governance in developing all the activities discussed by Hargadon (1998). However the research shows the poor position of the cluster on supporting activities allowing innovations to access their market (activity 4 in the Hargadon's typology). Castro-Gonçalves (2015) completes this work by identifying the specific individuals conducting knowledge brokering practices and describing and analyzing in detail the particular practices they develop in another French innovation cluster. The author shows how these practices contribute to the definition, deployment and strategic adjustment of the cluster overtime. She underlined that when the cluster obtains a high maturity level the activity 4 emerges.

Despite this important contribution in the scare literature, the authors do not outline the link with collaborative innovation which is at the very heart of the innovation clusters' mission. Can we find some common patterns of knowledge brokering practices that lead to the development and fostering of collaborative innovation within clusters?

In the empirical part that follows, we suggest to use the framework on knowledge brokering activities defined earlier to analyze the different practices implemented by three different cluster governances and their impact on collaborative innovation.

3. METHODOLOGY

3.1. THE QUALITATIVE APPROACH IMPLEMENTED

We propose a comparative qualitative approach of three French competitiveness clusters: Advancity, Axelera and Imaginove. "Competitiveness clusters" are issued from a French top-down political initiative that launched in 2005 a national call-for-project for the creation of regional innovation clusters, mimicking the Silicon Valley cluster. 71 clusters were selected and created, Advancity, Axelera and Imaginove belonging to this first wave. Following the call-for-project, French competitiveness clusters represent the spatial agglomeration of firms, research and education centres evolving in the same industry and developing innovative

collaborative projects in order to foster innovation and competitiveness at the national and international level. Advancity is in the Parisian region whereas Axelera and Imaginove are located in the Auvergne - Rhône-Alpes region, both regions being respectively first and second in terms of industrial and innovation competitiveness and representing together 24 clusters out of the 71 created in 2005.

3.2. DESCRIPTION OF OUR THREE CASE STUDIES

3.2.1. Advancity

Advancity is a Parisian innovation cluster that was created in 2005 under the leadership of the Chief Executive Officers (CEOs) of institutions from the Polytechnicum of Marne-la-Vallée. This cluster, which is recognized for its international potential, is based on the growth area of the sustainable city and mobility. Today, of 241 members, 178 are companies (18 major groups and over 160 SMEs–small medium industry), 31 represent academia (150 public and private laboratories are represented) and 31 are institutional actors (local governments, professional alliances, regional chambers of commerce and industry, incubators, etc.).

12 people compose the operational team in charge of governance. They need to face three main challenges to create a strong link between the four brokering activities studied: to construct a common definition of the concept of sustainable cities and mobility (1), to cross the knowledge boundaries existing because of the strong technological heterogeneity (information and communications technology, electronics, materials, chemicals, etc.) from the different players concerned (community utilities and services for industry, transport, industry and operations in the energy sector, the construction industry, telecommunications, engineering, etc.) (2), evolve local public authorities as partners of the innovations (for conducting experiments in the cities) or as the main target market (3). In six years of operation (2006-2012), the cluster approved 358 projects of the 470 proposed by its network, and 136 of them were funded. The cluster goes through the French government pressure to generate more innovation projects.

3.2.2. Axelera

Axelera aims at developing innovative and competitive industry solutions at the confluence of chemistry, environment and energy: “green chemistry”. It was initially created by five organizations: three industrial firms (Arkema, GDF Suez Environnement now split into Suez and Engie, Rhodia now Solvay) and two research centres (IFP Energies Nouvelles, CNRS), all of them being key national and international players in the chemical and environmental

industry. The initial impulse to link chemistry and environment was however given by two major institutional players: Auvergne-Rhône-Alpes region and the Grand Lyon representing the Metropolitan Council of Lyon, an inter-communal structure assembling 59 municipalities around Lyon. The "Chemical Valley" existed long before the creation of the competitiveness clusters but the regional and local authorities saw the national call for project as an opportunity to revitalize this industry and asked players of both industries to develop a common project, linking chemistry and environment.

Axelera gathers today 322 members: firms, research labs and education and training organizations. Its geographical perimeter is the Rhône-Alpes region but the hub is the Lyon metropolis. The cluster is structured around five strategic industrial themes: 1) Chemistry and Environment for application markets, 2) Preservation of natural areas, 3) Recycling and recyclability of materials, 4) bio-sourced chemistry, and 5) the Factory of the Future.

3.2.3. Imaginove

Imaginove federates and contributes to the expansion of projects and businesses belonging to the digital content industry in the Auvergne-Rhône-Alpes region. Originally created as a cluster for the video-game industry, the Grand Lyon and the region, main public financers after the State, constrained the evolution of the cluster to a larger scope, backing local players in the cultural and creative images industry (video-games, movies, audio-visual and multi-media). They were firmly convinced that the future of the image industry would lie in the convergence of those different industries and that the main goal of the cluster was to provide the foundations to foster true collaborative and innovative dynamics among them. Unlike Axelera, major industrial players do not support Imaginove but the cluster is rooted in a strong industry of digital content and usages in the Rhône-Alpes region.

The cluster gathers more than 160 members, mostly small firms, research labs and academic schools in the creative industry. Its scope of activity is the Auvergne-Rhône-Alpes region with 4 centres of excellence in Annecy and Bourg-les-Valence for the animation industry, in Villeurbanne (Lyon) for the audio-visual and in Ardèche for the documentary.

The table 1 hereunder offers a comparative overview of the three clusters with main data concerning the member firms and the cluster governance.

Table 1. Description of the 3 case studies

	ADVANCITY	AXELERA	IMAGINOVE
Creation Date	**2005**	**2005**	**2005**

Main Themes	Sustainable city and mobility	Chemistry, Environment and Energy	Digital content and usages (Video-games, audio-visual, multi-media)
Region	Parisian region	Auvergne-Rhône-Alpes	Auvergne-Rhône-Alpes
Nb of firms	**241**	**187**	**160**
SME (<250)	160	112	101
Strategic areas	**4 strategic areas:** Urban technologies and renewable energy ; Sustainable buildings and infrastructure ; Transport, accessibility and mobility ; Green City	**5 strategic areas**: Renewable raw materials; Eco-efficient factory; Products and materials for industry; Recycling and recyclability; Preservation and restoration of natural and urban areas	Digital content and usages with strong cultural and creative components. **5 target markets**: health, smart cities, education, service robotics, museography
Collaborative projects	136 projects/	260 projects / 800 M€ funding	175 projects / 350 M€ funding

	ADVANCITY	**AXELERA**	**IMAGINOVE**
Cluster Governance			
Strategic Management board	**13** members (SME, Large group, Research lab, Institution)	**8** members (6 founding members + 2 representatives of SMEs)	**6** members
Executive board	13 members from different bodies	25 members (3 bodies: industrials, scientists et education)	20 members (5 bodies: Poles of excellence, Large groups, SMEs, Research Labs, Education bodies)
Operational team	12 people	13 people	10 people

3.3. DATA COLLECTION AND ANALYSIS

The goal of our research was to analyse specific phenomena, which have been little studied, to date and which correspond to particularly innovative situations (David & Hatchuel, 2007). A total of 34 semi-structured, in-depth, face-to-face interviews with managers and members of the three clusters were conducted.

The interviews were all recorded and fully transcribed. To triangulate the data, we used many public or confidential documentary sources (website, newspaper articles, internal policy documents) and non-participant observations. The whole data generated categories of data that can be compared with the concepts of the literature on governance clusters and brokering activities (knowledge access, learning, networking and implementation). We then used the analysis grid following Hargadon (1998) to identify the knowledge brokering practices in each cluster, and we made a comparison in a second step for aggregate results.

4. RESULTS

To structure the analysis of this research, we will present the practices implemented by the cluster governance to sustain and foster collaborative innovation dynamics within the cluster according to the 4 main knowledge brokering activities: 1) Access, 2) Learning, 3) Link, and 4) Implementation.

4.1. BROKERING ACTIVITIES IN ADVANCITY

Access

The construction of a territorial distinctive competence in an international perimeter and a collective identity in a internal perimeter are in the center of the strategic definition of Advancity. They are also a means for identifying the target markets of innovation and the strategic positioning of the cluster *vis-a-vis* other clusters, which sometimes generates strategic tensions between the internal and the external (Castro *et al.*, 2012).

The results of this research show that this strategic definition follows a progressive process. As the network has become denser, the access to new knowledge changes gradually the strategic areas of the cluster. To find ways to balance the network accordingly to assure the collective collaborations and the respect of innovation environment, *the analysis of network dynamics* becomes a major practice that includes the access activity set up by the governance unit of Advancity. It aims at managing the diversity of knowledge and also ensuring the involvement of the actors in the collective dynamics.

The passage from 3 areas in 2005, to 7 in 2008, to 4 in 2012, shows the adjustment the identity of the network considering the growth of knowledge domains. The strategic reviews realized every 6 month with all the members of the cluster, underline the participation of the network on the strategic definition basing on their expertise. The governance of Advancity can than guide the actors to one field of knowledge or another. Each of the four strategic committees is now driven by industrial actors, instead of being guided by the governance team of the cluster. This organizational change has surprised some members but encourage the dynamic to access knowledge in the network.

Learning and Link

The learning and networking brokering activities are related to the running of the network, by aiming at the combination of knowledge and future uses of innovation (Dussuc and Geindre, 2012). In this context, the population concerned by each strategic area vitalizes the *practice of experimenting* with new ideas. At monthly or bi-monthly meetings, a core group of 6-15 actor members reacts to the potential of the ideas presented by sharing their experiences and making suggestions. It is mainly *discursive practices* that are at work in this system. New applications of technology are then identified.

Organizational reliability that is generated by access activities creates a sense of belonging to these groups of people and of trust towards the other members. People with ideas express themselves more easily and actor members contribute to the development of ideas by making them benefit from their knowledge of the subject. Thus, beyond the combination of knowledge related to innovation projects, they offer general thinking about specific topics. The formalization of discussions on the forms of strategic roadmaps is the result of collective learning that takes place during knowledge sharing. It makes visible the cognitive heritage that structures the network of actors and renews it. The SCOs represent localized communities participating differently in the strategy-making process of the cluster.

Implementation

Implementation activity was not identified within the cluster Dussuc and Geindre (2012) analysed. However, the *practice of supporting* development and the introduction of innovations in the markets seems to correspond to this activity in Advancity. Indeed, governance attempts, on the one hand, to develop ways that make it possible to promote innovation and, on the other hand, to display what constitutes the identity of the network as a differential in the market. In the context of Advancity, the quest for a common representation of sustainable development through the use of a common reference document seems to be an opportunity for differentiation through the creation of a *procedural practice.*

The groups from each strategic area also participate in implementation activities by selecting potential markets. Discussions about innovation projects in various stages of development enable them to build up organizational knowledge about environmental projects. Nowadays, 17 different markets have been identified and formalized as references for new entrants in the cluster. Moreover, other initiatives, such as the creation of "project coaches", are planned, to follow-up a project from its beginning to obtaining financing and then by evaluating the contribution of the project in terms of market access by a volunteer member.

4.2. BROKERING ACTIVITIES IN AXELERA

Access

In order to give access to new knowledge to the cluster members and to foster situations of exchange between them, the governance of Axelera faced a major issue right from the start: build a collective identity since members belonged to two distinctive industries – chemistry and environment – that were not used to work together and even had conflicting interests! ,To ensure the creation of a certain consistency within the cluster members, the governance focused heavily on networking practices – internally and externally. The coordination and the development of network dynamics at Axelera aimed not only at managing the diversity of knowledge but also at ensuring the involvement of heterogeneous actors in collaborative dynamics of innovation. For that, they launched right from the start a regular networking event, the "Jeudis d'Axelera" (10 per year), that gradually became the flagship product of the cluster. Not only did they present some selected members and the main actions and collaborative projects led by the cluster, but also they organised "speed meetings" to facilitate reciprocal discoveries and exchanges. This event led to the creation of a real social network, facilitating

the access to very diverse sources of knowledge as well as the exchange of knowledge. Other networking devices followed such as *Axelera Business Club*, a club for SMEs to help them exchange good practices and develop business networks with larger firms, and the participation to professional fairs under a common banner to facilitate the access to external knowledge. The governance of Axelera recognizes also its fundamental role in facilitating the links between the research and academic world and the business environment, in order to facilitate the emergence of synergies and knowledge transfer even if the gap is still there: "*We created walkways, bridges, but the gap is still there, culturally*." (Responsible of economic development). To overcome the difficulties to give access to new knowledge to all its members, Axelera has heavily relied on formal supports such as a very well documented and regularly updated website, an intranet with detailed membership directory, newsletters on technology and economic intelligence.

Learning

Since its creation, the governance of Axelera has concentrated its action in attracting and integrating SMEs in the cluster since "t*hey play a role of knowledge broker for setting up projects and funding*" (Former director of Axelera). This diversity, in terms of knowledge base as well as size and industry sector, is a great opportunity for the collective learning at the cluster level. As stated by a member of the strategic governance, founder of Axelera, "*the SMEs, that knock at our door, have all in common innovation and the need of networking. However, it is our role to provide them with greater awareness of their innovative potential".* In other terms, the cluster governance needed first to develop the absorptive capacity of its SME's members in order to facilitate the absorption and sharing of collective knowledge. They set up a "SME's PACK" with different devices aimed at facilitating the learning of new knowledge (training programmes on scientific and technical themes, one-day conferences or round tables led by academic or scientists of the domain, longer coaching and training sessions on innovation and management topics).

Linking

The linking activity enables the creation, mobilization and use of a collective knowledge specific to Axelera members through two major practices that developed innovative and complementary teams. First, the creation of 15 "*cluster programs*", transverse to the different industrial sectors of the cluster and embedded in the strategic themes defined by the governance: "*The specificity of Axelera is that we have mounted, more precisely driven by the*

cluster governance, large collaborative programs. (...) It allows to federate, to give a global overview on a innovation topic" (Axelera's general delegate).

The second practice is the constitution of active *knowledge communities* within eight "*ecosystems of innovation*" that accelerate the innovation and network dynamics within the cluster and facilitate the learning experience at the cluster level. As outlined by the former general delegate of the cluster, these ecosystems favour the development of "*an active community of members who are in the innovation projects as well as in the global dynamic of Axelera*." All collaborative projects are jointly elaborated and validated by the members of the ecosystems – large firms, SMEs, research labs, institutions – which legitimize the collaborative and knowledge building dynamics. Moreover, these ecosystems facilitate the integration and collaboration of SMEs in the cluster dynamic: "*Ecosystems generate a dual dynamic, of network as well as of innovation*." (Operational governance)

These ecosystems participate to the knowledge brokering activities as they facilitate the identification and construction of new knowledge through brainstorming meetings and thematic workshops, but also through the implementation of a specific unit in charge of scientific and business intelligence, collect of information on market actors, strategic analysis of specific theme.

Implementation

Aware of the intrinsic difficulty of implementing collaborative projects into real realizations (not only patents or innovative concepts), the governance of Axelera developed two "implementing" activities. First, they organized public "*Valuation Days*" for the finished collaborative projects to highlight the scientific and commercial results and increase the sharing and diffusion of the collective knowledge among cluster members, triggering a dynamic of collaborative innovation.

The second activity aims specifically at developing concrete realisations out of collaborative projects*: Collaborative Innovation Platforms*. These platforms are physical spaces that mutualize tools, machines, resources to facilitate the experimentation and the concrete implementation of the results of collaborative innovation projects. *Axel'One* is a platform launched by Axelera that offers "*a neutral territory where partners can work together to undertake collaborative researches*". It is a key brokering tool to facilitate *cross-fertilization*, promoting the transfer of knowledge from academia to industry, and *co-innovation*, by giving back to the academic sector a permanent vision of the industry bottlenecks.

4.3. BROKERING ACTIVITIES IN IMAGINOVE

Access

Giving access to knowledge, new and existing one, is a major task for the governance of Imaginove as most of its members are very diverse small firms with limited resources (financial as well as human) and great heterogeneity in terms of industry and approach to innovation. The necessity of building a collective identity to support the cohesion of cluster members and developing their absorptive capacity is here fundamental to facilitate the access to a collective knowledge at the cluster level. Two phases were needed for Imaginove: a *structuring* phase during five years followed by a *mutualisation* phase.

The structuring phase aimed at harmonizing practices and cultures within the cluster through informal networking events ("*Apéro'Rezo*"), and specific training business programs that facilitate both the internal as external networking as many business travels were part of it. Common participation to professional fairs and business conventions under Imaginove's banner are also part of the "access" package.

The current phase of mutualisation is focused on creating conditions favouring the emergence of a real network in which actors share collaborative values, including the mounting of joint projects oriented cross media and digital content. Within the governance operational team, the director and the R&D project manager have a pivotal role between the academic world and research labs on one hand and the firms on the other hand. They facilitate the identification of new and specific knowledge for the firms as they have a good knowledge of both worlds.

Learning & Link

The two brokering activities are linked at Imaginove. The cluster governance progressively developed a series of devices to bring together members of the cluster and to promote the creation of new knowledge pooled around the cross-media, and the *Serious Game* in particular, that embodies possible synergies between the different industries of the video-game, multimedia and audio-visual. They created their own professional fair, *the Serious Game Expo*, every year in Lyon, with workshops to specifically exchange on cross-media projects, as well as a yearly business convention, the *White Forum*, to discuss the evolution of the new usages and contents of the Image and Digital Content industry. In the same vein, a "*Think Tank*" was launched in 2012 whose mission is "*to feed the reflection of professionals gathered in*

communities around key themes": it gathers cluster members and outsiders to generate new ideas brewing, produce new and specific content and encourage cooperation.

Moreover, the cluster governance launched its own call for collaborative projects on the specific topic of Serious Game and New Usages (SGNU) to promote the constitution of a knowledge basis common and specific to the cluster members: "*Now we see that we need structuring projects, large structuring projects to go further. (...) We need to have the companies working together to create new and common content"* (President of the executive board).

Implementation

Like the collaborative platform projects or institutes of excellence supported by the state as part of the cluster policy, we observe the same gradual evolution at Imaginove towards the development of physical devices facilitating the implementation of the innovative concepts issued from the collaborative projects. The "*Living lab*" is a laboratory of the new usages that offers the cluster members a shared platform to test developed technologies before being placed on the market and at a lower cost: "*the challenge for us is to ensure that the territory could be identified as a place of experimentation where you can come and test new ideas, new products."* (Innovation project manager).

The second knowledge brokering practice is the "*Pixel Pole*", a "*creative factory to R & D projects*", a building housing the governance team of Imaginove, a co-working space, "*The Cube*", as well as an incubator, "*Imag'Incub*" that welcomes a project owner during 9 months and helps him/her to maximize the chances to implement his/her innovative project. The incubator is not only a venue but also "*a place to exhibit new media and new digital content, a place of exchanges and communication between the different project developers*" (operational governance).

5. DISCUSSION

As stated in our literature review, SMEs suffer a lack of resources, human as well as financial, that impede the recourse to collaboration for innovation, even if they progressively tend to open up their innovation process (Van de Vrande et al., 2009). The tree case studies we analysed in this research, confirm the position that by integrating an innovation cluster, SMEs try to reinforce their "liability of smallness" (Gassmann et al., 2010) through the development of open innovation and collaborative dynamics. In this way we contributed to this literature showing the concrete practices developed within these innovation clusters to activate different

proximities, and therefore to "dynamise" the openness of the clustered SMEs.

Following the "*knowledge-based-view of clusters'*, we concentrated our analysis on the knowledge component of open and collaborative innovation, and more precisely we studied the role of the cluster governance as it plays a specific role in 1) facilitating the access to knowledge to its cluster members, 2) developing the learning at the collective level and 3) the links between its members and, 4) foster the implementation of the conjointly developed knowledge. Those four main practices relate to the role of "knowledge broker" that we studied in three French clusters of innovation: Advancity, Axelera and Imaginove.

Our comparative analysis first highlights the activation of all brokering practices, especially for the first three phases: access, learning and link. To facilitate the access to knowledge to all cluster members, and specifically SMEs, and to lay the foundation for knowledge sharing and open innovation, we observed a common practice implemented by the three cluster governance: the creation of a collective identity at the cluster level to build cohesion between its members. As a matter of fact, the diversity and heterogeneity of the cluster members, in size as well as in knowledge base and absorptive capacity, is a great asset for enhancing open innovation processes within the cluster. However, it is at the same time a major challenge for cluster governance, as it needs to create an atmosphere of trust and a common sense of belonging between all its members for facilitating the access and sharing of collective knowledge at the cluster level. A second challenge emerged through this analysis: the importance of developing the absorptive capacity of clustered SMEs.

The analysis of the cognitive level of governance cluster shows the double flow of knowledge inside-out and outside-in concerning the opening process through socialisation and formalization approaches. While Imaginove coordinates its members through an informal and socialisation approach of knowledge, Axelera applies a more formal approach and Advancity oscillates between both approaches. The results broaden the understanding on the scope of practices cluster governance can implement to better develop the potential of open innovation for SMEs. They also confirm the importance of cluster governance as a powerful intermediary (Lee et al., 2010) in supporting SMEs' ability to integrate collaboration networks and eventually work together more effectively. Implications are both academic and managerial since we fill a gap in the open innovation literature for SMEs and the cluster governance literature. This work also provides a critical lens for cluster managers to adopt adequate practice to foster collaborative innovation dynamics for its members.

Table 2 gives the detail of these different cluster governance and knowledge management approaches.

Table 2. The cognitive dimension of cluster governance

Governance levers	IMAGINOVE	AXELERA	ADVANCITY
COGNITIVE	**Socialization of knowledge** - Brokering role of the Innovation project manager at the cluster level (linkages facilitator between academic & SMEs) - Training to develop knowledge base of SMEs & participation to professional fairs	**Formalization of knowledge** - powerful device to capture and co-create knowledge at the cluster level and favour outside-in or inside-out processes. - Large offer of informative training sessions for SMEs to develop a common K-base - Creation of physical collaborative platforms or research institutes	**Socialization and formalization of knowledge** - Formalization through 2 regulars events followed by cluster members aiming at presenting the results of strategic deployment and negotiating new strategy developments depending on the interests of clusters members. - Creation of coaching of SMEs practices and a web platform presenting the reference markets of the cluster

6. CONCLUSION

This comparative analysis puts in evidence the effects of each type of brokering activities on collaborative innovation dynamics. We found that cluster governance initially handled all brokering activities and progressively extended them to their members, then becoming a widespread activity within the internal networks. However, we also found that depending on initial cognitive distances between cluster members, the four knowledge-brokering activities were implemented differently. The maturation of these practices goes together with the maturation of its own cluster. The practice of experimentation particularly affects brokering activities and produces learning and networking effects within the cluster.

Finally, by focusing on concrete knowledge brokering activities that can be implemented by the cluster governance structure, we contribute to the current research of the *knowledge-based view of clusters* (KBVC) (Bahlmann and Huysman, 2008; Arikan, 2009). This current research emerged to point out the major role of knowledge in the development of regions but relatively little work has so far specifically focused on the knowledge management practices developed by cluster governance units.

The outcomes of this comparative research on knowledge brokering activities within French clusters induce the elaboration of practical knowledge management tools to create specific value at the territorial and cluster level. In particular we point out how these brokering activities focused on knowledge management help to reinforce the integration of SMEs in collaborative innovation dynamics within the cluster.

References

Alberti, F. 2001. The governance of industrial districts: a theoretical footing proposal. ***Liuc Papers***, Serie Picc(n°82): 1–31.
Arikan, A. T. 2009. Interfirm Knowledge Exchanges and the Knowledge Creation Capability of Clusters. ***Academy of Management Review***, 34(4): 658–676.
Bahlmann, M. D., & Huysman, M. H. 2008. The emergence of a knowledge-based view of clusters and its implications for cluster governance. ***The Information Society***, 24(5): 304–318.
Bell, S. J., Tracey, P., & Heide, J. B. 2009. The Organization of Regional Clusters. ***Academy of Management Review***, 34(4): 623–642.
Berthinier-Poncet, A. 2012. ***Gouvernance et innovation dans les clusters à la française. Une approche par les pratiques institutionnelles***. Thèse de doctorat, Université de Grenoble, Annecy.
Berthinier-Poncet, A. 2015. ***The governance of sustainable territorial value chains. The impact of institutional practices of innovation in clusters***. Presented at the EURAM, Varsovie, Pologne.
Bianchi, M., Cavaliere, A., Chiaroni, D., Frattini, F., & Chiesa, V. 2011. Organisational modes for Open Innovation in the bio-pharmaceutical industry: An exploratory analysis. ***Technovation***, 31(1): 22–33.
Castro Gonçalves, L. 2015. Strategizing across boundaries: revisiting knowledge brokering activities in French innovation clusters. ***Journal of Knowledge Management***, 19(5): 1048–1068.
Chesbrough, H., & Brunswicker, S. 2013. ***Managing open innovation in large firms***. Fraunhofer Verlag.
Chesbrough, H., & Crowther, A. K. 2006. Beyond high tech: early adopters of open innovation in other industries. ***R&D Management***, 36(3): 229–236.
Cooke, P. 1998. Global clustering and regional innovation: Systemic integration in Wales. In H.-J. Braczyk, P. Cooke, & M. Heidenreich (Eds.), ***Regional innovation systems: the role of governances in a globalized world***: 245–262. London: Routledge.
Cooke, P. 2001. From technopoles to Regional Innovation Systems: The Evolution of Localised Technology Development Policy. ***Canadian Journal of Regional Science***, 24(1): 21–40.
Corno, F., Reinmoeller, P., & Nonaka, I. 1999. Knowledge Creation within Industrial Systems. ***Journal of Management & Governance***, 3(4): 379–394.
David, A., & Hatchuel, A. 2007. From actionable knowledge to universal theory in management research. ***Handbook of collaborative management research***: 33–47.
Davis, J. P., & Eisenhardt, K. M. 2011. Rotating Leadership and Collaborative Innovation:

Recombination Processes in Symbiotic Relationships. ***Administrative Science Quarterly***, 56(2): 159–201.
Demil, B., & Lecocq, X. 2012. ***Innovation collaborative et propriété intellectuelle - Quelques bonnes pratiques (Annexe)***. INPI.
De Propris, L., & Wei, P. 2007. Governance and Competitiveness in the Birmingham Jewellery District. ***Urban Studies***, 44(12): 2465–2486.
Dussuc, B., & Geindre, S. 2012. Le pôle de compétitivité : un courtier en connaissances ? ***Entrepreneuriat : de la théorie à la pratique***, 17–35. Montpellier, France.
Folta, T. B., Cooper, A. C., & Baik, Y. 2006. Geographic cluster size and firm performance. ***Journal of Business Venturing***, 21(2): 217–242.
Freel, M., & Harrison, R. T. 2006. Innovation and cooperation in the small firm sector: Evidence from Northern Britain. ***Regional Studies***, 40(4): 289–305.
Gassmann, O., Enkel, E., & Chesbrough, H. 2010. The future of open innovation. ***R&d Management***, 40(3): 213–221.
Gould, R. V., & Fernandez, R. M. 1989. Structures of Mediation: A Formal Approach to Brokerage in Transaction Networks. ***Sociological Methodology***, 19: 89–126.
Hargadon, A. 1998. Firms as knowledge brokers. ***California Management Review***, 40(3): 209–227.
Hargadon, A. 2005. Technology brokering and innovation: linking strategy, practice, and people. ***Strategy & Leadership***, 33(1): 32–36.
Hislop, D. 2005. ***Knowledge management in organizations: A critical introduction.*** (Oxford University Press). Oxford, UK.
Huang, F., & Rice, J. 2013. Does Open Innovation Work Better in Regional Clusters? ***Australasian Journal of Regional Studies***, 19(1): 85–120.
Huizingh, E. K. 2011. Open innovation: State of the art and future perspectives. ***Technovation***, 31(1): 2–9.
Ketchen, D. J., Ireland, R. D., & Snow, C. C. 2007. Strategic entrepreneurship, collaborative innovation, and wealth creation. ***Strategic Entrepreneurship Journal***, 1(3-4): 371–385.
Lee, S., Park, G., Yoon, B., & Park, J. 2010. Open innovation in SMEs--An intermediated network model. ***Research Policy***, 39(2): 290–300.
Link, A. N., Siegel, D. S., & Bozeman, B. 2007. An empirical analysis of the propensity of academics to engage in informal university technology transfer. ***Industrial and Corporate Change***, 16(4): 641–655.
Maskell, P. 2001. Towards of Knowledge-based Theory of the Geographical Cluster. ***Industrial & Corporate Change***, 10(4): 921–943.
Meyer, M. 2010. The Rise of the Knowledge Broker. ***Science Communication***, 32(1): 118–127.
Pawlowski, S. D., & Robey, D. 2004. Bridging User Organizations: Knowledge Brokering and the Work of Information Technology Professionals. ***MIS Quarterly***, (4): 645.
Perrin, A. 2013. Knowledge lost in translation: the role of knowledge brokers in knowledge transfer. ***International Journal of Information Technology and Management***, 12(3/4): 214.
Porter, M. E. 1998. Clusters and the new economics of competition. ***Harvard Business Review***, 76(6): 77–90.
Shi, W., Markoczy, L., & Dess, G. G. 2009. The Role of Middle Management in the Strategy Process: Group Affiliation, Structural Holes, and Tertius Iungens. ***Journal of Management***, 35(6): 1453–1480.
Spithoven, A., Clarysse, B., & Knockaert, M. 2011. Building Absorptive Capacity to Organize Inbound open Innovation in Traditional Industries. ***Technovation***, 31(2): 10–21.

Torre, A., & Rallet, A. 2005. Proximity and Localization. ***Regional Studies***, 39(1): 47–59.
Traitler, H., Watzke, H. J., & Saguy, I. S. 2011. Reinventing R&D in an Open Innovation Ecosystem. ***Journal of Food Science***, 76(2): R62–R68.
Van de Vrande, V., De Jong, J. P., Vanhaverbeke, W., & De Rochemont, M. 2009. Open innovation in SMEs: Trends, motives and management challenges. ***Technovation***, 29(6): 423–437.
West, J., Salter, A., Vanhaverbeke, W., & Chesbrough, H. 2014. Open innovation: The next decade. ***Research Policy***, 43(5): 805–811.