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Strategizing across boundaries: revisiting knowledge brokering activities in French innovation clusters

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Abstract

Purpose – Cooperative relationships between actors located in the same geographical area that are economically independent and culturally distinct are the heart of functioning innovation clusters. This can slow down the creation of common innovation projects, particularly in French innovation clusters where cooperation is influenced by the governmental financing devoted to this system. This research focuses on knowledge brokering activities implemented in this inter-organizational context, showing how they cross knowledge boundaries, structure cooperative dynamics and participate in common strategy-making. The mobilization of the strategy as practice theory allows for an in-depth analysis, shedding light on various practices, resources and practitioners related to the brokering activities taking place within an innovation cluster in Paris. Findings show a widespread development of brokering activities that emerges from cluster governance unit to its networks according to a reflexive relationship progressive structured over time.

Design/methodology/approach – This research is based on a longitudinal exploratory analysis of the Parisian cluster Advancity. To capture its organizational dynamics, two databases of the cluster (focused on innovation projects and integration of members), 24 power point files presented to negotiate strategy and 13 interviews with managers and members of the cluster were used. The whole data was triangulated and generated categories of data that can be compared with the concepts of the literature on innovation clusters (governance), brokering activities (knowledge access, learning, networking and implementation) and strategy-making (recursive process and adaptation of the strategy).

Findings – The analysis shows the effects of each type of brokering activities on strategy-making across knowledge and organizational boundaries. The practices of implementation activity initially absent from the cluster become, in its mature phase, one of the central activities. Moreover, all the brokering activities are initially handled by the managers of the cluster and progressively are extended to their members, then becoming a widespread activity within the internal networks. 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.

Practical implications – From a managerial point of view, considering the organization of the clusters as a constellation of communities of practice (Wenger, 1998) emphasizes that the knowledge brokerage activities can be extended and delayed within each community that makes up the organization. A top-down approach could therefore suffocate the network. It would be interesting to develop this research approach in future work and complete this research by reinforcing microscopic analysis enabled, for example, by tracking a small number of innovation projects during their lifecycle.

Social implications – The empirical foundation proposed in this research strengthens the scientific nature of the theory of the activity that is itself integrated in the perspective of the practice (Seidl et al., 2006). The multilevel approach and wealth of the mobilized and analysed empirical data allowed making more visible how a social activity builds itself, develops and creates aperture effects on the strategy driven by innovation at the intersection of different boundaries.

Originality/value – The results of this research provide a theoretical contribution in that they allow to revisit the classification of the activities of a knowledge broker (Hargadon 1998, 2005) in a new organizational context representative of the knowledge-based innovation (Amin and Cohendet, 2004). They are also contributing to the current emerging from the knowledge-based view of clusters (Bahlmann and Huysman, 2008; Arikan, 2009) by mobilizing the theory of the practice (Whittington, 2006; Jarzabkowski, 2005). This perspective helps to discern a particular form of strategy-making within the clusters.

Keywords Innovation, Knowledge sharing, Learning, Collaboration

Paper type Research paper

1. Introduction

Despite Porter's scepticism concerning the creation of innovation clusters by public authorities (Porter, 2000, 1998, 1990), the French Government was inspired by this model to set up several innovation clusters in different fields in 2005[1]. These structures are today at the centre of the French national innovation policy. By allocating financial resources to the creation of the governance units of the clusters, the Government is determined that their first challenge is to build a distinctive competence within the national territory so as to make it visible internationally through the abundant production of innovative projects (DATAR, 2004). Therefore, the role of these units is to support the combination of knowledge between different and sometimes divergent actors (private or public research laboratories, institutions of higher education, small- and medium-sized enterprises [SMEs], large companies and local communities) present in the same national region. This open innovation logic (Chesbrough, 2006) aims at generating ideas for new products and services. The state then encourages inter-organizational collaborations within the 71 currently existing clusters in France by allocating subsidies to carriers of innovation projects and tax exemptions to partners. The idea is to reinforce the national and regional competitiveness[2] in the global and knowledge economy (Amin and Cohendet, 2004).

The geographical proximity between the actors concerned by the same innovation field is at the core of the operation of clusters, but it does not systematize the collective production and transmission of knowledge (Torre, 2006). Indeed, it is not easy for the governance of clusters to exceed the organizational, cognitive and cultural boundaries of each actor to create a common identity, a new area of shared knowledge (Castro Gonçalves et al., 2012). They then have a crucial role in generating partnerships by connecting different actors in a structured network and managing the knowledge produced (Chabault, 2010; Bocquet and Mothe, 2009).

Innovation clusters are then recognized as instruments of production and transmission of knowledge (Defelix et al., 2008, Retour, 2008; Mendes and Bardet, 2008) that are involved in territorial intelligence (Joyal, 2008). In this way, clusters must ensure overall consistency, internally, on the one hand, by building a recognized strategy, particularly in the face of significant accumulation of knowledge generated from these eight years of operation[3], and externally, on the other hand, given the imperative strategy to develop innovations internationally and to develop partnerships with other clusters in France and in other countries[4]. In this emergent context, the cluster strategy needs to be negotiated over time by the governance, in order to correspond to the interests of its members and also to the imperatives of the local and global innovation environment.

The current research into the *knowledge-based view of clusters* (KBVC) (Bahlmann and Huysman, 2008; Arikan, 2009) has then emerged to point out the major role of knowledge in the development of regions. However, relatively little work has so far specifically focused on the knowledge management practices developed by cluster governance units. This research proposes to bridge this gap by analysing how brokering activities are progressively built and deployed in French clusters to generate a common organization and a negotiated strategy over time, allowing the several actors concerned by their innovation context to converge.

> **"In this emergent context, the cluster strategy needs to be negotiated over time by the governance, in order to correspond to the interests of its members and also to the imperatives of the local and global innovation environment."**

"**In addition to considering knowledge as a strategic asset in these innovation environments, this research highlights the need to place the social construction of this knowledge emerging in the territory at the centre of reflection.**"

Dussuc and Geindre (2012) offer a first reflexion on this issue. The authors identified specific templates of brokering actions in a French cluster basing on the typology of activities proposed by Hargadon (1998). The research shows the poor position of the studied cluster in terms of knowledge brokering because of the lack of support activities allowing innovations to access their market. However, the authors do not describe in detail the knowledge brokering practices associated to the activities identified or the specific individuals concerned by these practices. The contribution of brokering activities to the emergent process of the definition, deployment and strategic adjustment of the cluster is also unexplored.

The practice-based studies (Jarzabkowski, 2005, 2005, Whittington, 2006) offers an in-depth perspective to open this "black-box" and revisit the concept of knowledge broker in emergent and inter-organizational innovation contexts. This approach seeks to understand knowledge strategy-making in action (Cook and Brown, 1999) as an embedded social process and a reflexive perspective. Our objective is to detail how the intermediation process of scanning, gathering and disseminating knowledge is practised in the cluster according to its broker function (Howells, 2006) and in relation with the actors of its network.

We structure this article in three parts. In the first part, we present the particular organization of French innovation clusters and their challenges associated with knowledge brokering activities. The principles of these activities are then revisited through the practice-based theory. In the second part, we outline the methodology used to analyse the dynamic of a Parisian innovation cluster. In the third part, we explore this case study, presenting and discussing the results of the research.

2. Major challenges of the activities of knowledge brokers within innovation clusters

To carry our reflection concerning the challenges of clusters in terms of brokering activities, we first use the literature about French innovation clusters. This allows us to characterize their organization and highlight its relationship to knowledge.

2.1 Characterizing the context of innovation clusters: the stakes in terms of knowledge management

As emerging structures based on inter-organizational relationships, innovation clusters differ from traditional organizations, such as the large companies studied by Hargadon (1998, 2005). Indeed, it is important to take their polymorphic and non-hierarchical nature into account to define the rules of action and the resources needed to meet the challenges of knowledge management that these organizations create.

Beyond the plurality of configurations that comprise the 71 French clusters[5], their organization is certain to change over time, according to the arrival of new actors, the development of new projects and, as a result, to the acquisition of new assets (skills, expertise and partnerships). The development of a critical mass by bringing in new members can, in fact, be a source of changes in the network of actors (Brass *et al.*, 2004). The search for new markets, technological developments and territorial expansion is an

expression of strategic policy decisions that gradually emerge within the clusters at the intersection of the organizational, cultural and cognitive boundaries of their members. The quantitative and qualitative effects of this enlargement require negotiations for an institutional arrangement to ensure the success and sustainability of collaborative networks (Pittaway *et al.*, 2004; Provan and Kenis, 2008). This polymorphic character from clusters underlines their needs in terms of knowledge management.

The challenge of the governance of the cluster is to be structured in areas of strategic knowledge that are representative of the congruence of the interests of their members and to be able to provide opportunities for generating positive externalities. This dimension becomes the basis for a common identity that is endowed with the flexibility that is needed to absorb changes in the network and requirements of the external environment of the cluster.

The non-hierarchical nature of the clusters makes this challenge even more complex. The alliances for co-development are the result of proactive acquisition strategies and knowledge sharing implemented by the actors (Rondé and Hussler 2005; Arikan, 2009) and not necessarily by the clusters. The regulation of collective action that is conditioned by the involvement of actor members cannot rely on a too restrictive and coercive logic because it may cause a lack of attraction for new members or a disengagement of bonded members.

The governance unit of the clusters can then be regarded as a "convener" (Wood and Gray, 1991), as a third player that aims to build and regulate inter-organizational networks (Doz *et al.*, 2000). It can also be seen in its role of *trust facilitator* (Mesquita, 2007) or also of *broker organization* (Chaskin, 2001) when it comes to encouraging collaboration by linking actors.

We are particularly interested in the knowledge brokering activities deployed within clusters and their effects. Despite the use of coercive instruments imposed by the French Government (performance contracts are an example of this), the issue of the governance of clusters is to spread a sense of fairness (perceived similar status and power of the actor members) to promote the logical complementarity of knowledge. It can motivate the inter-organizational collaborators (Ring and Van de Ven, 1992) to look beyond their boundaries. The analysis of dynamics within clusters therefore requires recursive reading keys that address the relational character between the management bodies and the practitioners who interact.

These reflections are part of the current KBVC research (Bahlmann and Huysman, 2008; Arikan, 2009). This current considers the social nature of knowledge with its tacit dimension (Polanyi, 1967) and the embedded nature of knowledge (Granovetter, 1985) in the context of clusters. Given the organizational characteristics of innovation clusters (inter-organizational, polymorphic and non-hierarchical network), knowledge brokering activities are crucial in creating relevant connectivity between people. However, they cannot be exercised in the same way as in a traditional business, as innovative as it may

"**This research also highlights new managerial perspectives for the governance units of innovation cluster (i.e. practice(s) allowing deploying brokering activities, reinforcement of relational management, development of community-based management).**"

be! Based on this assumption, we may recall the typology of activities of Hargadon (1998) to reposition them in the context of French innovation clusters (Dussuc and Geindre, 2012).

2.2 The activities of knowledge brokers within French innovation clusters

A broker is an actor who connects producers and users of knowledge (Meyer, 2010) and acts on the flow of resources or information between these different unconnected actors (Shi *et al.*, 2009). The literature therefore sheds light on the role of brokers in the dissemination of knowledge through interpretation, translation and their ability to recreate knowledge (Pawlowlski and Robey, 2004; Perrin, 2013).

The concept of the broker has been studied through network studies (Gould and Fernandez, 1989) and innovation studies (Hargadon, 1998). The first theoretical perspective emphasizes the structure and position of networks in detecting, accessing and transferring relevant information and potential resources to organizations. The particular structure and position of brokers requires them to support the knowledge flow for acquiring, controlling, translating or diffusing previously unconnected information and resources within a network (Gould and Fernandez, 1989).

In the perspective of innovation studies, knowledge brokering activities are described and discussed through new product development processes within industrial enterprises. In this context, combining knowledge of the markets and technologies for applications in untapped areas is the main mission of knowledge brokers. This mission is associated with the need to develop a strong strategy to maintain the continuity of innovation activities (Hargadon, 1998).

Four activities of the knowledge broker are distinguished in Hagadon's typology:

1. give access of existing knowledge to new companies and new situations of knowledge share;

2. learning from the variety of knowledge to consider new uses;

3. link complementary teams and people; and

4. implement innovation by transforming concepts in real products and organizations for new uses (Hargadon, 1998).

Dussuc and Geindre (2012) identified and analysed the templates of actions according to the content of these standard activities within the French cluster called Plastipolis. In this specific context, while the first three activities are performed by the cluster's governance, the activity of implementing innovations through the use of knowledge created remains an observed weakness. To verify this position practiced by the governance and reinforce the study of the concept of broker, this analysis could merit application in other French innovation clusters.

The table below shows the application of the broker concept, according to Hargadon's typology (1998), within the cluster studied by Dussuc and Geindre (2012) (Table I).

These theoretical and empirical perspectives are relevant in highlighting the role of clusters in managing knowledge in a territory, but they present two gaps. As Hargadon (2005) advocates, putting into perspective the activities of a knowledge broker and maximizing the potential of innovative output, empirical works should analyse the alignment between three interrelated factors, namely:

1. the innovation strategy;

2. the work done by the teams; and

3. the role of actors in support of the work that is carried out.

Table I Templates of brokering actions within a French innovation cluster

Types of activity	Templates of actions identified by Hargadon (1998)	Templates of actions identified within plastipolis by Dussuc and Geindre (2012)
Access	Exposing existing knowledge to new ventures in new situations of exchange	Internally by linking members Externally at the establishment of multicluster projects, during study trips, etc.)
Learning	Envisage future uses of knowledge considering the requisite variety	Running the network, providing a variety of skills Organization of thematic workshops and training programmes Identifying and structuring the knowledge held and of valuable expertise Search for new development routes
Link	Create teams by networking with complementary players Encourage the exchange and combination of knowledge	Create Plastipolis project and research teams based on (re)known skills of the members and of different criteria (complementarity, limited competitive risks, etc.) Create inter-cluster project and research teams by the same pattern
Implementation	Support transforming innovative concepts into reality (of product or process) Promote the construction of organizational knowledge for future use of the knowledge acquired	Activity not supported by the cluster

Sources: Inspired by Hargadon (1998); Dussuc and Geindre (2012)

This perspective represents a possibility for supplementing the work of Dussuc and Geindre. In addition, as the strategy is progressively negotiated, this perspective can better highlight the polymorphic emergent nature of clusters.

Otherwise, the existing literature about the concept of the knowledge broker remains focused on their status (what is the position of brokers) or their function (what are their templates for actions) and do not offer detailed explanations concerning their capabilities and skills for creating new knowledge in innovation clusters (what people do in the everyday life of a network to accomplish brokering activities and who are these people). To offer a precise view of the activities of brokers in action, we mobilize the practice-base theory (Jarzabkowski and Wilson, 2006). The idea is to analyse how these activities are deployed in practice by specific individuals in the embedded context of French innovation clusters.

2.3 Knowledge brokering as practice

The knowledge-based perspective (Barney, 1991), which inspired the KBVC current, among others, is not opposed to the practice-based perspective (Jarzabkowski and Wilson, 2006). While the first perspective is based on knowledge as a key asset and resource of organizations, the second focuses on the social practice that generates knowledge (Cook and Brown, 1999; Orlikowski, 2002). Sharing, articulation, circulation and transfer of scattered knowledge as well as the transition from an individual to a collective level can be studied at the intersection of the two approaches and with inclusive insight. With the interaction of the players being at the centre of the two perspectives, we recall that communities and networks are the most suitable environments for the creation and sharing of knowledge (Hislop, 2005) and that their practice can help to produce the strategy of the clusters.

Strategy-making studies that are part of the practice perspective (Whittington, 2006; Jarzabkowski, 2005) constitute a fertile source for revisiting the concept of the knowledge broker in connection with organizational strategy. This is an alternative perspective to the traditional and rational view of the definition, implementation and strategic adjustments that corresponds to the emerging and negotiated context of French innovation clusters. Proponents of this current defend the strategy as being socially constructed in everyday life, with all the members of the organization at its various hierarchical levels.

Strategic action is embedded in its social context. The strategic dimension (*strategizing*) is therefore inseparable from the organizational dimension (*organizing*) and takes place as a continuum over time. This is a current conducive to the study of phenomena in a context where the pace and intensity of knowledge prevail (Jarzabkowski and Wilson, 2006). This perspective leads us to consider that the content of the typical activities of knowledge brokers within clusters may develop in a reflexive way with the strategy that it helps to structure and readjust. It is this movement that we seek to highlight as a mechanism to overcome the existing boundaries of the different actors in interaction.

This reflexive approach of brokering activities can be explored through the articulation of three correlated aspects of strategic action representing a detailed view of the strategy-making process (Seidl *et al.*, 2006):

1. *The practice* is expressed by the interconnection between the actions of different and scattered people and groups and social, political and economic institutions enshrined in which people act and to which they contribute. This definition emphasizes that the practice can be studied from the institutional level to the microscopic level. We want to give a more microscopic understanding (of how groups of people engage in the business of knowledge brokerage) to the institutional approach proposed by Hargadon (the definition of activity types of a knowledge broker), taking into account the time dimension and the multiple actors involved in knowledge brokerage within innovation clusters.

2. *The practices* are the behavioural, cognitive, procedural, discursive and physical resources that actors use to build strategic action. Practices combine, alter and transform themselves according to their use in the social context. At this level, it is our role to understand how certain resources are used to carry out the activities of knowledge brokering and participate in the construction of the strategies of French innovation clusters.

3. *The practitioners* are people who use practices and build strategies based on who they are and how they act to mobilize resources. It is for us to look beyond the individual members of the governance team of the clusters and the actor members present in internal networks.

Each one of these aspects is necessarily present in the practice-based works and can represent dominant sources according to empirical research. Thus, the work of Whittington (2006), Jarzabkowski and Wilson (2002), Jarzabkowski (2003) and Whittington *et al.* (2011), who study the training of practitioners of strategy in terms of the profession and their position in the organization, help us to analyse the development of the activities of a knowledge broker within clusters. Moreover, the work of Vaast and Levina (2008) is our inspiration for the study of emerging practices in the context of technological change and collaboration.

Considering knowledge brokering as practice appears both as a potential extension of the literature and the possibility of revisiting the concept of broker in the embedded context of innovation clusters. Practice-based perspective centres our analysis on the practices of the broker's activities, who are the practitioners in the context of French clusters and the ways in which they shape and perform brokering practices over time. This in-depth analysis of the (re)production and negotiation of brokering activities in action allows a better understanding of their complexity.

We have shown how the practice approach can contribute to further in-depth study of knowledge brokering activities in connection with the strategy in the specific context of French innovation clusters. We will now explain the methodology used in this research.

3. The methodological approach

This research is based on a longitudinal exploratory analysis of the Parisian cluster Advancity, focused on the sustainable city and green mobility field. Before presenting the instruments for data collection and the method of analysis used, we will justify the choice of this cluster.

3.1 The representativeness of the research field

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[6]. This cluster, which is recognized for its international potential, is based on the growth area of the sustainable city and mobility[7] and has shown steady growth in the number of its members since its inception (Figure 1). 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.).

This network, through the variety and richness of its knowledge, represents a potential resource to the Advancity governance unit to put into practice brokering activities highlighted by Hargadon (1998, 2005) and Dussuc and Geindre (2012). The operational team in charge of these activities has increased from 5 people at its inception to 12 people today. As a knowledge broker, they have favourable position, allowing detecting and diffusing of information about the sustainable city and mobility to encourage innovation in this field. However, they need to face three main challenges to create a strong link between these activities and the emergent strategy of the cluster.

The concept of sustainable cities and mobility on which the cluster is based is the first challenge for a stable strategic definition:

> Everybody talks about sustainable cities, smart cities, eco-neighbourhoods [. . .] It's becoming a lot! The concept is rather vague and difficult to define, and the partners have different visions. So, it is almost becoming a big factory! But every innovation is useful! (Member of the governance of the cluster).

Moreover, Advancity is marked by a strong technological heterogeneity (information and communications technology, electronics, materials, chemicals, etc.) and players (community utilities and services for industry, transport, industry and operations in the energy sector, the construction industry, telecommunications, engineering, etc.). Crossing the many boundaries of different kinds between the actors is the second important challenge to manage the knowledge of its network. The differences between the actors can in fact generate situations and equivocal discussions within the network. Sustainable development is a strong political dimension within the cluster, but is also interpreted differently within the network.

Figure 1 Development of the number of members of the Advancity cluster
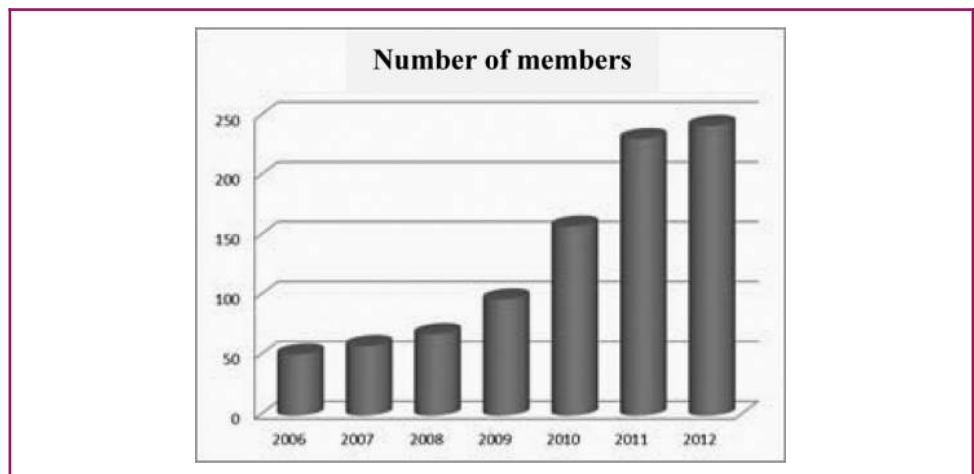
In six years of operation (2006-2012), the cluster approved 358 projects of the 470 proposed by its network, and 136 of them were funded. Faced with this assessment, the first assessment of the cluster carried by the French Government stipulated a need for optimizing control for the creation of more collaborative projects. This factor must also be taken into account in the frequent adjustments in the strategy of the cluster.

Beyond the articulation of knowledge of different types, another challenge of the governance of Advancity is to disseminate and promote it from within its network to enable sense-making around the ambiguous words that characterize it. Having local public authorities as partners of the innovations (for conducting experiments in the cities) or as a main target market makes its context more complex relative to other clusters, especially as the procurement code of public markets strongly constrains the commercialization of the innovations of the cluster. The very interpretation of market innovations generated within the cluster can be representative of changes in the strategy and collaboration at work.

Considering its particularities, Advancity provides fertile ground for our research, as it meets the criteria of representativeness corresponding to the goals that we wish to attain (Yin, 1994; Hlady-Rispal, 2000). The ambiguity and heterogeneity inherent to this context make this French innovation cluster an exemplary case in which knowledge management is a real challenge for creating value from innovation dynamics. Consequently, knowledge brokering practices can be strongly expressed for analysis. Advancity presents a context where brokering activities express a major need, not only for connecting people but also for creating a sense of this connection through facilitating, translating and disseminating the flow or exchange of information between individuals and organizations. Knowledge-brokering activities are then required to make frequent strategic adjustments step by step, as the needs of knowledge management are expressed in the network of actors. Using different instruments for data collection, we were able to "follow" the temporal evolution of the network and the governance of the cluster. We will first examine the strategic changes that occurred within the cluster between 2006 and 2012, and then those related to knowledge broker activities in coordination with the network dynamic of member actors.

3.2 Data collection and data analysis methods

In this research, we have focused on the diversity of instruments for data collection to have a broad and multilevel range of the perimeter of observations and to maximize opportunities to capture the organizational dynamics involved in the knowledge management within the cluster. Two databases of the Advancity cluster, created in 2005, were mobilized:

1. the one confronting the actor members of the cluster per year offers a look at changes in the structure and the inclusion of new disciplinary knowledge; and

2. the one about approved and funded innovation projects, which exhibits the combination of knowledge generated within the cluster.

Presentation supports of annual review meetings from 2006 to 2012 have been a rich instrument for identifying strategic adjustments over time. They are artefacts that are socially constructed by the network and the governance and are systematically screened during these meetings to introduce the strategic actions to be deployed, especially for discussing them and for negotiating them. Our non-participant observation of four review meetings led us to capture the content of discussions between the governance and the network of cluster members and observe how the activities of knowledge brokers take place in practice. Review meetings are ideal spaces for exchange, at least in terms of the most committed actors and potential new members interested in the cluster.

To strengthen our analysis and the validity of our understanding of the phenomenon that was studied in the light of the practitioners from the cluster (Lincoln and Guba, 1985), we

also conducted 13 semi-structured interviews with different categories of actors from the cluster. The actors concerned and the corresponding codes[8] are as follows:

■   three managers from large groups;

■   three leaders of research laboratories, two entrepreneurs from SMEs (SMEs); and

■   five members from the operational team of the governance of the cluster (among them two CEOs who succeeded one another) (GOV).

These interviews focused on the organization, knowledge management systems and their activities as knowledge brokers.

The inductive analytical approach that we used in this research (Strauss and Corbin, 1990) led us to proceed by coding resulting from meeting documents of the strategic review of the cluster and the reports that we created following our participation in these meetings. We then created a dictionary of the topics related to the theoretical framework of the research (Miles and Huberman, 2003). We focused on the nature and the means for capturing knowledge, having created strategic adjustments (related to technology, markets, partnership opportunities and the perimeter of the cluster), the actors involved in the network and knowledge management practices in the interplay between governance and the network.

All the data were triangulated, and this generated categories of data that can be compared to the concepts of the literature on innovation clusters (governance activities), on brokering activities (access to knowledge, learning, networking and implementation of innovations) and on strategy-making (recursive process and adaptation of the strategic definition). In this phase of the analysis, the aim was to reach a progressive level of abstraction of the empirical data (Strauss and Corbin, 1990).

Table II shows the correspondence between the levels of data collection, the collection instruments used and the analysis objectives at each level.

Using the analysis of the Advancity case, the research results show the link between the activity of knowledge brokers and the strategy within the innovation clusters.

4. Research results

To structure the analysis of this research, for each type of knowledge brokering activity, we present the practice (interconnected actions of different people), the practices (resources mobilized) and the practitioners concerned. We also emphasize the link that they establish with the strategic development of the cluster according to the practice-based view. A discussion of these results puts knowledge management into perspective to contribute to the KBVC current through revisiting the broker concept in innovation clusters.

Table II Summary of instruments for collecting and analysing data		
Level of data collection	*Instruments of data collection*	*Objectives of analysis*
Governance team of the cluster	Presentation media (assessment and strategy) – 351 pages 13 semi-structured interviews – lasting about 1:30 each	Identify and describe the processes and the mechanisms of knowledge as well as the strategic adjustments generated
Actor members of the cluster network	Database about the cluster members per year between 2006 and 2012 Database of the innovation projects per year between 2006 and 2012	Correlate the growth dynamics of the cluster network with knowledge accessible by the arrival of new members, knowledge generated by the innovation projects and identified and qualified strategic adjustments
The two levels	Non-participating observation of four debriefings of the cluster and at meetings of strategic committees	Observe the content of discussions between governance and the network of member actors, and analyse how the activities of a knowledge broker take place in practice

Table III Detailed summary of activities and practices of knowledge brokers within innovation clusters

Types of activity	The practice (interconnected actions)	Reinterpretation in the context of innovation clusters		
		The practices (resources)	The practitioners (people concerned)	Contribution to cluster strategy
Access	Practice of analysis of network dynamics Practice of creation and production of meaning Practice of coordination	Use of database, and listening behaviour in socialization spaces (behavioural and cognitive practice) Discursive practices allowing for the confrontation of points of view Using documents presenting the activity report	Members of the governance unit Members of the governance unit Members of the internal networks Scientific Council members	Redefinition of the scope of activity and of the collaborations of the cluster Reinforcement of the distinctive competence by bringing in new members in the cluster Semantic choices in the presentation of the strategic activities and the organizational units and for strengthening common values (regulatory practices) Organizational change and redefinition of responsibilities
Learning	Practice of experimentation	Discursive practices within the socialization spaces	Members of the governance unit	Creation of new innovation projects and reinforcing the potential for success of ongoing projects
Link		Collective formalization of practices of sheets of strategic roadmaps Coaching practices	Head of the Strategic Committees Members of the internal networks	Creating specific operating methods within each Strategic Committee to optimize performance
Implementation	Support practice Practice of selecting potential markets	Introducing innovation projects to a select group of actors within the Strategic Committees	Members of the governance unit Drivers of Strategic Committees Members of internal networks	External valuation of the cluster by the definition of the markets where it is positioned Common reference document being created (procedural practice)

4.1 Access activity as practice: the definition and recognition of distinctive competencies of the cluster

The concept of French innovation clusters is based on the construction of a distinctive competence, which is the collective identity, internally, and international visibility, externally. These areas are central to the strategic definition of the clusters because they can go beyond just the dimension of geographic proximity to generate the organizational, institutional and cognitive proximity that promotes partnership dynamics (Rallet and Torre, 2007, Torre, 2006). They are also a means for identifying the target markets of innovation and the strategic positioning of the cluster *vis-à-vis* other clusters, which sometimes generates strategic tensions between the internal and the external (Castro *et al.*, 2012). The governance of the clusters is therefore responsible for creating consistency when faced with the diversity of existing knowledge (Nonaka, 2007), which can lead to innovations in the scope of cooperation being collectively defined.

Dussuc and Geindre (2012) showed that the linking of clusters' members internally and the creation of inter-cluster projects and organizing international travel externally are templates of actions related to brokering access activity. But how does this activity contribute to the collective definition of the distinctive competence of the cluster? What are the practices that make it possible to cross the boundaries of member actors and participate in the definition of a recognized perimeter?

The definition of this competence follows a progressive process. At the creation of Advancity, the competence was represented by three main areas of innovation: city, habitat and transport. Because the two major member companies of the cluster represented these fields of activity, these areas were considered as the main strategic lines for innovation projects. Gradually, the network has become denser, mainly around academic players. In 2012, of 20 most involved actors in the activities of the cluster, 10 academics are the main promoters of the projects and 15 academics are among the major project partners. SMEs remain on the periphery of the network due to limited resources, the imperatives of short-term financial returns and sometimes the lack of time for entrepreneurs to participate in group activities at the organizational level:

> The participation of the SMEs in an innovation project for a minimum period of three years can be difficult to bear for them. Few of them embark on a second innovation project within the cluster (GOV).

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:

> We are constantly evolving. We are a small company, we have to react according to our networks so that the dynamics can take place (GOV).

Beyond the mobilization of formal tools such as the databases we use in this research, the practice of network analysis is expressed through the listening capacity of the network by the governance team. By studying the way of bringing in new members and the subject of the innovation projects that are submitted to financing, they express the interests of network in major strategic fields to make them visible as a collective framework.

The spaces based on the socialization of actor members (different kinds of meetings, presentations, conferences, etc.) are another source of analysis. Review meetings are held every six months within the cluster, and they have been a real forum for comparing performances and perceptions about the strategic fields that are defined.

The analysis practice of the network dynamics facilitates the understanding of the boundaries of the actors to then give rise to reflection and decision-making in the scope of collaborations. We therefore observe within Advancity the passing from three areas of

reference knowledge to seven, then to eight and finally to four in the past eight years. The fragmentation of areas of knowledge has created resistance from some actors:

Before, the themes were more general, there were more opportunities for projects and consortia (GG).

The governance unit then decided to remove or rename the areas of greatest difficulty in dialogue or with limited participation by the actors. The areas of greatest difficulty in dialogue or less participation of actors were then merged with others or have disappeared, giving rise to other names. Today, the movement of centring knowledge areas shows the distinctive proficiency of Advancity as seen below. Each area is identified as a business unit. In these organizational spaces, called a Strategic Committee (SCO), specific groups of actors from the cluster network present a differentiated relationship dynamic:

- *Urban technologies (green technologies in water, waste, air and fields) and renewable energy (green technologies)*: The least dense and the most fragmented network.

- *Sustainable buildings and infrastructure (green building)*: Dense network, centralized by big companies and outlying communities.

- *Transport, accessibility and mobility (green mobility)*: Dense network, strong presence of SMEs.

- *City, organization, management and decision support (green city)*: More divergent network.

These areas not only represent business fields but also ways of accessing the specific knowledge of the network of Advancity. The brokering practice of network analysis impacts the strategy of the cluster concerning the way it centres or fragments knowledge fields, in such a way as to better structure the network and bring together the interests of its members as a distinctive competence.

The prefix "green" before each label of the strategic committees gives proof of the ecological values that innovations in each area must abide by. As Kogut and Zander (1992) pointed out, the rules of behaviour are essential for the creation of identity in networks. This semantic acceptation therefore becomes *a practice of regulation* (as a defined resource), which is mobilized to cross the cultural boundaries of the actors and which is characterized as a strategic specificity of the cluster.

The analysis also indicates that *the practice of* sense-making (Weick, 1995) and *of* sense-giving (Gioia and Chittpeddi, 1991) is essential for building distinctive competences. They provide access to *cognitive resources* (which the players are capable of doing) by raising awareness of the network about the added value of areas of knowledge that were previously absent and of the potential of certain actors:

We worked a lot on bringing in [in the network] companies in the construction industry. Many members referred to them as mere vendors of concrete, though they were also providing interesting ideas (GOV).

What is innovation for engineering disciplines? There is no product! How can we transform our activities into competitive advantage within the cluster? [. . .] It is an innovation that has no status and no legitimacy, it is not patentable, so we cannot turn it into money. Our participation in discussions aims at having our legitimacy recognized by the other members of the cluster (GG).

We have a better understanding of the industrialists. [. . .] Today there is a diversification of research openings (RESEARCH).

Beforehand, it was thought that research was going in all directions. Today we are happy. The vision has changed for the better. [. . .] We can see the impact (of projects) on the strategy of the company in the long term (SMEs).

The practice of coordination is needed to 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:

> There is a real shift towards putting the industrialists more in charge (SMEs).

Leadership by an actor that is recognized in a field of knowledge promotes the mobilization of other actor members involved in the dynamics of the network. Using his/her charisma is recognized as a *behavioural practice* that plays an important role in creating knowledge across boundaries:

> Strategic Committee (SCO) leaders are responsible for bringing in newcomers, hosting their groups and supporting projects [. . .] The charisma of the leader, the president [of the SCO], is a determining factor for its proper operation (GOV).

> It is restrictive, but it also represents an opportunity for noticing that you are desired and that it is the way to ensure a degree of agreement among the actors. This is an opportunity to make boundary corrections and reduce existing areas of friction (GG).

Despite their peripheral position within the network, SMEs provide an important role in access the network:

> We have more new ideas from SMEs than from large groups (GOV).

The governance unit of the cluster then encourages the entrepreneurs to bring into the SCOs their leaders or play the leadership role themselves.

The access to the network is supported by another organizational change. Instead of operating with three scientific councils corresponding to the three initial fields of innovation, a single council was established in 2007, which has made it possible to mobilize a large number of experts who are associated with a greater variety of public and private research laboratories. Therefore, the selection of innovation projects is more flexible because of the greater diversity of knowledge on the part of the evaluators.

The access activity implemented by governance is expressed through the practices of analysis, design and production of meaning and coordination of the network. The interconnections between these actions and the actors of the network create new resources through cognitive, behavioural and regulatory practices. These practices strive towards strategic stability through organizational adaptation to changes in the network of cluster members.

4.2 Learning and networking activities as practice: towards the visibility of possible pathways

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 SCOs vitalize 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:

> In the SCOs, we realize, for example, that there are many things to do about waste, including sharing between two large groups in the environment (GOV).

> The bi-monthly meetings enable brainstorming, to see how they react and if the network is interested in it [. . .]. The number of participants is already an indicator of the interest of actors in the theme (GOV).

Organizational reliability that is generated by access activities creates a sense of belonging to the SCOs 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, the SCOs 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.

4.3 Implementation activity as practice: generating opportunities to test the market

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*:

> Our next meeting will focus on promoting the reference document. Not like a checklist, but through questioning with the project leaders involved. The idea is to get them to define the choices [in terms of sustainable development] and apply them in the projects (GOV).

The SCOs also participate in implementation activities through the *practice of selecting potential markets*. Discussions about innovation projects in various stages of development enable them to build up organizational knowledge about environmental projects:

> We try to format it all: ideas of access to very specific markets, the "cleanings" and "limitations" related to what exists in the markets in general but also in relation to other clusters, such as subjects that have not yet been dealt with, but which have a specific impact on the city as a whole. We help project managers in defining target markets based on new and existing situations (GOV).

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 "FUI[9] 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.

4.4 Discussion of the research findings

The table below summarizes the results of this research by specifying the practice (interconnected actions), the practices (resources mobilized) and the practitioners concerned with the activities of knowledge brokering activities within the innovation clusters.

The longitudinal analysis carried out in this research shows that the activities of knowledge brokers change over time and that they are heavily involved in the strategy-making of the innovation cluster by crossing the boundaries of the different actors.

An activity that is initially absent from the operation of the cluster becomes, in its mature phase, one of the central activities. This is indeed the case of the implementation activity which, whenever the practices associated with other activities become known in the daily operations of the cluster by the organizational learning effect, is nourished by the knowledge that is produced, combined and shared, to focus on their development internally and externally as a common market reference to be exploited by the innovations.

Moreover, the practices associated with the typical activities turn into, mobilize and create new resources while involving different actors. Members of the governance unit of the cluster are initially the only instigators of knowledge broker activities, but gradually other actor members of the network will participate in their implementation. Knowledge brokering within the cluster then becomes a widespread activity within the internal networks.

The maturation of the practice of the knowledge brokers' activities goes together with the maturation of the innovation cluster itself. This particularly leads us to consider that, concerning the identity of the network being built in the maturation phase, the boundary between learning and networking activities becomes blurred. A better understanding of different networks internally strengthens organizational reliability and the sense of mutual trust between the different actors. The practice of experimentation, in so far as it mobilizes the actors of the network to test new ideas, affects both types of activities simultaneously and produces learning and networking effects in the cluster.

These results represent an in-depth perspective, where, beyond the templates of brokering actions, the daily brokering practices, the resources mobilized and created and the practitioners concerned are highlighted according to a reflexive dynamic between *organizing* and *strategizing* within the innovation cluster. This analysis goes beyond just the performance aspect of innovation clusters often pointed in the literature to open the "black-box" of cluster dynamics, putting individuals and their practice in the centre of the analysis. The intermediation functions of the governance cluster units and specific individuals from the network of the cluster reinforce the issues of the KBVC perspective, such as enabling connectivity among potential partners, managing information and resource flows in their networks and disseminating knowledge according to regulatory uses, developments and participation (Castro *et al.*, 2007). In this research, knowledge management encounters a broader perspective, allowing consideration of the emergent and inter-organizational level of clusters. The practice-based perspective completes than the resource-based one that prevails over in this research current.

Reinterpretation and putting into perspective the activities of knowledge broker within clusters finally allow us to propose a knowledge management community-based approach. Clusters literature highlights the importance to combine complementary knowledge held by different actors to encourage innovation. In addition to this consideration, we also join Dibiaggio and Ferrary's (2003) point of view. The authors advocate that innovation in clusters is also a consequence of peer interaction dynamics, allowing actors to learn about collaboration in ambiguous and heterogeneous contexts. Communities of practice can then offer support concerning the attitudes to adopt towards novelty.

The collective nature of certain activities mentioned above would indeed make it possible to consider the cluster as a constellation of communities of practice (Wenger, 2000) where each organizational unit (the strategic committees, for example) creates an area of peer exchange of knowledge, with its common references, its rituals and its rules for bringing in new members. This type of operation allows access to tacit knowledge, representing a real source for innovation projects. Using devices of formalization and socialization, the articulation between knowledge that is generated in projects and communities of practice is assured (Castro Gonçalves, 2012) to create a strategic conversation between governance and the network.

In the inter-organizational context, the practices used by the governance unit strengthen the link between the knowledge brokering activities described by Hargadon and the strategy seen as a social process that involves actors within the same boundaries (peers sharing a common knowledge field in communities of practice) and at the crossroads of the different boundaries of the actors (innovation projects with heterogeneous knowledge). From a managerial point of view, this perspective is an alternative to the lack of ability of the cluster to manage in a flexible way the growth of its own network without suffocating its spontaneous dynamic. Governance systems that are only based on project perspectives in French innovation clusters runs the risk of being insufficient for creating a convergent and perennial collaborative dynamic and powerful strategy. This paper offers both perspectives to other clusters that are motivated to manage knowledge though organizational and strategic actions.

Such an axis of knowledge management combines the endogenous approach that is focused on modelling knowledge from and within the communities, and also an exogenous approach that is centred on the knowledge of environmental innovation projects for a legitimate competitive positioning. The instruments and rational indicators that are mainly used to define the performance of the cluster need to be confronted with more relational approaches to understand how knowledge is actually generated and what activities bind it to the cluster in strategy-making. "Performative" updates of the strategy through knowledge brokering practices therefore go beyond a focus on the technological potential of the innovations towards a greater emphasis on the interaction of the actors and the inter-organizational dynamics that they generate.

5. Conclusion

The objective of this research was to understand the development of the activities of knowledge brokers within French innovation clusters and its relationship with strategy in this inter-organizational context. Using the perspective of strategy-making in this research allowed us to show a strong link between activities that aim to create, share and combine knowledge (organizing), and the activities of strategic definition (strategizing) that are implemented by the cluster's governance and other internal actors. The clusters are reservoirs of knowledge (Bahlmann and Huysman, 2008) at the intersection of the different boundaries of the member actors. The fact of considering them as a process (Cook and Brown, 1999) makes it possible to favour flexible governance. Indeed, beyond the development of brokering practice (daily interconnected actions carried out through the interaction of the actors), brokering practices (different resources mobilized) and brokering practitioners (people that practise brokering activities), the research shows how each activity type of knowledge brokers changes over time and adapts to the internal networks of the cluster. The reflexivity and adaptation of the policy process (Jarzabkowski, 2003) show how important the porosity of the structure of governance is in more easily absorbing new knowledge that is constructed collectively.

Moreover, the empirical foundation that is proposed in this research strengthens the scientific nature of the theory of the activity that is itself included in the perspective of the practice (Seidl et al., 2006). The multilevel approach and wealth of the mobilized and analysed empirical data made it possible to make more visible how a social activity builds itself, develops and creates aperture effects in the strategy, which is driven by innovation at the intersection of different boundaries.

The results of this research therefore provide a theoretical contribution, in so far as they make it possible to revisit the classification of the activities of a knowledge broker (Hargadon 1998, 2005) in a new organizational context that is representative of knowledge-based innovation (Amin and Cohendet, 2004). They also contribute to the current emergence of KBVC (Bahlmann and Huysman, 2008; Arikan, 2009) by mobilizing the theory of practice (Whittington, 2006; Jarzabkowski, 2005). This perspective helps in discerning a particular form of strategy-making within clusters. In addition to considering knowledge as a strategic asset in these innovation environments, this research highlights the need to place the social construction of this knowledge emerging in the territory at the centre of reflection.

This research also highlights new managerial perspectives for the governance units of innovation cluster (i.e. practice(s) allowing to deploying brokering activities, reinforcement of relational management, development community-based management). Considering the organization of clusters as a constellation of communities of practice (Wenger, 2000), this research emphasizes that knowledge brokering activities can be extended and differentiated within each community that makes up the organization. A top-down approach could therefore suffocate the network. It would be interesting to develop this research approach in future work and complement this research by reinforcing microscopic

analysis, which could be enabled, for example, by tracking a small number of innovation projects during their lifecycles.

Notes

1. Porter (2000, 1998, 1990) recognizes the support of public authorities in encouraging the dynamics of innovation clusters, but he defends the central role of spontaneous collaboration in the creation of these structures.

2. The French innovation clusters are called "pôles de compétitivité" or hubs of competitiveness in English.

3. Currently, most of the innovation clusters are reaching a critical mass of membership and innovation projects, which represents a significant accumulation of knowledge in their network of actors.

4. According to Porter (2000), this opening-up movement internationally and to other innovation networks is constitutive of clusters that reach a certain stage of maturity. About the French innovation clusters, it concerns an imperative that was emphasized by the State after the second evaluation system of the national innovation policy, which was conducted in 2012.

5. Research has shown that collaborative cluster networks can be decentralized (Assens and Abitta, 2010) or centralized around focal firms (Ehlinger *et al.*, 2007; Tixier *et al.*, 2009; Castro Gonçalves *et al.*, 2011), from an actor designated by the State or by its own network and also by other organizations such as research centres (Mendez and Mercier, 2006).

6. The Polytechnicum is a public interest group. Present for 15 years in Marne-la-Vallée, in the Paris region, this structure brings together joint projects of 18 higher-education institutions and manages a business incubator.

7. The increasing number of conferences and events generally inspired by the subject of "smart cities" can be noticed in the past four years in the major economic centres worldwide.

8. These codes allow us to refer to the verbatim reports while respecting the anonymous character of the interviewed actors.

9. FUI (which means Fonds Unique Interministeriel in French or *Unique Interministerial Funds* in English) is the name given to a public financial fund attributed to partners of innovation projects for which the new product is in a well-advanced stage of development. Partners can respond twice a year to call for projects to obtain these funds. The role of the governance unit of French innovation clusters is to support to setting up the project proposal, particularly concerning the access of the innovation to its market.

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