French Regional Innovation Systems
Evidence for the Center Region

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</table>
Abstract

Over the past two decades, strategic plans for promoting innovation in the regions based on the concept of Regional Innovation System (RIS) are widely spread. For example, The European Commission has implemented more than 120 new programs of Regional Innovation Strategies in the last five years. So, the creation and the reinforcement of Regional Innovation Systems for enhancing the competitiveness of a region have become a political priority of all strategies of economical development. In order to implement its Regional Innovation Strategy, the French Center Region requested a diagnosis of its most innovative clusters. This paper constitutes a summary of the diagnosis that I conducted as a consultant for the Regional Innovation Agency of the Center Region, France. It provides a comparative case analysis on SMEs, regional innovation systems, clusters and innovation policy based on joint innovation between various universities, enterprises and government in a triple helix approach. One of the main finding is that cluster membership enhances the innovative performance of firms by using: the regional specialized labor market, subcontractor or supplier networks; local learning process through knowledge spillovers; local traditions for co-operation and entrepreneurial behavior, supporting agencies and organizations. The aim of the recommendations drawn on the basis of the comparative analysis is to provide regional policy makers with insights, which may be used to improve the efficiency of the competitiveness clusters innovation policy.

Keywords: Innovation; Regional Innovation System; Competitiveness, Clusters; SMEs; Innovation Policy.
1. Introduction

In the recent years, there is a large consensus that the creation and the reinforcement of regional innovation systems for increasing the competitiveness of a region have become a political priority of all strategies of economical development (Asheim et al., 2003; Cooke, 2001; 2004; Doloreux, 2004).

A great number of works have shown the importance of regional actors’ abilities to react and maximize the advantages of their interactions in increasing regional competitiveness. In addition, they pointed out that innovation tends to be geographically localized on a territory, stimulated by local resources used in this process and the social and institutional context (Asheim et al., 2004; Malmberg et al., 2002).

However, they seem to agree that the concept of a regional innovation system is debatable via regional development policies, that it reveals a certain ambiguity, and that the nature of its relationship with a territory is still open for discussion (Doloreux et al., 2005; Markusen, 2003; Martin et al., 2003).

This paper adds to the existing literature by drawing a partial image of the French Center Region’s RIS from the perspective of local innovative clusters. The overall aim has been: to identify the regional clusters, to select the most innovative ones and to diagnose their innovation capacity.

Drawing on the lessons learned from the comparative case analysis, we provide strategic policy implications and recommendations on the impact of different types of RIS policy with respect to promoting regional competitiveness and innovativeness.

The paper is organized as follows. The second section provides a brief overview of the theoretical background of the concept of regional innovation system and clusters. Then, we conduct a comparative case analysis of the most innovative clusters located in the French Center Region focusing on common observations (3rd section) and on 3 main topics: clusters’ actors, governance and research and innovation capacity (4th section). Thereafter, follows a
discussion of the main findings of clusters’ diagnosis and policy recommendations (5th section). Finally, we draw our conclusions (6th section).

2. Conceptual framework: innovations, regional innovation systems, clusters

Over the past two decades, regions are growing in importance as a competitive location of economic activities in the new learning economies (Asheim and Isaksen, 2002; Cooke, 2001). This is justified by the fact that territorial agglomeration provides the best context for an innovation based economy promoting localized learning and endogenous regional economic development. There are two empirical key studies sustaining this position: the rapid development of industrial districts (Asheim, 2000) as well as the successful regional clustering (Porter, 1990).

This section provides an overview of the theoretical concepts used afterwards in the comparative case study. Firstly, we discuss the role of innovation; secondly, we briefly introduce the RIS and cluster concept and finally, we try to clarify the connections between clusters and RIS.

In response to the intensified competition caused by the current globalization framework, every firm, region or nation uses innovation in order to increase its competitiveness. Yet, in recent years, the innovation process has become more and more complex due to a larger variety of inputs to be used by actors (individuals, firms and other organizations) and an increasingly interdependence and division of labor among them.

Various studies (Lundvall et Borras, 1997; Cowan, 2005) pointed out that innovation is an interactive learning process based on the combination of tacit and codified forms of knowledge build into strong interactions between actors creating and diffusing knowledge among them. Thus, the innovation process becomes increasingly inserted into various forms of networks and innovation systems at sectoral (Breschi et Malerba, 1997; Malerba, 2002, 2004), regional
(Saxenian, 1994; Cooke, 1992), national (Freeman, 1987; Lundvall, 1992; Nelson, 1993; Edquist, 2005; Lundvall, 1992) or international levels. A definition of the innovation system primarily incorporates the R&D functions of universities, public and private research institutes and corporations. The main purpose of an innovation system is to pursue innovation processes, that is, to develop and diffuse innovations (Edquist, 2005). Innovations\(^1\) are new creations of economic significance, primarily created out by firms (but not in isolation).

The regional innovation system (RIS) concept is based on the definition of innovation as a systemic process that involves some degree of interdependence of different local entities: enterprises, universities and public organizations. This set of relationships contained within the RIS form the institutional infrastructure facilitating intense mutual information exchanges which are necessary to the creation of new knowledge, and thus of innovation. In addition to the interactive and systemic nature of innovation, studies also highlight the increasing importance of the implementation environment of enterprises on their activities and exchanges, as the key factor of knowledge and experience sharing (Cooke, 1992).

The significance of the ‘regional dimension’ of an innovation system has emerged as another aspect of an interactive model (Kline and Rosenberg, 1986) that emphasizes the relationship of local companies with knowledge sources external to the firm. Such relationships are strongly influenced by spatial proximity mechanisms supplying externalities that may be used in the innovation process to enterprises, e.g.: the presence of skilled labor, different production inputs (Gertler, 2003). Furthermore, the use of informal channels for knowledge diffusion of tacit knowledge provides another argument for the tendency of innovation to be geographically confined (Lundvall 1992).

\(^1\) They include product innovations as well as process innovation. Product innovations are new or improved material goods and intangible services while process innovations are new ways of producing goods and services, being technological, organizational, managerial, marketing oriented etc. (Edquist and Hommen, 2008).
The emergence of the concept of regional innovation system coincides with the success of regional clusters and industrial districts in the post-Fordist economy (Asheim, 2000; Porter 1990, 1998, 2000). Porter’s cluster definition is: ‘geographic concentrations of interconnected companies in particular fields that compete but also cooperate’ (Porter, 2000, p.253). Here, we will employ a more strict definition given by the European Commission: ‘a concentration of “interdependent” firms within the same or adjacent industrial sectors in a small geographical area’ (European Commission, 2002/no. 3, p.14).

Porter underlines that local competition creates incentives to import best practice and boosts pressures to innovate, while also connecting the strengths of competition with the virtues of selective co-operation. He further argues that the competitive advantages who determine the success of a cluster are owed to its external environment. Several studies in economic geography also underline the importance of local and regional based knowledge to sustained firm competitiveness.

As used by Porter (1990, 1998) an ‘industrial complex’ or ‘cluster’ can, if it is regionally delimited, be seen as a combination of a sectoral and a regional system of innovation. Few studies try to elucidate the connection between regional innovation systems and clusters. First, the linkage between clusters and RIS begins with the simplest form of cooperation within a cluster which can be described as territorial integrated input-output relations. Thereafter, a more systemic approach is used by building up a competence network from vertical to horizontal cooperative firms. This involves stronger coordinated interactions between industry and knowledge creating and diffusing organizations. Here, the context of the French regional innovation system is a necessary element of the development of the emerging and existing clusters, requiring close and systemic cooperation between industrial and university actors in the context of e.g. competitiveness clusters, located in proximity of universities or research centers.
3. A comparative case analysis: evidence from the French Center Region

The following two sections provide a comparative analysis of the case studies. Given the wealth of data we choose to limit ourselves to common observation of clusters: location, type, date of creation, current situation and sector in the third section, as well as a set of three main themes: actors, governance and research and innovation in the fourth section.

The regional innovation system approach is not only a framework for economic studies on innovation performance, but also a powerful tool for policy makers to boost regional competitiveness and innovativeness. The new European operational programs for 2007-2013 highlight innovation, knowledge based economies and the anticipation of economical mutations. One of the priorities consists in putting together a Regional Innovation Strategy particular to each region. In order to implement its Regional Innovation Strategy, the French Center Region requested a diagnosis of its RIS from a perspective of the most innovative local clusters. Thus, the aim of our study is to provide elements of diagnosis allowing a comparative analysis of clusters using Prager’s methodology\(^2\), approved by the European Commission.

In order to achieve this goal, we start by building up a questionnaire that we will further on apply to the leaders of the clusters. Porter’s diamond (see figure 1) constitutes the basis of our questionnaire; the purpose is to take into consideration the 4 complementary factors that determine the competitive advantage of a cluster:

1. Factor conditions: conceptualization of the specialization and quality of the production factors entering the cluster’s value chain (input-output relations).

2. Context for firm, strategy and rivalry: localized context in which the firms are able to accomplish the appropriate levels of investment and upgrading.

\(^2\) Méthode de diagnostic du système d’innovation dans les régions françaises by Prager, 2008.
3. Demand conditions: demanding local customers with progressive consumer preferences.
4. Relating and supporting industries: regional intra-cluster cooperation and localized innovative activities.

Figure 1. Porter’s Diamond

Thus, the survey comprises 5 sets of questions resuming the cluster elements presented above:

1. Its territory: the legal framework and governance system.
2. Its actors: firms, public and private R&D institutes, universities.
3. Its environment: input relations with suppliers, subcontractors, public organizations, infrastructures, financial representatives, specialized technological or scientific equipments, consultants...
4. Its target markets: output relations with consumers and users.
5. Its main partners and competitors localized in the same region or at a national, European or international level.

Even though we adopt a wide geographical perspective, including national and international linkages, we focus however explicitly on the local by comparing the cases through the cluster concept. In this context, we underline the key importance of local collaboration and innovation in partnership for improving SMEs competitiveness and thereby the competitiveness of the Center Region.

The empirical base is formed by 8 case studies (see table 1) on sectoral clusters of SMEs located in the Center Region (classified by order of importance):

- 3 competitiveness clusters or *pôles de compétitivité*: Cosmetic Valley specialized in cosmetic and perfumery; Elastopôle, in rubber and S2E2 in electrical energy.
- 2 excellence clusters or *pôles d’excellence*: Aérocentre in aeronautics and Pôle Auto in automobile industry.
- A competence pole or *pôle de compétence* called AlHyance Innovation-a technological platform specialized in energy materials and processes.
- An industrial park in the metallurgy, PICF.
- A local productive system or *système productif local* in shop planning named Shop Expert Valley.
Table 1. Snapshot of clusters in September 2009.

<table>
<thead>
<tr>
<th>Nom</th>
<th>Location</th>
<th>Region (s)</th>
<th>Type</th>
<th>Date of creation</th>
<th>Current stage</th>
<th>Sector (s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aérocentre</td>
<td>Châteauroux</td>
<td>Centre</td>
<td>Excellence Cluster</td>
<td>May 2009</td>
<td>Embryonic</td>
<td>Aeronautics</td>
</tr>
<tr>
<td>AlHyance Innovation</td>
<td>Monts</td>
<td>Centre</td>
<td>Competence cluster</td>
<td>4 July 2006</td>
<td>Embryonic</td>
<td>Energy</td>
</tr>
<tr>
<td>Elastopôle</td>
<td>Orléans</td>
<td>Centre, Auvergne, Pays de Loire, Ile de France</td>
<td>Competitive ness Cluster</td>
<td>5 July 2007</td>
<td>Embryonic</td>
<td>Rubber</td>
</tr>
<tr>
<td>PICF</td>
<td>Vierzon</td>
<td>Centre</td>
<td>Industrial Park</td>
<td>February 2006</td>
<td>Embryonic</td>
<td>Metallurgy</td>
</tr>
<tr>
<td>Pôle auto</td>
<td>Ingré</td>
<td>Centre</td>
<td>Excellence Cluster</td>
<td>2004</td>
<td>Embryonic</td>
<td>Automobile</td>
</tr>
<tr>
<td>S2E2</td>
<td>Tours</td>
<td>Centre, Limousin, Pays de la Loire</td>
<td>Competitive ness Cluster</td>
<td>12 July 2005</td>
<td>Rejuvenated</td>
<td>Electrical energy</td>
</tr>
<tr>
<td>Shop Expert Valley</td>
<td>Blois</td>
<td>Centre</td>
<td>Local productive System</td>
<td>April 2006</td>
<td>Developing</td>
<td>Shop Planning</td>
</tr>
</tbody>
</table>

Source: own elaboration (2010).
The economical background of the Center Region, studied from 1990 to 2005 (prior to cluster labeling starting in 2004), shows that 6 traditional sectors are overrepresented in terms of regional employment compared with the national employment average. These sectors also represent the main source of industrial employment in the region. It is not surprisingly that our 8 clusters have emerged in these developed sectors because a cluster does not rise ex nihilo e.g. from nothing. This finding is corroborated by other studies on clusters (IAURIF, 2008; Europe Innova Cluster Mapping, 2008) stating that local context is vital to the emergence of clusters; we cannot order actors to cooperate (Gertler, 2003).

4. Cluster actors, governance and research & innovation

In the previous section, the focus was set on cluster general information whereas in this section we will change perspective primarily addressing 3 main themes: actors, governance and research & innovation (see table 2). Our original contribution consists in analyzing collaboration between the cluster actors from a ‘triple helix’ approach (Leydesdorff and Etzkowitz, 2000) e.g. the dynamic interdependency between 3 major actors: universities, government and firms.

Firstly, a central feature of all the case studies is that a high proportion of clustered firms are SMEs: 97% for PICF and 95% for SEV; 79% for Elastopôle, 72, 5% for Cosmetic Valley, 66 % for S2E23. Two major benefits of SMEs membership result from this analysis: on one hand, building a collective longer term economic future of the cluster jointly to the future of the region where it is located and, on the other hand, taking into account the European dimension through participatory collaboration of SMEs in research and innovation projects.

3 At national level, 85 % of clusters’ firms are SMEs in 2008, versus 83 % in 2007 (Enquête annuelle auprès des pôles, INSEE-CLAP, DGCIS, 2008).
### Table 2. Cluster’s actors, governance and research & innovation

<table>
<thead>
<tr>
<th>Indicators</th>
<th>Aérocentre</th>
<th>AllHyance</th>
<th>Cosmetic Valley</th>
<th>Elastopôle</th>
<th>PICF</th>
<th>Pôle auto</th>
<th>S2E2</th>
<th>Shop Expert Valley</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>1. Actors</strong></td>
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<td></td>
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<tr>
<td>Total of firms</td>
<td>20</td>
<td>30</td>
<td>193</td>
<td>39</td>
<td>30</td>
<td>193</td>
<td>79</td>
<td>19</td>
</tr>
<tr>
<td>Of which SMEs</td>
<td>10</td>
<td>10</td>
<td>140</td>
<td>31</td>
<td>29</td>
<td>109</td>
<td>52</td>
<td>18</td>
</tr>
<tr>
<td>Of which Start ups</td>
<td>0</td>
<td>0</td>
<td>14</td>
<td>1</td>
<td>2</td>
<td>0</td>
<td>1</td>
<td>0</td>
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<tr>
<td><strong>2. Governance</strong></td>
<td></td>
<td></td>
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<td>Leadership</td>
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<tr>
<td>Ind. Scient.</td>
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</tr>
<tr>
<td>Oper.</td>
<td>1,5</td>
<td>0*</td>
<td>8</td>
<td>3</td>
<td>1</td>
<td>2</td>
<td>8</td>
<td>1</td>
</tr>
<tr>
<td><strong>3. Research &amp; Innovation</strong></td>
<td></td>
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<td></td>
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<td></td>
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<tr>
<td>Public and private R&amp;D</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>coll.</td>
<td>45 labs</td>
<td>30 labs</td>
<td>6 labs</td>
<td>coll.</td>
<td>6 dep.</td>
<td>50 Labs</td>
<td>8 firms</td>
<td></td>
</tr>
<tr>
<td>Projects’ Number</td>
<td>4</td>
<td>31</td>
<td>37</td>
<td>16</td>
<td>1*</td>
<td>23*</td>
<td>36</td>
<td>21*</td>
</tr>
<tr>
<td>Total financing (k€)</td>
<td>528</td>
<td>13000</td>
<td>12888</td>
<td>5251</td>
<td>389</td>
<td>936</td>
<td>113000</td>
<td>602</td>
</tr>
<tr>
<td>Public financing</td>
<td>80 %</td>
<td>40-50%</td>
<td>37 %</td>
<td>30 %</td>
<td>70 %</td>
<td>83 %</td>
<td>35 %</td>
<td>70 %</td>
</tr>
</tbody>
</table>

**Caption:**

- **coll.** = occasional collaboration
- **dep.** = research department of cluster’s firms
- **Ind.** = industrial
- **labs.** = laboratories
- **s. d.** = study department
- **¤** = employees of the firm working temporarily on projects of the cluster
- ***** = innovation programs

Source: own elaboration (2010).
Furthermore, with regard to actors performing in clusters, one of the most important findings is that collaboration between SMEs, universities and government in a cluster enhances the innovative performance and competitiveness by combining resources and processes of interactive learning both of the clusters and thus, of the region.

Secondly, the concept of regions emphasizes an important level of governance of economic process between the national level and the individual cluster of a firm. The case studies demonstrate that the regional governance is expressed in private representative organizations such as branches of industry associations and chambers of commerce, public organizations such as regional agencies and enterprises, both SMEs and big firms. We identify the ‘triple helix’ e.g. three major actors empowered at national level to promote enterprise and innovation support (Asheim et al., 2003; Cooke et al. 2000).

In addition, we observe an industrial leadership for 6 of the clusters and a combined industrial scientific leadership for 2 of them: Aérocentre and AlHyance Innovation, more dependent on R&D driven innovation activities. The size of the operational team is variable, depending on the different operating and functional goals of the clusters.

Thirdly, the case studies clearly provide proof that research and innovation is a constant feature of each cluster. Innovation within clusters is not a solitary act but strongly depends on collaborations between SMEs (representing about 82 % of total enterprises) and knowledge generating and diffusing organizations such as universities, research laboratories, and companies’ study departments etc. All of these actors find themselves involved to a certain extent in the cluster innovative projects/programs. Clusters counting the greatest number of innovative projects owe their performance to 3 year-projects while others are functioning according to main axes that include innovation programs.

An interesting feature of the case studies is public financing closely linked to the type and operating method of clusters. Very high public financing are recorded: up to 83 % for the automobile cluster, 80 % for the aeronautics cluster, 70 % for Shop Expert Valley and the metallurgy cluster. In the case of
the technological platform specialized in energy, there is a 50-50 financing from both public funds and private firms, members of the cluster. A relatively low financing rate of 35% is set in the case of competitiveness clusters. In order to preserve the continuity of their development, the ambition of the clusters is to become independent, entirely financed by their own enterprises.

One of the limitations of this study is the impossibility to measure cluster innovation by the traditional indicators: patents and publications. In the majority of cases, firms within a cluster have not patented or published their innovations because their projects are still in progress (an average term of 3 years). Another reason is the confidentiality agreement that they are obliged to sign because firms work closely with their competitors in a great number of innovative projects. Nevertheless, we may consider the number of start-ups as an important indicator of the output of the innovation. Cosmetic Valley takes the lead with the creation of 14 start-ups. Far behind, 3 other clusters contributed to the creation of one or two new innovative firms. We attribute this achievement to the increasingly innovation efforts of clusters in order to enhance their competitiveness.

5. Main findings on clusters’ diagnosis and policy recommendations

In this section we will illustrate the main findings and provide policy recommendations drawn on the basis of the comparative analysis found in the previous section. The detailed assessment of each cluster ecosystem reveals that network dynamics is owed to 3 factors (Becattini, 1990):

- Proximity as spatial concentration of infrastructures, institutions, supporting agencies and organizations, individuals etc.
- Variety of actors’ know-how (savoir-faire), customers and users diversity.
- Accessibility or the ability to share, communicate, understand and learn. It is materialized as transportation and communication networks
and a competitive environment for actors that are cooperating and competing at the same time (co-opetition).

Empirical research has shown that in stimulating innovative activity in clusters of SMEs, it is usually necessary to access regional localized resources, knowledge, skills and competencies. Therefore, cluster membership enhances the innovative performance of firms by using the regional specialized labor market, subcontractor or supplier networks; local learning process, local traditions for co-operation and entrepreneurial behavior, supporting agencies and organizations.

Nevertheless, the regional level must be completed with national systems of innovation support. In order to preserve continuous cooperation and durability of a cluster, ‘bottom up’ (regional) and ‘top down’ policies must intersect. Close cooperation between actors will foster the interactive learning process and create an innovative milieu favorable to innovation and constant improvement. In connection with this, here are some common features of the cooperation between clusters: a common interest; a friendly leading method that would enhance trust between SMEs and large firms; a dedicated leader that guarantees the cohesion within the cluster; permanency by regularly meetings; partnerships with local actors and supporting collaborative agencies; regional dynamics stimulating the territorial evolution of the cluster. Regardless of the diversity of clusters, they all take credit for breaching SMEs isolation; nurturing mutual aid, knowledge exchanges and business flows; creating a trustworthy atmosphere necessary for the survival and longevity of the cluster.

Furthermore, we will provide policy recommendations drawn on the basis of the comparative case analysis. The reader should be aware that the generalized recommendations presented here require caution in connection with its validity to the specific circumstances of clusters and regions. For this reason, these policy recommendations should not be read as best practice. Instead, we stress that policy measures should be drafted considering cluster’s context. The aim of the recommendations is to provide regional policy makers with insights,
which may be used to improve the efficiency of competitiveness cluster innovation policy.

Bearing this development in mind, regional policy-makers should acknowledge SMEs as a target group helping them to overcome any size related barriers that may limit their innovation capacity and to take part in more collaborative projects of research and innovation at regional, national and international levels. Thus, policy measures to improve the competitive strength of SMEs must focus on boosting their innovative performance. Policy support is necessary to stimulate cluster membership. SMEs have little resources and may thus underestimate their participation. For this reason, it is important to change the individual short-term firm vision into a collective long-term horizon in order to align the growth of the firm with a regional long-term growth. Clusters also need time to fully develop, to introduce ‘professionalism’ in actor’s relationships.

Regional policy may have a major influence on the competitiveness of a region and its growth if it is able to target priorities: strengthening the existing clusters, entailing linkages with universities, research centers, laboratories, supporting agencies and organisms etc.; facilitating the access to information; developing new cooperation to foster innovation. Regional policy may be relevant only if actors are willing to work together on joint projects.

6. Conclusion

Based on the line of reasoning described above, there is a strong case to make today that regional clusters and innovation systems are important modes of economic coordination in learning economies (Asheim & Isaksen, 2002; Cooke, 2001) due to the existence of localized learning and a set of collective externalities that form a region-specific ‘context conditions’ vital to the innovative process (Dosi, 1998). The interaction at regional level of spatial proximity, accessibility and agglomeration provides a powerful influence on knowledge flows, learning and innovation. Generally, the regional innovative
performance can be promoted by identifying the milieu determinants that foster innovation (Storper, 1997).

There is a large consensus in the literature: a cluster does not rise ex nihilo e.g. from nothing (IAURIF, 2008; EICM, 2008). It is not surprisingly that our 8 clusters have emerged in sectors previously developed in the region since local milieu is vital to the emergence of clusters; we cannot order actors to cooperate (Gertler, 2003). We can’t export the cluster model either; however we can learn from their best practices.

French cluster policy started by inserting the three major actors: firms, government representatives and universities (the triple helix approach) into networks in a ‘top down’ approach. Yet, progressively, as the analysis angle was narrowing, local or regional context took over so we are now witnessing a switch to a ‘bottom up’ approach. Thus, a cluster represents a local ‘node’ in a globalized system. Consequently, one of the French paradoxes is that cluster policy is driven by the state to benefit SMEs and local actors.

Due to their limited resources, SMEs often innovate through interactions with actors of innovation systems at a regional, national or international level depending on their savoir-faire and needs. Through collaborations between SMEs, large firms, universities, research centers and public policy-makers in jointly creating regional innovation strategies, trust between partners can be enhanced.

In conclusion, the aim of our recommendations is to provide regional policy makers with insights, which may be used to improve the efficiency of competitiveness clusters innovation policy.
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