Ambidexterity and the evolution of clusters

Lionel Sack
Lund University
Circle
lionel.sack@circle.lu.se

Abstract
Recent debates in economic geography have mentioned the need for balanced efforts between exploitation and exploration in clusters. Yet, very little time of this discussion has been spent on how the latter, exploration, can truly be developed, while not being undermined by the dominance of exploitative practices of dominant incumbent firms, and the often-resulting fairly static and efficiency-driven (rather than variation-seeking) institutional frameworks of clusters. This study proposes that insights about ambidextrous organizations from the organizational literature can, when well understood, provide important learning for this problem. It indicates that when making this shift to the cluster, the problems of separation and integration (encountered in organizations) become less important, while the problems of manageability and proprietorship gain in relevance. While not explicitly attempting to provide a solution to the problem itself, the study raises awareness for the concept in cluster debates, and outlines important structural differences that need to be taken into consideration when discussing ambidexterity for regional clusters.

Jelcodes:O21,L51
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Lionel Sack
PhD Student
CIRCLE, Lund University

Existing State of the Art
Clusters have for the past two decades been acknowledged as hubs for innovation and economic performance in the global economy. They are generally described as agglomerations of specialized firms (and related suppliers) that provide benefits in terms of knowledge (e.g. specialized labor pools), networks (collaboration between firms, several advantages of proximity) and institutions (provided by shared company boards, inter-firm organizations, etc.). Despite those benefits, clusters are described to have some form of life cycles (or evolutionary patterns), that are in many cases strongly linked to the development of the industry the cluster specializes in (e.g.; Menzel & Fornahl 2010; Martin & Sunley 2011).

According to those cycles, clusters are bound to decline when their connected industry looses strength, unless they are able to renew themselves on related or unrelated paths. Yet, in clusters a number of mechanisms develop over time that lead to increasing path dependence and lock-in (of political, financial, technological nature, etc.). Many of the cluster initiatives since the 1990s have rather reinforced these mechanisms than made them weaker. Recent policy directives call for more balance between specialization and diversification, yet the underlying policy concepts (and related theoretical arguments) remain fuzzy. Some call for more entrepreneurial discovery, others for.

Research gap
It is not that scholars are not aware of the problem of declining regional clusters, and the need for structural renewal they need to undergo in order to keep up with (or even lead) developments in the global economy. What is still missing is clear concepts that allow to understand how clusters can both exploit what they are already good at, and explore new paths of development. Since the underlying problem in large organizations is often the same (specialization, path dependence, lock-in, see the cases of Commodore or Nokia), there has been a debate since the 1990s in organizational studies that can provide some structure for the problem: ambidextrous organizations (first mentioned by Duncan 1976, then explored in more detail by Tushman & O’Reilly 1996). The latter are organizations that are able to simultaneously exploit their current strength, and explore potential future paths of development. The debate disentangled the different mechanisms relating to exploitation and exploration (concepts by March 1991), examined their contradictory nature (in many terms) and intended to explain how the two can be combined, simultaneously or sequentially, within an organization.

This paper discusses how this concept can be interpreted and used to structure the debate on the renewal of clusters. Before proceeding too fast into empirical studies, it is necessary to disentangle the structural differences between the two levels of analysis (organizations vs. clusters).

Methods
The paper is essentially of conceptual nature and combines two streams of literature, by integrating thoughts stemming from knowledge about empirical cases.

Findings
While the underlying problem and some features between organizations and clusters are very similar, there are some important conceptual differences that need to be taken into consideration. Below are listed the three main ones explored in this paper:
1. When switching the level of analysis, there is an important switch in interest of “who is to survive”: where in OS this is the firm, in economic geography this is the cluster as a whole. This is important, since innovations don’t need to be reintegrated in existing firms, but can develop their own life in new firms that emerge in the cluster. When they reach critical mass, they can contribute to the survival and renewal of the cluster, even though the old established organizations might die.

2. The separation problem often discussed in organizational studies (how to keep exploitation and exploration separate) is of much less importance in clusters, since firms have much more distinct institutional boundaries between them than units within an organization. Clusters could in this sense be seen as a natural ground for the coexistence of exploitation and exploration.

3. In cluster in return, there is a much more important manageability problem: how can a cluster be managed, which incentives can be given by whom, and whose interest should be decisive? The interest of the large incumbent firms, those of the region, those of newly emerging firms? This is connected to an ownership problem: when new paths of development are to be collectively shared within the cluster, who will take the risk of exploration? (since exploration generally has much higher levels of uncertainty than exploitation, at least in the short and medium term)

References


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Keywords: ambidextrous organizations; clusters; cluster management; smart specialization; innovation policy;

Introduction

Clusters, as large companies, frequently have difficulties to renew themselves and become locked into one or few development paths, which are bound to decline at some point when the surrounding industry changes. Clusters and localized industries are known to have a strong path dependent character, meaning that institutions, networks and knowledge infrastructures interact and evolve in a way that favor incremental and continuous change. This leads to firms in clusters taking on specific and well defined (specialized) paths of development and being encouraged (or encouraging themselves) to extend existing technological paths, rather than engaging in change of more radical nature. It is common for firms and inter-firm organizations in such clusters, especially in older and more established industries, to reinforce those paths and to develop significant lock-in mechanisms.

This lock-in has been described as being of, for instance, technological, financial, political or institutional nature. Recent literature on the topic has stressed the need for branching and path
creation within regional clusters, in order to sustain renewal and competitiveness. Well-examined examples for lock-in in clusters are the shipbuilding industries in Denmark or in the Netherlands (Van Klink & De Langen 2001; Eich-Born, M., & Hassink, R. 2005), footwear in Southern Italy (Boschma & Ter Wal 2007) or the watch industry in Switzerland (Glasmeier 1991; Jeannerat & Crevoisier 2009, 2011).

For overcoming this lock-in and the related mechanisms leading to path dependence, it has been argued that those clusters will survive, that provide the structures for exploitation and exploration, and that reveal the necessary mechanisms for integrating outcomes from the latter into the former. While many recent innovation and cluster policy concepts (e.g. smart specialization) have mentioned the need for this equilibrium, very little has been said about how this can be achieved, and what mechanisms are necessary to develop (and incorporate) new development paths in existing regional configurations. What has been observed is that exploration (and change of more radical nature) needs very different forms of networks, institutions and agents than incremental changes that are commonly observed in exploitation.

The organizational literature may be useful in this respect, since it has discussed similar conceptual problems, and put much effort in disentangling and reintegrating the logics of the two opposing streams of innovation (exploitation and exploration) within organizations under the term ‘ambidextrous organizations’. This debate, initiated by O’Reilly & Tushman (1996) stated that organizations need to be proficient in both of them in order to survive in the long run - hence to be ambidextrous (“two-handed”), capable to practice exploitation and exploration. Yet, the underlying mechanisms necessary for exploitation and exploration are of such contradictory logic that they need to be, in some form, be kept separate within the organization.

The general struggles in clusters are in many respects similar as those of large organizations, since they need to cope with a changing environment (industry, global markets) while being constrained by their internal resources and underlying mechanisms: while the current specialization allows for increasing returns and economies of scale (in the organization) and localization economies (in the regional cluster), this specialization itself has the tendency to create mechanisms inhibiting developments that could be promising for future growth opportunities. It is well known that some clusters are particularly innovative and change-driven (e.g. the often cited Silicon Valley), with high amounts of exploration driven firms and corresponding supportive mechanisms. Most examples of clusters are however characterized by the opposite: a majority of embedded firms (and connected suppliers) being mainly exploitative, and creating shared institutional configurations that work against true exploration. It would therefore be valuable to understand how clusters can be ambidextrous,
able to explore and exploit simultaneously. This paper is an attempt in providing some ground for discussion on the topic. A few studies on clusters have already tried to include the ambidexterity-concept in the cluster context (e.g. Ferrary, 2011, Pal et al. 2014), but with little precision on the differences between the two levels of analysis. Before proceeding into further empirical studies on the topic, it is therefore necessary to think about underlying conceptual differences between ambidexterity on the two levels of analysis.

For simplicity, the study only uses the mainstream concepts around ambidextrous organizations (and the related debate on exploitation and exploration). Knowing that is a still relatively rapidly developing line of thought, some of the nuances and side-debates that have emerged around the concept (in sub-fields of OS) are reduced to the lowest common denominator. When comparing the two levels of analysis this seems appropriate, as it cuts out ambiguities and leads to a more comprehensive framework for studies on clusters.

In the first section, the paper provides an overview over main debates regarding ambidexterity in organizational and management studies in general. The second section outlines some basic debates about exploration and exploitation that have been mentioned in studies on clusters and regional specialization. The third section explains main commonalities and (structural) differences between organizations and clusters. The fourth provides some examples and challenges for ambidexterity in clusters. The last section concludes the insights and draws the attention to the potential for using the concept in current debates on regional development.

**Theoretical framework**

Ambidexterity is a concept from organizational studies (Duncan 1976; March 1991; Tushman and O’Reilly 1996) meaning in its literal sense “two-handedness”, the ability to skillfully use both hands - as opposed to being purely right-handed or left-handed. In the debate, the two hands largely represent exploitation and exploration (March, 1991), where organizations have a much higher probability to sustain their competitiveness in the long run when they are able to use both of these hands simultaneously (Tushman & O’Reilly 1996, 2004). The concept of ambidextrous organizations has, since its emergence, been extensively debated in a range of literature streams, amongst others on organizational learning, strategic management, technological innovation, and organization design. In those streams, the concept recurrently relates to the difficulties in combining continuous and discontinuous change. While each stream has its own terminology for the traditional dichotomy in innovation studies (exploration vs. exploitation, incremental vs. radical change, cumulative vs. recombinatory knowledge dynamics, etc.), the insights from the different perspectives overlap and provide
some complementarity. Today, the debate has come to a point where it make sense to summarize its main arguments and to translate its outcomes to the context of the regional cluster, a level of analysis where continuous and discontinuous change equally and recurrently conflict with each other (e.g. Tödtling & Trippl 2004; Hassink 2010).

The starting point for Thushman and O’Reilly’s (1996) debate on ambidexterity is the conflicting logic between exploitative and exploratory strategies within the organization. While exploitation promotes incremental changes on existing products and technologies, exploration engages in change of more structural nature and redefines products and technologies by combining different existing knowledge. In his 1991 article on exploitation and exploration, March states that these two strategies paradoxically contradict each other within organizations, as they require different mindsets, types of investment, and incumbent organizational structures. By pointing out a range of examples of large organizations being trapped or misbalanced towards one of the strategies, Tushman and O’Reilly (1996) argue for a need for simultaneous and balanced engagement in the two activities, as they are mutually dependent. They distinguish between incremental, architectural and discontinuous innovations. Incremental innovations are small improvements in existing products and operations. Architectural innovations are technological or process advances to fundamentally change a component or element of the business. Discontinuous innovations are radical advances that may profoundly alter the basis for competition in an industry. If organizations are ambidextrous, they are able to cope with the challenges of daily business and compete within a given competitive framework, while also being prepared and acting upon major architectural and structural changes in their industry. In this sense, the management of the three types of changes (incremental, architectural and discontinuous) is critical for organizations in terms of current and future viability. O’Reilly and Tushman (1996; 2004) argue that because of their contradicting logics, exploration and exploitation need to be kept separate within the organization, while providing an organizational structure allowing to integrate structural exploration-driven changes into the more exploitative units of the organization. Figure 1 illustrates how the broad outlines of such an organization varies in their design.
Accordingly, truly ambidextrous organizations are composed of project teams that are structurally independent and separate units, each having its own processes, structures and cultures, but that are integrated into the existing management hierarchy. In various subsequent literature streams of organizational studies, researchers have contributed to this discussion on ambidextrous organizations. The contradictions between exploitation and exploration, as well as the need to resolve the two orientations, have been discussed in contexts such as technological innovation, organizational learning, organizational adaptation and organizational design.

**Technological innovation**

In the literature on technological innovation, one of the main research themes in is the distinction between incremental and radical innovation (Abernathy & Clark, 1985; Dewar & Dutton, 1986; Tushman & Anderson, 1986). Incremental innovation represents relatively small adaptations of existing products and business concepts. Contrarily, radical innovation refers to fundamental changes leading to a switch from existing products or concepts to completely new ones. Extending this line of thought, Tushman and Smith (2002) describe incremental innovations (which are designed to meet existing customers’ needs) as exploitative and radical innovations (which are designed to meet the needs of emergent customers) as explorative.

Subsequent studies have adopted and further developed the categories of exploitative and exploratory innovation (Benner & Tushman, 2003; Danneels, 2002; Holmqvist, 2004; Smith & Tushman, 2005). Several scholars point to the tensions that organizations encounter when pursuing both types of innovation simultaneously (Abernathy, 1978; Dougherty, 1992; Nadler & Tushman, 1997). Leonard-Barton (1992), for example, describes a capability paradox in product innovation: Exploiting existing product innovation capabilities may have dysfunctional rigidity effects that rule out exploration of new competencies. At the same time, scholars stress the importance of pursuing both innovation processes. In this context, Tushman and O’Reilly (1996) define ambidexterity as the “ability to simultaneously pursue
both incremental and discontinuous innovation” (p. 24). Colbert (2004) argues that the interaction between exploration and exploitation reflects a complex task that provides an additional source of corporate advantage beyond those provided by each innovation activity individually. Several authors outline the various organizational dimensions that can be instrumental in finding a balance between the two innovation types (Brown & Eisenhardt, 1997; O’Reilly & Tushman, 2004; Sheremata, 2000).

**Organizational learning**

March’s (1991) article on exploration and exploitation spurred a debate in the learning literature on whether the two should both be associated with learning activities. Some researchers defined exploitation as the simple reuse of existing knowledge and thus assigned all instances of learning to exploration (Rosenkopf & Nerkar, 2001; Vassolo, Anand, & Folta, 2004; Vermeulen & Barkema, 2001). Other scholars have found that their ideas coincide to a greater degree with those of March, who initially differentiated between exploitation and exploration by focusing on the type or degree of learning rather than the presence or absence of learning (Benner & Tushman, 2003; Gupta et al., 2006; He & Wong, 2004). Baum, Li, and Usher (2000), for example, suggest that “exploitation refers to learning gained via local search, experiential refinement, and selection and reuse of existing routines. Exploration refers to learning gained through processes of concerted variation, planned experimentation, and play” (p. 768). These categories reflect other classifications into different modes of organizational learning, such as double-loop versus single-loop learning (Argyris & Schön, 1978), generative versus adaptive learning (Senge, 1990), local search versus long jump (Levinthal, 1997), and product innovation versus production-oriented learning (McKee, 1992). Despite the differences between the two learning processes, scholars have long believed that a well-balanced combination of the two types of learning is essential for long-term organizational success (Gupta et al., 2006; Levinthal & March, 1993; March, 1991). Whereas March considers the two types of learning as fundamentally incompatible, subsequent studies often conceptualize exploitation and exploration as orthogonal variables that can be achieved simultaneously (Auh & Menguc, 2005; Baum et al., 2000; Katila & Ahuja, 2002). Mom, van den Bosch, and Volberda (2007), for instance, show that managers may engage in high levels of exploitation as well as exploration activities. Top-down knowledge inflows from persons at higher hierarchical levels than the manager are positively related to exploitation. Conversely, horizontal and bottom-up knowledge inflows from peers and persons at lower hierarchical levels are positively related to exploration. The findings thus indicate that the more a manager acquires top-down and horizontal or bottom-up
knowledge flows, the higher the levels of exploration and exploitation in which the manager engages.

Organizational adaptation

A range of scholars have suggested that sustained competitiveness requires an organizational balance between continuity and change (e.g., S. L. Brown & Eisenhardt, 1997; Leana & Barry, 2000; Miller & Friesen, 1984; Probst & Raisch, 2005; Tushman & Romanelli, 1985; Volberda, 1996). Tushman and Romanelli (1985), for example, develop a model of organizational evolution that is defined by long periods of convergence punctuated by short periods of discontinuous change. Successful organizations thus not only emphasize exploitation and alignment during periods of evolutionary change but also pursue radical transformation and exploration in periods of revolutionary change (Tushman & O’Reilly, 1996). Along the same lines, Meyer and Stensaker (2006) relate an organization’s capacity for change to its ability to balance the need to implement changes and the need to maintain daily operations. The need for balance between continuity and change is also reflected by related constructs, including organizational identity, absorptive capacity, and in recent redefinitions of organizational routines (Feldman & Pentland, 2003).

These theories’ common underlying belief is that too many (or too radical) change actions could create organizational chaos if continuity is not taken into account, whereas the opposite could lead to inertia (Huy, 2002; Levinthal & March, 1993; Sastry, 1997). Consequently, some researchers argue that there is a need for regular and rhythmical organizational change by means of time pacing (S. L. Brown & Eisenhardt, 1997). Others suggest that managers take center stage in “mediating between forces for convergence and forces for change” (Tushman & Romanelli, 1985). Top management is mostly considered the main driver of discontinuous change, whereas middle management is expected to support incremental change (Floyd & Woolridge, 1996; Shrivastava, 1986). Conversely, Huy (2002) has developed a theory that middle managers facilitate organizational adaptation through the emotional balancing of continuity and change.

Organization design

Organization theory scholars have long discussed the challenge of using organizational features that make efficiency and flexibility possible. Thompson (1967) describes the trade-off between efficiency and flexibility as a central “paradox of administration” (p. 15). In their seminal work, Burns and Stalker (1961) argue that mechanistic structures—which rely on standardization, centralization, and hierarchy—support efficiency, whereas organic structures—with their high levels of decentralization and autonomy—support flexibility.
Duncan (1976) suggests that organizations require both structures: organic to create innovations and mechanistic to implement and deploy them. Several authors argue that mechanistic and organic structures are difficult to reconcile within a single firm (Ford & Ford, 1994; Lawrence & Lorsch, 1967; Lewis, 2000). Conversely, recent studies often claim that firms may resolve the paradox by combining mechanistic and organic features (Adler et al., 1999; Jansen et al., 2005a; Sheremata, 2000) or developing a collective organizational context (Gibson & Birkinshaw, 2004). From this perspective, ambidexterity can be defined as a firm’s ability to operate complex organizational designs that provide for short-term efficiency and long-term innovation (Tushman & O’Reilly, 1996).

**Conclusions from the different debates**

While the above sections provide glimpses of topics that have been mentioned in different streams of the OS literature, some main commonalities across the debates can be identified: organizations encounter tensions when engaging in both types of innovation simultaneously (that is: incremental and radical change processes). Partly, this is due to an underlying capability paradox: developing capabilities for the one form of innovation may have long-term effects that rule out the other. Similar conflicting aspects apply regarding incentives for employees to pursue exploitation or exploration, the often efficiency-trimmed mechanisms within organizations, and competition for the allocation of resources - that in many cases work against a natural coexistence of the two forms of innovation. One of the most important aspects in the debate is learning, since it is a key ingredient in any innovation process. Different forms of learning are necessary for different types of innovation: exploitation needs local search, refinement, selection and reuse of existing routines. Contrarily, learning for exploration is achieved through processes of variation, experimentation (with different influences) and play. A second big issue is the integration of newly developed products or processes (though exploration) into the existing units of the firm. Since the new product may compete with, or even cannibalize the organization’s old ones, this integration is often described to be highly complex and difficult to achieve.

In all this, one should also mention the time dimension: organizational scholars have observed that firms’ environments are often characterized by long periods of convergence (where exploitation is key), punctuated by short periods of discontinuous change (that should be anticipated with exploration).

**Exploitation and exploration in Economic Geography (and cluster debates)**

While many small notions (and related mechanisms) of exploitation and exploration have been disentangled in detail in OS, Economic Geographers have put much less focus on the
exact type of change processes on the individual level (or that of the firm). The interest is naturally more on the aggregate level: how and why do regions specialize (e.g. Krugman 1991), what are the benefits of specialization (Porter 1998; Malmberg & Maskell 2002), what happens to specialized regions when the industry changes (e.g. Martin & Sunley 2006, 2011; Menzel & Fornahl 2010), in what areas are regions most likely to succeed with transformation processes (Frenken et al 2007; Boschma & Iammarino 2009), or what type of knowledge-mix is beneficial for a region to innovate in general (Lawson & Lorenz 1999; Asheim & Isaksen 2002; Asheim & Coenen 2005). In all this, there is implicit awareness for necessity of both exploitation and exploration, but no clear inclusion of the conflicting differences of underlying mechanisms. In this lack of precision is the main value of the ambidexterity debate for studies on the cluster level: organizational studies have been much more explicit in different mechanisms relating to exploitation and exploration, and how they conflict and interact with each other. Table 1 (below) provides some examples. A better understanding of this interaction will, expectedly, allow studies on clusters (and specialized regions) to be more accurate when describing their evolution over time, and processes of renewal in particular.

<table>
<thead>
<tr>
<th></th>
<th>Exploitation</th>
<th>Exploration</th>
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<tr>
<td><strong>In Economic Geography:</strong></td>
<td></td>
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<tr>
<td>Cluster debates</td>
<td>Path dependence, extension</td>
<td>Path creation</td>
</tr>
<tr>
<td></td>
<td>Different types of institutions, networks and agents (with types of knowledge) on aggregate level that are necessary for different types of change (no clear division between exploitation and exploration, and its conflicting underlying mechanisms)</td>
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<tr>
<td><strong>In OS literature streams:</strong></td>
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<tr>
<td>Organizational learning</td>
<td>Type of knowledge required: established knowledge, local search, selection and reuse of existing routines</td>
<td>Type of knowledge required: recombined knowledge, concerted variation, “experimentation and play” (Baum, Li &amp; Usher 2000, p.768)</td>
</tr>
<tr>
<td>Technological innovation</td>
<td>Incremental change: relatively small adaptations of existing products and business concepts</td>
<td>Discontinuous change: fundamental changes leading to a switch from existing products</td>
</tr>
<tr>
<td>Organizational adaptation</td>
<td>Search for organizational balance, continuity, convergence, inertia</td>
<td>Creation of organizational misbalance, divergence, change</td>
</tr>
<tr>
<td>Strategic management</td>
<td>Strive for efficiency</td>
<td>Strive for flexibility</td>
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</tbody>
</table>
Commonalities between organizations and clusters

As mentioned previously, organizations and clusters are exposed to a similar basic problem: they need to exploit and explore somewhat simultaneously in order to stay competitive over time. If they only explore but do not exploit, they do not reap the benefits of the innovations they generate. If they only exploit existing knowledge, they run a big risk of getting trapped on a sinking ‘technological ship’, when new products or services replace the existing ones, or when other significant changes occur in the surrounding industry or economy.

But let’s explain the above briefly by outlining the ‘typical’ evolution of a firm versus that of a cluster. The evolution of a firm is normally characterized by a starting phase in which a new product or process is developed by an individual or a group of individuals. They ideally have a unique product or service in mind, and aim at integrating this product in an established (or a new) market. In this early phase, the firm is exposed to much variation in terms of production, customers, and markets. The firm consequently needs adapted learning processes and organizational structures that allow it to cope with this variation. As the firm grows (and possibly extends its product portfolio), it shifts its focus from the initial product creation, to improving the quality (or in many cases reducing the cost) of its existing products. In other words, it shifts from an exploration to an exploitation mode, putting more focus on making profit from its existing products, and being able to do it on an increasingly larger scale. With this shift come requirements (in terms of organization) that strive towards efficiency, standardization and reliability. If it does not actively engage in new exploration, it is very likely to develop a functioning mode that is trimmed towards exploitation.

The early phase of a cluster can have various shapes, but is generally characterized by a triggering element, such as natural endowment (as for instance the climate and soil in wine clusters), a research facility (that provides the bases for new technologies), proximity to large infrastructure (e.g. harbors) or the availability of other forms of resources (e.g. specific types of knowledge) that facilitate the seeding of a regional industry. In this early phase, locally emerging firms explore possibilities for growth based on the initial endowment. They may do this in many different ways, by trying different techniques, entering diverse marketplaces, or providing different types of services. When one of them proves to be successful, firms start to
join this new growth trajectory. The growing firm(s) spin off employees that start similar businesses; component suppliers and adapted services emerge, inter-firm organizations are established and the collectivity of firms starts developing (consciously and unconsciously) its own institutional configuration. The cluster gains momentum, and firms reap the benefits of specialization. It develops a specialized labor pool, incumbent firms profit from increasingly strong externalities in the cluster (those relating to localization, MAR-type), and policy supports the development by providing adapted infrastructure and other forms of public investment. The cluster becomes efficient, and increasingly trimmed towards exploitation of its current specialization. To this stage, one can see a range of similarities to the development of a single organization: a range of mechanisms and forces have come into place that favor exploitation over exploration, and it becomes increasingly difficult to successfully engage in the two activities to the same extent.

In the meantime however, the industry changes, global markets develop, and the established specialization may become threatened. Both for the firm and for the cluster, there is an increasing pressure for renewal. They need to reengage in renewal timely, before the downturn hits the firm or the cluster too severely. Although the cluster has a different general configuration than an individual firm, it - just as much as a firm - needs to engage in exploration while exploiting its existing strengths. So far to the commonalities between the two levels of analysis.

Differences between organizations and clusters

Now to the differences. One major difference between the two fields of study (that is Organizational Studies and Economic Geography) is the object that needs to survive:

OS: the firm
EG: the regional economy

While for organizational scholars the sine-qua-non is the survival of the organization they study, economic geographers are interested in the survival of the regional economy. This has significant implications when reflecting upon ambidexterity. While firms need to think about competition with other firms and need to develop an individual survival strategy (which for instance, may keep them away from investments in highly uncertain exploration), clusters have the ability to compensate (collectively) for external changes, by potentially having new firms growing within the system that explore new technologies or more radically new opportunities. If those firms generate a critical mass within the system, the local knowledge infrastructure can be kept alive, trained employees move from the old firms to the new firms
(ideally by transmitting some of their knowledge) and the regional economy keeps momentum. A recurrently coined term in this respect is regional resilience, a topic that is gaining attention in the EG community. As firms in a cluster are naturally separate and more independent from each other (at least in organizational terms, as opposed to units within a large firm), the often-mentioned separation problem regarding ambidextrous organizations (coping with exploitation and exploration simultaneously) becomes seemingly less relevant. This is also the case for the integration of the new product or process into the system (the cluster), since it does not need to be integrated in the previous organization (as in organizational ambidexterity), but can have a life on its own in the new venture that will grow within the cluster and profit from available externalities.

While the above factors seem particularly favorable for ambidexterity on the cluster level, there are also some major downsides. A firm, studied by OS scholars, generally has a director (or board of directors) and can actively be managed. This means, the directors can define a vision for future development, they can allocate resources, they can modify organizational units and can actively intervene in decision-making and related development processes in the individual parts of the firm. On the cluster-level this becomes much more fuzzy. While inter-firm organizations and policy boards (in many cases with representatives from the firms) do exist, their influence stays restricted. While they can define a broad vision for the region or the cluster, they generally do not have the power to allocate major resources, nor can they directly intervene in the decision making process of their individual units, the firms. Another issue here is that even when they intervene (for instance by modifying explicit local institutions), they are often strongly influenced (or formulated) by the largest firms in the cluster – those that may have no interest in being outcompeted by newly emerging firms in the cluster.

<table>
<thead>
<tr>
<th>Ambidexterity-related challenges</th>
<th>Firm-level</th>
<th>Cluster level</th>
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<tbody>
<tr>
<td>Planning</td>
<td>Top management</td>
<td>Policy makers, inter-firm organizations</td>
</tr>
<tr>
<td>Management</td>
<td>Unit managers</td>
<td>Self-managing, random</td>
</tr>
<tr>
<td>Implementation</td>
<td>In separate units within the organization</td>
<td>By entrepreneurial firms (often spin-offs) in the cluster</td>
</tr>
<tr>
<td>Resistance</td>
<td>Between units of the firm (e.g. explorative vs. exploitative units, or along hierarchical structures), competition for resources within the organization</td>
<td>From established firms, given by institutional configuration (e.g. inter-firm organizations) and hierarchies within cluster (representation in policy boards)</td>
</tr>
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</table>
This leads to the second issue: the proprietorship problem. While inside an organization, all innovation is for the benefit of the organization itself, in a cluster the achieved changes are somewhat shared collectively, since firms do not reap the benefits themselves but other firms in the system do. It is therefore perhaps more difficult in a cluster to provide incentives for firms to engage in innovation. Even those emerging firms that leap ahead with a new technology (or another new way of using local resources) will not want their competitive advantage shared with lagging counterparts in the cluster. This requires policy makers and inter-firm organizations to think through the way they can influence the cluster, although it can potentially be a fertile ground for ambidextrous activity. Table 2 indicates the above ambidexterity-related challenges on the firm and on the cluster level.

**Conclusions**

The study provides a basis for discussion for introducing the ambidexterity concept in cluster debates. It describes some of the main insights about ambidexterity in organizational studies, and points out perspectives within the field from different streams of literature on the topic. It stresses the commonalities regarding the underlying problem of firms and clusters: that of managing ambidexterity continuously (being exploitative and explorative at the same time), but also discusses key differences when changing the unit of analysis from the organization to the cluster.

In clusters, some of the main issues of organizational scholars are less relevant: firstly, those of separation of exploration and exploitation, since boundaries between firms in the cluster are different from boundaries between units inside an organization. Secondly, the issues of (re)integration of the newly developed product or process (achieved through exploration) in the established units of the organization, since firms can develop independently in the cluster. On the other hand, clusters are not manageable in the same way as organizations, and proprietorship problems arise when investments in new development paths are made. One highly positive aspect in clusters is that the interest of their survival is collective. This means that old declining industries can, technically, be buffered by newly emerging firms that can be disconnected from the organizational establishment.

The study can be a strong contribution to the recent debate about smart specialization in European regions. Those are encouraged to combine the strengths of cluster and specialization strategies with those of entrepreneurial discovery and exploration, while
acknowledging every specialization’s inherent risk of lock-in and path dependence. This is specifically complex and relevant, as many clusters and cluster initiatives have put much focus on improving already existing strengths, while sometimes neglecting the balance between exploitation of existing capabilities and exploration of new potential development paths. Insights from the study would suggest that policy initiatives in clusters can or should have two-sided strategies: they should, on the one hand, provide established firms with the infrastructure and institutional configuration to exploit current strengths, while also establishing tools that help newly emerging (or existing dynamic) firms exploring unknown development paths that may be beneficial for the region (or the cluster) in the long run. This can be in forms of adapted institutions, by provision of connecting points between innovating firms, or by attracting new firms/agents to the cluster.

There is much scope for further studies on this topic. It would be interesting to illustrate and test the above discussion on a range of clusters in different industries for comparison. Just as much, it can be interesting to go into individual empirical cases in detail, in order to further disentangle the exact mechanisms that occur and develop between actors in clusters that engage in exploitation and exploration simultaneously.

**Literature list**


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