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Work in progress

Relational aspects of clusters:
Discovering organizational roles
in the biomedico cluster of North Denmark

A research agenda for a project on Empowering Industry and Research

Abstract

The present paper is the first preliminary account of a project being planned for 2013, focusing on the development of the biomedico cluster in North Denmark. The project takes as its point of departure the establishment of a research and industrial policy initiative on *Empowering Industry and Research* which aims at contributing to the development of the biomedico cluster in North Denmark by bridging research, testing and commercialization in the field of health science. The project focusses on the relational capabilities of the cluster in terms of a number of organizational roles which are argued to be necessary for the development and growth of the upcoming cluster in question.

Section 1 outlines the field of interest in the project, while section 2 discusses the theoretical point of departure for the research agenda of the project. Finally, section 3 outlines the research agenda.

1. The field of interest

In 2012, Aalborg University in cooperation with the region of North Denmark and the University Hospital of Aalborg initiated EIR – Empowering Industry and Research. With a basic funding of DKR 38 million and intimately associated with the Department of Health Science and Technology at Aalborg University, the initiative aims at bridging basic science and private enterprising in the North Jutland Region and facilitating the cooperation on these activities between regional, national and global companies. EIR's vision is to contribute to research-based innovation and business development within health science and technology, thereby developing North Denmark into a leading European region for clinical trials, interdisciplinary health service and technology research, and innovation in the biomedico sector. The main vehicle for this endeavor is the establishment of a business park, both in physical and virtual terms, where synergies between basic and applied research are focused on innovation, local companies upgraded, and new national and international research-based companies attracted.

By developing activities along the lines stated above, the EIR initiative expects to make a significant contribution to the growth of the biomedico cluster in North Denmark. At the outset, this hope is faced with two major challenges.

First, it is questionable whether the biomedico cluster in North Denmark comprises sufficient critical mass in terms of the number of private companies, share of total employment, and extensive relationships with business partners (Stoerring, 2007). However, what is the necessary size of the critical mass of a certain cluster for take-off is disputed, and one may argue that with some sixty companies, half of which are R&D companies and one-third production companies, an initiative as EIR endowed with strong research qualities and a tradition for university spin-outs seems promising.

Second, the success of EIR depends on the interplay between private companies and framework conditions such as university research, regional policy, and support structures for business ventures. While the interplay between these economic agents, or clusterpreneurs (Christensen & Stoerring, 2012), is highly developed in North Denmark, the development of the biomedico cluster still represents a recent endeavour. An important aspect warranting consideration is the role of the science park. In essence, a science park aims at stimulating and managing flows of knowledge, technology and economic activities among the clusterpreneurs, often in conjunction with a university. However, even though universities appear to have an increasing importance for the development of economic activities (Etzkowitz, 2004; Clark, 2004; Gjerding et al., 2006), universities are a necessary, but not sufficient condition, and supporting institutions and policies are needed (Asheim & Gertler, 2005).

While previous analysis on the biomedico cluster in North Denmark has addressed the issues of cluster competences in terms of the working of supporting institutions, research institu-

tions, patenting, policy measures, and the establishment of venues for cooperation, the present project aims at studying cluster competences in terms of institutionalized roles which must be present in order for the cluster to succeed. In the following section, the theoretical point of departure is discussed, followed by a section on the research agenda of the project.

2. Theoretical point of departure

Three quarters of a century ago, Coase (1937) challenged the existence of pure markets by asking why firms exist. The main argument seemed to be that if markets are assumed to be perfect, then we may also assume that intermediate goods and services can be traded freely between individuals along the chain of value production leading to the occurrence of final goods and services. In essence, since firms do exist we must assume that there are costs involved in pure market activities which can be mitigated by locating these activities within an organizational entity. While these costs were associated with economies of coordination of production and the removal of intermediate steps in transactions, Williamson (1975) later expanded this line of reasoning within a contractual framework, arguing that asset specificity and actions directed towards opportunistic behavior would lead to the establishment of hierarchical relationships, i.e. the occurrence of firms and conglomerates. Within the field of innovation economics, Lundvall (1985, 1988) supported the critique of the idea of a pure market economy by arguing that price signals, as the main form of information channelling, were ineffective in providing the necessary signals about new products and services, especially because the advent of new products and services requires processes of knowledge transfer and learning at both the demand and supply side of the market. Instead, in order for the market to function effectively, firms must coordinate their activities and collaborate on the production and transaction of products, processes and services. In effect, the market becomes organized based on the intimate networking among the economic agents.

Thus, we can argue that organized markets occur not only because there are diseconomies entailed in using the market for production and transaction purposes, but also because networking implies that firms can achieve economies of scale beyond what the firm, by itself, is capable of. This is the main reason for regional clusters to appear, i.e. the co-location of firms within a specific geographical space which permits the firms to enjoy economies of scale related to more efficient production through specialization, a larger stock of potential human capital through pooling at localized labour markets, and access to non-formalised knowledge, as pointed out by Marshall already more than a century ago (Marshall, 1890). However, in order for co-location to become economically efficient, some type of intimacy between the co-located firms needs to be in place. Within the literature on clustering, this is normally envisaged as the occurrence of interorganizational ties and various types of governance structures,

including path-dependency of interfirm relations and the working of auxiliary institutions supporting the dynamics of the cluster (Porter, 1990; 2000; Bell et al., 2009).

The role of interorganizational ties is to some extent an unsettled matter. At the outset, it is natural to assume that strong ties facilitate interorganizational action, e.g. joint business activities, and knowledge production and dissemination. This has to do with the development of common practices, standards and trust embedded in lasting relationships. However, while these features are conducive to sustained economic activity, they entail the danger of being locked-in to established patterns forgoing potential opportunities. Therefore, weak ties may sometimes be preferable, as they imply a relationship which does not preclude new relationships from developing. This line of reasoning appears, for instance, at the heart of much debate in the field of knowledge management (Phelps et al., 2012, pp.1133-1134), and derives its inspiration from Granovetter's argument that strong ties may lead to fragmentation (Granovetter, 1973). The overall stance seems to be that the roles of strong and weak ties is a contingent phenomenon, where the capability of firms depends on heterogeneity in the composition of ties (McEvily & Zaher, 1999), and where even the absence of ties occasionally stimulates new cooperative patterns as firms seek market opportunities (Shipilov & Li, 2008).

The role of governance structure is generally assumed to be the institutionalization of relational assets in the form of patterns of cooperation on value production, distribution, and the creation of knowledge directed at innovation. However, the activities within clusters are not only characterised by cooperation but also by competition, and thus co-opetition (Brandenburger & Nalebuff, 1996) is an intrinsic feature of clusters (EU, 2008). This phenomenon puts a heavy burden on the ability of the economic agents to achieve a balance between cooperation and competition which is conducive to economic activities. Thus, the working of a cluster is highly sensitive to the institutional glue which channels cooperative and competitive relations between the firms comprising the cluster in question.

One way of describing the institutional glue is by focussing on how trust among economic agents is created, implying that trust is both the result of institutionalization and capable of institutionalization in terms of typification of behaviour based on a symbolic repertoire which enables the economic agents to make sense of what is going on (Kroeger, 2011). This type of description shares with most descriptions of clusters the assumption that clusters operate on the basis of relational interaction as the basic feature of the macroculture of the cluster. However, as pointed out by Bell et al. (2009), clusters may also exhibit patterns of hierarchies guided by the actions of dominant firms within the cluster. Taking a transactional point of view to the analysis of a number of clusters, Bell et al. (2009) argue that while "many transactions within successful clusters are characterised by the bilateral interaction patterns that Saxenian (1994) and others have described, it is also clear that many successful clusters are organized quite differently" (Bell et al., 2009, p.625). In cases where the macroculture of a cluster is relational, asset-specificity may warrant an explicit design of cooperation on asset-specificity which tends to organize cooperation along hierarchical patterns. On the other hand,

in cases where the macroculture is hierarchical, tacitness of assets may warrant an explicit design of cooperation on explication of assets, e.g. knowledge, which tends to organize cooperation along relational patterns. Thus, clusters exhibit a governance structure which is the product of counteracting forces, where the macroculture is influenced by the type of transactions going on between the incumbent firms. Furthermore, the governance structure is, obviously, influenced by changes in the strategic approach of the incumbent firms. For instance, Baum et al. (2003), characterising clusters as cliques, i.e. groups of firm which are to a considerable extent interrelated, argue that the density of cliques may be altered due to the occurrence of random partnering, partnering by peripheral firms aiming at a new market position, and partnering by dominant firms which attempt to maintain the controlling position within the cluster.

In sum, clusters need to be analysed not only in terms of geographical proximity and the frequency of interactions, but more importantly in terms of how relational ties are associated with the interplay between value producing activities and macroculture within the cluster. This interplay involves various types of economies of scale beyond the capacity of the individual firm, including production, distribution, and the creation of knowledge both in terms of joint activities and the utilization of a pooled labour force.

3. Research agenda

The approach of the project to how relational ties are associated with the interplay between value producing activities and the macroculture within the cluster is to identify the association by pointing out that certain organizational roles must be present within the cluster in order for the cluster to become successful. This idea is inspired by the contingency notion that economic entities must comprise certain organizational roles in order to cope with differentiation in terms of cognitions and orientations of the members of the entity (Lawrence & Lorsch, 1967), thus exhibiting requisite variety in order to deal with complexity. Importantly, the occurrence of a variety of organizational roles helps the members of the cluster to deal with bounded rationality (Simon, 1957) and engage in sense-making (Weick et al., 2005), thus bridging the variety of orientations which exist across a population of different clusterpreneurs.

The set of organizational roles depends on what is meant by a cluster being successful, and the success of a cluster must be judged in terms of what constitutes a cluster. The basic constitution of a cluster (Erhvervsfremmestyrelsen, 2001; Christensen & Dahl, 2004; Asheim & Gertler, 2005) comprises a critical mass of companies which engage in competition-oriented relationships based on access to and exchange of knowledge embedded in social interaction and trust between the actors involved. The macroculture is characterized by a cluster consciousness among the actors, i.e. the actors are aware that they belong to a cluster and actively

seek to develop new ideas, and plan and execute economic activities within the setting of the cluster. Besides having access to qualified labour, the cluster must enjoy services and infrastructure accommodating the needs of the actors. Based on these features, in order for an upcoming cluster to develop and grow, the cluster must achieve

- development and commercialization of knowledge,
- flexibility of structure and labour in relation to environmental pressures,
- innovations, based on a creative exchange of new ideas,
- entrepreneurial spirit, focused on risk-taking through learning-by-interacting,
- close-to-market perceptions, reacting to new commercial opportunities,
- access to capital, which is competent and patient, and not risk-averse,
- relational capability
 - internally, stimulating mutual learning processes and keeping the cluster coherent,
 - externally, linking to relevant clusters elsewhere,
- focus on core competencies, involving the will to outsource as international value chains are penetrated.

Of course, these achievements do pertain to individual companies as they form part of what a company must be capable of in order to compete on increasingly globalized markets. However, in the context of an upcoming cluster characterised by a division of labour between knowledge-producing entities, production entities, transaction entities, service and capital providers, and policy agencies, the achievements become an intricate matter since each of the cluster agents has a primary focus on the role which the agent plays among the set of clusterpreneurs. Thus, these focuses have to be balanced against each other in a way which contributes to the development and growth of the cluster. Inspired by governance research in the field of network theory (Gustafsson, 2004), the cluster may be described as a meta-company comprising a variety of economic agents each targeting specific activities within the cluster, and in order for the upcoming meta-company to succeed, a variety of organizational roles targeting the achievements must be present, such as

- *knowledge developers*, who focus on research, R&D, innovation, and the qualification of labour,
- *coordinators*, who facilitate projects, align processes among cluster agents, and serve as liaison officers (or network brokers),

- *business entrepreneurs*, who spot commercial opportunities and turn new avenues into viable business models,
- *producers*, who bring about new products and processes, and ensure deliveries to markets and actors within and without the cluster,
- *business service providers*, who act as consultants, or deliver services within fields such as IT, law, controlling and finance, which will not be present in many companies within an upcoming cluster,
- *sales agents*, who ensure market access and provides business intelligence, and
- *policy makers*, who provide framework conditions, and ensure social legitimacy when necessary (e.g. certification of products and methods of treatment in the health sector).

The project will address to which extent these organizational roles are present in the North Denmark biomedico cluster, and how they contribute to the macroculture of the cluster in question. In doing so, the project must take into account that even though organizational roles may reside within single cluster agents, they may also be located across cluster agents, or appear in the form of cooperative relationships between cluster agents. This may be due to the occurrence of mixed governance patterns, i.e. the combination of relational and hierarchical cooperative patterns which breach the existence of a uniform macroculture. Furthermore, the project will dig into the extent to which the organizational roles are confined within the geographical space of a North Denmark cluster or stretches across geographical spaces nationally, internationally or globally. As part of mapping the organizational roles, the project will survey the division of labour among the cluster agents, both in terms of economic activities and focus of attention. Finally, the project will provide recommendations on how the biomedico cluster can develop the organizational roles, and especially how the EIR initiative can contribute to this process.

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