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Christensen, Jesper Lindgaard; Stoerring, Dagmara

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Facilitating Cluster Evolution in Peripheral Regions: The Role of Clusterpreneurs

Jesper Lindgaard Christensen and Dagmara Stoerring

6.1 Introduction

In the last decades cluster initiatives¹ and cluster policy have become central features of policy promoting growth at regional, national, and European level. Many regional and national government's policies aim at imitating successful clusters in the belief that their local areas may also capture the benefits of new high-technology firm formation and expected economic growth (Cooke, 2001a; Feldman et al., 2005) despite the fact that there is little empirical evidence to support a rationale for such policy, as the link between clustering and economic performance remains under-studied (Stuart and Sorenson, 2003; Maine et al., 2010). Both academic models (Brenner, 2004) and a number of consultant-made guidelines, even guidebooks (such as DTI, 2004; Rosenfeld, 2002), have been developed to assist the policy decision process.² This promotion of high-tech clusters is not confined to urban areas but also often takes place in peripheral regions, such as in the example studied in this chapter, the possible development of a biomedical cluster in the region of North Jutland in Denmark.

However, the effectiveness and appropriateness of transferring experiences from other regions is debatable and there are dilemmas in stimulating the development of high-tech clusters in peripheral regions. One condition for the success of cluster policy in peripheral regions has been argued to be a degree of systemic innovation in the regions, which in turn implies that institutions and actors are interlinked (Cooke, 2001a). Thus, more than twenty years ago, The European Commission pointed out that:

It is not simply the presence of units of RTD infrastructure, but of the degree of interaction between them which is the most significant factor in local innovation. The quality of the linkage and the presence of local synergy is the key element. Therefore a systems or network approach provides the best basis for understanding and promoting regional RTD-based innovation. (CEC, 1988)

Morgan (1997) contends that less favored regions often not only are less favored in the traditional sense of having poor physical infrastructure, high unemployment rates, and low income per head, but also have poorly developed social capital. This was also pointed to at an early stage by the OECD, which stated that:

Less favoured regions seem to have little or no social capital on which they can draw, a point which turns the spotlight on factors such as the institutional capacity of the region, the calibre of the political establishment, the disposition to seek joint solutions to common problems. These factors – the invisible factors in economic development – are just as important as physical capital. (OECD, 1993)

This emphasizes the need to focus on the carriers of the cluster policy. When policy is to a large extent about stimulating collective learning processes and building social capital, the key issues for policy become centered around human capital in both a ‘supply’ and a ‘demand’ dimension.

Despite the importance of human resources and the role of policy actors, research on cluster development and even cluster policy has generally not revealed a more precise specification of this role. This article contributes to this debate by focusing on and substantiating the concept of ‘clusterpreneurs’, defined as important actors in cluster formation.³ Thus, a clusterpreneur is here regarded as a key actor in the emergence of clusters. We argue that active clusterpreneurs are relatively more important in less favored regions, and that different clusterpreneurs may act effectively in different institutional settings and in different phases of cluster evolution. The article thus contributes to the existing literature in that it combines the actors perspective and the incorporation of regional

specificities in the analysis of how clusters may be promoted. Moreover, dilemmas inherent in this combination are highlighted.

We illustrate the role of clusterpreneurs by the example of a biomedical technology cluster initiative in North Jutland, Denmark, which has many of the characteristics of a peripheral region. The example could be said to be a typical case of a policy-driven cluster initiative. However, we show how the presence of clusterpreneurs comprising a diverse set of actors, spanning both the public and private spheres, can make such an initiative more effective. Moreover, we claim that this region may deviate from the usual picture of less favored regions as having poor social capital and coherence. This may provide an important condition for the further development of the cluster.

We start by presenting the concept of clusterpreneurs: its origin and main features. Then we discuss the nature of cluster policies: the principal difficulties facing cluster formation in peripheral regions; and we review theories on cluster emergence and cluster policies with an emphasis on the relation between cluster policy and the dilemmas related to implementing such policies in peripheral regions. We then describe specific characteristics of our case region, North Jutland in Denmark. Our case of a biomedical cluster initiative in the North Jutland region is used to illustrate both the concept of clusterpreneurs and their role in this specific initiative. We conclude with some suggestions for further research.

6.2 Actors in the emergence phase of cluster formation

The emergence of clusters has been studied intensively in recent years, primarily based upon historical case studies.⁴ In general, the explanations given may be classified in three groups. One group of explanations emphasizes that clusters are concentrations of resources. They generate knowledge spillovers and draw upon a common pool of skilled labor and specialized intermediaries. Another group of explanations sees clusters as emerging out of random seeding, accidental or deliberately generated positive externalities at an early stage. The third

group of explanations sees the internal agglomeration dynamics as decisive and explore these by network and industrial organization analysis.

Irrespective of the type of explanation for cluster evolution, cluster studies tend to fail to a large extent to specify the actors involved in the evolution and to specify the context, that is the type of region in which they operate. Some studies do, though, emphasize the role of entrepreneurship in cluster evolution. For example, Feldman (2001), Feldman et al. (2005), and Feldman and Francis (2006) see entrepreneurs as key drivers in the formation of clusters. However, these and most other studies in line with them, see the entrepreneur as an individual, private actor in cluster dynamics, whose primary contribution to cluster development is through establishing and running a business. The conceptualization of the clusterpreneur below attempts to bring in more precisely the actor perspective. Moreover, the approach is different from that of Feldman et al. (2005) and others in that it does not assume that firms have static boundaries and includes intrapreneurship as important in the dynamics of developing clusters, which is something broader than individuals starting up firms. Hence, the concept of ‘clusterpreneurship’ unfolded below includes also the spin-off processes, the business developers within the firms, and entrepreneurial activities in the public sector. Although some cluster studies do point to the role of actors in cluster formation it is most often not specified what these actors do and who they are.⁵ We attempt to fill this gap. Although we realize that our contribution is to a large extent case-specific, we believe that it is nevertheless a positive contribution to cluster studies.

Clusterpreneurs have a crucial role to play in the cluster-emergence process and may be seen as a constellation of four types of actor: (i) key institutions in both the knowledge-generating and the knowledge-diffusing systems; in the case of high-tech cluster formation, universities and university-related institutions are the most important actors in this group; (ii) policy-makers, most often – but not necessarily – public policy bodies; (iii) private firms and

industry associations; (iv) business services and venture capital organizations. The term venture capital organization as used here covers a range of relevant types of financing organization. The Triple Helix literature (e.g. Etzkovitz and Leydersdorff, 2000) includes some of these actors: university/research, private firms/industry, and policy are the foci of the analyses. However, our concept and approach are broader. These actors may in combination compromise clusterpreneurs and act with varying intensity of involvement and resources over time.

6.2.1 The collective character and changing role of different actors

Although cluster initiatives may be started by a particular set of actors, such as local government, over time a broader set of actors usually becomes involved and, more importantly, clusterpreneurs may tie the different actors together. An important function of clusterpreneurs is thus to knit regional organizations together, not only in a physical sense by creating networks, equally important by creating social capital. Sometimes it is one type of actor (such as a private person), sometimes a group of two or more of these four types which is active in doing so. ‘Quadra Helix’ actors, comprising the four types of actors mentioned above, often dominate and drive the cluster development asymmetrically. Their collaboration can be loose and informal, with the result that it can be difficult to identify this kind of clusterpreneur,⁶ but it can also be formalized, for instance as a group/organization devoted to the promotion of a given cluster (BioMedCommunity in our case – see Section 6.6). In the later stages of development, formalized clusterpreneurs often finance the activities of cluster initiatives by charging fees to the companies involved in the initiative.

Clusterpreneurs are particularly relevant for emerging clusters or, rather, cluster initiatives. According to Sölwell et al. (2003), cluster initiatives are often started by one person with a background in the cluster who takes the lead – a clusterpreneur. However, they also give examples of numerous other types of actor involved in starting cluster initiatives,

such as policy organizations at different levels (national, regional, local), industry organizations, or even individual industry leaders.⁷ It is also often underlined that the reliance on a single, key individual can turn out to be a disadvantage, especially in later stages of cluster development (Raines, 2002). Our approach thus differs from that of Sölwell et al. in that we emphasize the group character of the actors.

There may be different levels of involvement by the different types of actor during the evolution of a cluster. Also, the roles of one type of actor in one cluster may be different from that of the same type of actor in another cluster. For example, in some cases policy may have a decisive role in the early phases of the cluster life-cycle whereas policy may be only supportive in later stages. The role of active clusterpreneurs may vary over time, and will generally diminish when the cluster grows and develop its own dynamic development processes and networks. Specifically, cluster development may lead to that the roles of clusterpreneurs develop into self-organized processes rather than top-down governance. We contend that whereas the presence of the four different actors of clusterpreneurs may be a pre-condition to develop a dynamic cluster development it is in itself not enough. The specific relationships between these actors may be more decisive than is the activity and presence of a particular part of clusterpreneurs. Furthermore, we argue that whereas many studies see institutions as exogenous or lagging behind cluster formation (Feldman et al., 2005; Mason, 2007 on venture capital), we see clusterpreneurs as proactively forming cluster processes and in doing so incorporating supporting organizations.

6.2.2 Collaboration between private and public actors

Clusterpreneurs may be further grouped in different ways. One possible distinction is between, on the one hand, private individuals and organizations devoted to promoting local business through enhancing networking in clusters and, on the other hand, regional government represented by government agencies and other public bodies. These two types of

actors may, at the same time, have some common and some divergent interests. Moreover, their activities are determined and controlled by different mechanisms and rationales. Private clusterpreneurs are motivated by the profit, network, image/reputation and spillover effects companies can derive from being agglomerated in a cluster, whereas public actors are primarily interested in generating new jobs in the region.

Porter (1998) emphasizes that many clusters include governmental and other public or semi-public organizations – such as universities, standards-setting agencies, think tanks, providers of vocational training, and trade associations – which provide specialized training, education, information, research, and technical support. Porter suggests a new agenda of collective action in the private sector; that it is not only government's function to invest in public goods. Cluster thinking clearly demonstrates how companies can benefit from local assets and institutions (such as trade associations establishing university-based testing facilities and training or research programs). Even if it seems obvious that private firms may in the long term benefit from such investments in public goods, it involves a classic dilemma of some firms investing while other firms free-riding as well as conflicting micro–macro objectives. Private sector investment in public goods has been claimed to be particularly problematic in the European Union in comparison to the United States (Cooke, 2001b). However, it is likely that there are substantial intra-European differences at this point.⁸ Cluster building in practice is often a joint effort of public and private sector action. The shared financing of the formalized clusterpreneurs' organizations is widely seen as an example of how clusterpreneurs' activities can trigger the participation of the private sector in public goods building, thus improving collective action.

6.3 Cluster policies – the principal difficulties facing cluster formation in peripheral regions

As mentioned, cluster policy has become a central feature of economic policy in the last decade. Although cluster policy has been widely criticized by parts of the academic world (Martin and Sunley, 2003), it is extensively implemented by policy-makers (OECD, 1999, 2001). The rationale for innovation policy in general has traditionally referred to market failure, where price mechanisms fail to take externalities into account. The objective of cluster policies is then to provide access to functions that the market fails to produce, specifically networks and coordination. Following the development of innovation thinking towards seeing innovation in a system perspective, innovation policies now increasingly refer to system failures rather than market failure (Edquist, 2001). Policies to alleviate system failures may address institutions and capabilities related to the interaction between key agents in the system. As such, this perspective is more adequate for cluster policies than the market failure perspective.

Moreover, cluster promotion is not confined to urban areas, even if clusters tend to concentrate in such areas. Cluster promotion in a peripheral region may, however, involve a series of challenges additional to those present in urban areas. First, peripheral regions are generally characterized by a lack of developed physical infrastructure and social capital, as mentioned in the introduction. Second, big companies, which may play the role of driving forces in the cluster formation process, are often absent and difficult to attract. Rather, urban areas have been shown to attract high-tech/high innovative enterprises (Therrien, 2005). Third, peripheral regions lack many other factors enabling the emergence of clusters, such as a critical mass of firms, a university and other knowledge institutions, venture capital and other financing sources, and supporting business services. Fourth, it may be argued that local knowledge infrastructure and the ability to attract talented labor is less developed in peripheral regions but nevertheless is crucial (Glaeser, 2003) in such areas that often have a low-tech specialization. A low education level among the labor force is likewise often

characteristic of peripheral regions. Moreover, such regions generally often lack basic Marshallian agglomeration effects rendering external economies passed on to firms as a result of savings from the large-scale operations of the agglomeration as a whole.

These factors are interconnected, and often the lack of just one of them is the reason why a cluster cannot be developed in a region which makes active policy even more necessary. Therefore, clusterpreneurs are even more crucial in these regions. It is, however, important to emphasize that the pure presence of the factors just mentioned as supporting cluster evolution is not necessarily enough. Cooke (2001b) contends that, for example, it is not the more readily available presence of venture capital and university bio-tech research that makes the US bio-tech industry outperform that of Europe, it is the system for the commercialization of the research that is more efficient in the US. This emphasizes the importance of the systemic, integrated activity of clusterpreneurs, rather than just the presence of individual factors.

6.4 Cluster policies: content, challenges, dilemmas

6.4.1 Content of cluster policy

The role of policy in cluster development has been the subject of much debate. Porter, for example, has suggested active cluster policy (1998a). However, it seems to be a general perception in the literature that in a market economy one cannot create clusters from scratch (Raines, 2002; Sternberg, 2003). Thus, Porter argues that the targets of active policies should be existing clusters that have proved sustainable, rather than the creation of new clusters (Porter, 1998a). The case in this study (Section 6.6) is to a large extent an example of active policies where cluster policies go against the general assertion and Porter's recommendation that creating clusters should not (and could not) be created by policy means.

The importance and apparent attractiveness of clusters implies new roles for government at national and regional levels. In the global economy, sound macroeconomic

policies are necessary but not sufficient. Government's more decisive influences are at the microeconomic level rather than at the macroeconomic level (Porter, 2000). Cluster theory highlights the role of local actors (local/regional governments) in economic policy focused on encouraging innovation.

Cluster initiatives have developed as a new policy agenda; however, the policies following this agenda is often based on traditional policy areas such as regional policies, innovation policies, and industry policy, and is conducted heterogeneously across countries and regions. A number of common characteristics of successful cluster initiatives, such as investing in education, setting the rules of competition by establishing market institutions, creating an adequate physical infrastructure, motivating collective action by the private sector, and tolerating and even encouraging multinationals (Gambardella et al., 2002), have been listed. Cluster policies are often associated with public initiatives and actors. However, there may be both public and private actors actively pursuing cluster policies, in Fromhold-Eisebith and Eisebith (2005) these policy approaches are termed "top-down" and "bottom-up" institutionalizations.

Another approach somewhat in line with the arguments presented in this chapter is that of Keeble and Wilkinson (2000), who suggest the following measures for promoting clusters (from Spilling and Steinsli, 2003):

- diffusion of knowledge from the science and technology base, for example by reducing barriers between industry and university by supporting technology consultants helping small firms to utilise knowledge from the university
- support networking and collective learning processes by for instance supporting research collaboration between local SMEs
- business support for high-technology SMEs, for instance through education and training facilities targeted at their specific needs and development
- policies targeted to the specific needs on the regional level in order to develop policies targeting the specific challenges in each region.

Tödttling and Trippel (2005) specifically emphasize the last point. They argue that innovation policy is likely to be inefficient if a ‘one-size-fits-all’ approach is adopted. It is essential that the policy approach takes into account the abilities of the region and the degree of systemic innovation in the region – that is, the degree to which institutions and actors are interlinked. Peripheral regions and high-tech urban areas differ in this respect. In addition to this we highlight the role of local actors (local governments, firms, universities), the clusterpreneurs. Another important content of cluster policy is the fact that it should support networking and collective learning processes among the local actors, especially SMEs and universities, thus supporting the building of the social capital in the region, something that in later stages can be an important foundation and pre-condition of a successful cluster policy.

6.4.2 Choosing the right policy target – industry, sector, cluster

Inherently, it is difficult to plan cluster formation based on innovation. The innovation process entails uncertainty – not only technical uncertainty, but also market uncertainty. Therefore, the path of technological development is difficult to predict, as the existence of the vast literature on technology foresight illustrates. Planning clusters in this environment is extremely risky and uncertain.

Presuming that governments have a role in cluster development, policy-makers are faced with a dilemma: seeds for clusters may emerge in several areas, and resources may be restricted; how then should one choose the right area to target and at the same time secure the diversity that makes the region less vulnerable towards changes (narrow vs. broad focus)? Achieving the necessary critical mass of firms in the chosen industry may be the biggest problem.

This may be called a ‘policy dilemma’ that regional policy-makers face when they wish to promote such a cluster without orienting policies too much towards rewarding certain sectors at the expense of others. Therefore it is important to see the two types of actor in

cluster formation – regional policy bodies and private individuals/organizations – as mutually reinforcing and dependent upon each other. In particular, the presence of private clusterpreneurs may allow local government to legitimize spending resources on specific sectors.

The specific instruments required in cluster and innovation policy are often disregarded in theoretical cluster studies, partly due to the fact that they may vary with the particular case; in other words, a general model of cluster policy is likely to be inadequate (Nauwelaers, 2001; Raines, 2002; Martin and Sunley, 2003). Cluster policies need to be adjusted to the specific conditions and strategy of the target region. At a more general level, the focus of innovation and cluster policy has moved in three phases from physical capital, such as infrastructure, R&D, and finance, to immaterial aspects related to human capital, such as knowledge, education, and training, and finally to social capital, such as networks, norms, and institutions (Nauwelaers, 2001). This poses challenges to policy-makers because the instruments of the latter types of policy are not well developed and less measurable.

Another dilemma may be related to the above-mentioned network/social capital as the target for policy. The question is how to promote social capital with policy instruments. Traditional policy instruments quickly become inadequate. Inherently, it is not easy to enforce collaboration on people. It may be possible, though, to bring the parties together and see if/how networks evolve. This, however, means that policy agents will have a positive role, conflicting with the perceived role of policy actors as being active and in control.

6.4.3 The rationale behind the promotion of low-labor-intensive high-tech industries

An additional problem may arise with the rationale behind the promotion of high-tech industries, which are usually not labor-intensive. In the case of peripheral regions it is primarily unemployment that is the biggest problem for policy-makers. This introduces a

time perspective dilemma between short-term and long-term policy objectives. Although in the short term, low-tech industries provide more work places in the region, they are more vulnerable to fluctuations at regional, national, and (perhaps most importantly) global level, as when production is moved to low-labor-cost countries. On the other hand, the promotion of high-tech industries or clusters involves structural change in the region, which is a long-term process (Dalum et al., 1998). This may put pressure on policy-makers to stick to stimulating the existing industrial structure.

6.5 Specific characteristics of North Jutland, Denmark

The North Jutland region has traditionally been characterized as peripheral, with the highest unemployment rate in Denmark. The industrial profile of Aalborg (the capital city of the region) has been dominated by traditional, labor-intensive manufacturing industries, while the other parts of the region have been dominated by the primary sector, especially agriculture and fishing, and in more recent decades, tourism. The regional specialization pattern for North Jutland shows that it is more specialized in primary industries and less specialized in finance and business services. Even if, during the 1990s, the region experienced a partial process of structural change toward more growth-oriented industries (some parts of the region became specialized in machinery, equipment, and electronics), it can still be characterized as relatively low-tech/peripheral in Denmark. Other indicators, such as education level, show that the share of people with tertiary education is significantly lower in North Jutland than in Denmark as a whole. Similarly, the R&D level in the region (weighted with the North Jutland's share of Danish firms) is for North Jutland approximately two-thirds of Denmark's level. Similarly, the region is lacking behind in the number of patents per 1000 inhabitants.

Thus, the region is structurally different from the rest of Denmark. Changing that is a very long process that requires considerable financial input. In sum, the region exhibits many of the characteristics of a peripheral region within Denmark, even though it is more

developed than many other regions in Europe. Hence, the term ‘peripheral’ is used here in a relative sense.

6.6 The biomedical cluster in North Jutland

In this section we present the case of the creation of a biomedical cluster in North Jutland. We present the cluster initiative, its history, and the main actors, and we put the case in its regional and institutional context. The purpose is to reveal key characteristics of clusterpreneurs and cluster policies as discussed above.

6.6.1 Cluster competencies

The actors behind the cluster initiative had identified the following competencies in the region that were thought to be decisive for the potential emergence of a cluster.

6.6.1.1 Aalborg University (AAU)

AAU established decades ago substantial activities within health science and technology, medico-technology, biotechnology, and related areas,⁹ which may overall be termed life sciences. In some areas the research has a 20-year tradition; in others, such as stem cells and nanotechnology, the research is more recent. Research at AAU in this area has now obtained international recognition. Among the established areas of activity, research within the medico-technical area at the Center for Sensory Motor Interaction (SMI)¹⁰ developed new methods for stimulating and treating electrical signals from muscles. Advanced methods were developed for measuring and activating the human motor function system and for locating pain. Moreover, the university developed a centre for research within stem cell technology,¹¹ aimed at determining how stem cells may be used to develop human ‘spare parts’. Another research field at AAU is biotechnology and the cluster initiative actors also see possibilities of synergy with substantial research in nanotechnology, although it seems that it is mainly within medico-technology that research is at the highest international level. In addition to a full study program in biomedical engineering, a doctoral school, which has approximately 50

Ph.D. scholarships, contributes to the high technological level of knowledge within the area as well as contributing to the pool of potential employers for local industry. A 2007 initiative was the establishment of courses in medical engineering. This was the springboard to the start of ordinary medical study from September 2010.

6.6.1.2 Aalborg Hospital, Århus University Hospital

Aalborg Hospital has a tradition of cooperation with Aalborg University and Århus University. Collaboration with AAU is primarily within biomedical research whereas research in health sciences is done in cooperation with Århus University. This cooperation is formalized in the HEALTHnTECH Research Centre (established in 2003), which offers support and evaluation of product ideas and applications developed by the industry. The close relations between doctors, scientists, and commercial partners have resulted in the set-up of a number of spin-off companies. In 2008, an 'Idea Clinique' was established with the purpose of supporting and facilitating the use – either internally or in commercial application – of good ideas from employees at the hospital.

6.6.1.3 Regional industry/companies

As already mentioned, the main high-tech companies in the region can be found within electronics and telecommunications. This sector is represented by big international companies,¹² but also many smaller companies, which play an important role in the ICT cluster. In October 2011, there were 51 companies active in biomedical technology or, more broadly, life sciences. These companies are a mixture of large firms in other industries some of whose activities related to life sciences and small development companies employing just one or two people. Some of them are spin-offs from the university research and therefore may rather be called development projects. Only a handful of the companies could be classified as pure biomedical production/manufacturing companies employing at least ten people. Another characteristic of this cluster is that its development has been turbulent, some companies

disappearing and new ones having been established. We can conclude that within the biomedical area the region is characterized by a lack of big companies and a number of small companies whose specialization profile is highly differentiated. As mentioned in the description of hospital competencies, the health sector in Denmark is to a large extent a public sector, which means that the local customers of the firms within medical technology are mainly public authorities. For facilitating evolution of this kind of cluster one may expect that policy may be relatively more influential due to the large size of the health sector in Denmark, and consequently high public procurement and -demand.

6.6.2 History of the cluster initiative

The beginning of this cluster initiative can be dated back to 2000. It was the Aalborg Commercial Council¹³ that, together with the Industrial Liaisons Office at Aalborg University, launched the initiative. Other actors joined them, specifically North Jutland County, Aalborg municipality, and finally industry representatives. Since the year 2000, several initiatives have been started in order to promote facilitate the evolution of biomedical technology in North Jutland. One of the origins of these initiatives is to be found in the Danish government's national strategy for the development of biomedical industries from 2000 (Regeringen, 2000). Moreover, regional policy makers were looking for industrial development potential that could supplement or eventually replace the existing mobile telecommunications (ICT) cluster, both because this cluster had experienced severe difficulties during the early 2000, and because a more diverse industry structure could reduce how sensitive the region is to business cycles.¹⁴ In this process they had noticed local strengths in the biomedical area. The biomedical area is considered one of the most promising from the industrial development point of view in almost every European country, and it is thus naturally attracting attention.

The initiative was formalized by these actors in 2003, when BioMed Community: Science & Innovation for the Living was established.¹⁵ BioMed Community is a collaboration aimed at developing and promoting North Jutland's cluster within life sciences. A steering committee was established representing the main actors in the region interested in this cluster initiative: Aalborg University, Aalborg Hospital, NOVI science park, biomedical companies, the County of North Jutland, Aalborg Commercial Council, and the Aalborg Region Cooperation, which means that there are agents from education, government, industry, and venture capital/supporting services. The group had administrative support from the Industrial Liaisons Office and Aalborg Commercial Council and was financed by the public actors.

The cluster is now at take off stage. It is perceived that a cluster goes through a series of stages, which may resemble the evolution of the ICT cluster in the region or follow the patterns of the cluster life-cycles described in the literature (see for example Menzel and Fornahl, 2009). According to the BioMed Community, the primary conditions for the first phases of a biomedical cluster are present in the region, namely research, education, networking, venture capital, and a well developed health sector. The region is claimed already to be above 'critical mass' in these respects. However, the small number of companies and their early development stage is regarded as a problem. Furthermore, it is only recently that the region's hospital was given the status of university hospital and its clinical research history is short. It may also be argued, as earlier in this chapter, that the pure presence of these factors will not be sufficient, that they need to be related to each other and interwoven in network constellations that may productively benefit from synergies. As also mentioned, the differences in performance between the biotech industries in the United States and Europe may be ascribed to differences in the way institutions are constituted rather than their presence or absence (Cooke, 2001; Orsenigo, 2006). However, BioMed Community is

aware of these problems and is taking action to find solutions, as will be explained in the next section.

6.6.3 Current policies in North Jutland for the promotion of the biomedical cluster

This section is for the most part based on interviews with the actors involved in the initiative, the clusterpreneurs. Interviews were undertaken with a number of key people; Appendix 6.1 lists the interviewees and the principal issues discussed.

Publishing promotion materials, marketing, attracting new firms to the region, promotion of new and established companies have been the main activities of BioMed Community in the first years of existence. As mentioned above, an increase in the number of firms is likely to spur a virtuous circle of cluster evolution, just as in the ICT cluster, where firms were attracted to the region because of the presence of a number of key players in the industry (Stoerring and Dalum, 2008). Consequently, efforts have been made to attract firms from outside as well as stimulate spin-offs and spin-outs. However, ‘soft factors’ were recognized as essential to the evolution of the cluster. Therefore, it is fair to say that the cluster initiative also took a more dynamic path after this period, giving rise to a number of actions.

Shortly after the initiative was formalized, in February 2003, a so-called ‘Firms Club’ was established for companies from Northern Denmark (not limited to the North Jutland region: one of the biggest companies was located in Ringkøbing). The networking that takes place in the club establish synergy between companies in the region, as they learn about each other, identify and discuss common problems, agree on how to influence their cooperation with the Liaisons Office and the hospital, and how more effective support to the innovative activities within the industry is provided. BioMed Community helps members of the Firms Club to find capital and offers them administrative, organizational, and marketing support,

such as providing meeting facilities and arranging common participation at national and international exhibitions. The club itself organizes visits to companies and hosts visits of outside companies. The aim is to bring companies together and support their cooperation.¹⁶

In their determination to develop the cluster, the cluster initiative actors have mobilized considerable financial resources, which they believe will speed up the process of cluster formation. These resources came partly from the North Jutland region and partly from the European Union funds. One of the first initiatives was the establishment of a Research House (*Forskningens hus*) at Aalborg Hospital. This initiative originated from the HEALTHnTECH Research Centre and should facilitate the cooperation and involvement of industry. In the Research Centre there is an area dedicated to students and office space to facilitate the incubation of commercial companies. The idea was to concentrate the innovation environment in one place: research and education from both medicine studies from Aarhus University/Aalborg Hospital and from the Department for Health Science and Technology at Aalborg University together with industry and emerging firms.

Three people were hired on a part-time basis to work with on initiative between 2003 and 2005: a start-ups consultant, an ambassador and a communication consultant. Their task, and especially that of the ambassador, was to attract companies from other parts of Denmark and abroad, for example by involving such companies in cooperative projects for which research would be conducted in the region. The start-up consultant should support new companies (for example, by offering the office space in the Research House), provide advice for the development of the existing ones, assist people in the Liaisons Office working with start-ups, and support the University start-up program at the medical technology department. Also at Aalborg University an intensification of activities took place. For example, at the Liaisons Office an additional person was hired to work on the biomedical cluster. From 2005, efforts focused upon attracting new companies and investors from outside the region. This

required intense marketing of the life sciences expertise in the region and the cluster in particular. Supporting the development of existing firms was a priority. Finally, much effort was put into knowledge dissemination, networking, and the establishment of awareness and team spirit within the cluster. This was done through a large number of meetings, networking activities, joint participation in fairs, and so on. The most recent (2010) initiative is to establish a Business Park in association with the building of new university facilities for the medical school.

The clusterpreneurs are aware that the ‘creation’ of a cluster is a long process that requires building up and maintaining contacts. They refer to the way the ICT cluster in the region emerged to illustrate how the potential may be achieved only after a very long period. They believe that only one (not necessarily big) significant company wanting to establish a subsidiary in Aalborg is needed to start the process, then other firms might follow. They further believe that this initiative needs a comprehensive approach and that is why they are working with Invest in Denmark under the Ministry of Foreign Affairs. In essence, transferring competencies from the university and the hospital to industry and reaching a critical mass of companies are the main challenges, according to them.

Our case illustrates the multiple character of clusterpreneurs, as representatives university, government, and industry are involved in the initiative. The group of clusterpreneurs often consists of both public and private actors, and the presence of the latter in particular serves to legitimize cluster policy. Concerted action, where links between different actors are created through informal cooperation, is another important feature of clusterpreneurship. Such action helps to overcome a main problem of peripheral regions – the lack of social capital and ability to stimulate collective learning and action. This cluster initiative is characterized by the concerted, in many cases collective, action of the clusterpreneurs. We observe an evolution of this action, from the informal collaboration

between university and hospital through the establishment of the HEALTHnTECH Research Centre to the founding of the Research House.

There is clearly a formalization process going on, spurred by the clusterpreneurs. In particular, this is seen in the establishment of BioMed Community as an organization devoted to the promotion of the cluster and, later, the creation of the “Firms Club”. The formalization of a group of clusterpreneurs (such as in the form of an organization), which can be a possible outcome and continuation of the concerted action, is an important step in clusterpreneurs’ development, enhancing the quality of the links between the actors and the synergy effect. Clusterpreneurs have a common vision of their cluster that is formulated in a strategy. It should be emphasized that this common vision exists in spite of any divergent interests among the actors involved in the cluster initiative, which are especially likely to be observed in peripheral regions, where unemployment is often the biggest concern of the public actors. Network policy plays an important role in clusterpreneurs’ strategy. As previously mentioned, network policy is not easy to enforce collaboration and it may be the most difficult part of cluster policy.

The clusterpreneurs are united by the common vision of a prospective biomedical cluster in North Jutland in spite of the fact that they represent very different types of actor with divergent interests. This common vision is translated into a formalized strategy for the biomedical cluster development.¹⁷ The cross-factorial character of the clusterpreneurs gives legitimacy to the initiative, which can overcome some of dilemmas connected with the promotion of high-tech clusters in peripheral regions. Local society can be more likely to accept the dedication of financial resources to a biomedical cluster if they see many different actors collaborating on its promotion.

The biomedical cluster initiative in North Jutland uses network policy as the main instrument of the clusterpreneurs’ action. All the activities at Research House, including the

appointment of the new consultants, and branding of the cluster by the clusterpreneurs, aim to build new contacts, particularly within the industry both in and outside the region. This is an important part of the process of building social capital in the region and, while it may be a general element in stimulating the evolution of clusters, it is arguably even more important in biotech. Maine et al. (2010) contend that knowledge in biotech is often intrinsically tacit and therefore more proximity-dependent. Despite the fact that biotech firms also source knowledge from all over the world, they benefit more than firms in many other fields from clustering. Moreover, established traditions for cooperation in North Jutland, due to the presence of an existing (ICT) cluster, have made it easier for the clusterpreneurs to realize a new cluster initiative.

6.7 Conclusions

This paper has presented and discussed the role of actors in cluster formation in different regional contexts. We use the term ‘clusterpreneurs’ for important actors in cluster formation and emphasize their collective/group character. Clusterpreneurs can comprise four types of actor: (i) university and other research organizations; (ii) policy-makers; (iii) private firms and industry associations; (iv) business services and financing organizations. The arguments were illustrated by a single case, the promotion of a biomedical cluster in North Jutland. Our findings suggest that cluster policies in less favored regions, like North Jutland, face substantial challenges. Several reports and studies have pointed to the instruments of cluster policies and the conditions for successful cluster development initiatives. However, we find that a deficiency in the literature is the lack of emphasis on the importance of social capital (which can be symbolized by the clusterpreneurs) and discussions on how this can be stimulated. This perspective, combined with the fact that less favored regions often have weaknesses in their employment structure, specialization pattern, social and institutional

structure, entrepreneurial traditions, availability of venture capital, educational level, and so on, poses substantial problems for active cluster policies.

We further believe that policies may be restricted by a need for legitimization. This problem is especially present in less favored regions. We find that the cross-factorial character of clusterpreneurs – the fact that they comprise not only government but also private agents, firms, or university representatives, as in the biomedical cluster case – helps to legitimize cluster policy.

However, we found that North Jutland may deviate from the usual picture of the less favored region. Although it has characteristics of a less favored region as far as structural indicators are concerned when compared with the rest of Denmark, it also possesses features atypical of less favored regions: the presence of social capital and a tradition of concerted action, which emerged with the successful development of a previous cluster. The challenge of promoting the biomedical cluster was taken up by clusterpreneurs in the hope of replicating that past success. This gave them both a mental and a social proximity and fostered agreement on objectives that reached further than the region's short-term unemployment problems. It was stated in the introduction that less developed regions often lack social capital. Admittedly, this one case is not a convincing reason for rejecting that assertion, but it does show that there are exceptions to this pattern.

Our analysis points to some problems in the promotion of the biomedical technology cluster in the region, the main one being the achievement of a critical mass of firms. This critical mass may be needed for the cluster to be able to compete at national and international level and to facilitate a take-off of interaction and synergy within the cluster (classic Marshallian agglomeration effects). In addition to the lack of critical mass, the biomedical cluster currently includes no large firms, which in the long run could make the cluster more sustainable through spin-offs and a more stable competence base. Finally, it is consistently a

question how to ensure the transfer of competencies from university to industry or, as noted in the introduction, to ensure a well functioning system for the commercialization of research.

Our main conclusion with respect to establishing the biomedical cluster in the peripheral North Jutland region is that in spite of having the structural characteristics of a periphery, such as high unemployment, a low share of university-educated workers, a low R&D ratio, and low growth and income, North Jutland has some important beneficial institutional features that are atypical for peripheral regions. In particular there are social capital and networks to draw upon, and there is a world class research facility at the local university, which make up an important part of the competency base. Hence, together with active policy/clusterpreneurs, these institutional advantages may alleviate the traditional structural deficiencies characteristic of less developed regions.

We also found in our case study that history and context matter in another way. The Danish social welfare model, with its extensively publicly supported help for people with various disabilities, means that there is a large demand for devices and instruments produced by firms in the cluster. This may be an important condition for the way the cluster has developed so far and may be important to how it will evolve in the future. The fact that the commercialization of research is not purely technology-push, but also to a large extent demand-driven may be an important success factor for high-tech cluster development in general and for our case specifically. Further research could elaborate on how macro-economic conditions and demand influence the viability of clusters.

Appendix

List of interviews:

Charlotte Villadsen, managing clerk at Industry Liaison Office at Aalborg University

Allan Næs Gjerding, office director at North Jutland County until April 2004

Ulla Christensen, responsible for Biomedico initiative at North Jutland County, especially for the contacts with the hospital

Simon Eskildsen, graduate from the Institute of Health and Science Technology, research

assistant involved in the university start-up company

Jens Haase, medical doctor in neurosurgery retired, presently professor at SMI, Aalborg University

Thomas Sinkjær, professor, head of SMI, key person for the development of medical technology at Aalborg University, Neurodan's founder

Egon Toft, medical doctor, cardiologist at Aalborg Hospital, also visiting professor at Aalborg University

Steven Rees, associate professor at the Centre for Model-based Decision Making at Aalborg University

Jeppe Vangsgaard, consultant at HealthandTEch Research Centre involved in Biomedico cluster promotion activities

Lasse Mogensen, consultant at HealthandTEch Research Centre employed until February 2005

Jens Luebeck Johansen, start-up consultant at HealthandTEch Research Centre, former administrative director at Neurodan

Jesper Nielsen, product development director at Neurodan

Morten Haugland, founder and scientific officer of Neurodan

Finn Allan Larsen, consultant at Aalborg Commercial Council responsible for Biomedico cluster initiative

Poul Ernst Rasmussen, Managing Director of NOVI A/S

Suni A Dalbø, Technology Transfer Office at Aalborg University

Notes

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- ¹ *The Cluster Initiative Greenbook* defines a cluster initiative as an organized effort to increase the growth and competitiveness of a cluster within a region, involving cluster firms, government and/or the research community (Sölvell et al., 2003).
- ² See then extensive list of such reports at <http://rtsinc.org/publications/index.html>.
- ³ The concept of clusterpreneur was presented in the “The Cluster Initiative Greenbook” at the 6th Global TCI Conference held in Gothenburg, Sweden in September 2003. The purpose of this Greenbook was to give a summary of current practices in organizing and implementing cluster initiatives around the world (Sölvell et al., 2003). The Greenbook presents data from over 250 Cluster Initiatives around the world, based on Global Cluster Initiative Survey 2003 and a series of case studies.
- ⁴ One exception is Brenner (2005), who makes quantitative analyses of cluster emergence.
- ⁵ Orsenigo (2006) sees clusters as a combination of a strong academic knowledge base, entrepreneurship, venture capital, a strong IPR regime, and other infrastructure- and entrepreneurship-supporting institutions.
- ⁶ Lorenzen (1998) finds in a study of a Danish furniture cluster that key clusterpreneurs are to be found in local lodges and clubs (such as Rotary clubs), where the build-up of trust and mental coherence provides a basis for business collaboration.
- ⁷ Another example of emphasis on the role of the actors in cluster initiatives can be found in DTI (2004), *A Practical Guide to Cluster Development*. The authors of the *Guide* claim that the success of clusters is often associated with strong leadership, from either individuals or institutions. They identify the function of industry leaders in removing obstacles, assisting in cultivating collaborations between cluster stakeholders, developing a vision, and acting as ‘champions’ for the future strategy of the cluster (p. 50).

⁸ This may be reflected in the large differences between European countries in the level of private investments in vocational training, an area also characterized by free-rider problems.

⁹ Related areas include biostatistics, nanotechnology and model-based medical decision support.

¹⁰ <http://www.smi.hst.aau.dk/>

¹¹ <http://www.hst.aau.dk/lsr/>

¹² During the evolution of this cluster, international companies like Siemens, Motorola, Maxon, L.M. Ericsson, Texas Instruments, and Flextronics established subsidiaries in North Jutland as a part of the ICT cluster.

¹³ Aalborg Commercial Council provides services to more than 5000 companies, including advice on business start-up, finance, export and import, staff and management development, marketing, and obtaining subsidies.

¹⁴ In fact, it is explicitly expressed in interviews conducted by the authors that the ambition is to replicate the successful development of the ICT cluster. Policy had an important role in the later phase of the development of that cluster and policy-makers in the region are aware that active policy may likewise be decisive for the biomedical cluster.

¹⁵ www.biomedcom.dk

¹⁶ According to the creators of the club, “power is in unity”.

¹⁷ Strategi for udvikling af bio/medicokompetence klynge i Nordjylland med SWOT analyse [Strategy for the development of a biomedical competence cluster in North Jutland with SWOT analyses], April 23, 2003.