

Cluster Development through Public Sector Facilitation

Mads Bruun Ingstrup

Department of Entrepreneurship and Relationship Management

University of Southern Denmark, Engstien 1, 6000 Kolding, Denmark

E-mail: mbi@sam.sdu.dk • Phone: 0045 65 50 13 29 • Fax: 0045 65 50 13 57

Torben Damgaard

Department of Entrepreneurship and Relationship Management

University of Southern Denmark, Engstien 1, 6000 Kolding, Denmark

E-mail: torben@sam.sdu.dk • Phone: 0045 65 50 13 82 • Fax: 0045 65 50 13 57

Abstract

Cluster development is a highly prioritized topic among policy makers around the globe in order to promote economic development. This paper aims at understanding how the public sector acts and can act as a facilitator in the process of developing clusters. In literature the public sector is typically portrayed as having a rather limited role and is often restricted to the tasks, competences, and qualifications of a regulator, an administrator and a fundraiser when facilitating clusters. This relatively one-sided and framework setting strategy may be questioned regarding to which extent it leads to innovative clusters. Our findings reveal that there is a misfit between for what the public sector aims when facilitating clusters and the means used to achieve this goal. To address this situation, we propose that the public sector changes its one-sided strategy to a two-sided strategy by combining the framework setting role with active facilitation of the innovative and commercial processes within clusters in order for these clusters to take advantage of their full potential. The paper offers a theoretical frame of reference which contains a review of the concepts of clustering and cluster policy followed by a case study and a discussion supporting our claim for public sector facilitation of the innovative and commercial processes when developing clusters.

Keywords: Cluster development, facilitator, cluster policy, public sector.

1. Introduction

Clusters have been around for many years and since the beginning of the 1990s the concept has received a considerable amount of attention (Benneworth and Henry, 2004; Brenner, 2006; Wolfe and Gertler, 2004). Alongside the growing globalization, national and regional framework conditions have become increasingly more important in order to differentiate, as well as to focus on, activities which cannot be done cheaper elsewhere (European Commission, 2006). As a consequence of this growing focus on geographically located advantages, policy makers at different governmental levels have adopted the cluster concept or modifications of it. Yet there are measureless differences in how the public sector, on behalf of policy makers, facilitates and engages in cluster development and for how long they have been doing so (Boekholt and Thuriaux, 1999). In some cases the public sector, here defined as governmentally controlled and financed agencies, has a long history in facilitating cluster development and in others they are beginners. In some cases cluster development is promoted by the public sector through competitive frameworks, and in other cases the public sector facilitates specific interactions and processes within clusters.

This focus on the role of the public sector in developing clusters has been stressed by researchers such as Ahedo (2004), Hospers and Beugelsdijk (2002), and Tödting and Trippel (2004), but the role is typically limited and framed within the boundaries of different cluster policies. These policies appear in many forms but most of them are based on the ideas and rationale of Michael Porter (Aziz and Norhashim, 2008; Cumbers and MacKinnon, 2004) who emphasizes that clusters should develop by themselves and that policy intervention should take on a rather indirect than direct approach by creating platforms for cluster development through competitive frameworks. Still, clusters do not always develop on their own (Rosenfeld, 2005), and they do not necessarily meet the benefits of co-location by themselves, see e.g. Colbourne (2006), Kaiser (2003), and Wickham (2007). This situation indicates that the current, primarily framework setting cluster policies, and the present intervention from the public sector in the development of clusters are lacking certain aspects and that there is a need for other initiatives from the public sector. Based on this, it becomes relevant to discuss how the public sector facilitates clusters now and what could improve this process in the future.

This particular interest in discussing the role of the public sector in developing clusters is also empirically rooted in two research projects concerning clusters in Southern Denmark (Damgaard and Ingstrup, 2010; Klyngeudvikling Syddanmark, 2009). Both of the projects revealed that clusters seldom take advantage of their full potential due to difficulties in creating an effective and trustful platform for innovation and commercialization of jointly developed products and services (Damgaard and Ingstrup, 2010). Only a few of the clusters investigated had experiences with joint innovation (Damgaard and Ingstrup, 2010; Klyngeudvikling Syddanmark, 2009). Derived from this and the theoretical reflections above, the intent of this paper is to understand how the public sector acts and can act as a facilitator in the process of developing clusters and with a special emphasis on how to support and facilitate innovative and commercial processes within clusters in order for these clusters to increase their rate of success. We investigate this based on a single case study of the cluster named Welfare Tech Region located in the Region of Southern Denmark and initiated by the regional growth forum. The cluster is organized around the aim of innovating health care and welfare products and services for both national and international markets.

In order to fulfil the purpose of this paper we ask these research questions:

1. How has the role of the public sector as facilitator in cluster development been described in literature?
2. How can the public sector facilitate clusters and their development by intervening in their innovative and commercial processes?

The remainder of this paper is structured in the following sections. The next section contains the theoretical frame of reference explaining what a cluster is and what characterizes cluster policy. Section three includes the findings from the literature review illustrating different approaches towards public sector involvement in cluster development. In the fourth section the research methodology of the paper is explained followed by a section in which the single case study is presented. The paper ends with a discussion of the case findings combined with information from the theoretical frame of reference and the literature review, and with a conclusion summarizing and reflecting on the findings of the paper and stressing implications for future research and cluster development.

2. Cluster Research and Cluster Policy

The aim of this section is to create a theoretical frame of reference on which the paper is structured and the research questions are answered. In the following the concepts of clustering and cluster policy are presented.

2.1 Former Cluster Research

As mentioned in the introduction, clustering is a highly discussed topic on the public policy and research agenda but research on clusters dates back to the studies of Marshall (1920) on English textile districts in the 1800s. As a result of these studies, Marshall reached the conclusion that location matters as the textile manufactures that were located outside the industrial districts had a lower performance and success rate compared to those inside. Based on this discovery, three sources leading towards cluster formation were identified: economies of specialization, economies of labour pooling, and finally knowledge spillovers (Marshall, 1920). This breakthrough changed the focus of cluster research. Instead of focusing on the location of firms relative to others as the traditional location economists like Von Thünen (1826) and Weber (1928) had done, Marshall (1920) changed the focus towards the advantages of co-location, which have been the centre of attention in cluster research since then. Over time, this understanding of clustering has been challenged by industrial economists and economic geographers, such as Bergman and Feser (1999), Krugman (1997), Malmberg and Maskell (2002), Porter (1990; 1998), Rosenfeld (1997), Storper (1997), and Wolfe and Gertler (2004).

As a consequence of this development, there is no overall definition of a cluster and according to Stoerring (2007), the theories of clustering is part of a broad and heterogeneous group of contributions by researchers representing areas as geography, history, business, economics, and sociology. In the search for describing the essence of clustering, Krugman (1997) highlights both the geographical dimension and the Marshallian sources on cluster formation. However, Krugman questions the importance of the Marshallian source concerning knowledge spillovers and to which extent it is important for economic agglomeration except in high-tech industries (Dahl, 2003). The possibility of cluster formation and development depends alongside these externalities on the degree

and quality of social capital within and around clusters (Rosenfeld, 1997). The topic of social capital is in particular emphasized as an essential element in Italian industrial districts which is a cluster of firms based on relationships where social interaction, loyalty, and trust are the main drivers of cooperation and competition facilitating innovation and competitiveness for the involved actors (Pyke et al., 1990).

Despite its long history and influence from different researchers and research traditions, the cluster concept is often positioned towards and applied within the framework of Porter (1990). Porter defines a cluster as: *"Clusters are geographic concentrations of inter-connected companies, specialized suppliers, service providers, firms in related industries, and associated institutions (e.g., universities, standards agencies, and trade associations) in a particular field that compete but also cooperate"* (Porter, 2000, p. 16). This definition and the theoretical framework behind it is based on a micro economic understanding inspired by among others the contributions of Dahmén and his notion of development blocks and Burenstam-Linder's focus on local demand as a prerequisite for export (Dietrichson et al., 2009). This micro economic understanding is also reflected in the earlier work of Porter (1990) in which he identifies four interconnected sources leading to competitiveness: (1) factor input conditions like specialized infrastructure and trained labour suited for the need of individual firms and clusters, (2) demand conditions that encourage firms to develop and renew their products and services through sophisticated local demand, (3) firm strategy and rivalry are highlighted as drivers of development and competition that force firms and clusters to up-grade their activities and resources, and finally (4) related and supporting industries are intended to have a positive effect on firm performances through cost reductions, increased cooperation, and innovation. These four sources make up Porter's competitive diamond model; and the geographical dimension of clusters, as stressed by Krugman (1997), strengthens the links between the sources.

Alongside the contribution from Porter (1990), economic geographers have shed light on issues related to clustering by stressing the importance of knowledge and innovation and thereby broadening cluster research. This has taken place in the literature on national innovation systems (Edquist, 1997; Lundvall, 1992) and regional innovation systems (Asheim and Isaksen, 2002; Cooke, 1992), where the focus on learning and knowledge flows and the geography of innovation have been underlined as an outcome

of interactions and relationships embedded in a social and institutional context of economic activity like clusters. Especially the role of knowledge institutions as suppliers of inputs to innovation processes is stressed in the innovation system literature and so is the importance of knowledge contributions from private firms and the public sector (Edquist, 1997). This approach towards clustering puts greater emphasis on participation from the public sector compared to the ideas of Porter and his focus on cluster development as a process driven mainly on market terms.

As it has been illustrated, the cluster concept is built on different theoretical platforms, which makes the concept fuzzy and complicated to frame (Martin and Sunley, 2003). Nevertheless, Ketels (2004), which follows the Porterian school of clustering, states that clusters share a number of similarities which are: proximity, linkages, interactions, and a critical mass. In other words, the essence of a cluster can be summarized to an inter-organizational configuration with a closeness that makes it possible to pool resources and share activities between actors in order to obtain positive spillovers due to cooperation and competition. We follow this clarification of clusters, and the four above-mentioned cluster attributes are visualized in the case study. Below, we focus on cluster policies which often frame the effort by the public sector in facilitating cluster development.

2.2 Cluster Policies

As previously mentioned, the cluster concept is a highly recognized and scattered policy instrument among policy makers to promote economic development (Teigland and Lindqvist, 2007; Wolfe and Gertler, 2004). The public sector facilitates clusters through a variety of channels but especially through cluster policies. However, the fuzziness regarding the cluster concept affects the understanding of what cluster policy actually is (Nauwelaers, 2001), and according to Aiginger (2007) and Boekholt and Thuriaux (1999) cluster policy should not mistakenly be considered as an independent policy area. Instead cluster policies are embedded in an industrial policy tradition including macro, meso, and micro economic incentives, promoting e.g. industry-government cooperation, networks, foreign direct investments, and infrastructure.

Traditionally, industrial policies have aimed at supporting selected industries in terms of financial subsidizing with the purpose of protecting jobs from being outsourced (Boekholt and Thuriaux, 1999). This kind of industrial policy has a reactive focus where the policy becomes a reaction to a new and changed competitive situation for the industries in focus. During the 1980s this focus of industrial policies shifted from being reactive to being more proactive and market oriented, promoting especially technological advantaged and future-oriented industries (Boekholt and Thuriaux, 1999). This trend also dominated the 1990s where the political focus was primarily on establishing and maintaining competitive frameworks instead of directly supporting selected industries financially (Boekholt and Thuriaux, 1999).

In line with these industrial policies, clusters and their development have been and are still supported financially and non-financially. However, the policy focus has begun to change by which the interventions from the public sector are becoming more focused on facilitating specific interactions and participating in processes internal to the cluster as an ordinary member (Nauwelaers, 2001). This change is also reflected in the rationale behind cluster policies which is to increase innovation and improve the economic performances of the participating actors and the region or nation as a whole by building relationship ties and favouring clusters (Nauwelaers, 2001). Anderson et al. (2004) add that the logic of cluster policies can also be to imitate successful clusters, to stimulate the mobility of large firms and to adapt to an increasing globalized marketplace. Given these different rationales it becomes clear that the main difference between cluster policies and industrial policies lay in their fundamental point of departure. Overall, cluster policies focus on selected clusters and their activities and resource constellations, whereas traditional industrial policies have the national or regional innovation systems in focus (Raines, 2001). Furthermore, these two types of policies do also differ due to the degree of intervention and facilitation from the public sector.

Nevertheless, cluster policies should not be considered as a homogeneous group of policies. They can be divided into two groups: cluster policies that are created according to the aggregation levels that they are targeting, e.g. nations, regions, sectors, or niches and cluster policies which are focusing on the end goals, such as improving the competitiveness of the cluster or advancing the effectiveness and innovation within the cluster (Aziz and Norhashim, 2008). With the purpose of illustrating examples of cluster poli-

cies, two cluster policy typologies respectively by Anderson et al. (2004) and Boekholt and Thuriaux (1999) are applied. Both typologies contain cluster policies that aim at different aggregation levels as well as diverging end goals, indicating that different situations demand different policy incentives, compare with Tödtling and Tripl (2005). In other words, there is no best cluster policy as it should be formulated according to the strengths, weaknesses, opportunities, and trends in the present context. Anderson et al. (2004) work with five types of cluster policies targeting specific aspects of clustering: (1) *Broker policies* that seek to support and encourage dialogue and cooperation between actors within clusters, (2) *Demand-side policies* aim at stimulating actors within and around clusters for the purpose of reaching markets effectively as well as being open towards new innovations and trends, (3) *Training policies* are implemented in order to upgrade the competences to insure effective clustering, (4) *Promotions of international linkages* focus on establishing linkages for the cluster and its actors with relevant international communities, and finally (5) *Framework policies* are developed with the purpose of creating sound physical and human framework conditions that support the functioning of the cluster.

As an alternative to Anderson et al. (2004) Boekholt and Thuriaux (1999) propose four policy models in which the development of clusters can be embedded and supported. The policy models are: (1) *The national advantage model* where the focus is on supporting certain clusters that are vital to the country, by offering up-to-date framework conditions through upgrading e.g. regulations, infrastructure, and education, (2) *The SME networking model* aims at promoting innovation and learning in small and medium-sized firms with the intention of increasing inter-firm cooperation and network formation, (3) *The regional cluster development approach* focuses on regions and in particular on how regional authorities can use different policy instruments in order to strengthen as well as develop clusters and promote and stimulate the attractiveness of the region as a whole, and finally (4) *The cluster policy research-industry relations model* is implemented to improve and encourage the use of knowledge within inter-organizational settings like networks and clusters with the aim of supporting the economic growth of emerging technologies.

Building on the above descriptions it becomes clear that cluster policies are complicated to conceptualize as an independent policy tradition as they rely on many of the same

incentives as other types of industrial policies. Moreover, there are overlaps between the two cluster policy typologies by Anderson et al. (2004) and Boekholt and Thuriaux (1999), respectively. Both of them are fundamentally formed and influenced by the theories of co-location presented by Marshall (1920) and Krugman (1997) among others, as well as by the cluster perspective of Porter (1990). As a consequence of this, the cluster policies should therefore be regarded as being complementary and the policies named the national advantage model, the regional cluster development approach, training policies, and framework policies focus mainly on the cluster framework, whereas the SME networking model, broker policies, demand-side policies, promotions of international linkages and the cluster policy research-industry relations model focus more on the interactions and the actors or potential actors within clusters. The cluster policies are explicit on initiatives to develop clusters but they lack a clear indication of the specific role that the public sector should play in the facilitation of innovative and commercial activities within clusters. This is surprising as the public sector has great influence on how cluster policies are turned into action in the end.

Based on this outline on clusters and cluster policies, the next section contains a literature review on the role of the public sector in facilitating cluster development.

3. Public Sector Facilitation of Cluster Development

With the aim of understanding and researching the role of the public sector in cluster development a literature review has been made using six search terms combined with the concepts 'public', 'state', and 'government' in database searches: 'cluster policy', 'cluster development', 'cluster facilitation', 'cluster formation', 'cluster management', and 'cluster building'. As a first step in the review process, the search terms have been chosen due to their presence in communities of clustering, and they have been investigated for appearance in abstracts, titles, and keywords in the database host EBSCO (Business Source Complete and Academic Search Premier). In the second step, the snowball method by Miles and Huberman (1994) has been applied using references of the identified papers as a starting point for spotting other relevant and essential references. Following these two steps, papers that did not fit with the purpose of this paper and dealt only in

short phrases or in subordinate clauses with the role of the public sector in facilitating cluster development, have been excluded from the onward literature review. Below, the papers that made it through the review process are presented in table 1 with their key publication data and main message on public sector cluster facilitation.

Table 1: Results from the literature review

Author	Year	Journal	Main cluster facilitation focus
Ahedo	2004	European Planning Studies	Organizational and structural focus
Bailey	2003	Policy Studies	Organizational and structural focus
Colbourne	2006	Canadian Public Administration	Framework focus
Gertler and Vinodrai	2009	European Planning Studies	Framework focus
Hospers and Beugelsdijk	2002	Kyklos	Organizational and structural focus
Huggins	2008	Economic Development Quarterly	Organizational and structural focus
Huggins and Johnston	2009	Growth and Change	Organizational and structural focus
Kaiser	2003	European Planning Studies	Framework focus
Kuchiki	2008	International Journal of Human Resource Development and Management	Framework focus
Lee and Tee	2009	Singapore Journal of Tropical Geography	Organizational and structural focus
Leibovitz	2004	Urban Studies	Organizational and structural focus
Liou	2009	Public Administrative Review	Framework focus
Lundequist and Power	2002	European Planning Studies	Organizational and structural focus
Newlands	2003	European Planning Studies	Innovation focus
Santisteban	2006	European Urban and Regional Studies	Organizational and structural focus
Shapira	2008	Prometheus	Framework focus
Tambunan	2005	Journal of Small Business Management	Framework focus
Tambunan and Supratikno	2004	Gadjah Mada International Journal of Business	Framework focus
Teigland and Lindqvist	2007	European Planning Studies	Framework focus
Tremblay and Cecilli	2009	The Journal of Arts Management, Law, and Society	Organizational and structural focus
Wickham	2007	The Australian Journal of Public Administration	Framework focus

The literature review shows that through a range of cluster policies the public sector facilitates various and diverse aspects of cluster development. Several papers concentrate on the effort of the public sector in facilitating clusters through different frameworks including a financial framework, covering aspects like public funding and risk capital, a regulative framework improving legislation and removing barriers for cluster development and industry growth, and finally a research and educational framework focusing on initiatives fostering research as well as education and training programmes (Colbourne, 2006; Gertler and Vinodrai, 2009; Kaiser, 2003; Kuchiki, 2008; Liou, 2009; Shapira, 2008; Tambunan, 2005; Tambunan and Supratikno, 2004; Teigland and Lindqvist, 2007; Wickham, 2007). Other papers highlight the public sector as an actor who facilitates the organization and structures of and around clusters by supporting and encouraging the creation of relationships between the triple helix actors (knowledge institutions, firms and public authorities), establishing forums for cooperation, and setting up formal institutions with the capacity to launch political initiatives, business-industry plans, dialogue, and different competitiveness programmes stimulating the developmental process of clusters (Ahedo, 2004, Bailey, 2003; Hospers and Beugelsdijk, 2002; Huggins, 2008; Huggins and Johnston, 2009; Lee and Tee, 2009; Leibovitz, 2004; Lundequist and Power, 2002; Santisteban, 2006; Tremblay and Cecilli, 2009). Furthermore, one contribution focuses on the public sector at different aggregation levels facilitating and supporting innovation and innovation activities of clusters through a range of diverse initiatives, schemes, and policies (Newlands, 2003).

Derived from the above, two main points can be made. First, the role of the public sector is primarily centred on facilitating clusters and their development through a set of different frameworks and structures of which the overall aim is to improve the environment within and around clusters. However, the process of creating an attractive environment and the cluster itself is not the end goal and the reason why the public sector facilitates clusters. The end goal is innovation (Lagendijk, 1999; Nauwelaers, 2001), which is also stressed by this statement from Mattsson: *"Put simply, innovation is the goal and cluster is the means"* (Mattsson, 2009, p. 1626). This leads to the second point that the public sector aims for innovation by participating in cluster development but according to the papers included in the literature review, the majority of the facilitation activities run by the public sector do not or only indirectly deal with innovation within clusters. In other words, there is a gap between the end goal of public sector cluster faci-

litation and the means used to achieve this goal, which needs to be addressed by looking further into the role of the public sector and how they facilitate innovation in clusters.

The dominating approaches to cluster development reflected in the literature review relates to several of the cluster policies presented earlier in the theoretical frame of reference. Especially the policies by Anderson et al. (2004) named broker policies focusing on encouraging dialogue and cooperation between actors within clusters and framework policies which focuses on creating sound physical and human framework conditions come close as well as Boekholt and Thuriaux's (1999) cluster policies, called the national advantage model, and the regional cluster development approach, both centering their attention on political incentives to support the environment of clusters and promote the attractiveness of either the nation or the region as a whole. From this comparison it becomes clear that the way in which the public sector facilitates clusters to a large extent follows the rationale of Porter (1990) who emphasizes that policy intervention should take on a rather indirect than direct role in facilitating clusters often limited to creating an environment where the cluster can develop with the highest possibility of success.

Following this rationale of Porter, Colbourne (2006) stresses that cluster policies can set the environment that makes the cluster industrially and socially attractive. Nevertheless, we argue that this is a too passive role for the public sector to play in developing clusters and not enough in order to achieve the end goal of clustering: innovation. As highlighted by Kim and Yoo (2007) and others, clusters can have problems meeting the full advantages of co-location including innovation, which is why we argue that the public sector can play a more crucial role by facilitating the innovative and commercial activities within clusters. These issues highlight the relevance of the topic of public sector cluster facilitation but the specific role taken on by the public sector in facilitating the innovative and commercial activities within clusters has not been discussed in relation to large parts of the cluster and public policy literature. In other words, on the first research question asking how the role of the public sector as a facilitator in cluster development has been described to date, the response will be that it has been described in several papers but typically with a framework and structural focus neglecting the essential aspects of innovation and commercialization.

With the aim of illustrating this point and discussing it further, a single case study has been carried out. In section four, the research method behind the case study is explained followed by the case description itself in section five.

3.1 Limitations in the Literature Review

The literature review is not without limitations. Firstly, other search terms than the applied might have revealed other relevant papers fitting the overall purpose of this paper. Secondly, only peer reviewed academic journals are included in the review leaving out books, reports, conference proceedings, and PhD theses. Despite these limitations, the literature review states that the focus on innovative and commercial activities within clusters from the public sector when facilitating cluster development is not receiving much attention.

4. Research Method

This paper is built upon research characterised as explorative with the purpose of obtaining an understanding regarding how the public sector facilitates the development of clusters. Three research strategies have been applied for data collection and analysis. Firstly, a single case study (Yin, 1994) that offers an example of how the public sector can facilitate cluster development by influencing different innovative and commercial activities within the cluster Welfare Tech Region. Secondly, the data for the case study stems mainly from two semi-structured interviews with the deputy director of the cluster steering group and the head of regional development in the Region of Southern Denmark, respectively. The focal point of the interviews was on revealing the background and future goals of the cluster as well as the opportunities and challenges of public sector facilitation and intervention in the cluster development process. The interviews were recorded and notes were taken for the purpose of writing the case below. Finally, the third research strategy applied is document and literature studies including official documents and press material from the Region of Southern Denmark, newspaper articles, company presentations, and material from the cluster itself.

The rationale and suitability of a case study for this paper are based on the strengths of the method in the process of investigating and obtaining an in-depth understanding of different actors in a context characterised by dynamics and complexities in real-life settings (Yin, 1994). The Welfare Tech Region which is the unit of analysis is a cluster of actors with different interests and motivations consistently influencing and testing the internal and external environment including the boundaries, resources, and activities of the cluster. The specific case of the Welfare Tech Region has been chosen for three reasons: Firstly, the accessibility and richness of information; secondly, the political importance and prestige devoted to this cluster by the regional growth forum in Southern Denmark and thirdly, the cluster is among the first of its kind in Denmark where the public sector that actively in terms of financial funding tries to create a cluster as well as to facilitate its innovative and commercial activities.

The validity of the case study is ensured by following the four qualitative validity criteria of Hirschman (1986): credibility, transferability, dependability, and confirmability. The credibility criteria has been preserved as the key informant to the case study, the deputy director of the cluster steering group, has been presented with the final version of the case description for approval. The transferability of the case is for the future to test because it depends on the context in which the case will be transferred and the data to which it will be related and with which it will be incorporated. The dependability issue of the case study has been dealt with as the case has been presented to colleagues and at a conference with the aim of meeting any misinterpretations. Finally, the confirmability of the case study is made certain by the review process which the paper has gone through in order to get published.

5. Public Sector Cluster Facilitation in the Welfare Tech Region

To provide a thorough presentation of the Welfare Tech Region and how the public sector facilitates innovative and commercial processes within the cluster, the presentation is divided into three sections. First, the situation leading to the formation of the cluster is laid out followed by a description of the organizational and structural set-up of the cluster and its activities. Finally, the effort from the public sector to facilitate innovation and commercialization inside the cluster is carefully explained.

5.1 Cluster Formation

The Welfare Tech Region was established in 2008 mainly as a result of ongoing discussions and an extensive focus on welfare and welfare services delivered by actors from the public sector at national, regional and municipality levels in Denmark. At that time but also at this current state, the demand for welfare services is increasing and challenging the public sector in order to meet the expectations and needs of the population while keeping the budgets. The costs alone for the health care sector are expected to grow dramatically in the years to come (PriceWaterhouseCoopers, 1999). In addition to the increasing costs, the public sector faces a growing number of persons needing care at the same time as the number of nursing employees within the public sector is decreasing. These circumstances comprise the burring platform highlighting that important and large changes are necessary, and it is within this context that the Welfare Tech Region has been established as a cluster in the Region of Southern Denmark. The objective of the cluster is first and foremost to involve firms, knowledge institutions and the public sector in order to innovate, create, and test new products, product ideas as well as develop new business areas within and related to the welfare industry so as to meet the changing demand for welfare services and create new businesses and jobs in the region.

From the beginning, key actors related to public welfare took part in the process of developing the cluster. They were the City of Odense, the Business Development Forum of Odense, the local hospital, the National Board of Social Services, the University of Southern Denmark, and MedCom. These actors formed a strategic steering group responsible for managing the overall cluster development process supplemented with inputs from two groups: A group of civil servants focusing on coordinating and presenting new ideas and political initiatives for promoting welfare technologies taking both the demand-side and the supply-side of the welfare industry into consideration, and a group of stakeholders represented by knowledge institutions, NGOs, national technology centres, and the public sector. To finance the cluster, the regional growth forum provides a grant of 10,300,000 Euros over three years. The rationale for supporting the formation of the cluster seen from the regional growth forum is generally the intention of creating a sustainable cluster in seven to ten years that will bring the Region of Southern Denmark in the forefront as a centre of expertise within the area of welfare technologies and products.

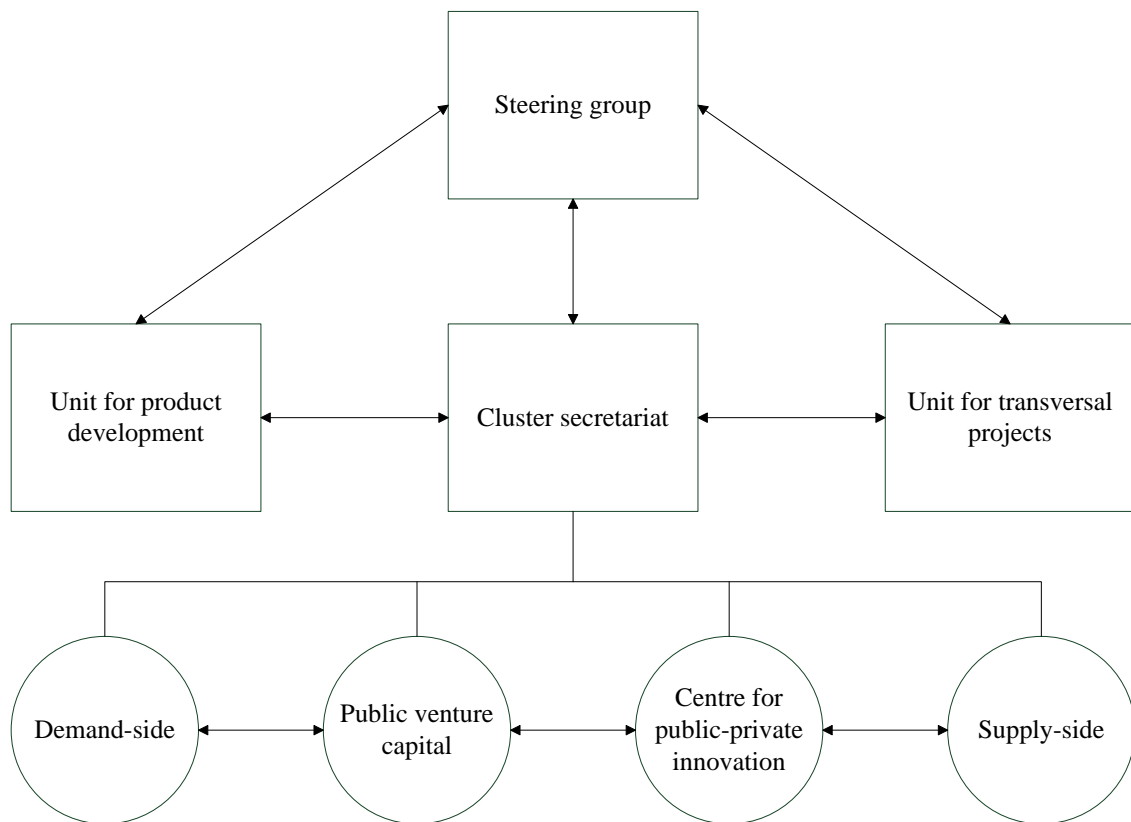
5.2 The Organisational and Structural Set-up in the Cluster

As mentioned, the Welfare Tech Region is a regional cluster covering the Region of Southern Denmark. Nevertheless, the core activities and the cluster secretariat are located and centred in the proximities of the City of Odense, which is the largest city in the region. The cluster has roughly 50 members which are primarily actors from the public sector and municipalities in particular. Yet a growing number of firms and knowledge institutions are joining as well as actors from other regions in Denmark. So far no actors outside of Denmark have become a member but it is the goal of the cluster that foreign firms and institutions either directly or indirectly will be involved through other actors in the years to come. Other than the funding from the regional growth forum, the Welfare Tech Region is financed by a yearly membership fee varying from 135 Euros for interests groups and industry associations to 1,000 Euros for firms with more than 20 employees. Furthermore, the City of Odense and the University of Southern Denmark are the main financial contributors as they support the majority of the projects and pay the salaries of the employees in the cluster secretariat whose employees that have the task of facilitating the actors, resources, and activities within the cluster in order to meet the overall objectives.

The Welfare Tech Region is organized in four main units. The daily management and facilitation is handled by the cluster secretariat which is the coordinating hub that glues the other three units together: (1) the steering group responsible for the vision and strategy of the cluster, (2) the unit for product development which deals with specific development projects for new and innovative welfare products and services, and finally (3) the unit for transversal projects aiming at strengthening and developing the critical mass and the platform for innovation within the cluster. Surrounding these central units four subunits exist. The first subunit represents the demand-side of the welfare industry consisting of actors from the public sector, e.g. the Region of Southern Denmark and different municipalities bringing ideas, proposals, and needs into the cluster, based on their own experiences of running hospitals, schools, kindergartens, retirement homes etc. These ideas are placed in a project portfolio connected to the supply-side of the welfare industry, which make up the second subunit. The supply-side exists of employees from the cluster secretariat playing the role of a broker by passing ideas from the project portfolio to relevant firms in order to convince them to develop and produce products and

services that meet the wishes and requirements of the demand-side. With the aim of facilitating this process, alongside the value chain of the welfare industry, the cluster secretariat and its employees are closely connected to the industry and know about their technological competences. The third subunit is a public venture capital fund that supports ideas and needs if private capital is not available. Finally, the fourth subunit in the cluster is a national centre of expertise in public-private innovation, whose aim is to investigate and research what drives these innovation partnerships and to which barriers they are exposed. The organization of the Welfare Tech Region can be illustrated as shown in figure 1 below.

Figure 1: The organizational and structural set-up of the Welfare Tech Region

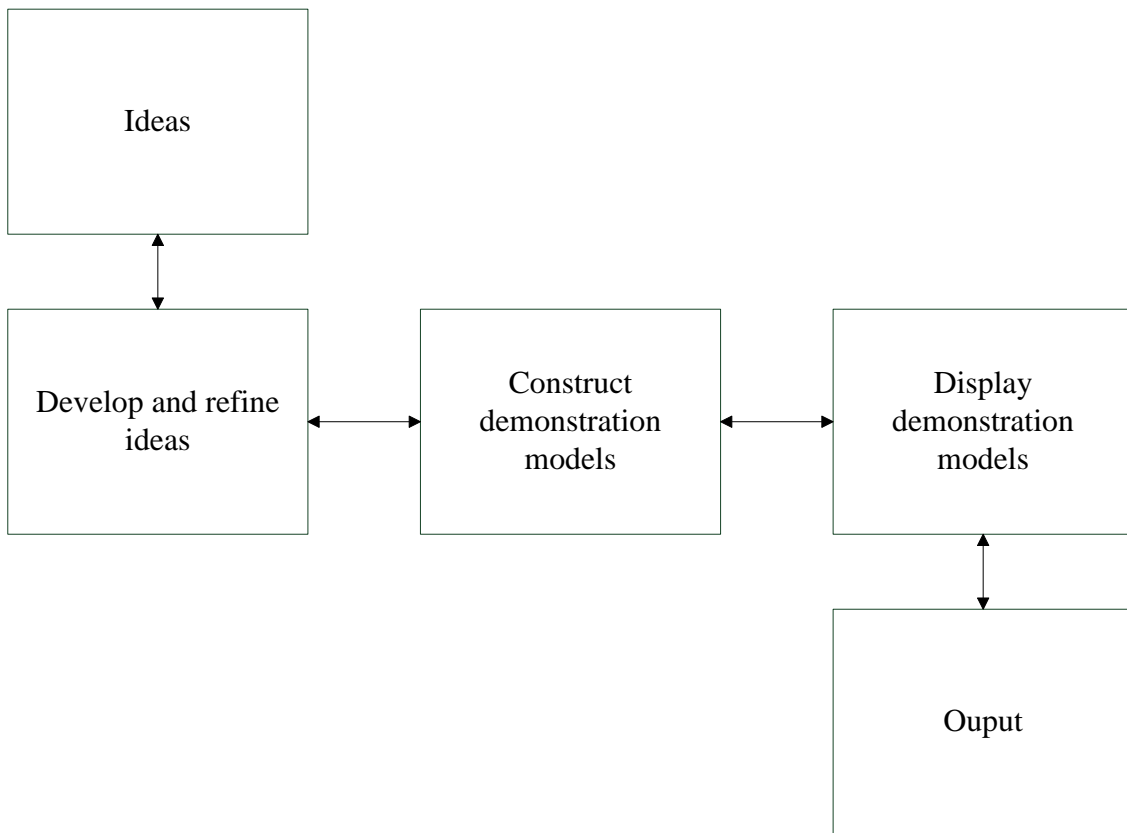


5.3 Public Sector Facilitation within the Cluster

Central to the organizational and structural set-up regarding the Welfare Tech Region are the two main units on product development projects and transversal projects. Currently, eight product development projects are indicated covering areas such as how to innovate solutions to automate and streamline the processes of cleaning operation equipments at hospitals, software targeting training of mentally handicapped, robots to help people with low mobility, message robots, and diagnose robots that can understand and interpret face expressions related to certain emotions. On the other hand, the portfolio of transversal projects encloses seven projects in total and among other things they focus on developing demonstration models for new welfare products, branding the Welfare Tech Region as an international cluster for welfare technologies, setting-up educational and training initiatives to distribute knowledge to people who are going to work with the newly innovated products, and establishing international relationships to foreign firms and knowledge institutions in order to create innovative partnerships. All of these fifteen projects are facilitated by the cluster secretariat and in accordance with the overall objective of the cluster.

Beside the public sector taking active part in the facilitation of the cluster framework and structures by playing a central role in the organizational and financial set-up within the Welfare Tech Region, the public sector is through the cluster secretariat also involved in the facilitation of individual projects in addition to the fifteen previously mentioned. The cluster secretariat uses two kinds of facilitation tracks. The first track focuses on facilitating ideas for product development within the welfare industry, and the process begins with a number of abstract and intangible ideas generated by both the demand-side and supply-side of the cluster. Based on these ideas, the facilitation process is divided into three steps. First the ideas are developed and refined in workshops followed by the second step where demonstration models are developed scarping and shaping the product ideas further and lastly the demonstration models are displayed as show cases where firms, end-users, and other interest groups can comment and propose modifications to improve the product ideas. In other words, through this process the cluster secretariat facilitates an abstract idea into a demonstration model that can be adopted by firms with the ambition of producing and later commercializing the product idea. This facilitation process is summarized in figure 2.

Figure 2: The facilitation process for product development



The second track of facilitation departs in contrast from the first one from already tangible and specific product ideas or products developed outside the cluster framework. In this process, the cluster secretariat facilitates certain activities and makes particular resources available with the general aim of bringing the product idea or the product further in the process of commercializing it. The performed facilitation activities include for example searching for partners that can play a beneficial role in the ongoing process of developing the explicit idea or product, locating available funding mainly within public venture capital funds, and writing applications in order to obtain a patent or get the product safety approved by the relevant authorities. Whereas the cluster secretariat is driving the first facilitation track, this track is driven by the actors who presented the product idea or product and the role of the cluster secretariat is then on request to deliver certain activities and resources and coordinate these in accordance with the overall process as a consultant or an adviser in the field of business development and innovation.

6. Facilitation of Innovation and Commercialization in Clusters

In this section, issues from the case study are discussed and reflected on through inputs from the literature review and the theoretical frame of reference. The emphasis is on how the public sector, as part of facilitating cluster development, can take on the role of supporting innovation and commercialization in clusters.

The development of clusters can be facilitated and influenced by the public sector using a range of channels and methods. However, the way and context in which the facilitation process takes place and the type of facilitation applied vary greatly and intervenes in the innovative and commercial activities within clusters. In the particular case of the Welfare Tech Region two types of facilitation dominate the effort by the public sector in promoting cluster development. The first type focuses on the cluster framework and structures, which is illustrated by the actions of the public sector in facilitating the financial framework, the research and educational framework, as well as the organization of the cluster. For the most part, the financial framework is facilitated through public funds, grants, and venture capital. The research and educational framework is built on different education initiatives and projects and a research centre for investigating the pros and cons of public-private innovation. Finally, the organization is facilitated by the public sector as they are involved in the four main units of the cluster set-up but also because of their appearance in subunits for cooperation and dialogue centred around the cluster secretariat. Overall this type of facilitation focuses on the framework and structures of the cluster and keeps an arm-length approach towards the specific actors, resources, and activities that drive the innovative and commercial processes within clusters. As most other types of cluster facilitation this one is based on the rationale of Porter (1990) who emphasizes that policy intervention should take on a rather indirect than direct role in facilitating and supporting clusters.

The second type of facilitation by the public sector within the Welfare Tech Region focuses on projects and product development in order to foster innovation and later commercialization. Fundamental to this process are ideas and proposals from firms combined with the active and initiating role of the public sector at both the demand-side and the supply-side of the cluster set-up. Within this arrangement the public sector facilitates innovation tracks internal to the cluster for example by running workshops with

participation from the wider value chain within the welfare industry, searching the market for identifying and determining the potential for upcoming innovations as well as strengthening products or product ideas by the support of a range of services, e.g. searching for development partners, locating available funding, writing applications for patents or government safety approvals etc. According to the literature review, this second type of public sector cluster facilitation has not received much attention which among other things might be due to its role of being in opposition to the Porterian understanding of cluster development and the traditional industrial policies.

These two types of cluster facilitation performed by the public sector in the Welfare Tech Region can be discussed and compared further using the cluster facilitator typology developed by Ingstrup (2010). The first type of facilitation, which is focusing on the cluster framework and structures, relates to the role of the framework facilitator. This type of facilitator is characterized by having a focus on the cluster environment and having an indirect approach to facilitating actors, resources, and activities within clusters. On the other hand, the second type of cluster facilitation corresponds to the role of the project facilitator who focuses on individual projects and product development where a more direct and intervening approach to the actors, activities, and resources within clusters is applied.

This situation of having both a framework approach and a project approach towards cluster facilitation adds to the understanding of the role of the public sector in facilitating and promoting clusters including their innovative and commercial processes. Following Ingstrup (2010) and his notion of cluster facilitation, this two-sided strategy to cluster development can be classified as all round facilitation, where the external and internal actors, resources, and activities of the cluster are taken equally into consideration during the facilitation process. In other words, it is not a matter for the public sector to have either a framework approach or a project approach to cluster facilitation. It is a matter of having both in order to build a framework and structures as well as internal processes and tracks to support and pave the way for innovation and commercialization. Based on these important learning points, in the following we will discuss what qualifications and competences the public sector should possess when facilitating innovation and commercialization in clusters.

6.1 Competences and Qualifications for a Public Sector Cluster Facilitator

To facilitate the innovative and commercial activities in clusters, the public sector will benefit from being in position of a number of qualifications and competences. With inspiration from McCulloch and Crook (2008) we define a qualification as a skill which is learned and which is independent of the context in which it is used. On the other hand a competence is an ability that is influenced by the attributes of individuals and is context depended (Nicholson, 1995). With the aim of facilitating innovation and commercialization, we highlight the following qualifications: problem solver, time manager, inspirator, trustful, flexible, and holistic as well as these competences: market understanding and relationship management for the public sector to possess.

Starting with the competences, the public sector has to establish a market understanding and insight including both the supply-side and the demand-side in order to be able to contribute to the innovation processes by identifying trends and putting forward ideas and proposals with the aim of being constructive and critical. Alongside the market knowledge and a perspective on what drives innovation and commercialization, the public sector further needs to possess the competence of relationship management as clusters are typically composed of the triple helix actors; firms, knowledge institutions, and the public sector, with diverging goals and motivations. With the intention of making these actors work together and meeting the goal of innovation and later commercialization, despite their different points of departure, the public sector must create a platform on which they can agree by working inter-organizationally. This is, nevertheless, a challenge, as, put simply, firms are motivated by profit, knowledge institutions by access to knowledge and the public sector aims at maximizing welfare and creating new jobs.

Underlying these competences are several qualifications of which the public sector should be in position of when facilitating and supporting innovation and commercialization. The first qualification concerns the issue of being trustful and having integrity as to create social capital and loyalty that will motivate and inspire actors both in-side and out-side clusters to share ideas and proposals. Furthermore, when the public sector facilitates activities, resources, and actors within clusters for the sake of innovation and with the above-mentioned differences in motivation in mind, flexibility and holism are also required qualifications as well as being a problem solver and a time manager. Flex-

ibility and problem solving in the sense that many interests have to be met, and for this to take place holism is necessary but within a certain time frame and that is why time management is another important qualification. Especially the matter of time is where the public sector cluster facilitator has an advantage compared to its private counterpart as the time horizon in the public sector is typically longer leaving more space for innovation and commercialization.

In summary, the case study and the above discussion illustrate how the public sector can facilitate cluster development by influencing the innovative and commercial processes of clusters. In particular, it was emphasized that cluster facilitation by the public sector is not a matter of either a framework approach or a project approach. It is a matter of both, combined with a number of specific competences and qualifications. However, more case studies are required for a deeper insight into the advantages and drawbacks of public sector cluster facilitation and its long term potential.

7. Conclusion

The paper contributes to the understanding of the public sector as a facilitator of cluster development and in particular it focuses on how to facilitate the innovative and commercial processes within clusters by using certain competences and qualifications. In order to create this insight, the concepts of clustering and cluster policy have been described, highlighting their fundamental characteristics. According to Ketels (2004) and his four cluster attributes, clusters can be understood as inter-organizational configurations with a closeness that makes it possible to pool resources and share activities between actors in order to obtain positive spillovers due to cooperation and competition. On the other hand, cluster policies comprise the frame that guides the public sector in facilitating clusters. The literature review reveals that the role of the public sector in developing clusters has been described in several papers but typically with a focus on the cluster framework and structures, neglecting essential aspects of the innovative and commercial processes within clusters and how to promote these. This relatively one-sided and framework setting strategy represents a misfit according to the end goal of public sector cluster facilitation, as it can be questioned to which extent it leads towards the goal of innovative clusters.

To address this situation a single case study regarding the Welfare Tech Region has been carried out, stressing the necessity and importance of combining framework facilitation and project facilitation when supporting and intervening in the innovative and commercial processes of clusters. This two-sided strategy is a break with the sole focus on framework facilitation by the public sector. In the case study, the formation, the organizational and structural set-up, and the different facilitation tracks within the cluster were underlined, and the value of having both the supply-side and the demand-side of the welfare industry represented in the cluster as well as access to public venture capital were drawn to special attention in order to foster innovation.

As the awareness of the topic of public sector cluster facilitation and their effort in facilitating the innovative and commercial processes within clusters is limited, further research is needed to discover more. Firstly, more case studies are desired in order to investigate the advantages and drawbacks of public sector cluster facilitation. Secondly, it is relevant to concentrate on the questions on which barriers and obstacles appear when the public sector facilitates innovation and commercialization in clusters and how the public sector cluster facilitation changes depending on the development stage at which the cluster is.

In summary, the paper fulfills a gap in the literature by providing an understanding of how the public sector, as part of facilitating cluster development, can take on the role of supporting innovation and commercialization in clusters. It is especially stressed that public sector cluster facilitation is not a matter of having either a framework approach or a project approach. It is a matter of having both in order to build a framework and structures as well as internal processes and tracks to support and pave the way for innovation and commercialization. For practitioners the paper offers an investigation of different competences and qualifications, from which the public sector will benefit when facilitating cluster development and an example of how facilitation of innovation and commercialization is done in a regional cluster in Denmark. In total, this paper sheds light on a rather ignored aspect of cluster facilitation, which is valuable for clusters in their effort to meet their full potentials.

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