Cluster Policies – Cluster Development? Edited by Åge Mariussen. Stockholm 2001. (Nordregio Report 2001:2)

Nordic Clusters and Cluster Policies

By Mats Brandt[24]

Introduction

During the 1990s the cluster concept has attracted considerable attention, and has even be suggested as *the* key source of competitive advantage. In a global economy, with free trade leaving companies free to compete for markets throughout the world, it is becoming all the more important from a national perspective to understand the fundamentals of competitiveness. This presentation takes a look at cluster analyses and –cluster policies in four Nordic countries, Sweden, Denmark, Norway and Finland.

The cluster definition and approach principally followed here has its origin in Michael Porter's (1990, 1998) *The Competitive Advantage of Nations*. Cluster approaches have also been applied in research on the innovation process and the role of innovation in the economy, e.g. within the ambit of an OECD project on National Innovation Systems was a research programme called Cluster Analysis and Cluster-Based Policy Making.

The industrial policy issue was treated by Porter in his 1990 book and the competitive advantage framework further addressed, in a regional policy context (1996), where it is e.g. maintained that externality effects at the cluster level are more important than are the generalised urbanisation effects of infrastructure in developed economies. In his later work Porter has continued to emphasise the importance of local characteristics and agglomeration effects, those local characteristics which distant competitors can not match, and call for an affirmative role of government. (Porter 1998a 1998b)

The aim of this outline is to present an overview of cluster-related analyses and policies in Sweden, Denmark, Norway and Finland, without claiming to offer a comprehensive discussion. Rather, it is an attempt to provide a broad survey of Porter cluster studies and to try to discern any apparent shifts in economic/industrial policy towards cluster-based policies. The presentation is divided into one section on the rationale of cluster policy, including four subsections that deal with the country specific investigations respectively, and another section with concluding remarks.

[24] Nordregio.

A Cluster Policy Outline

Government involvement in economic growth and development is a controversial topic. Traditional laissez-faire arguments invoke private incentives and market hegemony, leaving the role of the government to a minimum. During the 1980s and 1990s, for example, the tendency has been towards scaling back the state's role through privatisation of an increasing number of activities. Nonetheless, public industrial policy has been called for time and time again, in one shape or another.

Historically, industrial policy was motivated primarily by the needs of national defence and the enhancement of military capabilities. Industrial policy, defined as any government intervention that affects industries as distinct parts of the economy, would be legitimate in a neo-classical economist's eyes in the face of a market failure and when the social benefits of the policy action exceed the costs. However, deciding when and if this is the case is not always easy. Industrial policy furthermore allows for the possibility of rent-seeking behaviour and political factors. The complexity of the issues involved has watered down the market failure arguments somewhat. Instead, industrial policy has gained a developmental reputation vis-à-vis economic growth, as in France in the aftermath of the Second World War or in Japan in the 1950s and 1960s. (Federico and Foreman-Peck 1999) Porter (1990: 619) leaves the door open for government involvement within his framework of national competitive advantages. Indicative of Porter's (1990) approach, though, is that competitive advantage is created within firms and industries, not by the governments of the nations that host them. Rather, the role of government is indirect, affecting the structures within which firms operate. The job of government is to amplify the deeply rooted forces of competitive advantage in the Porter diamond.

Government should play a direct role only in the cases of e.g. public goods, or other situations with externalities when the private incentives are not enough and firms underinvest. Following the lines of Porter (1990), the government's role is to push and challenge firms to strive for competitiveness. Generally, in order to capture the effects of the varied factors at work in creating competitiveness, Porter (1990) stresses improvement and innovation as instrumental capacities. Policy directed at sustaining and enhancing national advantages implies, in Porter's (1990: 673) view, some form of targeting by governments, directly or indirectly. This targeting provides signals to the market and is therefore distortionary. In line with the innovatory characteristics of the clusters, Porter (1990) nonetheless advocates a policy shift to an indirect policy mix that addresses the upgrading of elements of national advantage, e.g. relating to demand conditions, competition, human resources and science. In Porter (1998a 1998b) the cry for an affirmative role for government in industrial policy is reiterated. A sound macroeconomic policy is considered a necessary

but insufficient condition for productivity growth. Government must additionally ensure the resources for upgrading through appropriate policies, e.g. in the areas of antitrust, intellectual property, taxation, regulation of product quality, safety and environmental impact, in order to ensure the microeconomic conditions for productivity and productivity growth. A significant part of the national strategy should also be the upgrading of clusters.

Instead of promoting targeting practices, however, Porter's approach is that every cluster contributes to productivity and it should be left to the market forces to determine which clusters are to be successful and which are not. The argument is not to imitate but to encourage competitive advantage on the basis of local characteristics. (Porter 1998a 1998b). Porter (1996) invokes the same line of argumentation to illustrate his views on the conduct of regional policy. This reasoning, enmeshed in a public developmental strategy, nonetheless seems to be an invitation for ambiguities. As Porter (1990) points out, any intervention, direct or indirect, leads to either explicit or implicit targeting, a practice usually deemed undesirable if the market is to be left freely to sift out the firms to be crowned with success. Policy design can be pursued along other dimensions, as well. For example, one can distinguish two broad approaches to industrial policy following a top-down or bottom-up direction of development initiative, with the state at the one end and the local level at the other. Two examples of industrial policy strategies in such a context could be called "picking the winners" or "eliciting the winners"; the former implies targeting by the state, and the latter could mean promoting the framework conditions à la the Porter diamond.

Figure 1. Examples of policy strategies

Policy measures	**Direct**	**Indirect**
Top-down	"Picking the winners", direct targeting	"Eliciting the winners", *implicit targeting*
Bottom-up	Partnerships	Diffused, endogenous development strategies, industrial districts

As Aalbu et al. (1999) observe, a top-down approach is called for in e.g. a nation-building context or when setting national standards. Conversely, the

bottom-up approach is applicable in an endogenous development situation in the context of so-called "learning region"-strategies. The latter has become a leading concept in regional development in the Nordic countries, the European Union regional policy serving as a beachhead in the Nordic countries for advocating this approach. (Aalbu et al. 1999)

Aalbu (1999), in turn, provides an exposition of the trends of business policies in the Nordic countries in terms of policy and policy instruments. He points out the difficulties in clearly defining industrial/business policies, especially in cross-country comparisons, and draws the line at describing explicit policy instruments, e.g. investment and localisation incentives, direct development incentives, indirect development incentives such as business policy infrastructure (e.g. enterprise councils, competence centres), and operation subsidies.

The policy classifications could be argued along lines that are sectoral, i.e. targeting a specific sector of the economy, or horizontal, i.e. actions that influence overall performance and the framework conditions of the economy. However, as Cowling et al. (1999) point out, there is still the question of an implicit form of targeting. Although objectives have shifted from sectoral to horizontal, the industrial policy instruments still incorporate sectoral elements. Cowling et al. (1999) argue that choice of sectors still needs to be on the agenda of policy analysis. However, so as not to induce strategic decision making by firms on the basis of distorted signals resulting from government targeting or, at the other extreme, to limit bureaucratic involvement in the selection process, they advocate a diffused and democratic selection form. The EU community initiative on Regional Innovation and Technology Transfer programme (RITTS) and the Regional Innovation and Strategy programme (RIS) could serve as examples of such partnership-based industrial policies. (Cowling et al. 1999)

This partnership principle can take different shapes. The partnership principle in the EU Structural Fund context has been analysed from a Danish and Finnish perspective by Mariussen and Virkkala (1999). They point to the fact that partnership principles can be applied in diverse ways, a determining factor being national institutional patterns. (Mariussen and Virkkala 1999)

Although Cowling et al. (1999) do not take the cluster as their particular starting point they address the issue of targeting in industrial policy. Asheim (1999) on the other hand, addresses directly a model of agglomeration economics and endogenous development, the industrial district. The development of many traditional industrial districts into *technological districts*, i.e. districts able to make use of new technologies to compete internationally, is attributed to purposeful actions and institutional settings aimed at creating a positive environment for enterprises.

The emphasis of policy actions is not merely on creating a supporting network structure, but rather to serve as a social catalyst to induce interaction and knowledge diffusion. Taking this perspective implies following a policy approach that is context-sensitive, production-system-oriented rather than firm-oriented, and focused on an ongoing upgrading of capabilities. In addition, Asheim (1999) argues that a regionally embedded innovation system is not enough to bring about radical innovation and that an innovation policy that provides linkages to the national innovation system is required. (Asheim 1999)

Peneder (1999) addresses the design of cluster policies by presenting experiences from the Austrian innovation research programme. The cluster concept here is based on the notion of positive externalities from Alfred Marshall's industrial districts, with interdependent but organisationally independent entities that constitute "'*organic*' *economic systems*" (Peneder 1999: 341). The policy lessons from this conceptual framework suggest a move away from specific policy instruments, targeting, and large scale public intervention, and towards horizontally implemented programmes vis-à-vis regulatory frameworks (eliminating distortion), measures to overcome public goods problems (experimentation and co-operation), upgrading of human capital (education), dissemination of information, demand-pull-driven development, focused R&D measures, and using cluster environments to advertise attractive business locations. (Peneder 1999)

Boekholt and Thuriaux (1999) take as their point of departure the OECD definition of clusters as "networks of production of strongly interdependent firms…, knowledge producing agents…, bridging institutions…, and customers, linked to each other in a value-adding production chain. Cluster policies comprise the set of policy activities that aim to: stimulate and the support of the emergence of these networks; strengthen the inter-linkages…; and increase the value added of their actions" (p. 381). They undertake an international comparison of various cluster model policies and come up with a fourfold typology to describe cluster policies: national advantage, inter-firm networking, regional development and industry research. The rationale for government intervention pointed out by Boekhalt and Thuriaux (1999) is based on the marriage of two concepts, the interactive innovation processes in the National Innovation System literature and the market-oriented approach of clusters. Some deficiencies can be remedied through policy intervention, e.g. those pertaining to regulations that hamper business activity and innovation, the lack of collaboration and co-operation that hinders interactive learning, etc.

No set of cluster policies is applied uniformly in different countries. The national advantage strategy entails identifying clusters or potential, and creating the conditions to sustain or develop them. The inter-firm networking strategy has its focus on SMEs and their interactions and often emphasises promoting

interaction with external firms to enhance the knowledge base. The regional development strategy aims at promoting the attractiveness of certain regions for business location, while the industry research strategy aims at improving industry-research links and networks, often stimulating user-oriented research. (Boekhalt and Thuriaux 1999) The following sections examine the four Nordic countries, Sweden, Denmark, Norway and Finland, in order to respectively map cluster analysis undertakings and also to try to discern any apparent cluster elements in their respective business/industrial policies.

The Swedish Situation

The Swedish Ministry for Industry, Employment and Communications together with the Federation of Swedish Industries have, in the late 1990s, initiated a project investigating possibilities for a new interactive economic policy. NUTEK, the Swedish National Board for Industrial and Technical Development, was commissioned to carry out a survey on cluster analyses and -policies in Sweden. This resulted in a report entitled *Clusters and Cluster Policies*, NUTEK (R1998:29).

Before embarking on cluster tracking, it should be acknowledged that Porter clusters involve no directly new ideas for the Swedes (and followers of Erik Dahmén irrespective of country of origin). The concept of "development blocks" was introduced already in the mid-20th century. According to Dahmén, interdependence between firms and industries facilitates the diffusion of knowledge, encourages networks that strengthen businesses and is a source of development. (NUTEK R1998:29) Porter-based cluster analyses in Sweden were carried out at the end of the 1980s and were included in some of Porter's publications (1990, 1998). The case of Sweden was intended to illustrate a small country which was nonetheless an important international trading partner with sizeable exports, high income and low unemployment. Sweden was termed one of the early post-war winners, alongside the US and Switzerland. The Swedish study was presented and analysed at greater depth in Sölwell et al. (1993).

The Porter studies sparked more interest into the investigation of cluster effects. The NUTEK (R1998:29) report asserts that cluster analyses are strategic tools for business leaders in understanding business dynamics and for policy makers in implementing a properly designed, growth-oriented, economic policy. A later NUTEK report (R1996:86) analyses the relationship between regions and competitiveness to identify economic factors that perhaps could be improved by regional policy measures. NUTEK has also drawn up a report on the Swedish National Innovation System (B1998:9) to contribute to the OECD project on innovation systems. The intention was to identify general technology-policy issues in relation to the Swedish system. In this context it can

be noted that Sweden is leading among OECD countries in R&D expenditure with a gross domestic expenditure on R&D of over 3.5% of GDP. (B1998:9, p 53)

In a report commissioned by the Ministry of Industry in 1999, the activities of several government bodies were evaluated to discern possibilities for more effectiveness and co-ordination vis-à-vis the promotion of growth and development. This report contends that the cluster ideas embodied in Porter's (1990) work have had less impact on Swedish government policy than in some other countries, although Sweden has a longer tradition of cluster thinking related to Dahmén's development blocks. (*Utredning om vissa myndigheter*, Ministry of Industry 19 November 1999)

In Sweden the cluster policy actions undertaken have been related to the strengthening of knowledge networks and links between companies and their external environment. One example of such is the founding of competence centres, a brief description of which is given in the OECD project (1999b, annex 1) and in the Urban Exchange Initiative III (Annex 1). The organisation for promoting knowledge and innovation has three tiers, comprised of eleven regional industrial development centres, eight technology centres located in university cities and 29 university centres of competence. The centres of competence work in various sectors and concentrate on promoting the collaboration of businesses and research, focusing on business-oriented research. (Urban Exchange Initiative III)

One policy area where cluster analysis has proved to be an important part of regional policy is in the marriage of the institutions that practice regional development embodied in the partnership structure of the recent Swedish Growth Agreements. These are agreements on partnerships between the local, regional and national bodies that use policy instruments and other actors to promote sustainable economic growth (see Prop. 1997/98:62, Swedish government's policy bill on *Regional growth - for jobs and welfare,* (author's own transl.)). Giving concrete form to interaction between these bodies is intended to lead to a more efficient use of resources for development. The policy bill recognises that competitiveness of industries is based on innovation and knowledge and that dense networks of firms, e.g. in clusters, facilitate the transfer of knowledge and innovation between them.

A preliminary evaluation and follow-up on the working process on the Growth Agreements was made by the Department in November 1999, aimed at assessing their potential for sustainable growth and ecological impact, gender equality, and state economising. The funding of the agreements through state grants is conditional upon their having a clear analysis of the regional economy, a tangible programme for regional growth on the basis of that analysis, and a clear assignment of responsibilities vis-à-vis implementation, financing, etc.

Equally important are participatory aspects, e.g. regional partnerships, business sector representation and an observance of the national plan for employment.

Growth is seen as conditional upon the functioning of the regional and local networks that are essential for economic dynamism. With firms exploiting the network advantages, the region's competitiveness increases. As sales, turnover and profits increase in the firms due to their competitive edge, the rest of the economy is vitalised. Growing demand increases employment, regional incomes and leads to increased standards of living. The Growth Agreements can therefore briefly be described as relying on a model of competitiveness à la clusters (clustering or agglomeration) and a multiplier effect on the regional economy. It is acknowledged, however, that this macro effect might have ambiguous effects on employment and that there is no automatic mechanism involved in the process. (Preliminary Evaluation by Ministry of Industry, Employment and Communications 30.11.1999)

A particular government agency that has made frequent use of the cluster concept is the *Invest in Sweden Agency* that provides information and contact services for foreign investors evaluating opportunities in Sweden. The concept of dynamic clusters is seen as a way of conveying the idea of Sweden as an attractive location for foreign direct investment in sectors such as food; timber and wood processing; automotive industry; IT, telecom and new media, as well as in a wide range of science parks. (See www.isa.se)

Danish Development

A comparative analysis of clusters including Denmark, Finland and Norway has also been undertaken by NUTEK (R1995:12). The Danish experience reported here is extracted from that report. An overview of Danish cluster analyses and policies is also provided in Drejer et al. (1999)

Denmark was one of the countries included in the original Porter studies of national competitive advantage. In the aftermath of the Porter studies, follow-ups were initiated. According to NUTEK (R1995:12), the Danish cluster study in the late 1980s was initiated by an advisory board on economic policy to the Danish government, EUR. The main difference between the Porter studies and these follow-ups is that the latter consider most parts of the business sector, not only the internationally competitive industries, as do the Porter studies. In particular, the linkages between the segments and their interdependence were emphasised. One of the main motivations behind the report was to document the Danish business sector with an eye to economic/industrial policy.

The studies looked at what would be called Resource Areas. The analysis was initiated to ascertain the framework of the economy, i.e. its research, technology, and innovation systems, education, physical infrastructure, labour and capital markets, and goods and service markets. The report was industrial

policy oriented and some policy areas were specified as targets of government action. The analyses have continued, the methodology has been developed, and discussions have been undertaken between the parties involved in order to come up with policy formulations in line with the conditions that frame the business environment, see Drejer et al. (1999). The resources areas have become a cornerstone of business policy. In its *Erhvervsredegorelse* (1997, Danish Business Policy), the Ministry for Trade and Industry reports some of the initiatives made as a result of the ongoing work on resource areas. These initiatives pertain to e.g. changes in laws and the regulatory framework, standardisation in the IT/tele/electronics field, medical research centres, IT research centres and multimedia-centres, and education. An even more recent *Erhvervsredegorelse* (1998, Danish Business Policy) identifies innovation policy as one of the keys to promote wealth in the longer term. Investigations have been undertaken, for example, into the Danish National Innovation System, resulting in the DISKO report. The innovation system approach entails a look at so-called innovation clusters, with the emphasis on networks and interaction between the actors in the cluster.

The five *key* policy areas are emphasised by Danish Business Policy for the years 1998-99: public regulation, access to knowledge, access to capital, public-private partnerships and international competitiveness. Actions undertaken in these areas are intended to promote wealth and improve the framework conditions of industries in order to safeguard their future competitiveness vis-à-vis other developed countries. In Business Policy 1997, the government reported having made 77 new initiatives (and in the 1998 document 40 further ones) within the five key policy areas with the goal to enhance framework conditions. These initiatives include e.g. knowledge accounting, i.e. promoting the accounting practices of firms to take account of investment in human capital. Other initiatives reflect an intention to increase the commercial penetration of public spending on research and development. The initiative for the establishment of six so-called innovative milieux, in order to increase the interaction between research institutions and industry utilising existing competencies and resources, is an example in point.

Actions and initiatives in the key policy area of regulation include among others a new competition law from the beginning of 1998 to bring industrial regulation into harmonisation with that of the European Union. In order to promote access to capital the government has initiated so-called business development associations, an authorised exchange for unnoted stocks, as well as channelling venture capital via a financial institution to smaller growth enterprises that need foreign capital but wish to retain the control of their investments. Within the partnership policy area, for example, development contracts and feasibility studies have been implemented. (Erhvervsredegorelse 1998)

Figure 2. Examples of Danish Business Policy (Business Policy Report 1998)

Key Policy Area	Examples
Regulation	New competition law (EU harmonisation) 1.1.1998
Access to knowledge	Knowledge accounting Innovating millieux
Access to capital	Business development associations Authorised exchange for unnoted stocks Mezzanine capital
Public-Private Partnership	Development contracts Feasibility studies Institutes for service development Service centres
International competition	Investment promotion and marketing, Invest in Denmark Export credit/promotion/subsidy Engagement in standardisation and international trade questions

The Norwegian Norm

The Norwegian Porter study was initiated by representatives of two large companies in Norway to serve as a basis for understanding the industrial milieu and to give impetus to economic/industrial policy, according to NUTEK (R1995:12). The original Porter cluster report was compiled by Reve et al. (1992).

The point of departure for the Norwegian project, as well as the previously mentioned projects, was the Porter diamond and growth theories that emphasise positive externalities. Its aim was to list the sectors of the industry that were internationally competitive and to investigate the existence of clusters, according to NUTEK (R1995:12). The Porter study was followed by another research report by Reve and Mathiesen (1994) that was intended to serve as input to the formulation of industrial policy for the European Union. The Norwegian Porter study is currently being followed up in a project called *Et*

Verdiskapende Norge (A Value-Creating Norway), where the Bergen Business School has the responsibility of analysing clusters, innovation in- and outside of the clusters, and the policies that affect the dynamics of the clusters. A report on this project is forthcoming in the summer 2000.

NUTEK (R1995:12) reports that the Porter study had no clear implications for industrial policy in Norway. However, according to the same report the focus on the importance of research and education in the development of clusters did have an impact on R&D and education policies. It also claims that the study affected the public discourse on economic policy, making the cluster concept a buzzword in Norway as well. The cluster study, furthermore, met a demand at the regional level. Isaksen (1998) is an example of how the cluster approach has been elaborated to promote a strategy to encourage local industrial development in the face of the globalisation process. Other research initiatives have been made in order to emphasise cluster innovation patterns, as in Hauknes (1999). The Norwegian Research Council has also commissioned a study on the national system of innovation as a part of the OECD programme. This work is described e.g. in a working paper by Orstavik and Nås (1998) from the STEP Group.

In the policy bill on industrial policy in 1998 (Stortingmelding nr. 43 1997/1998) the Norwegian government states that its objective is to further the overarching national goals of welfare and employment. The onus is on industrial policy to make Norway an attractive location for enterprise and the government therefore intends to undertake five broad measures to strengthen competitiveness. Four key areas focus on 1. making it easier to establish new businesses and to operate a business, 2. developing knowledge and competence, 3. making it possible for diverse and environmentally sound enterprises to function throughout the whole country, and 4. undertaking measures to promote Norwegian stakes in a globalised economy.

In the first key area the government places emphasis on SMEs, so-called active ownership, simplification of regulation, and research and development. The profile of the Norwegian Industrial and Regional Development Fund, SND, i.e. the government body for business development, is to be developed to make it a key instrument in policy directed at SMEs. Efforts promoting interaction between research and firms are also to be promoted. Within the second area the government focuses on human resources. Furthermore, the policy bill states that there are close connections between research input, adaptive capacity and wealth creation. The aim of policy will therefore be directed towards the areas where Norway has the potential of being at the forefront of technology and science. The Norwegian Research Council holds a strategic post in this regard. A key principle in this respect is user guidance, i.e. the users, mainly firms, who apply research should initiate, guide and partly fund that research. The

government considers for example that user-guided research constitutes an important part of the Norwegian research and innovation system. This, in turn, it is maintained, raises demands on the competence level in the user firms, in order for diffusion of technology and knowledge to be successful, and thus requires competence upgrading and education. (Stortingmelding nr. 43 1997/1998)

The vision for Norwegian R&D policy directed towards businesses is to take Norway onto the development path of a nation with an ability to produce and avail itself of new technologies and knowledge as the basis for increased wealth creation. User-guided research is the most important instrument used by the Research Council in these efforts. The Research Council is, among other things, directed towards establishing stronger interaction between businesses and research institutions, enhancing the value chains of firms by stimulating networking, clustering, and learning. Stimulating innovation, systematic use of R&D efforts, and creating core competence milieux are all emphasised. Furthermore, it is considered important to invest in the long run in sectors where the social returns are very large. This entails developing certain key research areas where Norway has a clear competence advantage, in collaboration with the private sector and research institutions. (Forskning för framtiden, *Research for the Future*, Norway Research Council 1998)

The foundations of the industrial policy bill rest on four principles applied horizontally in the sectors covered by the specific strategies. One central feature is the holistic view and co-ordinating aspect of policy. The Ministry for Trade and Industry is responsible for ensuring that other policy measures accord with the government's overall strategy. The second principle is that the government aims at industry neutrality, i.e. not singling out any specific sectors in need of support, although recognising that some general actions, e.g. by the Research Council or SND, may require concentrating efforts when measures are implemented. The other two principles relate to the efficient use of resources and support to specific sectors of the economy, measures that are to be limited to cases of market failure and competition failure. (Stortingmelding nr. 43 1997/1998)

The industrial strategy with its four key areas was reiterated in a White Paper from the Ministry of Trade and Industry in the year 2000. As knowledge and competency are regarded as key factors for the competitiveness of firms, special weight is placed upon innovation. The government sees it as imperative that spending on R&D should rise to the average level of OECD countries. The private sector is considered a large stakeholder in this respect, with the government contributing through its technology and networking programmes. Some key areas are to be promoted especially, e.g. through competence milieux (IT and competence centre at Fornebu, telemedicin at Tromsø, microtechnology

at Horten, Oslo and Trondheim, language technology at Voss). Emphasis is also placed on SMEs through the programme *Et enklere Norge* (A simpler Norway), aimed at making it easier to establish and run businesses in Norway). (St prp nr.1 1999/2000 Ministry of Trade and Industry)

Additionally, the Norwegian government also applies the principle of partnerships, e.g. in its regional policy. Regional development programmes are instruments used for restructuring regional economies. These plans contain partnership elements, the idea being to capitalise on so-called functional regions, i.e. using regional strategies that accord with national ones and are based on the regional capabilities and resources. The goals are to mainly inhibit migration from the peripheries and develop robust regions throughout the whole country by a more effective policy instrument in the form of the partnership. (St mld nr. 31 1996/1997)

The regional administrative entities, *fylkeskommunene*, are identified as the bearers of a special responsibility vis-à-vis development in the elaboration of partnership strategies with business and third-sector partners. In general, the national programmes for regional development and the SME policies of SND are being allocated more resources. In the national programmes for regional development one can discern several cluster-oriented elements. The practical measures in these national programmes are to be regionally anchored and based on strategies that have been elaborated by firms, knowledge milieux, and national and regional authorities. Programmes that are directed towards knowledge upgrading of SMEs include e.g. the NT programme, aimed at contributing to innovation in technology firms in Northern Norway by capital investments, competence contributions and by developing networks between firms and competence milieus. The TEFT programme is directed towards making national research environments more oriented towards the needs of SMEs. Other programmes aiming indirectly at knowledge enhancement and upgrading are e.g. FORNY, a programme for transforming research-based ideas into business products, and the REGINN (regional innovation) -programme which is intended to strengthen relations and co-operation between regional businesses, regional research environments and other regional actors. The above-named projects are financed or co-ordinated via the SND or the Research Cuncil. (St prp nr. 1 1999/2000 Ministry of Local Government and Regional Development)

To conclude on the overall Norwegian industrial policy there are no clearly articulated cluster policy elements pertaining to national advantage. However, there are several policy measures that fit into the cluster category. There are e.g. cluster arguments vis-à-vis innovation policy, with references to innovation systems. At a regional level also the emphasis is on SMEs and

networking, e.g. in the Reginn programme, so there are some influences that fall within the ambit of cluster policies.

The Finnish Formula

NUTEK (R1995:12) also deals with Finnish cluster studies. The Finnish study of competitive advantage was initiated by researchers, among others at the Research Institute of the Finnish Economy, Etla, to learn more about the causes and mechanisms of structural change. The analysis was prompted by the recession at the beginning of the 1990s, and its preliminary results were included in a document on industrial clusters called *National Industrial Strategy for Finland* as outlined by the government (1993, Ministry of Trade and Commerce).

The study led to a report, *Advantage Finland (1996)*, co-ordinated by the institute Etla., which triggered a policy discussion and much of Finnish policy making in the 1990s has been based on guidelines from the National Industrial Strategy in 1993. Indicative of this policy approach is the favouring of favourable framework conditions and promoting the better functioning of markets, according to Rouvinen and Ylä-Anttila (1999). Subsequent cluster analyses have been undertaken to analyse Finnish industries, e.g. Hernesniemi (1999) on energy. The Porter cluster analyses have also been built upon by e.g. Vuori (1995) to analyse the technology sources in Finnish industries. However, later research on the role of technology in Vuori (1997) has utilised another cluster approach to distinguish the clusters that acquire technology from the technology source clusters. More or less at the same time a project was undertaken to map empirical data on the Finnish system of innovation, reported in Numminen (1996).

Cluster policies, as reported by NUTEK (R1995:12), have been applied both at national and regional levels, in industry, science and technology, education and regional policies as well as export-promoting activities. Funding has also been provided by the government ministries for various sectoral cluster programmes to promote innovation by strengthening the links between innovation policy and other relevant policy sectors. One course of action has been to increase government support to increase R&D spending and investment in human capital in the information technology sector (see OECD 1999b, Annex 1). In the Industrial Policy statement of 1996 the government stated that it goal was to promote sustainable development based on economic growth, employment and stable public finances. The main role of industrial policy is to reduce the obstacles for enterprises to prosper. In its statement the government recognises the role of clusters and knowledge of these clusters for international competitiveness. It clearly states that specific clusters per se should neither be favoured nor targeted, but instead that horizontal actions should be emphasised.

Specific action can be undertaken to strengthen networking, knowledge, and partnerships under the precondition that competition in the market is not stifled. In its report the government states that industrial policy is only one particular instrument that can be used for attaining the goals. A stable macroeconomic policy is not always enough for a prosperous business environment, nor can industrial policy be successful unless consistent with the macro policy. Also, industrial policy and regional policy border on each other. It is clearly stated that entrepreneurship plays a central role and that its activity in the economy also creates higher levels of employment. In this context the government has recognised that: "*knowledge-based clusters in manufacturing and services are vital to the creation of jobs that provide export revenues*".

Technology and education enjoy high status in Finnish industrial policy as well. The government asserts its belief that a well functioning innovation system is conditional to the economic success of nations. Priority is given to investment in R&D through the research resource body Academy of Finland, technological research institutes, technology development centres, as well as the Employment and SME Development Centres that were established in 1997. In collaboration with the latter institutions better use is to be made of the opportunities offered by the European Union Structural Funds. Future R&D efforts are to be aligned more closely with the needs of manufacturing and other sectors. Education is also to be provided according to the changing needs of employers. In this respect industrial cluster analysis should be applied according to the government policy statement. (Finnish Government's White Paper on Industrial Policy 1997)

In addition, the Centre of Expertise programme warrants mention. This programme is an instrument in support of regional development to enhance the strengths of various regions and co-operation between expertise centres. Between 1994-1998 Finland established eleven centres intended to "complement national innovation policy by channelling local regional, and national resources into the development and creation of selected, internationally competitive fields of expertise" (Urban Exchange Initiative III).

The experiences from the previous programme proved satisfactory (see e.g. Osaamiskeskusarviointi 1/97 for an evaluation in Finnish and the Urban Exchange Initiative III for a short description of the job creation and maintenance impact) and the government renewed the programme for a second period 1999-2000 to include fourteen regional competence centres and two national networks. The emphasis is, as before, on the strengthening of research and business collaboration. In addition, the new programme entails a focus on areas other than technological expertise, e.g. marketing skills. Furthermore, the programmes must encompass increased job creation and clustering by SMEs and also their collaboration with larger firms. (Osaamiskeskusohjelman linjaukset, työryhmän esitys 1998)

Country	Source	Method	Characteristics	Policy context
Sweden (general evaluation in NUTEK R1998:29)	*Porter 1990*	*Porter's diamond of clusters*	*5 clusters identified (transport, forest, metal, health, and telecom*	
	Sölwell, Zander, Porter 1993	*- " -*	*6 larger industry clusters: materials/metal, forest, transportation, multiple businesses, power generation and distribution, telecommunications*	*6 policy areas identified: co-ordination of policies, innovation clusters, higher education, competence vis-à-vis innovation, R&D intensive groups, improved co-ordination of public R&D funding*
	NUTEK R1996:86	*regions and competitiveness*		*Regional Growth Agreements process 1998*
	Swedish National Innovation System, NUTEK B1998:9	*National Innovation System*		
Finland (for overview see Rouvinen and Ylä-Anttila 1999)	*Hernesniemi et al. (1996)*	*Porter's diamond of clusters*	*1 strong (forest) , 2 semi-strong (metal and energy), 5 potential and 2 latent*	*National Industry Strategy 1993 - policy guidelines based on preliminary Porter-studies focusing on framework conditions and functioning markets*
	Numminen (1996)	*National Innovation System*		
	Vuori (1997)	*OECD technology clusters*	*4 acquiring clusters; 6 source clusters*	*Government White Paper 1997*

Country	Source	Method	Characteristics	Policy context
Denmark (for complete overview see Drejer et al. 1999)	*Pade 1991*	*Porter's diamond*	*5 clusters (agro-food, shipping, technical, pharmaceutical/biotech, medico, and mink)*	*policy oriented proposals in six areas: knowledge factors; physical infrastructure, information and communication markets; demand; competition on goods and services markets; co-operation among firms, esp. suppliers.*
	Erhvervsredogörelse 1994: summary of 8 cluster studies *Erhvervsredogörelse 1997 1998* *DISKO 1999*	*Porter diamond focusing on the whole of the business sector, resource areas* *National Innovation system*	*8 resource sectors (medical/health,*	
Norway	*Reve et al. 1992*	*Porter's diamond*	*8 clusters (petroleum, metal, maritime, wood, power, fishing, tourism, research)*	*Impetus to sector policy documents, e.g. maritime and regional development. Frame of reference in discussions on economic policy.*
	Reve and Mathiesen 1994 (follow up report on European Competitiveness) *Isaksen 1998* *Örstavik and Nås 1998* *Hauknes 1999* *Et Verdiskapende Norge forthcoming 2000*	*- " -* *Regional clusters* *National Innovation System* *Input-output tables*	*6 clusters and analyses of features of innovation*	

Conclusions – and Some Questions

This account was intended to shed some light on the matter of cluster analyses and policies in Sweden, Denmark, Norway and Finland. It is, of course, difficult to say to what extent cluster analyses have had an impact on policy making. The method applied in this paper mostly makes use of government policy statements and reports and consequently only allows the painting of a picture in very broad-brush strokes.

However, it does enable some conclusions to be drawn. It is quite clear that all of the countries have taken on board elements pertaining in one way or another to cluster concepts as typified by Boekholt and Thuriaux (1999). Denmark is the example where cluster studies in the form of resource areas have been placed in the forefront and been made a comprehensive tool of business policy making. Finland is another example with clearly articulated cluster elements in policy making. This is totally in line with the findings of Boekhalt and Thuriaux (1999). Using their fourfold typology they characterise the focus of both the Danish and Finnish cluster policies as being on national advantage. Furthermore, they categorise Norway as having its focus on inter-firm (SME) networking, and Sweden as emphasising industrial R&D clustering. Their findings are more or less corroborated by the piecemeal evidence in this outline.

How do the national principles of industrial policy as described in this paper fit the Porter agenda? Porter's interest was primarily in productivity growth and its effect on competitiveness. The various government policy documents, however, focus on a broader set of issues, including employment, regional equality aspects, environmental sustainability, etc. Nonetheless, the policy gist of Porter's agenda, an agenda that allows an affirmative role for government in industrial policy, is indeed compatible with the various approaches in the Nordic countries.

Most policy measures touched upon here are programme oriented. Some horizontal measures have been touched upon, but in no great detail, the obvious examples being competition policies and other forms of national regulation. These horizontal measures are not interpreted as resulting from an explicit cluster approach in the four countries. They can be viewed generally from an international perspective as deregulation and striving for perfect competition. Both have been high on the international agenda in the 1990s and, as calls for dismantling barriers to trade, have been loudly advocated. Horizontal measures promote transparency and contribute to removing distortionary practices. Not to speak of European integration, which without further elaboration is considered to have speeded up this regulatory evolution.

Generally speaking, one finds that the concept of clusters has been investigated and discussed in all these four Nordic countries. The focus seems to have been directed more clearly at technology and innovation issues rather than general cluster aspects. Increased government spending on R&D in Finland and the foundation of competence centres in Sweden indicators of a transition towards innovation policy which clearly follows along the lines defined in the OECD programme on National Innovation Systems. The cluster, in turn, is embedded in the OECD framework.

The policy agenda seems to be to target key sectors, although the approach sometimes is very broad (e.g. in Finland 16 centres of expertise covering a wide range of fields, while Norway boasts six centres of excellence as their international spearheads). This approach prompts a variety of technologically oriented policies, e.g. creating innovative milieux, competence centres and network linkages, where prioritisation is the order of the day. Here one might argue that the problem of targeting remains. Interpreting this as devolution, e.g. in the sense of making partnerships the rule in an attempt to follow a bottom-up approach in industrial policy making, still seems a bit too overly optimistic a conclusion at this point in time. However, this outline is too casual in its inspection of the policies on the national systems of innovation to yield any conclusive observations in this regard.

Suffice it to note that the targeting problems remain and that there is also a possibility of technology lock-ins. One example of the contrary is the telecommunication cluster in Finland that is dominated by Nokia, the mobile phone company. In the Finnish Porter-type cluster study telecommunications were identified as a "potential cluster" in the early 1990s. There has been a sustained interaction between the public sector and the industry in e.g. investment in R&D (by TEKES, universities, etc). This together with the prevalence of intense foreign and domestic market competition and a demanding clientele for this small economy based industry were recognised to have the potential of creating a cluster in the Finnish economy. (Hernesniemi et al. 1996)

The extent to which either specific Finnish telecoms policies and/or the surge of telecoms and information technology in general that seems to be creating a separate new economy of its own in the world market ([25]) should be credited with the successful evolution of the Finnish telecoms cluster is not investigated here. However, when 60% of the market value of the Finnish stock exchange is riding on the back of one company alone, the mobile phone

[25] See the observation in *The Times*, 19 February 2000, Tempus column " A Tale of Two Cities but Chances Abound".

company Nokia ([26]), one surely would not like to think of the emergence of the telecoms cluster as pure luck on the part of the Finns or as part of a general information technology boom/bubble. It is rather more reassuring to put it down to entrepreneurship, businessmanship, a very skilled pool of labour, and all the elements of a cluster working together to develop something that a very few years ago seemed only potentially promising.

The trajectory that technology will take has shown itself as extremely difficult to predict. Still, as Asheim (1999) points out, in the case of the industrial districts, institutional efforts do matter. The issue of targeting nonetheless remains and will require further inspection. The wealth creation effect that the government is striving for could easily dissipate into less beneficial rent-seeking behaviour.

To return to the cluster concept, in Norway and Sweden cluster studies also seem to have given impetus to regional policies. This is completely in line with how Porter's own work has been elaborated, e.g. in Porter (1996) and (1998a 1998b). The Swedish Regional Growth Agreements and the Norwegian REGINN programme both contain cluster elements of upgrading linkages between firms in networks.

One final observation to end on a positive note for the cluster perspective: one can see that the cluster concept itself seems to have a marketing value. It has frequently been used by government agencies promoting foreign direct investment into the various countries. Apparently these agencies find the concept a valuable reference in promoting the national attractiveness to foreign investors. In the Nordic countries, therefore, there seem to be two broad policy strands emanating from the cluster approach, one focusing at a national level on technology and innovation and one with a regional perspective, that during the past decade or so have influenced the developmental agendas of the Nordic countries in question.

References

Aalbu, H. (1999) *Næringspolitikken i de nordiske land*, Nordregio WP 1999:3, Stockholm.

Aalbu, H., Hallin, G. and Mariussen, Å. (1999) *When Policy Regimes Meet: Structural Funds in the Nordic Countries 1994-1999*, Nordregio R1999:3, Stockholm.

[26] See the Nordic Securities Market Monthly Statistics for December 1999, available on the Internet.

Asheim, B.T (1999) *The Territorial Challenge to Innovation and Endogenous Regional Development in Industrial Policy in Europe. Theoretical Perspectives and Practical Proposals*. Routledge, London.

Boekhalt, P. and Thuriaux, B. (1999) "Public Policies to Facilitate Clusters: Background, Rationale, and Policy Practices in International Perspective" in *Boosting Innovation-The Cluster Approach,* OECD, Paris, 1999.

Cowling, K., Oughton, C. and Sugden, R. (1999) "A Reorientation of Industrial Policy? Horizontal Policies and Targeting" in *Industrial Policy in Europe. Theoretical Perspectives and Practical Proposals*. Routledge, London.

Cowling, K. (ed.). (1999) *Industrial Policy in Europe. Theoretical Perspectives and Practical Proposals*. Routledge, London.

DISKO (1999) *Det danske innovationssystem* - DISKO-projektet: Rapport nr. 9 (The Danish Innovation system, own transl.) The Danish Agency for Trade and Industry, Ministry of Business and Industry, Copenhagen at http://www.efs.dk/publikationer/rapporter/innovationssystem/index.html, 12 November 1999.

Drejer, I., Kristensen, F.S. and Laursen, K. (1999) "Studies of Clusters as a Basis for Industrial and Technology Policy in the Danish Economy" in *Boosting Innovation-The Cluster Approach*, OECD, Paris, 1999.

"Et Verdiskapende Norge - Agenda for norsk konkurransedyktighet".(Agenda for Norwegian Competitiveness, own transl.) Project by Norwegian School of Management in Bergen. Book report forthcoming summer 2000.

Erhvervsredegørelse (1994) "Status of Business and Industry" Ministry of Business and Industry, Copenhagen.

Erhvervsredegørelse (1997) "Status of Business and Industry" Ministry of Business and Industry, Copenhagen.

Erhvervsredegørelse (1998) "Status of Business and Industry" Ministry of Business and Industry, Copenhagen.

Federico, G. and Foreman-Peck, J. (1999) *Industrial Policies in Europe: Introduction* in Federico, G. and Foreman-Peck, J. (eds.). (1999) *European Industrial Policy***.** Oxford University Press.

Hauknes, J. (1999) **"**Norwegian Input-Output Clusters and Innovation Patterns" in *Boosting Innovation-The Cluster Approach*, OECD, Paris, 1999.

Hernesniemi, H. and Viitamo, E. (1999) *Suomen energiaklusterin kilpailuetu* (The competitive advantage of the Finnish Energy Cluster, own transl.) ETLA B 154 1999 Helsinki.

Isaksen, A. (1998) *Regionalisation and Regional Clusters as Development Strategies in a Global Economy* Report R-01. Step Group, Oslo.

Mariussen, Å. and Virkkala, S. (1999) "Diversity by constructing regional actors in a multi-level Europe. A comparison of the partnership principle in

Denmark and Finland". *Nordisk Samhällsgeografisk Tidskrift*, No. 29, December, 3-21.

Numminen, S. (1996) National Innovation Systems: Pilot Case Study of the Knowledge *Distribution Power of Finland* No 25/96, VTT, Group for Technology Studies, Espoo.

NUTEK (R1998:29) *Kluster och Klusterpolitik* (Clusters and Clusterpolicy, own transl.) Swedish National Board for Industrial and Technical Development, Stockholm.

NUTEK (B1998:9) *The Swedish National Innovation System,* Swedish National Board for Industrial and Technical Development, Stockholm.

NUTEK (R1996:86) *Regionen och den internationella konkurrenskraften* (The Region and International Competitiveness, own transl.) Swedish National Board for Industrial and Technical Development, Stockholm.

NUTEK (R1995:12) *Klusteranalys och näringspolitik* (Cluster Analysis and Industrial Policy, own transl.) Swedish National Board for Industrial and Technical Development, Stockholm.

OECD (1999a) *Boosting Innovation-The Cluster Approach*, OECD, Paris, 1999.

OECD (1999b) *Managing National Innovation Systems*, OECD, Paris, 1999.

Osaamiskeskusarviointi 1/97 *Evaluation of Centres of Expertise programme* (own transl.), Ministry of the Interior, Ahola, E; Kortelainen, S. Helsinki 1997

Osaamiskeskusohjelman linjaukset Työryhmän esitys ohjelman sisällöksi ja menettelytavaksi, (Proposal for content and procedure for the Centre of Expertise programme, own transl.), Helsinki 1998

Pade, H. (1991) *Vækst og dynamik i dansk erhvervsliv* (Growth and dynamics in the Danish Business Sectors, own transl.). Schultz, Copenhagen.

Peneder, M. (1999) "Creating a Coherent Design for Cluster Analysis and Realted Policies: The Austrian TIP Experience" in *Boosting Innovation-The Cluster Approach*, OECD, Paris, 1999.

Porter, M. (1990, 1998) *The Competitive Advantage of Nations*. Macmillan Press, Hampshire, London.

Porter, M. (1996) *Competitive Advantage, Agglomeration Economies, and Regional Policy,* International Regional Science Review 19, 1&2, 85-94.

Porter, M. (1998a) "The Adam Smith Address: Location, Clusters, and the 'New' Microeconomics", *Business Economics,* vol. 23, no. 1, 7-13.

Porter, M. (1998b) "Clusters and the New Economics of Competition," *Harvard Business Review,* November-December, 77-90.

Preliminary evaluation of Regional Growth Agreements 30.11.1999 Ministry of Industry, Employment and Communications at http://www.tillvaxtavtal.gov.se/statskdel.htm 18 January 2000 (in Swedish)

Prop. 97/98:62 *Regional tillväxt för arbete och välfärd* (Regional Growth for

Employment and Welfare, own translation**)** Swedish Government's policy bill

Reve, T., Lensberg, T. and Grönhaug, K. (1992) *Et konkurransedyktigt Norge* (A competitive Norway, own transl.). Tano AS, Oslo.

Reve, T. and Mathiesen, L. (1994) "European Industrial Competitiveness", SNF-Report No 35/1994, Bergen.

Rouvinen, P., and Ylä-Anttila, P. (1999) "Finnish Cluster Studies and New Industrial Policy Making" in *Boosting Innovation-The Cluster Approach*, OECD, Paris, 1999.

Stortingsmelding nr 31 (1996/1997) *Om distrikts- og regionalpolitikk* (On districts and regional policy, own transl.), Norway Government Policy Bill http://odin.dep.no/repub/stmhj.html 25 January 2000 (in Norwegian)

Stortingsmelding nr 41 (1997/1998) *Naeringspolitikk inn i det 21. Århundret* (Economic Policy towards the 21st Century, own transl.) Norway Government Policy Bill http://odin.dep.no/repub/stmhj.html, 25 January 2000 (in Norwegian).

Sölwell, Ö., Zander, I. and Porter, M. (1993) *Advantage Sweden,* Macmillan Press, Hampshire and London, The Times 19 February 2000 Tempus column *A Tale of Two Cities but chances abound* http://www.the-times.co.uk/news/pages/tim/2000/02/19/timbiztem01001.html, 1999.

Urban Exchange Initiative III. Urban Development through Expertise, Research, and Information, Informal meeting of the Ministers responsible for Spatial Planning and Urban/Regional Policy of the European Union, Tampere, October 1999.

Vuori, S. (1995) "Technology Sources in Finnish Manufacturing", ETLA B 108, Helsinki.

Vuori, S. (1997) "Technology Sources and Competitiveness - An analysis of Finnish industries", ETLA B 138**,** Helsinki.

Örstavik, F. and Nås, S.O. (1998) *Institutional Mapping of the Norwegian National Innovation System,* Working Paper A-01. STEP-Group, Oslo.

Information on *Invest in Sweden Agency* was obtained from http://www.isa.se. Norwegian Research council at http://www.forskningsradet.no.

The Nordic Securities Market, Monthly Statistics December 1999, most traded domestic shares Helsinki at http://www.ose.n.