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Putting Porter into Practice? Practices of Regional Cluster Building: Evidence from Sweden

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ABSTRACT *In the last decade there has been an increased interest in the cluster approach as a tool for boosting regional competitiveness. In this article practices and processes of regional cluster building in Sweden are examined in order to better understand the key traits that seem to be common to successful regional cluster initiatives. It is argued that regional cluster building may be formed through long running policy processes that are crucially constituted by public and private actors' collective vision of what cluster policy involves and what a cluster can look like. Results from a study of 13 cluster initiatives in Sweden are presented. Out of these, four key examples are presented in detail to illustrate four distinct 'models' of cluster approaches that emerged: (a) industry-led initiatives to build competitiveness and competence within an existing base; (b) top-down public policy exercises in brand-building; (c) visionary projects to produce an industry cluster from 'thin air'; (d) small scale, geographically dispersed, natural resource based, temporal clusters that link or dip into global rather than national systems, sources of innovation and competitive advantage. The article closes with the presentation of a checklist of some common elements that successful cluster initiatives in Sweden have shared. It is hoped that they may trigger further research or be useful to policy-makers working in the area. It is concluded that though many questions and problems persist over the use of the cluster-approach it can be a useful tool for regional development.*

1. Introduction

There is little doubt that in recent years the 'cluster' concept, whatever its value, has become increasingly widely used and recognized as an essential part of regional development strategies and thinking. Across the OECD and beyond, government agencies, local authorities and private sector actors alike have been rushing to uncover, discover, invent and reinvent 'clusters' as an attempt to improve their sectors' and regions' competitive position. This fever pitch has been apparent at all scales of governance from supra-national bodies such as the OECD (1999, 2001), EU (European Commission, 1999) and the World Bank to local authorities in sparsely populated areas of, for example, northern Sweden. Although the term only became widely articulated in its present form in the early 1990s, with the work of Michael Porter (Porter, 1990, 1998a, 1998b), the idea has penetrated policy thinking to such an extent

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that by the end of 2000 the World Bank alone actively funded 266 'cluster' projects (World Bank Project Database, December 2000). With such a weight of support and resources being put behind cluster approaches it is therefore important to examine cluster-building as a constituent part of regional development and in particular to address the questions that remain as to whether it is wise to use the cluster concept as a new tool for regional development.

In this article an attempt is made to address some of the questions that remain over the mechanisms needed to put a cluster-based regional development strategy into practice. In particular the problems associated with putting a Porterian-type cluster concept into practice are addressed. On the basis of an extensive study of recent cluster initiatives in Sweden, we argue that it appears that to date, 'putting Porter into practice' has been a rather partial process with practitioners and actors using a very selective and overly simplified version of the concept. However, what these different projects lack in adherence to more codified versions of the concept they make up for in a common understanding of the usefulness of a 'cluster vision' as a regional development tool. Swedish policy-makers are shown in this article to use the term 'cluster' as something of a buzz word that represents a shift away from narrowly focused firm-based strategies to more holistic regional economic development approaches; in particular to partnership approaches such as those underlying current EU regional policies (Hallin & Lundequist, 1999). Approaches which are built upon a recognition of systems and functional interconnectivities that are more or less geographically concentrated and focuses on these as the policy objectives to be worked on in a cooperative long-run dialogue. Thus this article sets out to examine the use of the cluster approach not as an analytic tool (e.g. for empirical cluster identification, SWOT analysis, or benchmarking) but as a proactive policy tool and approach based on negotiated and, often, collaborative efforts to manufacture and utilize 'visions' of regional development futures to good effect. The intent of the article then is not to attempt to judge the economic performance of cluster firms (for instance in terms of their growth rates, innovativeness, relative size, long-term robustness, etc.) or to focus, as is often done, on horizontal and vertical relationships between firms in a cluster. Rather it looks at cluster based policies showing that these can take a variety of paths, many of which seem quite far from the original writings of Porter (1990).

Many studies have demonstrated that regional policy must be seen as a building process or a continuous on-going conversation (Amin & Thrift, 1994, 1995; Cooke & Morgan 1998) and that economic geography is well placed to, and indeed should, address policy relevant issues and material (Henry *et al*., 2001; Markusen 1999; Martin, 1999; Peck, 1999; Pollard *et al*., 2000). In line with this type of thinking the paper attempts to link the use of the cluster concept to an understanding of regional development as a building process, in order to better understand the usefulness of clusters as regional development tools and some of the ways in which it has already been turned into a powerful tool for regional development. The article starts by briefly outlining the context within which the 13 Swedish cluster cases that were the research's empirical focus operate and were chosen. We then turn in more detail to four cases which are illustrative of different 'models' of cluster building processes. The article then concludes by suggesting that evidence from exercises in implementing cluster-visions in Swedish regions point to a number of key elements apparent in a successful cluster building initiative; it is hoped that these might act as a useful set of pointers to policy-makers and points of departure for further research.

2. Clusters and Cluster Building in Sweden

The cluster concept is most often associated with the work of Michael Porter (1990) who suggests "[c]lusters are geographic concentrations of interconnected companies, specialized

suppliers, service providers, firms in related industries, and associated institutions (e.g. universities, standards agencies, trade associations) in a particular field that compete but also cooperate" (2000a, p. 16). Whilst it is beyond the scope of this article to review the work of Porter it is important to note that in recent years a considerable body of work has built up on the theoretical dimensions of clustering (Baptista, 1998; Bergman & Feser 1999; Bresson & Hu 1999; Den Hertog *et al.*, 2001; Malmberg & Maskell, 2001; Malmberg *et al.*, 1996; Maskell, 2001a, 2001b; Peneder, 1997; Peters & Hood, 2000; Porter, 1998a, 1998b, 2000a, 2000b; Speilkamp & Vopel, 1999) and empirical studies of clusters at work. (Austrian, 2000; Bathelt, 2001; Berranger & Meldrum 2000; Birkinshaw & Hood, 2000; Clancy *et al.*, 2001; Enright, 2000; Enright & Ffowcs-Williams, 2000; Hallencreutz *et al.*, 2000a; Ivarsson, 1999; Oakey *et al.*, 2001; Swann *et al.*, 1998). What this extensive body of literature makes clear is that the cluster concept is both in theory and practice quite slippery and hard to categorically define. Nevertheless it is obvious that the concept has been used as a label for many recent policy and industry initiatives in Sweden and elsewhere. Thus it is important to examine how these 'clusters' and associated initiatives operate and develop if we are to better understand how the concept, no matter how loosely defined or adhered to, is having an effect on regional development processes.

In Sweden the cluster approach has gained a lot of ground in recent years amongst both academics (Berggren, 2000; Birkinshaw, 2000; Braunerhjelm, 2000; Braunerhjelm & Carlsson, 1999; Braunerhjelm *et al.*, 2000; Brown, 2000; Ivarsson, 1999; Hallencreutz *et al.*, 2000a, 2000b; Holmen & Jacobsson, 2000; Jonsson, 1992; Jonsson & Olander, 1995; Sandberg, 1999; Sölvell, 2000; Sölvell *et al.*, 1991, 2000) and organizations with a stake in regional development (Boye, 2000; CMA, 2000a, 2000b, 2001; Edgren 2001; Maskell, 2001a; NUTEK, 1998, 2001a, 2001b; Söderström 2001) as it has been associated with a move away from targeting support to individual firms, narrow industrial sectors and hard infrastructure. Rather a cluster approach focuses on support packages that attempt to take a holistic systems approach that is more focused on competence building or 'soft infrastructure'. It is within this context that the empirical component of this paper draws on a study of 13 cluster initiatives across Sweden (see Figure 1).

The sample represents the 13 projects that form the membership of *Klustergruppen* (The Swedish Cluster Focus Group). This group was set up by NUTEK (The Swedish Business Development Agency) in Spring 2000 and is a partnership between regional and national policy practitioners that aims to link significant regional cluster initiatives together in order to learn from each others' experiences. In addition to NUTEK, the most prominent national level actors in *Klustergruppen* have been representatives from VINNOVA (The Swedish Agency for Innovation Systems) and ITPS (Swedish Institute for Growth Policy Studies). The regional practitioners taking part in the *Klustergruppen* are mainly civil servants from regional county administrative boards (*Länsstyrelser*) which have a strong strategic role in the Regional Growth Programmes. The group holds regular meetings and also invites academics, consultants and policy-makers. The background to this is that NUTEK as one of the main business development agencies in Sweden is involved in the making of the latest rounds of 'Regional Growth Programmes'. These programmes, administered by the Ministry of Industry, Employment and Communications, are now the primary national policy instruments for implementing regional industrial policy and draw heavily on the partnership principle seen in EU Structural Funds. Evaluations of the first round of these programmes showed that cluster development was a recurring area of priority, however, due to a lack of knowledge, experience and rigour in the analysis of cluster strengths and opportunities most regions failed to implement any cluster initiatives (cf. Regeringskansliet—Näringsdepartementet, 2001). NUTEK which currently considers cluster-based policies as one important potential policy tool thus set up *Klustergruppen* to increase knowledge and knowledge-exchange on this ap-

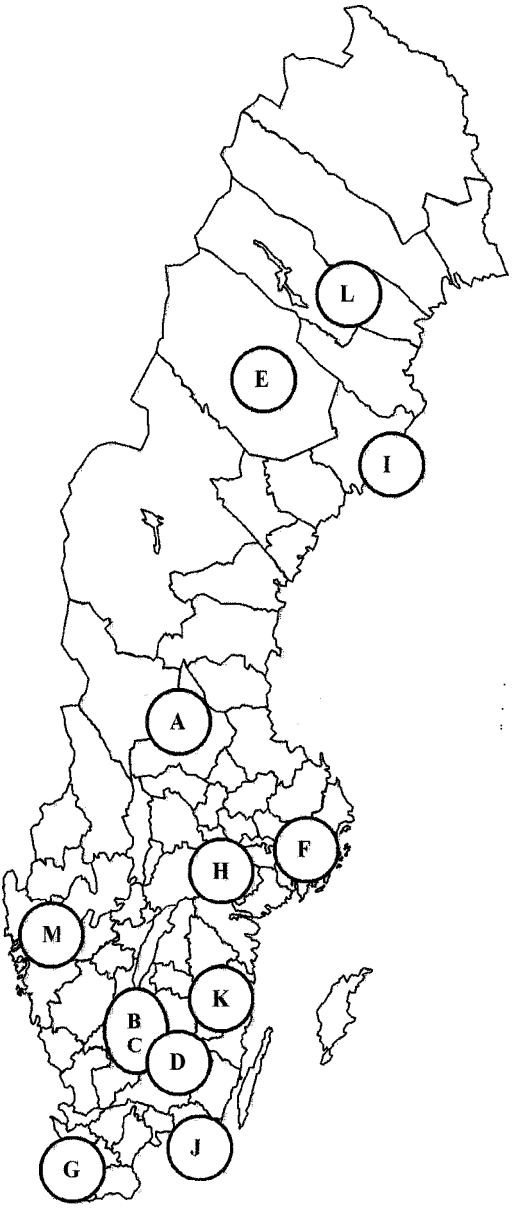

Figure 1. The 13 cluster initiatives of the *Klustergruppen*. (See endnote 1 for legend.)

proach—both between those using it already and with those agencies interested in adopting this tool as part of wider Regional Growth Programmes. The 13 cases dealt with in this article are a part of a case study on regional clusters undertaken by *Klustergruppen* who selected the specific cases from different geographic locations to show the variety of approaches undertaken in various regions. This meant that both major urban areas and more peripheral areas were included. Another important selection criteria was to highlight the sectoral diversity of cluster initiatives, including both high-tech (e.g. biotech) and low-tech clusters (e.g. woodworking). Despite the diversity a commonly shared idea of what constitutes a cluster can be found in the group's strategy documents: "the aim in thinking and acting in clusters is to set in

motion the dynamic interplay between companies within a common strategic area of knowledge and the interplay between these companies and other parties concerned" (NUTEK, 2001b, p. 14). A cluster here then is a geographically defined community of economic actors and others defined by their relation to a coherent 'knowledge area' or 'primary product'. Thus the sample of industrial or 'strategic knowledge area' clusters we use here has been carefully selected by the policy community itself and as such is a highly representative, though not exhaustive, sample of Swedish cluster building processes in action.

These 13 clusters range dramatically in size, scale and context. Some are large initiatives to support the development of clustered research, development and production of the highest levels of technologies—e.g. Umeå Biotech Cluster, Crystal Valley, Polymercentrum, and Medicon Valley—while others are highly localized small scale initiatives in sparsely populated areas—e.g. Norrbotten Test-Industry cluster, or Västerbotten Carpentry and Woodworking cluster. However, despite the diversity apparent in this sample what is interesting is that out of the data it appeared that on the basis of policy process and vision four main categories could be discerned: (a) industry-led initiatives to build competitiveness and competence within an existing base; (b) top-down public policy exercises in brand-building; (c) visionary projects to produce an industry cluster from 'thin air'; (d) small scale, geographically dispersed, natural resource based, temporal clusters that link into global rather than national systems of innovation and competitive advantage. A key example of each category is treated in detail later. It must be noted that this is not an attempt to develop a definitive identification method or typology of cluster approaches (such as those of: Bergman & Feser, 1999; Bresson & Hu, 1999; Enright, 2000; Malmberg & Maskell, 2002; Maskell, 2001; Peters & Hood, 2000; Spielkamp & Vopel, 1999) but rather to use Swedish case data to flag interesting issues that emerged from our research that may be useful in future research and policy work.

3. Case Studies

3.1 Aluminiumriket—Private Sector-led Initiatives to Build on Existing Strengths

Aluminium is a key material for many products such automobiles, telecoms and packing and in recent decades strong yet often volatile growth in demand for high quality aluminium products has greatly increased global structural change and competition in the global aluminium industry (see for instance: Desa, 1991; Lindquist, 2001; Oosterbeek, 1992). Within this context the agglomeration of aluminium industries found in the predominantly rural Småland-Blekinge area of southern Sweden has grown rapidly and become an important part of the region's economy as well as a recognized European centre for firms offering quality solutions in the area of aluminium. In this area can be found a distinct cluster of firms and other organizations with a stake in the aluminium industry. They are involved in activities ranging from the manufacture and fashioning of sheet-metal to specialized foundry activities. This has led to the area being dubbed *Aluminiumriket* ('Kingdom of Aluminium').

At present there are about 500 firms in the Småland-Blekinge area using aluminium as speciality input; with 80 of the largest companies together employing more than 7000 people. Growth has been extremely rapid. There are examples of firms which have grown from one to over 40 employees in a single year of trading. With such a strong existing network of firms and high expectations of further growth many private actors, from the 1980s onwards, became concerned to build upon existing strengths: in particular, by focusing attention on the industry's need for skilled, specialized and entrepreneurial labour. In short they started to see educational and community development strategies as a necessary part of firm-led cluster-building (cf. Johanisson & Jonson, 2000). Out of these private sector driven educational initiatives a well defined cluster approach emerged during the mid-1990s with a clear vision

for *Aluminiumriket*; one which stressed, and continues to stress, the need for a private sector-led cluster-wide framework aimed at sharing the costs of developing the region's competence-base and technology, skills supply, and its image as a leading centre for aluminium production.

The story starts with a series of networks that were formed between people in various sectors during the 1980s. As has already been mentioned the initial impetus of these moves were in the area of skills development. Early on the emergence of *Teknikcentrum* in Småland-Blekinge as well as *Länsteknikcentrum* and *Gjuteriföreningen* proved crucial. Essentially R&D network centres they quickly became foci for industry wide R&D on quality and productivity issues as well as forming meeting and connection points for collaboration between firms and local educational institutions. An example of other educational initiatives pioneered during this period can be found in the local secondary school system. An early lead-actor in the cluster-building process Mats Jonson, an executive in one of the area's largest companies—ProfilGruppen—and member of the *Teknikcentrum*, identified the need for ensuring the supply of qualified people to the industry from local schools. From this and other such efforts local schools now offer specialized courses related to the aluminium industry. Most prominent in this respect is the *Aluminiumgymnasiet* ('Aluminium High School') in Åseda, started in 1999, which is specifically focused on educating future workers for firms in the surrounding cluster.

It was in this climate of relatively *ad hoc* private sector-led initiatives, and a highly supportive publicly funded education sector, that the idea of a focused and proactive programme for developing '*Aluminiumriket*' was born. The first real moves towards a cluster based approach were developed during 1996–1997. Again education took centre stage with the industry organization *Skalaluminium* in 1997 taking the initiative to strengthen education in aluminium at four different universities both in and beyond the Småland-Blekinge region. A distance learning programme run by *Teknikcentrum* and *Skalaluminium* has since been added. In spring 1998, *Teknikcentrum* and others called for a greater role for a unified '*Aluminiumriket*' concept in the development of the area. With this impetus traditional cluster-building stables such as firm contact networking and seminars were started and relations between the 'cluster' and the region's universities and the Swedish Foundry Association were formalized. At first these well attended seminars and meetings—often with over 300 actors from related sectors participating—were on the concept of *Aluminiumriket* and explicitly aimed at building consciousness of the identity. Lately this emphasis has changed somewhat and the meetings have increasingly been arranged by *Teknikcentrum* and been targeted on more technical and strategic issues.

During the period, culminating in autumn 1999, an active partnership between private and public actors—20 firms, various local authorities, universities, *Teknikcentrum*, *Länsteknikcentrum*, Swedish Foundry Association, NUTEK—emerged to further formalize a cluster approach to the region's development; one based on the *Aluminiumriket* concept. The overall vision for *Aluminiumriket* was formulated as follows:

> Aluminiumriket aims at a regional growth milieu and market-place for an aluminium industry providing world-class products and services. (www.aluminiumriket.com; authors' translation)

This vision codified all the elements already evident in earlier stages of *Aluminiumriket*: close cooperation between industry and educational institutions; development of R&D; international marketing of the *Aluminiumriket* concept as a mark of quality. Added to this though was the fact that by further formalizing the cluster-approach and by bringing the public sector in to a greater extent the cluster was made a central element of a wider regional growth strategy that entailed a holistic view of the regional and national economy and its components. This has given the Småland-Blekinge cluster greater access to national innovation systems and networks (such as NUTEK's and VINNOVA's SMEs support networks) as well as established

national business promotion bodies (such as Invest in Sweden). Since information and distinctive image building is a crucial ingredient in realizing the cluster's vision of being an internationally renowned market-place this sort of access and support is crucial. In addition to this recent moves have been made to place the cluster at the centre of global flows through systems of collaborative networks with foreign clusters in the same business area (e.g. with AC-Styria in Austria).

What is interesting though in this case is that the greater exposure and networks now available to the cluster has not tempted the members to forget their initial firm-led, bottom-up approach. This sort of logic is partly behind the creation in November 2000 of a legally founded association, *Föreningen Aluminiumriket*, which is almost entirely firm based and aims to retain industry's leadership role in the development of the cluster. What this example demonstrates is that successful cluster initiatives do indeed sometimes emerge from a solid previously existing base and that the emergence of a cluster identity and approach is often seminally formed by the 'vision' and activity of self-interested industry actors;

> Cluster-projects never start from zero. Key components need to be in place, components which are developed during a long time period. There must also be someone who can see the new opportunities, enthusiasts/volunteers in firms and organisations. The leadership in a cluster project with many partnership members needs to have the members' confidence. It is necessary that there is someone who can act as network broker and represent an organisation without taking part of any specific organisation(s). (Internal document received from Hans-Göran Karlsson, CEO *Teknikcentrum* and project manager during the pilot phase of *Aluminiumriket*; authors' translation)

Controlling the extent of public involvement and maintaining a clear sight on the initiative's original objectives and support base emerge from this example as crucial to successful cluster-based regional development strategies.

3.2 Medicon Valley—Top-down Cluster-branding Exercises

Between the southern coast of Sweden and the Danish capital Copenhagen lies the narrow Öresund strait which was bridged for the first time in 2000. The 14 kilometre Öresund Link is both an enormous capital investment and the cornerstone of a joint vision of the Danish and Swedish governments that aims to turn the areas at both ends of the bridge into a single functional regional market consisting of almost 3 million people and capable of becoming one of Europe's predominant economic regions. The impacts of this massive social, economic and structural engineering project are far-reaching (cf. Boye, 1999; Danish & Swedish Governments, 1999; Lyck & Berg, 1997; Jonsson & Olander, 1995; Maskell & Törnqvist, 1999; Matthiessen, 2000) and a large number of projects have been designed to make the most of the opportunities arising from 'reunification' (the southern Swedish area of Skåne belonged to Denmark earlier in history). Central to such policy moves has been the idea of turning the region into Europe's pre-eminent hub for life sciences R&D and production with the Medicon Valley cluster project at the forefront of this vision.

The cross-border region already hosted an impressive number of biotech, pharmaceutical and medical companies and institutions. The Medicon Valley area is, at least according to its proponents, Scandinavia's largest centre for pharmaceuticals and biotechnology with around 30,000 employees and 60% of Scandinavia's total activity in this field. It is also home to 26 university research hospitals, 11 universities and five science parks. In order to build upon these existing strengths the public sector took the leading role in coming up with a cluster approach based around the Medicon Valley brand. Two interesting points mark this as a

different approach to cluster-building than the previous *Aluminiumriket* example. Firstly, the public sector has been the driving force and initiator of the whole venture and, secondly, that the cluster-building worked towards the development of the brand name first and foremost with other aspects of the cluster's development—such as for example competence development, networking etc.—largely taking second place.

This stress on the brand's primacy in cluster-building seems to be based on actors' recognition of the fact that in the highly competitive world of modern global medicine and biotech it is the availability of skills and knowledge combined with an active and dynamic venture capital market that are centrally important to a regions' success in nurturing existing and new firms. The concept and its associated policies should then be seen as having been built to link into and symbolize a picture of a strong and attractive (for both staff and venture capitalists) Öresund biotechnological/pharmaceutical region. The genesis of this approach came in the early 1990s as national and local authorities on both sides of the straits started pointing to the strategic importance of biotechnology and pharmaceuticals to the new regional economy. One important contribution to this was the 1993 publication by Åke Andersson, Christian Matthiessen entitled *Øresundsregionen: kreativitet, integration, vaekst* (The Öresund-region: creativity, integration and growth) which is usually viewed as the starting point for the Medicon Valley project. Around the time the so-called *Öresundskommittéen* (Öresund Committee)—with Danish and Swedish representatives from the biotech industry, hospitals and other regional actors—started a project aimed at the detailed identification of the areas' core competencies and comparative advantages in biotech and pharmaceutics.

It was in this context that 'Medicon Valley' was launched as a concept and in 1996 a series of reports and meetings worked to secure the centrality of the term in the regions' impending integration strategies. With this public sector actors started to actively pursue the further promotion of the Medicon Valley tag. This can be seen with the start, in 1996, of cross-border joint programmes such as that between the local government of Skåne (Swedish side encompassing Malmö and Lund) and Copenhagen Capacity which launched a series of joint measures to promote Medicon Valley internationally in order to attract foreign venture capital and companies to the region. The basic idea was to develop cross-border partnerships between industry, universities, hospitals and investors.

In recent years the number of new biotechnological companies has increased significantly; these new companies are both local ones or subsidiaries of foreign biotechnological companies. It is widely held that one of the most important aspects of this project was that everyone involved came to the same conclusion; namely to continue focusing on and developing 'Medicon Valley'.

This stress on the brand running through all policy initiatives can be seen in the 1997 naming of the cross-border medical educational and networking institution the Medicon Valley Academy (MVA). A non-profit, member financed and managed organization, MVA is a regional and bi-national network organization with the aim of firing-up integrated R&D in Medicon Valley. Its members include practically all the universities, healthcare organizations, and most of the biotech and medico-related companies and other organizations in the region. Initially started as a 3 year project with a total budget of SEK 18 million it has offices in both Lund and Copenhagen. Its first work was in the area of extending and deepening the links between research, hospitals and industry through applied development projects as well as information inter-exchange and focused lobbying. In April 2000 it switched focus somewhat by turning into a member financed association defined in terms of acting as meeting point for its over 175 core commercial members drawn from biotech, pharmaceuticals, medicine and related firms in areas such as specialized logistics. As with such organizations in many other types of clusters its role as a meeting point and unified information and marketing point has proved important to both the cluster's objectives and member integration. It seems that here

too the centrality of institutionalized meeting points—that are not public sector dominated—adds to the firms' sense of ownership and partnership in the cluster venture and vision. Such a sense of ownership appears in this case to be important to the private sector who under normal circumstances can tend to prefer to take the backseat when it comes to regional development 'visions'. Organizations such as these can then be seen to have an important role in anchoring regional development visions to practical networking and integration processes and in this case at least has proved valuable as a 'front-door' to inward investment and venture capitalization.

The story of Medicon Valley is an interesting example of the many ways in which Porter's, and others', cluster concept can be actualized in reality. Most notable about the success of this project is that the public sector need not look on cluster projects as an easy way to retreat from fiscally and politically difficult development decisions and pass the gauntlet of regional responsibility to the private sector. Rather it is an example of how a cluster approach can be usefully integrated into grand visions of regional futures. Nonetheless it is important to note that other complementary institutions of regional development must not be neglected and that such institutions must proceed from a strong cluster-brand and must also attempt as far as possible to give the private sector a substantial 'stakehold' in their vision.

3.3 TelecomCity—Cluster-building from Nothing to Something

Listed as an UNESCO World Heritage site the historic naval dockyard city of Karlskrona in south-east Sweden has in recent years used a cluster-approach to great effect in the transformation of its economic base. Through the 1970s and 1980s harsh military cutbacks and economic restructuring in traditional heavy industries badly affected the city and its surrounds. Population decrease, high unemployment and the inability of the region to retain skilled graduates from its further education colleges signalled the need for a radical industrial changeover and placed great public pressure on local officials to 'do something'. In this context the local authorities and associated public sector actors made a strategic decision to reinvent the city as a leading international 'infocom' development environment with a focus on telecommunications: named 'TelecomCity'. From almost nothing the region has been successful in taking first steps towards attaining its goal and is now one of Sweden's fastest growing municipalities with infocom firms employing around 4500 people and adding an average of 600–700 new jobs per year. Roughly 20% of the city's workforce is now in telecoms and IT.

> The municipality is one of the few successful examples of industrial changeovers, in Sweden over the past 20 years. That is to say changing from a base of heavy industry to a centre for the telecommunications industry (*Affärsvärlden*, 1–2, 1999).

Unlike the previous examples of *Aluminiumriket* and Medicon Valley Karlskrona is an example of where the cluster vision is perhaps better described as a cluster-imagination or wish-list. Although the telecoms giant Ericsson has had a small presence in Karlskrona since 1947 in the early 1990s only very few high-tech and telecommunications firms were located there. Within 10 years a rich variety of IT and telecoms firms came to operate there, including global names such as Ericsson, Nokia, Sun Microsystems and Hewlett Packard, indicating a speed of cluster evolution far too rapid and with far too little historical background to be fully consistent with what path dependency accounts often seem to suggest (such as that of Engstrand, 2001). The success of the cluster can be accounted for in many ways but four aspects of the approach are worth paying especial attention to: lead firms; lead actors or 'cluster motors'; targeted division of labour; a focus on quality of life.

It appears that the presence in the early 1990s of a few lead-firms was important to set the

tone of the whole cluster initiative. One firm in particular proved crucial. EP-data (50% owned by Ericsson) with around 50 employees had a department focusing on telecom-related software applications. This firm was, amongst other things, characterized by a visionary board of directors, particularly the CEO, Jan-Åke Kark, who took the success of the firms telecoms applications division of EP-data as a cue to the sort of growth areas the cluster might best target. Kark was instrumental in the early stages of the formation of a cluster strategy and the development of strong *Högskola* (technical university)-industry links. A second telecoms firm with board level social links to the area also proved important. This was the mobile phone operator Nordic Tel—now Europolitan Vodafone—which decided to locate their headquarters in Karlskrona. The decision to locate in Karlskrona coincided with their getting the license to build and operate Sweden's third mobile network in the mid 1990s. This meant that the cluster now had a high profile and rapidly growing lead firm that was also not shy in telling others that their decision had been influenced by Karlskrona's vision of creating a centre for telecom industry.

As has been seen already in this paper the existence of dynamic key players, cluster motors or drivers, at an early stage in the development of cluster initiatives is crucial. In addition to the above mentioned Jan-Åke Kark two other actors were important in envisioning and actualizing TelecomCity. First, the newly appointed director of the *Högskola* Per Ericsson. Second, Tage Dolk who at the time was the municipality's chief officer for economic development. These three key people had, of course, different views and ideas of the regional economy. In the case of Jan-Åke Kark a focus on issues strategically important for his firm's core business idea (telecoms software) formed his vision. For Per Ericsson a strong interest in IT-related research and his own business-experience in the IT field were the key drivers. Last but not least Tage Dolk was anxious for the de-industrializing municipality to develop a strong service sector, and IT of some kind could provide this. Despite different points of departure the three managed to agree on an integrated common vision that encompassed all their concerns and in 1993 the TelecomCity partnership network was formed. Although some consultation took place before its formation it was only after some time that support for the project increased. One key person in increasing interest amongst policy-makers for TelecomCity was Mats Johansson, chairman of the municipality. He proved vital to securing a unified public sector support base for the project by skillfully managing to anchor the idea of TelecomCity both within the dominant political party local in the municipality (the Social Democrats) and in the municipality's general and professional policy and planning community. Or as he himself put it:

> During the last two years there has been a wide political platform for the initiative—when it comes to budget questions we are always quarrelling but never when it comes to the TelecomCity project. [The continuation of the cluster-building exercise] needs a sustainable and clear political leadership, no matter which block is in office. (Mats Johansson, Chief Executive Karlskrona Kommun, 1998; authors' translation)

The third dimension of the project that is particularly noteworthy is that a strict division of labour and responsibilities, coordinated by the TelecomCity membership association, was put in place early on. The project is designed to work on different levels with different tools in order to strengthen business development, competence support and development. An important and prominent aspect of this work—from *Högskola* to municipality—is that different organizations have different tasks. Member companies undertook to identify and press for issues related to: individual firm growth; increasing R&D operations; firm-level and firm-student cooperation; encouraging and nurturing spin-offs; attracting new entrants; marketing the TelecomCity brand. The *Högskola* undertook to account for what actions were to be taken in

order to: integrate or add new technological directions; integrate various kinds of skills; increase student numbers and broaden the scope of IT/telecoms education; ensure exchange between university and business at all levels; complement in-house training of TelecomCity employees. In its turn the municipality undertook to: take measure to facilitate growth in small technology and knowledge based companies; improve the quality of local infrastructure and the municipality's services; lower taxes and fees; open up national and international communication; pay attention to the social and physical environment.

The fourth interesting dimension of the cluster is the stress placed on the social environment and on the networking of young people in informal settings. An example of this is the 'TelecomCity Club & Co' which organizes activities geared towards 'networking' local further education students and younger employees together. It appears however that such activities are not merely cynical recruitment drives but rather fit into the cluster's idea of economic development that is integrated with the development of a rich living environment. This aspect of the cluster's work is important to note since workers in telecoms and IT have excellent mobility opportunities, and quality of life issues are key factors in young professionals location and workplace choices (cf. Florida, 2000). The cluster organizations' recognition of the importance of wider spatial and social issues appears to have been useful in this sense and points to the benefits of linking cluster policies into wider local quality of life and environment issues. This may suggest that when developing a cluster in an area with little or no existing firm or expertise base other regional assets such as social and cultural opportunities and amenities become more important than might otherwise be expected: i.e. *homo sociologicus* cannot be ignored.

TelecomCity then demonstrates several interesting dimensions of cluster building as well as showing that contrary to the logic of Porter (1990), and geographic economists such as Krugman, clusters need not start from an organic basis and may in fact by designed and built from scratch in a relatively short time. What is crucial however is that a strong vision and leadership emerge early on and that a strategic and purposeful view of the process be taken.

> Strong regions do not develop by chance. As you make your bed—so you lie on it. (www.telecomcity.org)

3.4 Automotive Test Industry Cluster—Temporarily Fitting into the Global Economy; Climate Driven Part-time Clusters

During the winter the inhospitable sub-artic climate of inland Norrbotten in the extreme north of Sweden becomes the unlikely home to the likes of Porsche and Mercedes. Hundreds of people from the European automobile and automotive component industry gather to test their products on the traitorous frozen lakes, iced solid frozen roads and snow drifts that the reliably freezing winter climate of the area provides. With companies such as BMW, Knorr Bremse, Porsche, Fiat, Haldex, Landrover, Mercedes, Bosch, Daimler-Benz, Chrysler, TRV, Continental Tires, Skoda, Saab, Opel, and Volvo using the lakes, roads, and indoor test facilities of the area from November to April every year the area has become a part-time world-leading node in the global automobile industry.

The first signs of the industry were in the 1960s when Volvo and Opel started to test cars and components in Arvidsjaur. In the 1970s the industry started to take-off when the German company TELDEX started testing on a cleared ice track on lake Hornavan used by local people as a runway. In response to this local contractors started-up in order to provide services to the company. Since then the test industry has expanded greatly and has spread to the neighbouring areas of Arjeplog, Jokkmokk, Älvsbyn and Kiruna. In the last 25 years the industry has become an important and sizable contributor to the sparsely populated and

relatively inaccessible interior region. Today the industry is composed of about 20 establishments which have a turnover of about 150 million SEK. In addition to 300 people locally employed in the industry a further 1500 make shorter or longer visits to the region providing valuable revenue to hotels, restaurants and the like.

The core of the industry encompasses firms who prepare the test-paths on the frozen lakes, etc. and a range of specialized garages, workshops and indoor test facilities often with linked accommodation. These services around the test-paths are mainly handled by local firms specialized in testing but there are also examples of end-producers—such as Bosch, Volvo and Continental Tires—who have built up their own test-workshops and establishments. Local entrepreneurs have traditionally worked independently, been quite small-scale and sold their product to 'their' customers. In short there has been no coherent collaborative marketing of either the region or the firms and little or no inter-firm collaboration; in fact the opposite has usually happened with the territorial local contractors guarding their existing custom. This may be because the businesses have usually grown quite quickly and all the working time has been focused on providing the best services for their customers. Also secrecy around the nature of the products being tested may have added to this lack of communication; car companies in particular have gone to often extraordinary lengths to hide their latest designs from other winter visitors (such as masking new models in plastic cladding with darkened windows). Thus time and competition have meant that whilst most of the entrepreneurs know each other no networks had been developed for formal and informal information-exchange etc.

In recent years this situation has had to be re-evaluated as although the industry is steadily growing it faces a number of threats. One threat is the area's ability to meet the customers' demand for infrastructure and skilled labour. Another threat is the scarcity of accommodation and shortages of data and telecommunication services. Thus whilst naturally provided ice-tracks remain the core product large investments have also to be made in land-based tracks, garages, accommodation, offices, etc. Analysis suggests that to develop a fully appropriate infrastructure would cost around SEK 500 million.

In order to tackle these shortcomings local actors have started to come together around a cluster vision for the area that is focused on the test industry. As a first step against these future threats and to work for further development of the products the local entrepreneurs/contractors have joined together in an association called the Swedish Proving-Ground Association (SPA). SPA is a non-profit association aiming "to promote and diffuse knowledge regarding tests of vehicles and vehicle-components" (SPA Mission Statement). Though a small organization it has quickly become a strong voice in the region's development plans and started lobbying regional government on legislative, infrastructural (especially IT) issues and environmental issues important to the industry's trajectory. It has also attempted to bring the firms together and try to get over their past mistrust of each other by organizing a range of meetings, workshops and study visits. The association then aims in the coming years to further develop members' collaboration and participation and the sense of an inter-linked and mutually beneficial common purpose. An important element of the association is that by coming together costs can be shared when addressing pressing problems such as land-use and environmental certification, collective equipment and consultancy purchasing, and combined marketing and sourcing of new customers. Since their marketplace is essentially a global one dominated by large disparate conglomerates, savings in marketing and approaching new clients are especially important for the small businesses in the area. Development of executives' business skills and competence is also a top-priority for the young industry. In this regard a common identity and vision has already proved important in getting the attention of national business development agencies such as NUTEK as well as regional development services.

The above example we feel demonstrates some interesting dimensions worth considering when clusters are thought about. Firstly, when thinking of clusters we often focus on contact networks, learning and human capital, etc. as clusters' key assets. While this is often most important a climate-driven cluster like this one alerts us to the fact that it must be remembered that natural resources and physical conditions can be key factors in cluster development. If this is so then initiatives aimed at the identification of cluster realities and opportunities should attempt an assessment of the physical conditions of a region as well as the purely economic conditions present. Secondly, the temporal nature of the cluster is interesting in that we often think about clusters as full-time enterprises and attempt to further 'lock' firms into the cluster. In this case there is of course no way of extending the cluster's core product, the winter. However, the development of a 'time-share approach' to the cluster's infrastructure has begun in Norrbotten with the idea of developing another temporal cluster, this time based on the summer environment: wilderness tourism. Since environmental protection and accommodation related services are as important to motor-testing as to tourism action in these areas can have great affects for both. Clusters should therefore be aware of the usefulness of other activities seemingly unrelated to their core activities as vital synergies and cost reductions with neighbours can be mutually beneficial.

4. Conclusions

In this article evidence has been presented from cluster building processes ongoing in Sweden which suggests that in practice clustering takes many forms. We suggest that whatever shape cluster initiatives take, despite certain problems and uncertainties, they can be seen as useful regional development tools.

Out of the 13 regional clusters that form the *Klustergruppen* defined sample we identified four types of cluster building processes that whilst not an exhaustive typology tell us some interesting things about the usefulness of the concept as a policy tool. We used four key examples to show that successful clustering can be: (a) as Porter suggests industry-led initiatives to build competitiveness and competence within an existing base; (b) top-down public policy exercises in brand-building; (c) visionary projects to produce an industry cluster from 'thin air'; (d) small scale, geographically dispersed, natural resource based, temporal clusters that link, or dip, into global rather than national and regional systems and sources of innovation, competitive advantage and strategic assets. Although none of these cases fully match up to Porter's definition (1990) of what a cluster is and how it should proceed the fact remains that all can be viewed as successful cluster initiatives. Furthermore despite the apparent diversity a number of recurrent features appear in all of the 13 Swedish cases. In all we have identified a number of key features (see also NUTEK, 2001a, 2001b) that seem to be common to successful cluster initiatives, no matter the scale and scope of the project. These features draw on some of the key findings of *Klustergruppen* in the process of discussing the mechanisms that seem to be significant in successful cluster initiatives. These features can be seen at work in four different phases or aspects of the cluster building process outlined later. However, policy-makers and practitioners all too often view cluster initiatives as programmatics to be developed and implemented along some sort of uni-linear timeline (see for instance: European Commission, 1999). In contrast to this type of approach, and the four 'phases' later, the argument here is that successful cluster building involves a more reciprocal process that can be described as an on-going conversation amongst various stakeholders (or even stockholders) in economic development. All the cases share these common features though in differing degrees and at different moments. As such these should not be understood as a programmatic checklist.

(1) *Creation and Institutionalization.* The creation of a cluster building process or the institutionalization of ongoing processes under the banner of clustering is a continuous and multifaceted process. Despite different histories, etc. the case material examined here points to four key considerations in this process. First, experience shows that starting from zero is hard: a key characteristic of success is to work on the basis of identifying and developing the existing sources of regional competitive advantages. The key challenge is to create resources and capacities that facilitate the transfer of ideas and innovations into new commercial products. Public brokered and institutionalized links between educational institutions and industry are often key to this. In this context it seems advisable that public actors act on the needs of individual firms and entrepreneurs identified through open and flexible channels. Thus for this to work best different actors with a stake in boosting the cluster should be involved in bottom-up processes. Second, a common denominator in cluster projects is to the creation of a distinctive cluster vision. A widely anchored vision concerning the future of the cluster, which has been arrived at through a consensus based process, has by experience been shown to be an important platform for a successful cluster strategy. The vision should however be flexible as well as focused; it should be open enough to change with circumstances within and outside the cluster.

Third, it appears that in order to initiate and implement a cluster strategy it is crucial to give authorization to one or a few people to act as cluster 'drivers'. These people—or civic entrepreneurs—can either be from the public or the private sector. One of their most important qualities must be to have a capacity to act as a network broker between sectors and individual interests. The cluster driver can also be an organization such as network broking organizations like the Medicon Valley Academy. Irrespective of whether a cluster driver is composed of one person or an organization, it is very important to have a 'managing unifier' rather than a 'managing communicator': to have dialogue rather than monologue. It is also good if the cluster motor acts in collaboration with an executive body or an advisory board which allows time and resources for supporting the on-going cluster work. However, some diversity seems healthy in cluster-building as if there is only one cluster driver there is a risk that the project can lose sight of its roots and direction. Lastly, it is important to note that during the creation and institutionalization of cluster building initiatives the public sector has a role. It appears that the Porterian vision of clusters as almost entirely private driven is in many ways a neo-liberal bridge too far. Whilst in many countries and localities the State has retreated somewhat from its once central place it is still a crucial actor and resource cache available to regional development. At least in Sweden, a country where the State has traditionally never shied away from direct intervention in business life, it appears that a positive public cluster vision can be crucial. Thus successful clusters need not only be self-organized by private actors, as Porter suggests, indeed public sector resources and crucially regulation may be vital.

(2) *Management.* The structure, organization and operation of management in the various schemes examined varied considerably but it appears that two main features seem most important. First, the provision of meeting places. Successful cluster projects are closely related to the existence of meeting places which act to foster the development of trust, collaboration, increased information and knowledge exchange, etc. It is crucial that the meeting places create distinctive (surplus) increased value for the firm involved. Ideally these meeting places should not be too introverted since it is important to develop and create links with other similar cluster within or, often more importantly, outside the clusters' home region. Secondly, the existence of a specialized division of labour through which different actors identify their core competence areas and use these competences for contributing to the cluster development seems important. If the performance of this

division of labour is to continue to benefit the cluster then actors' share in the work must be of some immediate relevance to their own organization's or firm's interests. A division of labour builds a bottom-up element into the cluster as well as reinforcing incentive structures.

(3) *Marketing*. A marketing phase and effort principally directed at brand building was characteristic of all the cases examined. It appears that in order to strengthen the competitiveness of the cluster a clear cluster brand needs to be developed. In this study brands have been seen to have three main functions that in varying degrees all clusters share: brands strengthen the attraction of the cluster for investment, venture capital, skilled workers and new entrants; brands help to unite actors in a shared purpose and identity; brands often complement firms' marketing and collaborative-marketing activities. In several cases the marketing of a cluster also relied on an understanding that not everything in life is business-related. Often clusters cannot be built purely as an exercise in chasing competitiveness (of nations or regions) in that clusters are always based on the people working and surrounding the industry in question. An area that is proactive in developing, or drawing attention to, a healthy and sustainable physical and social environment most often best encourages members' lasting commitment and involvement. In short one cannot forget that people are not only skilled inputs into productive processes; they also desire stimulating and fun social contexts that add to a high quality of life. As in other phases it is important to note that in the marketing of a cluster building process the public sector can have an important role. The public sector's access to broad channels of communication and the legitimacy its involvement confers on projects has been important to most of the cases treated in this article.

(4) *Upgrading*. One key determinant for being successful with a cluster initiative is to ensure the development of cluster oriented competence support policies and strategy. Examples of competence support are informal firm networks for inter-exchange of knowledge and experiences and targeted educational programmes. It is important to note that competence support should not merely consider products and production processes as competence development in areas such as business line, marketing, and end-user expectations are also important. Such support mechanisms ensure that upgrading and product development runs as smoothly as possible.

In conclusion, in this article we have tried to identify the key mechanisms needed to put a cluster-based regional development strategy into practice. The fact that regional cluster processes seem to come in a bewildering array of sizes and shapes must not blind us to the fact that there are some common recurring denominators. In the research community the cluster approach has most often been turned into a tool for identification and classification of interrelated firms and assets. However, for policy-makers it is something of a buzz word that represents a shift away from narrowly focused firm-based strategies to a more holistic approach to regional economic development. In Sweden, and elsewhere, regional economic development policy has traditionally tended to focus on individual firm support policies, hard infrastructure projects, technology transfer, and competence development. However, the form of economic governance underlying this was one that viewed policies as somewhat separate and distinct from each other. One could argue that the recent focus on cluster building has brought with it something of a new form of economic governance: one that emphasizes the merging and synthesis of traditionally separate policy fields to form more systemic, even holistic, approaches to regional development; and one which recognizes functional interconnectivities and systems that are more or less geographically concentrated and focuses on these as policy objectives to be worked with in a cooperative long-run dialogue involving a wide variety of actors and stakeholders. This new form of economic governance is one that has

much in common with notions of the 'associational economy' (Cooke & Morgan, 1998) or the stress many authors have placed on the role of 'institutional thickness' as a prerequisite for regional prosperity (Amin & Thrift, 1994, 1995). Such processes have been used to good social and economic affect in Sweden thus pointing to their further usefulness as tools for regional development in Sweden and perhaps elsewhere.

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Note

1.

(1) Private sector-led initiatives to build on existing strengths
  (A) Crystal Valley (Dalarna/Borlänge)
  Core products: Liquid Crystal Display (LCD) related products and production technologies.
  Cluster organization: The Swedish LCD Centre was set up to provide research and development for the LCD industry in Crystal Valley. The focus is on technology development and transfer of LCD materials and production engineering as well as providing university education and on-the-job training courses.
  Vision: to strengthen the 'Crystal Valley' brand and become a global nexus of excellence in display research and production.
  (B) 'The Polymer Centre' (Gnosjö region)
  Core products: plastics and polymers.
  Cluster organization: The Polymer Centre (TPC) is membership-organization consisting of about 25 firms. Through TPC—with local companies as active owners—a platform has been created for the development of products and techniques.
  Vision is to develop TPC into a national centre of excellence.
  (C) The Cutting Technology Centre (Gnosjö region)
  Core products: cutting processes.
  Cluster organization: membership-organization consisting of about 25 local firms as active owners/members.
  Vision: to strengthen the cooperation between companies, raise the level of specialized skills and expertise, and to develop the Cutting Technology Centre into a national competence node.
  (D) *Aluminiumriket* (Småland—Blekinge)
  Core product: aluminium-related products.
  Cluster organization: a membership-based organization that represents the area's 500 firms which works with both branding and the development of specialized skills and expertise.
  Vision: strengthening the competitiveness of the firms and assisting in competence development.
  (E) Hedlund a woodworking cluster (Västerbotten)
  Core products: woodworking products.
  Cluster organization: The woodworking firms in Hedlunda have an informal cluster organiza-

tion to stimulate exchange of experience in terms of equipment, production, etc. Regular meetings are held.
Vision: to develop an effective woodworking industry in inland Västerbotten.

(2) Top-down cluster-branding exercises

(F) TIME (Stockholm)
Core products: Telecom, IT, Media and entertainment.
Cluster organization: a virtual organization—www.time.stockholm.se—focusing on information and events related to the 9000 firms and 80,000 employees included in TIME's sectoral definition.
Vision: to strengthen the TIME brand.

(G) Medicon Valley (Öresund region)
Core products: pharmaceuticals and medical technology.
The cluster organization: Medicon Valley Academy, a member-financed association.
Vision: to make Medicon Valley an attractive and recognized international brand.

(H) IDEA Plant (Sörmland/Eskilstuna)
Core products: products and services related to information design.
Cluster organization: membership-based organization that is co-financed by local authorities consisting of about 40 firms.
Vision: that IDEA Plant will achieve global recognition for creativity and core competence in information design

(I) Biotech cluster in Umeå
Core products: biotech/medicine, laboratory instruments, etc.
Cluster organization: there is no formal cluster organization, but Umeå University and a number of research centres may be viewed as the binding elements in the cluster with local authorities active in brand-building exercises.

(3) Cluster-building from nothing to something

(J) TelecomCity (Karlskrona)
Core products: IT and Telecom products.
Cluster organization: TelecomCity is now a membership organization, with a progressive membership depending on a company's size (revenues, number of employees, etc.).
Vision: that TelecomCity will become a leading development environment focused on telecommunications.

(K) Rockcity (Hultsfred)
Core products: music related activities and digital media.
Cluster organization: the cluster is centred around IUC Hultsfred and those companies that are a part of the Rockcity initiative.
Vision: to develop a national knowledge and educational node in music and digital media.

(4) Part-time clusters

(L) The automotive testing cluster in inland Norrbotten
Core product: to offer infrastructure (i.e. a stable winter climate and well tended frozen lakes) for testing of automotive and related components in winter climates.
Cluster organization: the cluster is held together by a non-profit association—the Swedish Proving Ground Association (SPGA).
Vision: SPGA's vision is to promote and spread knowledge about automobiles and components as well as to develop the automotive testing industry.

(M) The motion picture cluster in Fyrbodal
Core products: motion picture and video production.
Cluster organization: Film i Väst is a public financed body
Vision: the goal is to develop facilities for film and video production and to strengthen the infrastructure around the production such as post-production work, to initiate university programmes for film production, and to build up studios, etc.

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