

Clusters and Networks – Tools for Northern Development

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Abstract

This paper discusses clusters and networks as tools for regional development. The issues are clarified by examples of the different types of networks – resource-based, skill-based, knowledge-based, administration-based. The main characteristics of these four types of networks are described and suggestions for regional policies that support the growth and evolution of networks are given.

Concepts

Prosperity in a region is created by competitiveness, which is based on the quality of its companies and industries. As the environment within which the firms operate strongly influences this competitiveness, the focus must be on improving the quality of a region's business environment.

The cluster theory proposed by Porter states that there are four basic attributes that affect regional productivity and innovation: 1) demand conditions, 2) context for firm strategy and rivalry, 3) factor conditions, 4) related and supporting industries. This structure has been called "Porter's diamond" (Porter 1998).

A **cluster** "is a geographically proximate group of interconnected companies and associated institutions in a particular field, linked by commonalities and complementarities". As the sum of its parts is of greater value than each individual company or institution, clusters create synergy.

A **network** is a collaborating group of companies. They don't necessarily compete but offer services and products that combined gain a stronger position on the market than if the companies did not collaborate.

Clusters lead to better efficiency. Networks do the same but in addition they create interdependencies and can lead to a reasonable division of markets. Networks and clusters are of the following main types based on the common feature they are based on: skill-based, knowledge-based, resource-based, administration-based. They are local or regional. On the local level "business parks" are often viewed as networks. That is not an inherent feature of a park. But in a business park the conditions for birth and growth of networks are favorable.

It is difficult to find pure clusters or networks in the real world. In most cases groups of companies compete and collaborate. That can easily lead to wrong interpretations of the dynamics within a group. In this paper we will use both terms – cluster and network – to describe approximately the same types of business agglomerations.

Clusters bring several advantages to a regions economic strategy. According to Porter, clusters improve competitiveness in three ways:

- Clusters improve productivity through improved access to specialized suppliers, skills and information.
- Innovation is given more importance as the need for improvement in production is emphasized and firms working together can satisfy this need.
- Once established, clusters will grow as a result of the creation of new firms and the entrance of new suppliers.

Cluster development has become an important tool for regional development. The main reasons are:

- The growing number of people involved in economic development activities. The decentralization of decision-making processes to the regional level and the importance of international organizations have left many planners with the need to find new tools.

- Use of traditional industry policies such as providing subsidies for uncompetitive industries, attempting to build new industries from scratch and trying to attract incompatible foreign investments is unproductive.
- The globalization of international markets. With the reduction in constraints on trade, companies can compete freely in any economy at the global level. Regions must compete internationally in the sectors in which they have an advantage. Clusters support this trend by building on local differences, seeking an endogenous growth of regional economies, and strengthening the assets already present in the local economies.

Initiatives to create a network usually come from the private sector and the public sector in the region responds, or the framework is created by the public sector in order to motivate companies to develop networks and clusters. Often a network is created by companies without any involvement of the public sector in this process. During later stages of the networks evolution it is in most cases in the interests of all stakeholders that the public sector gets involved.

Networks need a starting point – seed or root – that triggers the emergence of a network. Public sector support can act as a catalyst – fertilizer if you wish – to make a network grow and prosper. Public sector efforts to create networks are almost unavoidably doomed to fail if there is no starting point for entrepreneurial activities within the private sector. A core of business activities is needed. A possible diversification strategy is to create spin-offs within a sector using an existing cluster as a starting point.

Knowledge-based networks

At the core of a knowledge-based network is the ability to transform scientific and technological knowledge into products that form the base for industrial production (Formica). A long term trend has been to move from skill-based to knowledge-based production systems. Companies are able to separate between development, control and production. Complexity is added to product development and research while complexity is reduced in production. This separation makes it possible to move manufacturing to almost any part of the world while the core of the company's value – knowledge – is more strongly connected to a regional environment and to a knowledge base involving culture, education, universities and research centers. This separation between knowledge and production leads to one characteristic long term dynamic feature of knowledge-based networks. At the early stages production is taking place within the region where the knowledge-base is situated. When the activity matures, production is disconnected and moved to other regions and countries, while searching for the most favorable location measured by access to markets and production costs.

The information technology sector in the city of Oulu is a typical and well known example of a knowledge based network. Nokia was, of course, the trigger for this network. In 1972 Nokia started production of U.S. military radio equipment in the Oulu region (Ali-Yrkkö 2001). At the same time the department of electrical engineering was strengthened at the University of Oulu and the Technical Research Centre of Finland started activities in Oulu. A few years later the city of Oulu decided that one of its goals is to become a "city of technology". Part of this strategy was the creation of the first science park in the Nordic countries.

The positive feedbacks between industry, university, city, and region lead to the growth of one of the strongest IT clusters in the Nordic countries. Today the electronics sector's share of Oulu region's total employment is more than 10% while it is 2% for the whole country. This network has to rely on continuous innovation and development in order to survive. As mentioned above, assembly lines will be used in the core region only until it is feasible to move production to other countries. Management of this dynamic aspect of a knowledge-based network is a very complex activity involving all stakeholders in the region.

More information on the IT cluster in Oulu can be found, e.g., in a presentation by Pekka Hautala which is available on NRF's website ([www.nrf.is/News/Oulu 2005/Oulu-Pekka Hautala.ppt](http://www.nrf.is/News/Oulu%2005/Oulu-Pekka%20Hautala.ppt)).

Skill-based networks

As mentioned above, many skill-based networks have mutated into knowledge-based networks as knowledge matures and replaces the need for skilled workers. This general rule is not applicable to every type of production and networks. When a network operates in a market with heterogeneous customer demands and products that are not pure assembly line units, it is necessary to have a

skilled workforce. These skills are in many cases based on a long tradition and a value system that holds these skills in high regard. A classical example is diamond-centered activities in Antwerp. More than 60% of the world's cut diamonds come from Antwerp although the diamond mines are thousands of kilometers away. The strong position of Antwerp is based on the strength of the network and the skills of the diamond cutters working in the industry. These skills have a long tradition. Already in the sixteenth century Antwerp played a determining role in the development of diamond-working techniques.

Skill-based networks are more stable than knowledge based networks as the skills of the workers are an important part of the competitiveness. One danger within this type of networks is stagnation. Companies rely too much on skills and are slow to follow innovative trends and technological changes that influence their competitiveness. It is necessary to keep a good knowledge-based background network alive so that new innovations and production technologies are developed and introduced as efficiently and soon as possible.

Entrepreneurial clusters do not have to be local. They can be spread over a broader region. One example of this is the skill-based network of boatyards in Ostrobothnia. Like in Antwerp, this region has a tradition in a specific skill. In the Ostrobothnian region this is boatbuilding skills that have been developed over hundreds of years. There are more than 70 boatyards and subcontractors in this network spread over a long coastal region with a length of more than 200 km. The biggest and most famous boatyard is Nautor – the builder of the Swan range of sailing yachts. Nautor was forty years ago the trigger for the currently operating network, although many boat builders had been working in the region for a long time. The total labor force in this network is approximately 1500 of which more than 400 work at Nautor. Each year 100 new jobs are created within the network. This might not sound as a big network compared to some of the global ones, or to the Oulu cluster. The impact on the regional economy is, however, important. More than 12% of the region's labor force works in this network.

Coordination and communication is supported by several public sector organizations which in some cases receive substantial funding from the European Union. A core characteristic of this boatbuilding cluster is that assembly line production is only part of the strategy. Most boats – big and small – are to a certain extent custom designs based on common standard elements and modules. Some companies aim at customizable standard production. This manufacturing strategy – custom designs based on common modules – means that direct customer contacts are very important. Every customer is individually taken care of and long term relationships are a high priority. There are cases where over the decades a customer has ordered five boats from the same builder. The marketing strategy used by the companies and their boat designs and sizes vary. Baltic Yachts, for instance, builds only big – over 50 ft - sailing yachts while some of the others concentrate on smaller boats. Nautor's strategy is to focus on big and expensive sailing boats with superior quality.

Resource-based Networks

The main part of economic activities in northern regions has traditionally been based on natural resources. Typical examples are fisheries, oil and gas, forest industry, agriculture, mining, and tourism. Tourism is probably the sector with the highest potential for growth while creating jobs for local populations. Oil and gas has a natural potential for growth, but this will only to a limited extent benefit local populations and can have substantial negative environmental impacts harming the natural conditions supporting tourism. This is especially relevant as tourism can create jobs for both men and women and for all age groups. The other sectors tend to be dominated by jobs for men.

Two important problems concern 1) the management of these resources, and 2) conflicts between sectors that are based on the same resource.

Management of fish stocks in international waters is a classical example of how the national and international political system is incapable of managing the sustainable use of a common resource. Cod was almost fished to extinction outside New Foundland. All signs indicate that the European Union is incapable of preventing similar collapses in European waters.

A related problem can be seen in the conflicting ways to harvest salmon. Is it more profitable for a community to catch salmon in a river or to catch tourists who catch the salmon? An obviously unsolvable problem concerns salmon in the Gulf of Bothnia. There are several issues involved. Where and when should fishing be allowed? What types of quotas should be used? What is the right balance between fishing at sea and in the rivers? How should one manage the balance between local fishing and use of salmon as a way to attract tourists? How should one deal with the interests

of Sweden and Finland in this border region? I only mention these issues here. A review would go far beyond the topic of this paper. The situation is not unique for this region. Where there is a salmon river there is a conflict.

Tourism is both a source for additional prosperity and a constraint on traditional resource based activities in northern regions. Tourism is an industry that is growing more than many other sectors. Global growth within this sector is 5%. Forest management is often the focal point of conflicts related to environmental protection and tourism. It is on one hand important to use forests as a resource base for industry, on the other hand environmental concerns and requirements of the tourism industry push for protection of forests. Another problem is related to mining – especially uranium mining – which is considered to spoil opportunities for tourism in the regions concerned. In the case of uranium mines it is a question both of objective destruction of environmental values and of the perceived risks and dangers of uranium and wastes created by the mines.

Due to the inherent characteristics of resource based economic activities, it is difficult to create collaborative networks except perhaps within the tourism industry. Clusters emerge for instance in the fishing industry. These clusters are in most case pure competing systems without any network characteristics. This leads to resource depletion unless the fish stock is carefully managed. The competition, in which actors from almost any country can participate, will, however, lead to overexploitation and collapse unless the activities are controlled by the political system. The political system seems to be, as stated above, unable to handle this problem.

Administration-based networks

Administration-based networks will not as a rule lead to new growth and competitiveness in the private sector. Their main purpose is often to improve efficiency and access to services. Health care and education are two typical examples of services that can benefit from well developed administrative networks. These activities will, of course, improve the quality of the public sector's support for activities in the region. It can not, however, lead to new job opportunities and growth within the private sector unless there is an active strategy aiming at creation of corporate networks.

The Bothnian Arc, which is a typical administration-based network, includes seven Swedish municipalities and five Finnish regional municipalities that in turn consist of 32 smaller municipal entities. 610,000 people live within the Bothnian Arc region, more than half the population of northern Sweden and northern Finland. This region has the EU's northernmost concentration of cutting-edge expertise in industry, and it is assuming an increasingly important role for development in both a European and global perspective.

Not only does cooperation within the Bothnian Arc open new opportunities for creating a strong and competitive region, but it also contributes to the development of Europe's entire far north.

The Bothnian Arc is, at this stage, in reality an agreement to improve public sector collaboration and coordination within the region. The aim is to create a better environment for private companies working in the region. One key expectation is that the framework will lead to the emergence of networks and clusters that create new jobs and prosperity in the region. In order for this to happen it is important that trigger companies are identified and that initiatives are taken.

Singletons

This paper deals mainly with clusters and networks. We should, however, not forget the importance of individual companies working and prospering in northern – sometimes improbable – environments. I call these companies "singletons". They prosper and grow, but due to the inherent characteristics of their markets, technology, and products, they have not been triggers for networks or clusters. I can list several of these "singleton companies" in the northern regions of Finland. Similar lists can be made for all countries in the region. Four examples of Finnish northern singletons are: Pentik (www.pentik.fi), Rapala (www.rapala.com), Lappset (www.lappset.com), and Mirka (www.mirka.com). These are companies that most of you have never heard about and will never meet in the market. They are, however, often of decisive importance for the communities in which they operate and have a strong market presence in their niche. It is not easy to find common characteristics for this kind of business activities. The companies I have listed are all different. Pentik focuses on the Finnish market but sells its products in the other Nordic countries too, Rapala now has factories in five countries, Lappset has production in Finnish Lapland but sells its products on the global market. Mirka has production in two locations in Finland and sells its products on the

global market. Pentik and Rapala manufacture consumer products. Lappset and Mirka sell to the public sector and to industry. One common feature of these companies is that they put high priority on innovation, design and quality. They do not try to be the cheapest but they do try to be the best. As an example I will mention the main facts about Mirka. Mirka is a specialist in flexible abrasives and products that allow for dust-free surface finishing processes. It has become a forerunner in its area by placing a strong emphasis on product development. This development has been backed up by an effective production system and many decades of experience. The company's factories employ 650 workers and are located in two small rural communities in the Swedish speaking part of Ostrobothnia. The total population in the communities is 8000. Much of Mirka's international success is due to strong innovative activities within the company. The company's flagship product is "Abranet" which is a revolutionary new sanding material for dust-free sanding. More than 90% of Mirka's products are exported and sold in 70 countries.

Northern Clusters in a Global Context

The relationship between regional administrations and enterprises has changed considerably in the past decades as a result of globalization. This process is based on the concept of time-space compression, and a key element is the development of an integrated global economy. One of the central features of the current phase is the rise of information technology and the increase in mobility and liquidity of capital (Böckerman 2002).

In addition, global trade has increased at a far higher rate than the global national product. Consequently, the extent to which business activities in one part of the world are affecting societies and crisis areas in other regions is growing. Companies are now required to adjust to new markets and to develop strategies which extend beyond their local, regional and national markets. Small and medium-sized enterprises encounter problems accessing knowledge and information and obtaining financial resources. Every local company is under pressure to compete worldwide. At the same time, the range of general business activity is broadening and time scales are shrinking. This creates opportunities for individual companies, but also increases risks.

Two trends are of importance:

- A new system of spatial order is emerging. For northern regions to survive politically, socially and economically, they must create an attractive environment for existing companies and potential investors. The chance for local municipalities lies in the fact that many resources necessary for global business activities have turned out to be rather stationary.
- Responsibilities are shifting between the public and private sectors, between regional government and business. Institutional structures and decision-making processes play as great a role as participants' changing interests, objectives, and resources. This is a good argument to support the creation of administration-based networks.

The claim that regional systems are increasingly capable of self-governance is undermined by the fact that local communities are unable to adapt their population, infrastructure and environment to the changing demands of globalization. Companies have no option but to react quickly and flexibly to international competition, but the establishment and reorganization of business-friendly clusters and networks require time-consuming efforts from the public sector which requires substantial resources. These resources often come, in the case of Europe, from the European Union. Disagreements between the public sector and the private sector are often very difficult to handle. This creates the impression that the worldwide expansion of capitalism is actually downgrading rather than upgrading regional structures. Some critics even argue that exploitation of local populations' social, economic and environmental quality of life in peripheral regions is more a rule than an exception.

Big companies in big markets tend to form oligopolistic clusters. In peripheral and northern regions the situation is different. These regions form a polypolistic environment. According to classical theory, if polypolistic structures are paired with equal rates of investment and equal access to technological knowledge, the growth of the regional economy is only determined through population growth and access to technological knowledge (Gruppe and Kusic 2005). Underdeveloped regions will then catch up to higher developed regions. This is only theory. In reality the situation is different. Northern regions have diminishing populations and slow access to technological innovations. Companies in the region are small and far away from each other. For this reason it is extremely important that network creation has high priority. It is a risky strategy to try to attract manufacturing

plants of big companies with subsidies. These plants move around the globe with the speed of access to cheap capital and labor.

To what extent are current clusters and networks a phenomenon that is dependent on the national and international environment during the last decades? Trade liberalization, new communication technology, growing prosperity in the western world, access to financial resources, and other factors may have contributed to a situation which was – and perhaps is – favorable for the emergence of networks and clusters. How do we know that this situation will prevail? Networks and clusters prosper as long as they offer a comparative advantage to the participating companies. This advantage is real as long as all global competitors don't follow this strategy. When we arrive at a situation where in all relevant countries networks and clusters are developed to the same level, there is no comparative advantage any more. Those who don't follow this strategy will, of course, suffer from a comparative disadvantage.

Conclusions

1. A region's support for any entrepreneurial activity should be in harmony with its relevance to the region's competitive advantages and the activity's success in export markets. This has to be at the core of every sustainable strategy. I quote a comment from an Australian study on the Tasmanian light shipbuilding cluster (Wickham 2005):
"We have had some examples, back in the '80s..., it attracted a number of growth businesses for a while, ... and now most of them have moved to Fiji and elsewhere. It was totally unsustainable because the minute another government grants a greater subsidy, they packed up and left ... they would have been mad not to. It was totally unsustainable. So, we are very careful not to financially support activities which haven't got reasons, independent of the government's financial support, to profit in business here".
2. The public sector in northern regions has an important role to play. Larger regions have critical mass and it is really a choice of the public sector as to how much it gets involved. A small regional economy is different; the public sector has a key role in bringing people together, providing leadership, not in how to run companies but to provide leadership in terms of direction, vision and continuity.
3. The role of the public sector in network development changes over the network's life cycle. As a result it needs to have the capability to identify and monitor industries that exist within the region, and their stage of development. It is also important to avoid the adoption of a standard policy regime for all industrial networks, as each will have its own requirements depending on their stage of development.
4. The public sector must understand the nature of "chance events" as they occur. Chance events need to be managed in terms of their relevance to the natural advantages and social capital of the region.
5. There is a need for regional governments to actively dilute the importance of dominant firms as the sophistication of the supplier firms advance, without creating disadvantages for these dominant firms. It is necessary to safeguard the viability of the firms in the network and the region's entire set of industry members against reliance upon one major entity for their growth and innovative capacity.

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