



**'NORTHERN LIGHT' OR 'OUT IN THE COLD' –
A COMPARISON OF TWO NORDIC REGIONS**

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ABSTRACT

The development of regions has attracted substantial interest during the recent decades, involving several studies of ‘industrial districts’, ‘developing regions’, ‘hi-tech regions’ and ‘entrepreneurial districts’. Different propositions regarding how the development of dynamic regions can be understood has thus, with different theoretical approaches, been put forward. This article aims to increase our knowledge about how the factors behind the development of regions can be understood. The point of departure is Porter’s ‘Diamond Model’, which is applied as a theoretical framework for an analysis of two Nordic regions: The Oulu region (the city Oulu and the county of Pohjois Pohjanmaa) in northern Finland and the Luleå region (the city of Luleå and the county of Norrbotten) in northern Sweden. By utilising different data sources, interviews with key actors in the two regions as well as statistical data and previous studies, the study identifies four main factors behind the notably more favourable development of the Oulu region. These factors relate to the two cities’ different positions in their national hierarchy of cities, different modes of co-operation between local and regional key actors, different roles as demanding customers played by the dominant companies in the regions, and structural differences regarding the role of emerging versus mature industries. Also factors with minor and often indirect importance for explaining occurring differences are identified in the article.

Introduction

Why some regions experience a more dynamic development than others is a familiar theme in several studies. Most often these studies have attempted to describe and analyse ‘success stories’ such as the Italian industrial districts (Piore & Sabel 1984, Porter 1990a, Brusco 1995), entrepreneurial districts such as Gnosjö/Anderstorp in Sweden, Badem-Wurtemberg in Germany or Mondragon in Spain (Johannisson 1994), or high-tech regions such as Silicon Valley and Route 128 (Saxenian 1985 and 1994). Considerably less salient are efforts to cross-case comparisons of successful and less successful regions (a notable exception is of course Putnam 1993). Our article aims at contributing to this specific scarcity of knowledge by comparing and analysing the development of two Nordic regions: the Oulu/Pohjois Pohjanmaan region in Finland and the Luleå/Norrbotten region in Sweden. First we give a brief description of the development in these two regions. Then we apply Porter’s ‘Diamond Model’ as a framework for analysing differences in the two regions’ development paths. This analysis finally forms the basis for our conclusions regarding factors and driving-forces behind the two regions’ different development paths.

Luleå and Oulu are both located by the Gulf of Bothnia in Northern Europe, Luleå at the west coast and Oulu at the east coast of the gulf. Both cities have their historical roots in Sweden's imperial era in the 17th century and the mercantilist economic policy dominating this period. Luleå was granted the privileges of being a city (i.e. a monopoly to manage trade and thereby serve as a node for the state's tax-collection) in 1605, and Oulu was granted a similar position in 1621. A more significant process of growth of these cities and their regions did however not start until later; in Oulu during the second half of the 18th century due to the city's importance as a trade centre for tar and wood-products, and in Luleå during late 19th century as a result of the growth of a saw-mill industry, rail transport and the out-shipment of iron ore. A more substantial growth did not however emerge in Luleå until the 1950's, when an ironworks was located in the city and firms in mechanical engineering emerged. In the Oulu region the growth during the post-war period emanated both from industries processing natural resources, from private and public services and from the establishment of the first domestic university outside the nation's capital in 1958. Oulu university was already from the start assigned an important role in the development of culture, business and industry in the whole of northern Finland, and today has five faculties and more than 11 000 students. In Luleå a University of Technology was established later (1971), with a marked orientation towards the need for research and future employees in the region's historically important, but now mature, industries. Luleå University of Technology has today two faculties and about 8 000 students.

During the 1970's both Luleå and Oulu regions, as well as other regions in the industrialised world, faced a structural transformation from large-scale production, often based on natural resources, to global competition and 'flexible specialisation' (Piore and Sabel 1984) based more on specific competencies and capabilities than on existing supplies of raw materials (Greenwood et al 1991). Location patterns and ways of co-operating and communicating across firms changed due to continuous development of information technology. New 'engines' or 'locomotives' for creating growth and development emerged, implicating new actors and new drivers for regional development. While the two regions historically share several similarities, they also represent cases where different development paths emerge in the two regions. This is illustrated by some simple demographic indicators.

**Table 1: Growth in population 1970-97
(thousand inhabitants and percent)**

	Population		Growth (%)	Population share in regional centre		Population share of total nation	
	1970	1997	1970-97	1970	1997	1970	1997
<i>Regions:</i>							
Oulu (FIN)	300	360	+ 20%			6.5%	7.0%
Luleå (SWE)	255	262	+ 3%			3.2%	3.0%
<i>Cities:</i>							
Oulu (FIN)	71	114	+ 60%	28%	32%		
Luleå (SWE)	59	71	+ 21%	23%	28%		

Source: Official statistics from Statistics Finland and SCB, Sweden.

Table 1 reveals that the city of Oulu as well as the Oulu region have experienced a more positive population growth when compared to its 'sister city/region' at the other side of the gulf. In a ranking of 43 Swedish and Finnish regions by population growth rate the Oulu region

is ranked as No. 6, while Luleå region (Norrbotten) is ranked 26. While the region's share of its total national population somewhat increased in Finland we note a minor decrease in Sweden. Both regional centres during 1970-97 increased their portion of the total regional population.

Turning to the labour market of the regions reveals the following data (total employment and some selected sectors):

Table 2: Employment 1996 and employment change 1987-1996:

	Oulu region		Luleå region		City of Oulu		City of Luleå	
	1996 (1000)	1987-96 (%)	1996 (1000)	1987-96 (%)	1996 (1000)	1987-96 (%)	1996 (1000)	1987-96 (%)
Total. Employ.	125.5	- 12	108.4	- 14	42.7	- 7	33.8	- 12
<i>Selected sectors:</i>								
Manuf. industry	25.9	- 9	18.1	- 20	8.4	+ 2	5.9	- 20
<i>Of which high-tech industry</i>	8.1	+ 77	0.7	- 9	4.2	+107	0.2	- 28
Banking, insurance and other firm-related services	10.6	- 2	9.4	+33	4.7	- 10	3.7	+14
Public sector	35.7	- 4	43.1	+ 8	14.4	- 6	11.4	+12

Source: Official statistics from Statistics Finland and SCB, Sweden.

While Table 2 depicts a decline in the number of total workforce in both regions, interesting differences appear regarding the development of different sectors. Manufacturing industry has declined in both Oulu and Luleå region, but while the decrease in employment in manufacturing is 20% between 1987 and 1996 in Luleå, the corresponding decrease in the Oulu region is only 9%. In the city of Oulu we even note a minor increase (+2%). The table also notes the main source of these differences: the different development patterns referring to high-tech industries. While the significant high-tech industry in the region and in the city of Oulu increased employment by 77 and 107 percentage respectively, the very marginal high-tech industry in Luleå decreased. Instead Luleå and its region reveals a more positive development of employment in the public sector and in services such as banking and insurance.

The statistics presented so far have demonstrated that the two studied cities/regions, starting out from similar conditions at each side of the coast of the Gulf of Bothnia, have developed quite differently. One significant difference between the regions is that high-tech industry seems to have developed in opposite directions. While high-tech firms in the Oulu region almost doubled employment from 4 590 to 8 141 between 1987 and 1996, an already marginal high-tech employment in Luleå region decreased to 700 employees in 1996.

The questions emerging from the differences indicated above are (a) which factors contribute to explaining the differences revealed, and (b) how different factors may be understood to be inter-related. In order to address these questions we need a framework for identifying relevant factors and their inter-relations.

Theoretical framework

When Michael Porter in 1990 presented his well-known ‘Diamond’ for analysing national competitiveness he provided us with a tool suitable for the purpose of this article. As Simmie (1997) argues, this framework may be applied “not just to whole nation-states but also to smaller political entities within them” (p. 20). Porter’s Diamond Model will therefore serve as a point of departure in our search for relevant factors contributing to a better understanding of factors and inter-relations referring to regional competitiveness and dynamics.

Porter identified four broad attributes that individually and as a system form the basis for competitiveness of a nation (or, as the case is in this article, of a region):

- Factor conditions, such as skilled labour and infrastructure,
- Demand conditions such as the character of home demand, where sophisticated and demanding buyers and an early market demand serve as driving-forces for shaping competitiveness in market-driven firms,
- The presence of related and supporting industries that are internationally competitive, and
- Firm strategy, structure and rivalry among domestic (regional) competitors.

Each attribute by itself has an impact on the competitiveness of a region, but is also dependent on other elements. In addition to the four basic attributes of national and regional competitiveness Porter then added the role of government and government policy, but also recognised the relevance of ‘chance’ or pure luck.

Johannisson (1994) especially underlined the importance of spatial closeness of firms in similar or related business sectors, of the ability to combine co-operation *and* competition in the ‘local milieu’ (Camagni 1991), and of a local/regional culture supportive of entrepreneurship and innovation based on, e.g., technological renewal. Johannisson moreover identified personal networks as an entrepreneur’s “strategically most important resource” (1990; p. 41), facilitating ‘a glocal strategy’ where targeting international markets and utilising globally available and relevant knowledge is combined with a strategy where ‘business dynamics is linked not to single businesses but to a local or regional system of enterprising’ (1994; our translation).

We will utilise Porter’s Diamond Model as the overall framework for this article and endeavour to apply it on the two regions. This framework, combined with other research contributions relevant to our research problem, constitutes a base for formulating a number of different tentative propositions that will be analysed and discussed separately. Before presenting this specific section of the article, we will however present some necessary basic information on the methodology of the present investigation.

Method

To determine factors behind regional growth is an intricate task, especially if research has the ambition to establish causal relations. This article has a more humble ambition. Instead of trying to establish causal relationships, we aim at identifying some critical factors behind regional dynamics and growth, building on the fact that we here study two regions with similar (but not identical) geographical locations and a similar (but not identical) history, but reveal a different path of development regarding the transformation and reconstruction of the regions’ employment, business and trade. Porter’s Diamond Model, together with other research results, constitutes an important point of departure for generating propositions to how the differences between the two studied regions may be understood. Our methodological approach is however more abductive than purely deductive, since these propositions are based not only on our theoretical framework but also emanates from cocksure statements from people around us regarding why paths of development differ when planning and designing this study.

Our data collection has addressed three different data sources:

1. Statistical data and other secondary data from national statistical authorities, regional governments, local communities and other sources.
2. Previous studies of the two regions, especially national studies and comparisons (e.g. Havusela 1996, Erkkilä 1997, or Ahokangas & Räsänen 1998, Davidsson P et al 1994) or studies containing comparisons of regions in the Nordic countries (e.g. 'Nordisk Industrifond' 1997).
3. Qualitative interviews with key actors in both regions possessing knowledge and experience in relevant fields.

When conducting the qualitative interviews in Sweden and Finland we used a combination of open-ended questions and semi-structured questions. A few key respondents representing local businesses, regional and local authorities, as well as researchers in different fields in the two countries were first identified. We then used the initial interviews with these key respondents also to identify other relevant respondents to interview (cf. Whyte 1943/1984). In total we interviewed 14 key actors from both regions, but we also (as a result of the snowballing technique we used) had shorter interviews with further 20 respondents in order to control the information we received, get another perspective on a specific phenomenon, etc. The concerned tentative understanding was then presented on a seminar ('Economic Perspectives for North Sweden during 2000-2006' in February 1998) where 40 experts and representatives comprising of different EU, national, regional and local authorities, representatives of business and trade, business consultants as well as researchers from different fields, participated. Our tentative understanding was moreover presented on a seminar with research colleagues at our own university. Both these seminars served the purpose of validating our tentative findings, and resulted both in complementing information as well as providing methodological suggestions which we have considered when developing the final study.

Results

The propositions we found relevant for understanding why the Luleå and Oulu regions have developed differently are, together with a resume of our findings, presented below.

Factor conditions:

P1: Oulu and the Oulu region has a significantly more important role than Luleå and the Luleå region in its national context.

Oulu is the natural regional capital of Northern Finland and Finland's fourth largest city. Its location is favourable since it is located far from competing national and regional centres, but at the same time much closer to the main Finnish population agglomeration than Luleå is to the Swedish. It was moreover during our interviews in Finland pointed out that "when people in our capital want to see the rest of the country, they turn North. When people in your capital in Sweden want to face the majority of Swedes, they turn South". These geographical differences are then combined with demographic differences between the two regions. While the Oulu region together with the northern-most county in Finland (Lapin lääni) represent 15% of the total population in Finland, the two northernmost counties in Sweden represent a mere 6% of the total population. Luleå is with its 70 000 inhabitants furthermore far from being the natural 'capital' of northern Sweden. Instead the city competes with 7-8 similar cities located along a coast-line of about 750 kilometres in northern Sweden.

Obviously there are significant differences in this respect between Luleå and Oulu, indicating that a direct comparison between the cities and its regions is not quite fair. Oulu has a more

central location in its national context and plays a more significant role in the domestic hierarchy of cities and regions than Luleå does.

P2: The role of the university is more significant in Oulu than in Luleå

Statistical data proves that the educational level in both Luleå and Oulu regions has increased dramatically. The share of employees holding only compulsory school education has e.g. halved in the Oulu region 1987-96 and more than halved in the Luleå region during the same period. At the same time the share of the work-force holding university degrees has increased by more than 30%. This is evidently a consequence of ongoing changes in production structures but also reflects the effects of when elderly and often less educated persons leave the labour force and are replaced by younger and more well-educated work-force. To some extent this of course also reflects the effects of a university in the region (cf. Lundgren 1996), which motivates us to have a closer look at the distribution of university-trained staff within different sectors in the two regions (Table 3).

Table 3: Distribution of employees with university degrees on different sectors

	Oulu region	Luleå region	City of Oulu	City of Luleå
Industry	19%	8%	20%	9%
<i>Of which in high-tech</i>	10%	<1%	12%	1%
Firm-related services	10%	9%	11%	14%
Public sector	59%	72%	60%	65%
Other sectors	12%	11%	9%	12%

Source: Official statistics from Statistics Finland and SCB, Sweden.

Table 3 notes a remarkable differences between the two regions, where every fifth Finnish person with a university degree is employed in the industry sector compared to only every tenth on the Swedish side of the Gulf of Bothnia. Similar to the employment data presented earlier, this to a large extent emanates from Oulu's significant high-tech sector and the exceptional growth this sector has demonstrated during recent years. Out of the 4,000 employed in the high-tech sector of the city of Oulu in 1996 almost 40 percent had a university degree.

One of the most important missions for universities is to produce a skilled labour-force for the different sectors of society. Assuming that the data depicted in Table 3 mainly refers to labour-force trained by each regions' own university (which, of course, is a simplification), we may conclude that Oulu university has been more succesful in producing a labour-force for the industry in its region, and especially for high-tech firms. This contrasts to the situation in Northern Sweden, where the industry's share of univeristy-trained labour-force amounts to only half of the level achieved in Oulu. With these more general observations we now turn to other aspects of the role of the university in each region.

The University of Oulu was founded in 1958, while the university in Luleå was established more then ten years later, in 1971. The university in Oulu is moreover an almost fully developed university (the second largest in Finland with five faculties, 11,000 students and 2,600 staff). The university in Luleå is primarily a technical university, incorporating a faculty of philosophy (from 1997), 8,000 students and 1,000 staff. Our interviews with key persons in Finland strongly confirmed the important role of Oulu university, but they hardly ever referred

to the university as a whole, or to the fact that Oulu university is a complete university. Instead our respondents underlined the importance of a very limited number of key departments and professors and other scientists at these departments. More specifically, the importance of Oulu University was perceived to be related to its expertise in emerging industries/technologies such as electronics, software and biotech. Comparing this to Luleå, we find that its specific competencies to a large extent has been oriented towards traditional and mature branches of industry, such as mining, building and construction, and mechanical engineering. Our conclusion, then, is that it is rather the different orientations regarding branches of industry than the two universities age or range of faculties represented, which make a difference.

Representatives of the universities in Oulu and Luleå both pointed to their fruitful co-operation with trade and industry. In Luleå, this co-operation to a large extent was oriented towards larger manufacturers or infrastructure corporations, and only to a limited degree involved smaller firms (INNO 1995). In Oulu, the co-operation was not mainly aimed towards larger, already established companies such as NOKIA. Instead smaller and growth-oriented firms in electronics and software industries often represented significant co-operation partners for the university. A similar co-operation pattern was also found between the University's medical faculty and growth-oriented biotech firms.

Adding to the structural differences discussed above, we may therefore state that the university in Oulu (and especially its departments for electronics and software) have had, and still have, a more significant emphasis on expanding and preferably smaller firms in the region in contrast to the university in Luleå. This is, as we shall see later, an important difference.

P3: Co-operation between key actors is more developed in Oulu than in Luleå

A unanimous message from our interviews with different key-actors in Finland was that a mutual co-operation has been established in Oulu, involving persons from the local government, local trade and industry and the university. This co-operative spirit was by several respondents characterised as 'The Oulu Spirit', and manifested by many different networks serving as arenas for dialogue and co-operation: the local and regional chamber of commerce, different trade organisations, networks organised by local or regional government, religious networks (laestadianism), educational networks (organised by e.g. the electronics or software cluster of Oulu), or different social clubs. Some of these networks are also visible in Luleå and the Luleå region, but especially arenas where local industry and trade interact with local government have only been organised a few years ago and are far to infant to have had any impact on the region's development. Instead, we may regard the typical networking structure in this region as 'either-or networks', where membership in one structure (e.g. the political/trade union structure) is regarded with suspicion in the other structure (e.g. by organisations for trade and industry).

The two different local cultures emerging from our interviews became surprisingly obvious when we asked our respondents to identify persons who they themselves regarded as being important for the development of the region. In Oulu our respondents, regardless of which sector they represented, readily identified a limited number of key persons from local trade and industry, from the university and from local government. In Luleå, our respondents generally nominated only persons belonging to the respondents own sector, i.e., a respondent from local trade and industry identified one or several important businessmen, a respondent from local government often identified leading politicians, and representatives of the university identified e.g. former deans of the university or members of the national government.

This may be a consequence of the fact that no single political party dominates the political scene in Oulu. In the city council the conservative party, the social democrats and the farmers (centre) party are all concentrated around 20% of the voters in the last election, while the left-

wing socialists and a new green party gained 16 and 11 percent respectively. In order to reach political majorities, different parties have accordingly been fostered into co-operation to make decision-making possible. In Luleå, the political scene has traditionally been heavily dominated by the social democrats. This party has gathered more than 50% of the votes and hence been in the position to dictate the decision-making in different political contexts. The formation of political alliances has therefore been more devoted towards in-house discussions with for example trade unionists, than towards representatives of other political parties representing different social, entrepreneurial or industry groups. One may therefore suspect that the arena where the public discussion on regional development issues and problems take place, has become somewhat limited in Luleå and Luleå region since decades.

From these observations we might conclude that the civic culture, or the social capital to use the vocabulary from Putnam's famous investigation into consequences of the Italian regional reforms of the 1970s (Putnam 1993), seems to be stronger and more developed in the Finnish as compared to the Swedish region. As Nonaka & Konno (1998) so properly notes, interaction and learning between different actors requires places or arenas ("Ba's") where knowledge-creating processes may take place. We find these arenas to be more developed in the Finnish region, and an important factor behind the two regions' different paths of development.

P4: Venture capital supply is more favourable in Oulu than in Luleå

In this respect we have found no major differences between the regions. Certainly, 'the spirit of Oulu' is manifested also by venture capital organisations founded as joint ventures between public and private capital, but the number of organisations providing venture capital is impressive also in Sweden. In Sweden (and certainly not only in Northern Sweden) institutional venture capital is however dominant, and prosperous private individuals investing in new ventures are almost non-existent. In Oulu, such 'business angels' have now emerged on the venture capital market, looking for interesting investments. These business angels, normally prosperous due to the fact that they have sold out their successful firms to larger, often multinational corporations, invest not only money but also their competence in making new business concepts successful. It is notable that this phenomenon, emerging during recent years in Oulu, has no correspondence in northern Sweden. One may expect that a system where you risk your own money (instead of operating in a board of directors where you put government or institutional money at risk) fosters a more genuine interest to also transfer competence and know-how to a new business venture. Recognising that empirical evidence on this point is weak, we regard this as an interesting difference that should attract further attention. So far, however, differences referring to venture capital supply do not seem to be able to explain any significant part of the differences occurring between the two regions.

Demand conditions:

P5: NOKIA is more important as a demanding and sophisticated local customer to smaller firms in Finland than, e.g., SSAB or LKAB are in Sweden.

Our impressions after interviewing several key actors in the Oulu region is that the NOKIA Corporation has a very significant role in shaping an ever expanding electronics and software industry in the Oulu region by;

- acting as a sophisticated and demanding buyer
- transferring the state-of-the-art technology and international market influences to smaller subcontractors
- at least indirectly stimulating smaller firms to enter export markets. NOKIA with 95% export sales is here an important role model, but also subcontractors' own ambitions to

balance their dependencies of NOKIA by selling also to other customers is an important driving force.

In comparison to Luleå and the Luleå region, we find that e.g. SSAB and LKAB may well be very demanding customers to their subcontractors, but that similar examples of how smaller firms may be 'trained' and 'coached' by a larger customer to expand on new markets are very rare. While 'the jobbing workshop' subcontracted by the larger firm and depending on price-based competition is the standard model in the Swedish region, the relation in the electronics and software industries in Oulu may to a great extent be characterised as a master-apprentice relation encouraging and fostering development and growth.

Firm strategy, structure & rivalry:

P6: The Finnish management style and management practices are more favourable during times of rapid change and turbulence

Finnish management style is, compared to Sweden, more oriented towards alert decision-making, while Swedish management style is characterised by team-building and establishing decisions firmly in the own organisation (Malo T & Kokotti 1992, Laine-Sveiby 1991). These differences are considered to imply that Finnish corporations can act more resolute and quickly when market conditions change, while Swedish firms are tied up by negotiations and other forms of anchoring processes. These differences, supported by our interviews, do not however explain the differences between the two specific regions, since the Finnish management style is present also in other and less dynamic Finnish regions.

Another argument, also based more on national than on regional characteristics, builds on the fact that Sweden used to be a 'blissful island' of wealth and prosperity, while Finland has had to struggle to develop its economy from a less favourable position. The implication of this argument is that if you already live 'in the best of worlds', your motivation to improve your position is lower than if you compete internationally from an under-dog position. Similar to the proposition regarding management styles, this argument depicts potential national differences that should be visible also in less dynamic Finnish regions, and hence does not explain the regional differences occurring between Luleå and Oulu regions.

P7: Firms in the Oulu region have a more international orientation than firms in Northern Sweden have

Here our Finnish respondents often pointed out that Swedes are generally more European than the 'Slavish Finns', and due to their more European cultural background have lower barriers when learning English and operating in West-European contexts. To overcome such barriers, the City Council of Oulu in 1995 launched a specific programme supporting more international co-operation in business, research and education, culture, sports and other activities.

Dispite (or maybe due to) these disadvantages on the Finnish side, this proposition was supported by several interviews with key persons in Oulu, who claimed that "You're nothing if you are not able to go abroad". Looking into statistics also seem to support a stronger international orientation of companies in the Oulu region: NOKIA's significant export of 95% of its production is combined with the fact that the electronics and software cluster of smaller firms export around 30% of their production. On the other hand, larger firms in the Luleå region are also very dependent on export sales, while small and medium sized firms are not. We accordingly find that larger firms in both regions are very internationally oriented, but that smaller firms in the Oulu region are considerably more internationally oriented than in Luleå and Northern Sweden. This can however be referred more to the fact that the important electronics and software industries in the Oulu region operate in particular market niches

where internationalisation is both natural and a necessity, than to a more devoted international orientation among Fins or the region *per se*. This proposition was hence only partly supported.

P8: New venture creation is a more characteristic feature of the Oulu region than of the Luleå region

Recognising the emerging sector of smaller firms in Oulu, one would expect that start-ups of new firms is a more frequent phenomenon in Oulu than in the Luleå region. This is, however, not the case. According to recent research from Oulu university (Erkkilä 1997), new venture creation in the Oulu region is *lower* than in the rest of Finland and even lower than in the Luleå region. Not even in high-tech sectors of industry does the frequency of start-ups in Oulu amount to any more impressive numbers. Start-up of new firms in general does not seem to explain the differences occurring between the two regions, and the proposition was hence not supported.

Related and supporting industries:

P9: The Oulu region is characterised by clusters of firms in expanding or emerging industries, while Luleå and the Luleå region is characterised by mature branches of industry. The dominating clusters in Oulu are, to a higher degree than the branches of industry dominating the Luleå region, characterised by early home demand and early saturation.

The dominating cluster of firms in the Oulu region is the electronics and software cluster of firms consisting of

- NOKIA (5 500 employees)
- Electronics industry cluster (1000-1500 employees)
- Software industry cluster (500 employees)

After NOKIA established in the region (cables in 1960; electronics in 1975), the dynamics of the region was fertilised first by the establishment of new smaller firms in electronics, and later by a similar wave of establishments in software industry. An important generator of the present dynamics of the Oulu region is hence an expanding cluster of software firms increasing their demand for new engineers with about 20-30 percent every year. The expected generator of tomorrow's dynamics is the biotech sector; a sector that already today is represented by 40 smaller firms in the Medipolis Science Park. The new emerging industries creating continuously new 'competence blocks' (Eliasson 1997) of significant importance for the development of the Oulu region can thus be illustrated in the following way:

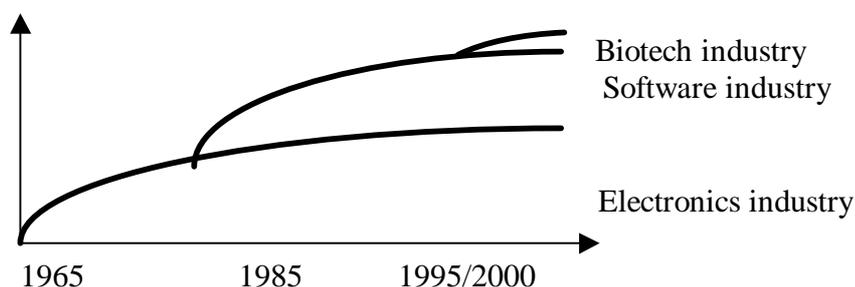


Fig 1: Emerging industries in the Oulu region

Comparing this to Luleå and the Luleå region, we find that development to a much higher degree here has been centred around the processing of natural resources. It is true that the software industry is considerable also in Luleå, but other industries based on emerging technologies have mainly been located to other regions. The electronics industry is accordingly found in other cities and local communities north and south of Luleå. The emerging biotech

industry in the north of Sweden is located in the university town Umeå, about 250 kilometres south of Luleå. This implies that the 'competence blocks' generating economic development in Luleå are more traditional, more oriented towards processing of natural resources and less likely to benefit from the dynamics the breakthrough of new technologies have created (and is expected to continue to create) in Oulu.

The message built into the product life cycle theory moreover implies that a higher degree of maturity of a line of industry in turn implies a higher degree of standardisation, a lower degree of innovation and more emphasis on cost reduction. Electronics and software industries are, as compared to more mature industries such as mining, steel, sawmills and pulp and article mills, generally characterised by a higher development pace. NOKIA, being the leading regional customer in electronics in Finland, has a reputation of being at the technological edge with several applications, and therefore also creates an early home demand. When new technological solutions replace older solutions, this also implies early saturation. According to Porter's Diamond Model, this is beneficial for developing competitiveness in a whole cluster of firms.

It should be recognised that the Oulu region and the north of Sweden has a similar history and traditionally has been dominated by the processing of different raw materials to steel, iron, article and pulp, as well as different wood products. Contrary to Luleå and northern Sweden, however, the Oulu region to a much more significant degree has managed to introduce and exploit also new emerging technologies. This requires an openness towards new industries and new technologies from both the business and the public sector. From this specific perspective, it was interesting to learn that two industrial giants in the Oulu region, operating in pulp & paper and steel, themselves at an early stage invested in the electronics industry. A large producer of pulp and paper thus already during the 60's established 'Kajaani Electronics', and actually triggered NOKIA to establish in Oulu. Also a corporation in steel-manufacturing (Rautarukki Oy) invested in different new electronics-based companies, mainly in machines and equipment for mechanical engineering and steel manufacturing. Thereby these established and important regional representatives of existing job and wealth creators also *legitimised* an interest for, and further investments in, a new emerging industry in the region. There are examples of other Finnish regions where the dominating industry has instead actively or passively opposed to the introduction of new lines of business, since this was expected to increase the local competition of skilled labour and force an increase in the salary levels in the region. These regions today experience a far less favourable development as compared to Oulu.

Comparing then to Luleå and northern Sweden we find no similar examples of how the dominating industries themselves have engaged in new industries outside their own area of competence. We have examples of state controlled investment companies, where revenues from iron ore mining together with government funding, should be used for investments in (preferably) new and other lines of businesses. Swedish Steel also invested in software support, mainly to secure access to the competence needed for maintenance and development of their own processes (Primdata Ltd). We moreover have examples of subsidiaries either upstream or downstream to the existing processes of the dominating companies, such as explosives for mining (Kimit Ltd), product applications related to minerals (Minelco Ltd), or metal sheets for building and construction (Plannja Ltd) and metal components for car industries (Plannja Hardtech Ltd).

While important and established 'wealth creators' in Oulu hence *themselves* invested and controlled their investments in new industries and new technologies, and thereby legitimised the emergence of new lines of industries, the established larger corporations in northern Sweden to a large extent *delegated* this to others. And while the dominating industries in Oulu

to a large extent invested *outside* their own area of competence and existing businesses, the pattern emerging in northern Sweden is that these investments were closely downstream or upstream *related* to already existing processes. Although good arguments for both diversification and core competence strategies can easily be found in the literature, we find the differences occurring between the two regions interesting and thought-provoking.

To conclude, we find this proposition highly significant for understanding why development paths of the two regions differ.

P10: The role of the science park is more significant in Oulu than in Luleå

The Technopolis of Oulu was established as the first technology park in the Nordic countries in 1982. Together with the associated Medipolis, established in 1990 and addressing the biotech field, Technopolis represents a success story in Finland. With around 250 firms located to the two technology parks, and with subsidiaries now being set up in nearby communities, the firms in the technology parks employ around 2000 persons and are expected to continue to grow. In this respect, the science parks of Oulu are more comparable to the largest and most successful science park in Sweden Ideon in Lund, than to the technology park Aurorum in Luleå. The science parks in Oulu do not *per se* seem to be able to explain any major part of the differences occurring between the two studied regions. Instead the science parks, emerging as a result of the role of the University (P2), NOKIA's and other larger corporations' role (P9), and the 'co-operative spirit' between key actors (P3), fits into a pattern important for understanding the differences occurring between the two regions.

P11: There is a more favourable second-hand market for buildings, production equipment etc. in Oulu than in Luleå.

This proposition, suggested by Johannisson (1994) and prominent also in Porter's (1980) concept of entry barriers, was not supported when comparing the two regions. In fact, the situation regarding available buildings and other premises can be regarded to be more favourable in Luleå than in the dynamic Oulu. This proposition seems therefore unable to explain the differences occurring between the two regions.

Government policy:

P12: Oulu and northern Finland is politically more important than Luleå and northern Sweden is

Referring to the fact that the two northernmost regions in Finland represent 15% of the total population in Finland, while the two corresponding regions in Sweden only represent 6% of the population, indicates differences regarding political power. Recognising also that former and acting presidents of the Finnish republic have had strong links to northern Finland indicates that northern Finland has a more significant role in the political geography when compared to northern Sweden.

Our interviews with key persons in Oulu did however not support this proposition. Instead it was striking how self-reliance and 'the spirit of Oulu', involving a belief in the region's own competitiveness, dominated over a dependency of central decision-makers. Despite its lower political voting power, this dependency seemed to be more apparent in northern Sweden. In Oulu we were confronted with regional vision-making, where the role of national political and funding bodies were reduced to financial joint-venture partners, if any. The proposition was hence not supported.

Chance:

P13: The development of the Oulu region is a good example of when ideas, persons and timing agree

The importance of suitable ideas meeting the right persons at the most suitable time should not be neglected. This was frequently pointed out to us during our interviews in Oulu as one important explanation behind the dynamics of the region. “We jumped on the electronics train at the right moment”, or “we were lucky to recruit NN as the new professor of the electronics department”, or “NOKIA’s establishment in Oulu is a major explanation behind the growth of new industries in the region” all express this understanding. And obviously success often generates more success in a virtuous spiral, while failures are often followed by more failures in an opposite process.

Recognising the importance of such processes it would however be naive to identify pure luck as any major force behind the regional differences we have in focus in this study. Instead we would like to propose the understanding that ‘luck is when opportunity meets preparation’. In this respect the Oulu region seems to have been extremely sensitive in capturing the early indications of emerging technologies and industries, and by investing in research, training and infrastructure facilitating a positive development of these new opportunities. Training programmes directed towards the electronics industry and (today) software industry, investments in order to facilitate the development of a new biotech industry in the region, or a city council programme to facilitate a higher degree of internationalisation are all illustrative examples of this sensitivity. Overall, we hence find no support for the understanding that chance would play any major role in explaining the differences occurring between the two studied regions.

The main findings of our study into the regional dynamics of the Oulu and Luleå regions are summarised and presented in Table 4 below. Out of 13 propositions related to the Porter framework, four was found to be highly significant, five insignificant and four having limited and/or indirect importance (further empirical underpinning is found in Lundgren & Ylinenpää 1998).

Table 4: Summary of findings

Circumstances related to:

Finding/Conclusion

Factor conditions

P1: The role of the region in its national context	Significant
P2: The role of the university	Some significance
P3: Co-operation between key actors	Significant
P4: Venture capital supply	Not significant

Demand conditions

P5: The role of larger, demanding and sophisticated customers	Significant
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Firm strategy, structure and rivalry

P6: Management style and management practices	Some significance
P7: International orientation	Some significance
P8: New venture creation	Not significant

Related and supporting industries

P9: Clusters of firms in emerging vs. mature industries	Significant
P10: The role of the science park	Some significance
P11: Second-hand market for buildings, production equipment etc.	Not significant

Government policy

P12: Political importance of the region	Not significant
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Chance

P13: Chance or pure luck	Not significant
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Some final reflections

This article focus on two specific regions. Our study however also addresses possibilities and limitations for local and regional development on a more general level. There are for example only limited scope for a region to influence its position in a national hierarchy of regions, at least on a short-term basis. On the other hand, a region may develop a co-operative spirit among key-actors which facilitates front-edge initiatives supporting a favourable development of the region. Oulu is in this respect an interesting illustration of how initiatives such as the city's science parks, the university's research in emerging technologies, or a local programme supporting internationalisation may serve as functional vehicles supporting the region's transition from mature to emerging industries.

The exploitation of such opportunities derives from a local or regional 'social capital' which to a very limited degree stems from administrative or political decision-making. Taking our two studied regions as examples, Luleå exposes a more impressive list of different projects, organisations and other initiatives created with the specific purpose of fostering and supporting cross-sector co-operation than Oulu. These arenas do not *per se* manifest an existing co-operative culture. As demonstrated by several previous studies of industrial districts, entrepreneurial districts, or high-tech regions, the administrative packaging of forums for exchange and co-operation is not the main issue (cf. Nonaka & Konno 1998, Johannisson 1994, Saxenian 1985, or Piore & Sabel 1984). What is important, however, is the existence of a culture where the value of different resources and competencies is recognised and respected, and in a purposeful way used as a base for creating win-win solutions for the parties involved.

As Johannisson (1994) points out and the Porter Diamond further underlines, such cultures may involve both co-operation and rivalry between actors. In Oulu, the 'soft-ware cluster' represents both a phenomenon and a formal organisation formed by the regions' firms in softare industry, the university, and local government. The cluster accordingly mainifests the existence of competing firms in the same sector of industry, but also the existence of

organisational co-operation for vocational training or joint marketing efforts initiated by smaller soft-ware firms in the region. Far more important than its administrative form, the Oulu soft-ware cluster hence manifests the existence of a favourable local culture or a functional 'social capital' (Pyke *et al* 1990).

From our investigation into regional dynamics the Swedish case seems to exhibit an obvious 'inability to transform' its economy from bulk goods competing on price to specialised products competing on quality, uniqueness or other qualities which enable temporary monopoly rents. On the regional level Luleå illustrates, with almost perfect clarity, Porter's general conclusion for Sweden on the national level: 'The Swedish economy is caught in a kind of a trap..... The process of innovation is slow and restricted to a relatively narrow range of fields - Swedish firms rarely succeed in industries with short product life cycles' (Porter 1990b, p. 700). In a recent article (Edquist & McKelvey 1998) Sweden has been pointed out as a paradox having the worlds highest R&D intensity related to value added, but very few high tech products. In fact Sweden has become increasingly de-specialised in production of R&D-intensive products since 1970. The reason why this situation has come about includes, of course, both firm-specific and national contextual factors. Sweden's production structure is heavily dominated by large firms, who stick close to existing products when innovating and producing. Small Swedish firms have usually not been able to exploit R&D-intensive products and grow into larger firms similar to what has happened in the US. Nor have large firms diversified as in Japan (Edquist & McKelvey p. 140).

In sharp contrast to this Swedish and Luleå situation Oulu exhibits large diversifying companies, at least in the 1960s and 1970s, along with fast growing small high-tech firms in the 1980s and 1990s. It takes us too far to try to address why these differences in strategies have emerged and why different political and institutional settings have come about on the regional and national levels. But it is obvious, as Porter points out in his 'agenda for Sweden', that deeply rooted Swedish values such as income distribution, egalitarianism and a continued significant state role, at least partly run counter to changes needed to develop an innovation-driven economy (Porter 1990b, pp. 704-705).

An important question, touched upon above, is whether it is possible to influence societal change to any considerable degree by political or other forms of deliberate action. From for instance the economic historian Douglas North's research into the processes of institutional change we know that seemingly small initial differences caused by divergent formal or informal 'rules of the game' at one stage, due to the strength of path dependencies, later on will result in major variances in the performance of the economy (North 1990 and Denzau & North 1994). A challenging question, then, is if it is possible to identify these 'small differences' otherwise than in retrospect. The history of the regional economic changes in Oulu and Luleå provides an illustration of how small initial divergence's in the 1950s and 1960s have led to major differences in the performance of the regions three decades later.

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