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Business services and industrial innovation in small scale business environments

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Abstract

The recent decades have witnessed a marked turn towards agglomeration thinking in economics and geography. The formation of New Marshallian industrial districts has not only emerged as an explanation model of Post Fordistic production spaces, but also come to serve as a normative model for how regions can progress in creation of value and employment. Porter's ideas of clusters of industries have won acceptance among consultants, policy makers and public industrial developers.

This thinking is clearly urban in bias. The traditional types of agglomeration advantages were mainly to be found in cities, where firms nearly automatically could obtain external benefits from co-location. To be true, within New Marshallian districts we talk of specific agglomeration advantages, linked to a particular trade or value chain. But also in this context there are benefits linked to size and complexity of the industrial environment as a whole, which presupposes an urban lead.

A reinforcement of the urban development bias also follows from the fact that the agglomeration thinking not only is linked to transaction advantages between enterprises in close proximity. The new approach to the issue implies a stronger focus on creation and application of knowledge. Process and product innovations, whether these are secondary or tertiary in character, will far more than earlier depend on supply of knowledge and competence. There are forms of tacit learning contributing to improvement in products and processes. This applies probably mainly to incremental innovations through learning by doing. More radical innovations will usually apply formalised and codified knowledge. This capability may be developed within the firm. In line with restructuring during recent decades it will more probably be provided in a market or by institutions compensating for market failure.

In this process producer services play an increasing role. Such firms can through rather routinised functions contribute to innovations in client enterprises. This includes assistance in elementary forms of accounting, law, ICT, architecture etc. Client firms can thus be updated. Service providers can simultaneously accumulate tacit knowledge from their client portfolio. This may later be transferred to client firms, often through "packages of services" both as codified and transferable tacit learning. In this way, producer services perform a key function in agglomerations.

Other more research oriented producer services may perform a more tailored assistance to the client firms, explicitly contributing to innovations. These may be product and process innovations, but also radical changes in organisation, marketing, firm strategies etc. It goes without saying that advanced services like these require a certain customer base. This is again most readily found in cities or sizable production environments. Also proximity to universities, research institutes and technology parks is often advantageous. Such institutions are considered by Porter as necessary auxiliary functions in a successful cluster.

Research performed up to now on successful competitive milieus, agglomerations and clusters has mainly concerned large-scale cases. In turn, the results from these have formed

basis of models, which have later been transferred to smaller towns and production sites without any documentation of transfer requirement.

Norway has a small population, weak urban centres and still a substantial rural population. Simultaneously, the country has pursued a radical regional policy, aiming at instigating economic growth and consolidation of population in sparsely populated and weakly urbanised areas. The idea of industrial districts has undoubtedly been an inspiration for policy makers during the last decade.

As a scientific documentation of this type of regional policy we have in a research project gone to the other extreme of the conventional research tradition by examining towns and industrial milieus on the margin of expected external effects between enterprises (The project is funded by the program *Regional Development* in the Norwegian Research Council). The objective of the project has been to throw light on small-scale localities to find out whether the form of growth mechanisms found in cities also exists at the other end of the scale. It has not been the goal to verify or refute the existence of such mechanisms, neither to define a lower limit of agglomerations. From the outset we have been open to the possibility that any agglomeration of firms is able to create positive external effects. Likewise, we have presumed that learning processes will take place in any business environment, leading to some accumulation of knowledge. The expertise may be embedded in specialised producer services or public institutions, notably in the educational field.

Our data build on case studies and cases are drawn from towns, small even in a Norwegian context, (+/- 10 000 inhabitants). In the further analysis the hypotheses will be tested in even more rural cases to find out whether cluster formations and service suppliers offering advanced and tailored services emerge within rural tourism areas. In the present paper I will present two cases from Middle Norway (The towns of Namsos and Stjørdal).

Our methodology takes its point of departure in the presumption that regional production systems are unique and that in each place there are specific linkages between the enterprises and between enterprises and region. The paper gives a statistical analysis and an interpretation of the development of the regions in line with current regional economic thinking. Apart from this we penetrate openly without specific presumptions into the case study areas. In each region in depth interviews are made with four groups: Representatives of producer services, of manufacturing industry, potential production milieus in services and public bodies.

The results so far point in the direction of differences between the two cases; the most differentiated place can be considered an emergent cluster economy where producer services play an important role.

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1. Introduction — the aims of our project

Grand theories in a small country

Norway is a very small country, highly dependent upon its surroundings. However, although we decided not to apply for EU membership, we are a very open economy and society. Our economy is strongly specialised and export oriented, and has been so for hundreds of years. Accordingly, we import most of what we need of manufacturing products.

Analogously, in the intellectual field we are highly dependent on import of theories and models, even so in the field of regional development. Certainly, we have our own traditions, but in general most of our theories about regional development builds on common international ideas. This is of course a good thing: A small country like Norway can never expect to be self reliant about material goods or intellectual ideas. However, there is an inherent tendency in this transfer of ideas from the big world to little Norway to neglect the scale order and other specific, contextual conditions within which these models have been developed. Thereby the transfer in itself might be invalid.

What is specific about the Norwegian context is a small population, dispersed over a very large area. Spatially speaking, the only thing that is big in this country is distance, while settlements and economic concentrations are small (figure 1). However, the outstretched geography has produced a lot of regional differences not only in terms of economy, but also in culture and institutions. There is a North-South divide, where Northern Norway and the capital region are the opposites in our centre-periphery dichotomy. However, our leading «metropolis» Oslo contains no more than from 0,5 to 1 million inhabitants, depending on how we define the region. The other great divide is between East and West, where West today represents our internationally oriented economic history with shipping, fishing, aqua culture, metal industries, oil production and advanced technological industries. East is symbolised by Oslo, government, media, cultural institutions and producer services – and the traditional agricultural sector, whose conditions are best east of the mountain chain, where the landscape is protected from excessive rainy weather from the west. In the cross section between E and W, N and S we find the region of Trøndelag which is often labelled Mid-Norway, not only in geographical meaning, but also as an *average* region in the Norwegian socio-economic context.

A theoretical and practical perspective

The main economic geographical theory explaining differences in localisation and development in modern, knowledge intensive capitalism is *agglomeration theory*. Geographers never managed so sell this theory to a wider audience, but it was understood as an underlying theory, able to explain urbanisation in general and more specific concentration of economic activities in particular. Practical models like *industrial estates* and *growth centres* also used agglomeration theory as a legitimation. During the 1980s, the ideas about *industrial districts*

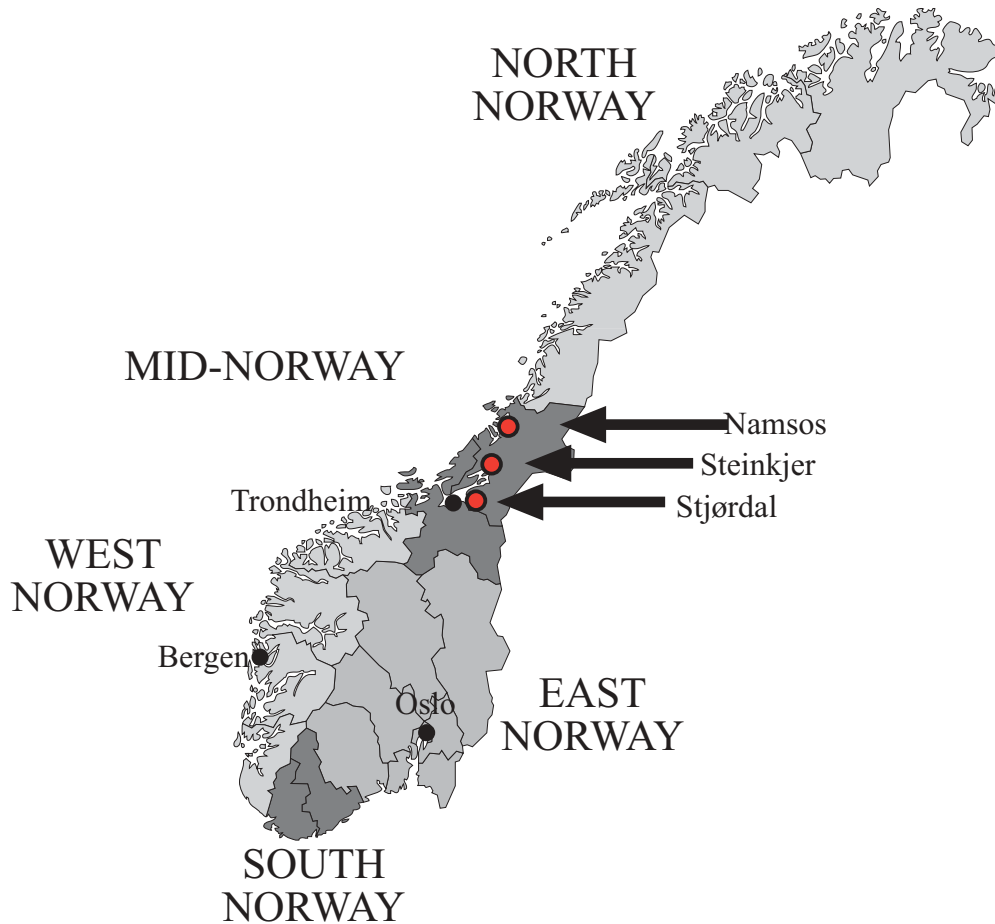


Figure 1. Norway, major regions and case studies.

and *flexible specialisation* gave new strength to agglomeration thinking, but still in a rather narrow group in the academy. The literature embraced several successful case studies from Italy and California, UK and France, kindling hope of a brave new *regional* world. The intellectual core of the discourse still mainly stayed within the small group of economic geographers, however.

The new era of agglomeration theory came in the 1990s when economists like Paul Krugman and especially Michael Porter incorporated it in their understanding, the first as an academic analyst, the second as a practical strategist. Porter made the concept of clusters far more widespread and applied than geographers ever managed with their agglomeration theory. Several «Porter studies» were made, internationally and in Norway, and even regions have used this concept in their search for enhanced growth. While agglomeration was a concept for insiders, *clusters* has become an everyday word for economic and regional policy, and economic developers in the state or regional apparatus, do not hesitate to use the term.

From these general considerations, we can make a more precise delimitation of the aims of our project:

Our first aim is to examine the area of validity of agglomeration theory. There is no doubt about its meaning and relevance in large urban centres and big industrial complexes, and we do not wish to contest its general value. However, we have good reasons to ask if the elements and relationships described in agglomeration theory are also to be found on lower regional levels, for instance in smaller towns at the bottom of the urban hierarchy? Could small and medium-sized industrial towns develop clusters within certain industries? These questions refer to what normally is called localisation effects, in contrast to urbanisation effects. It is widely accepted that the typical Norwegian one company town lacks the ability to create an industrial environment, including advanced producer services, but it would be of great interest to find out if smaller towns with several manufacturing firms exhibit some of the characteristics of an agglomeration. That is why two of our three cases are small town regions with a different mixture of old and new manufacturing industries.

Secondly, this gives us the opportunity to develop a more precise understanding of the role of service industries in growth processes. One aspect is of course the formation of service based clusters, replacing the old fixation on manufacturing industries — a possibility we as service researchers take for granted. Our intention is therefore to put focus on a more specific aspect of the role of the service sector, namely the advanced producer services (APS). We define this service group as services with a certain knowledge and competence intensity, distinguished from the material producer services as transport, logistics etc.

Traditional agglomeration theory had no special place for producer services, because external effects mainly emerged from formal linkages between manufacturing firms, normally supplier structures. Today the main focus is on the development and accumulation of knowledge, and in this process APS play an important part. Our aim is accordingly to define and identify the role of APS in developing and diffusing knowledge and competence to other industries. In this function APS might be a part of industrial clusters, either of the urban (general) or the localisation (more specific) type. It is the latter we expect to find in small towns or rural regions.

Thirdly, the aim of our project is to examine the role of political institutions in building an agglomeration or more specific knowledge base of such an agglomeration. Traditional agglomeration theory had no room for such a role, operating well within neoclassical theory where development of market relations between atomised actors gives sufficient explanation. However, traditional neoclassical theory generally failed to explain satisfactorily growth and development processes, in strong contrast to evolutionary theory, where innovation, entrepreneurship, knowledge and technological progress are at the core of the theory.

An important question in the present debate on an endogenous growth theory is the role and function of social and political institutions. Newer agglomeration theories, putting weight on knowledge creation, stress the importance of institutional endowment, both in its formal and informal meaning. In his famous diamond Porter underlines the importance of

both arbitrary incidents, conscious planning and political interventions. The question is then to try to identify these political initiatives and to evaluate their role in the local or regional development process. Is the institutionalisation of different development bodies like development planning necessary to create growth locally, or is it merely wishful thinking by politicians? To throw light on this question is not only of academic interest, but could also help us to distinguish between agglomeration as a descriptive or explanatory theory only, or as a model for regional development.

Our fourth aim is also practical in its implication: If the development of the region is not endogenous, it is probably governed or managed from outside. The intuitive understanding is of course that every region is created as a mixture of endogenous and exogenous forces. The question is relevant both in the public and private field. Political institutions outside the region might be more important than local institutions. In lack of local suppliers of producer services, external suppliers will cover the local market. Finally, the concept of clusters might be questioned in its internal-external dimension. One possibility is of course that central firms in the cluster are branch plants in a multiregional concern, managed from the outside, and getting all its service supplies from central offices. Another possibility is that the cluster in itself is not local or regional, but national in character — or perhaps we will find industrial configurations combining different patterns.

Summarised, our project aims at identifying agglomeration outside the large city regions and to identify the role of advanced producer services, especially in accumulating and distributing knowledge. Particularly important is to uncover the role of agglomeration and APS in innovation processes in the region. The question is then: How is it possible to gain empirical knowledge about such aspects of regional development? Our answer so far is that there are diverse methods at hand. One method is to collect statistical data, describing the sectoral mix, the development within sectors, the input-output matrix (if available), the regional shifts and so on. A quite different method is to put together historical material, throwing light on the institutional development, as well as business histories. A third approach is to interview the central actors of the possible agglomerations. Even if our project has emanated from highly theoretical debates, it is our view that actors are able to identify the mechanisms of agglomeration and innovation and knowledge supplies through intensive interviews.

We had two reasons for choosing Mid-Norway as our study area. One is that the region represents a Norwegian average, and what we find here probably is relevant for most Norwegian small-scale towns. More precisely, we have chosen the urban field of North Trøndelag County as our research area, the three urban localities of Namsos, Steinkjer and Stjørdal. These three localities represent three levels in the urban hierarchy: Namsos is the smallest and most peripheral locality, as a matter of fact it is a truly rural centre, outside the urban field. Steinkjer is the regional centre of the county, while Stjørdal has developed into

some kind of suburban centre in a greater Trondheim region (which is outside our research area).

The second reason why we choose these cases was that this area was covered by another project studying the development of Trøndelag in general, and our project could both benefit from this project and contribute to a deeper understanding of essential processes in the larger region. Both projects were funded by the Regional Development programme under The Norwegian Research Council.

2. Conceptual and theoretical points of departure

We have found it convenient and relevant when approaching the problem briefly outlined by way of introduction, to illuminate it by as broad a theoretical framework and platform of explanation as possible. This means that we will seek to throw light on the issue from various angles and construct what we can call a multidimensional theoretical framework. However, it will be more a conceptual than a rigid theoretical construction. This is also in conformity with the nature of the issue, which needs a more eclectic approach, fit for an explorative study.

As we focus on production relations and production systems which are generally small in scale and scope and concomitantly on small urban places, we have found it necessary to concentrate on fairly unique structures both in terms of the roots these have in a long history and in the processes moulding the present socio-economic structure. Simultaneously, it is necessary to be open to more general, even ubiquitous patterns which are being developed, and of which any system in a modern economy is a part. This fact makes the analytic approach rather complicated.

Four groups of theories and conceptual systems can be mentioned:

2.1 Evolutionary theory, innovation theory

When describing the emergence and the further development of the system and its possible present interactive pattern and functioning, we have found it necessary to take our point of departure in an evolutionary perspective, if not in outright evolutionary economics. It means to be open to an economic-historical tradition of explanation. Such an attack on the problem is not unambiguous and uncontroversial, however. There are many models developed to this purpose, but little theory in the strict sense of the term. One possible approach, which is simultaneously economic-geographic in origin, is that of Massey (1984, 1994) in her theses of successive layers of investments and corresponding activities over time, some of these becoming obsolescent and gradually discontinued, others being reinforced in the course of time. This will make the places bear the marks of several forms of economic structures. The combination of different rounds of new forms of activity, often formed in a complex manner, also gives room for how the local economy has come to function in interaction with other spatial structures on different geographical scales. With this point of departure we may be

able to describe and eventually explain the roles being played by the local community within regional, national and global structures.

The moulding and functioning of the industrial environment and its specific interactive pattern have two main sources, although these sometimes will operate in concert. The instigation of development may on the one hand be endogenous, manifested through local entrepreneurship. This needs not only be embodied in individual psychological qualities, which, according to Sundboe (1998) has been an important theoretical tenet. *Groups* of entrepreneurs are common (Spilling 2000). Some are operating in front line of their speciality, clearly innovative in attitudes, tools and performance; others are more incremental in their pursuits. Rather than being “lone wolves”, entrepreneurs often are clearly embedded in particular social and economic environments. These rather complicated relationships will be elaborated on in later paragraphs.

Looming particularly large in the theoretical point of departure of this paper is the institutional viewpoint: institutions as a force in impacting upon both existing structures and innovations. Institutions, both formal and informal, with the function of drawing up the rules of the game through their norms and values, may both promote and hamper development of the *existing* structure and have a profound impact upon *new* entrepreneurial activities and their success or failure in new sectors. This pattern of moulding development may vary from situation to situation. A civil spirit of dynamism may prevail in one locality and be conducive to industrial innovation and growth, whereas in another the same spirit because of institutional ideosyncracies may be considered threatening to cherished values, and actively worked against.

Neither should we overlook the normative aspect in an economic geographic context like the one we are going to analyse. Notably, formal institutions on the municipal and regional level will, to a varying degree, operate by setting norms of development and thus directly affect spatial economic development. This is particularly the case in marginal regional situations.

Important as they are for throwing light on particular theoretical industrial configurations, the relations touched upon above must also be supplemented with more exogenously derived variables. In part this is true because of market relations, which necessarily transcend local boundaries both on the demand and the supply sides. But it is also valid partly for organisational reasons. Increasingly, it is a fact that even in small town situations industries are becoming part of a wider network. This is partly due to concern formation which operates with its tentacles deeper and deeper into small industrial environments. Thus, the industrial structure, also seen from the angle of the local community, is tending towards being incorporated into a greater system. Theoretically, therefore, perspectives from the central place theoretical legacy may be valid for getting a broader understanding of ongoing processes and formation of industrial structures. As a part of our multidimensional approach and for making up an extended frame of reference, these relations may in the first place be valuable

by showing what external possibilities and constraints exist for developing particular industrial systems and for promoting their functioning. In the second place, certain urban economic and locational economic elements are inherent in central place systems, acting as driving forces in location of new activities, particularly valid from an analytic viewpoint in smaller urban places.

2.2 Knowledge and learning

In a knowledge based economy, the core of the growth process — in an evolutionary perspective — is the ability to create knowledge or apply competence in old and new trades – and in public institutions. Knowledge is not like the other production factors, a fourth supplement to labour, capital and natural resources. The essence of knowledge is to improve all the other factors of production, and by increasing productivity making them competitive in a competing world.

Knowledge contributes to growth, but the *essence* is not to induce a quantitative change, but a qualitative one. Knowledge and competence building improves the ability to *innovate* in the economy, making the business competitive by producing smaller or larger novelties others lack. Of course, most of the innovation process is marked by small steps —*incremental* innovations. However, firms which lack the ability to take even small steps forward are soon passed by competitors. And the firms which succeed in making *large* steps forward, fundamental or *radical* innovations, will for a long time have a leading position compared to competitors. Even if gross regional product, net migration and job creation are good measures of regional growth or success, the fundamental phenomenon is innovation. A regional study trying to evaluate a region's growth potential should accordingly look for the ability to innovate.

The ability to innovate is closely connected to the level of knowledge and competence. However, this must not be understood as *formal* knowledge only, emanating from research-and development institutions (R&D), or learned from academic institutions, Universities and higher education (U&H). This is what is called *codified* knowledge. The other source of knowledge is practical life itself, competencies developed from work and social interaction. It is learning by doing, which also might be called improving by doing. This is the *tacit* or *informal* knowledge.

From a geographical point of view, there is a lot of confusion about what makes a region (or nation) competitive in the knowledge economy. Some believe that globalisation means that knowledge will be spread throughout the world in the form of information. The conveyor is ICT. Accordingly, a lagging region must bridge the ICT gap, and by doing so it will keep up with more central regions. The prospect of levelling out unevenness between centre and periphery by technology is of course a promising perspective — seen from the periphery.

Others are arguing for a polarising hypothesis, stressing the importance of heavy public or private institutions in building competence, especially the role of R&D and U&H. These institutions are parts of the agglomeration economy, leading to a very uneven development. This approach renders little hope for the periphery, except for those deciding to be linked to modern centres of knowledge by telecommuting.

Both arguments have a certain validity, but they also need a specification. The formal institutions of knowledge surely have a very concentrated localisation pattern, but formal knowledge is at the same time the kind of knowledge most easily spread and stored through ICT. R&D will probably not be evenly spread, but many of its products will be very effectively diffused by ICT. Information and codified knowledge have become what is called an «ubiquity». However, the continuous improvement and innovation in real life, in production processes and even in social interaction, will create unique competencies, very difficult to get access to through ICT or imitation. This type of knowledge is *embedded*.

Returning to our hypothesis about the dual character of regional processes, an external as well as an internal part is identified. The distinction also gives us a better understanding of why globalisation very easily is combined with its counterpart regionalisation. The deepest meaning of regionalisation is building competencies from below, giving new meaning to unique regions. However, no region can be developed in isolation. Transregional interaction is necessary in order to be informed of what is new. And of course there is a great learning potential in regional-global interaction.

In neoclassical theory labour primarily meant unskilled labour; at least formal knowledge was not expected to be found in the labour force in general. In the neoclassical growth theory knowledge rained like «manna from heaven» — it was a free exogenous resource, an ubiquity. In the endogenous revision of old theory, products from R&D are an integral parts of the growth process, but still outside the labour process itself. This is the traditional «linear» model: From science to research and development, commercialisation and production. Knowledge is a question of investing, and it will pay rents like other investments, if successful. Investments in science and technology may be collective and public, or private within firms or firm alliances, but in both cases we expect returns. The ability to invest in knowledge development in a region is undoubtedly an important endogenous capability. Lacking R&D and universities and colleges means that knowledge and competence must be imported.

A supplementary view is that all production processes have a potential of knowledge creation. All actions and routine operations often repeated, have a learning potential. The actor or operator will through observation and small adjustments improve the production process, sometimes also by radical innovations. *Learning* is an important internal factor in all productions systems.

2.3 Regional division of labour, agglomeration and clusters

The resources of regions may be described by their role in the regional division of labour. Essentially we have two forms of spatial division of labour.

Functional division of labour locates different stages in the production chain to different regions. At one end are regions specialising in extracting resources and labour intensive production; at the other end regions endowed with management and strategic planning, research, development and decision making. There is undoubtedly an hierarchical relation between extremes like these, and that is why this form of spatial division of labour is called spatial *hierarchical* division of labour. The typical rural participation in this spatial form is through branch plants of large concerns, with head offices located in the metropolitan areas. Most of the strategic development resources are provided from outside the region: Capital, formal knowledge, planning. The firms are developed from the outside — an exogenous form of development. A modern branch plant will in many cases be an excellent state of the art producer, but is also a strong contrast to the lagging region surrounding it. The vertical integration is an obstacle to horizontal regional integration. The strong hierarchical dimension within the firm seldom leads to frequent contacts with the local environment. Most of the firms established inside the region serve as contractors to the dominant plant, and thereby the vertical dimension is reproduced inside the region.

In contrast to this, the rise of new *specialised production regions* leads to a completely different pattern of regional division of labour. It will foster integration inside the region, by externalities from firms that can be reaped by several actors in an agglomerated economy. In both an old and new version these are the industrial districts, which in modern terminology could be described as learning and innovative regions. We will not go deeper into the description of the modern success region, except voicing some reflections on the regional scale — an often neglected theme. A local production system (or innovation system) will by its small scale collect the externalities among firms in a rural municipality or a city district (perhaps within a street). A national production system has by the distance between the firms rather few external effects among the firms, and we expect the spatial division of labour to be of the hierarchical type.

However, this typology presupposes a common friction of distance, equal to all regions and industries. Contrary to this, it is possible to argue in favour of parallel geometries, where coefficients of friction are highly varying. Perhaps an industrial district of jewellers and watch makers have a local base, while a system of wooden products or metal production is national in character? If we can decide the correct scaling, a system with functional spatial division of labour might shift to a case of regional specialisation with agglomerative effects in a very large region.

After what can be termed “the knowledge turn” has won acceptance in economics, economic geography and national and regional development policy, we can distinguish between two forms of agglomerations and agglomeration theory.

What we somewhat loosely can call “old” agglomeration theory is derived from the Alfred Weber tradition and had its culmination in the 1970s. This theory primarily dealt with transactions. Co-located firms profited from mutual externalities, because proximity made transport easier and transactions simpler and cheaper. This theory belongs to the cost minimizing location tradition. It mainly explains static relations.

The first analyses of new industrial districts came in the early 1980s (Piore and Sabel 1984) and mark a transition to “new” agglomeration theory with more weight on social embeddedness in collective institutions. Simultaneously knowledge and innovation were emphasized as growth factors in the economy. Endogenous growth theory was formulated by the economists and Michael Porter (1990) particularly provoked much attention with his cluster theory, aimed at explaining why certain nations were in front in economic development. His theory was gradually “regionalised”. Proponents of the new growth theory increasingly attached great importance to various regional elements and conditions, (Krugman 1991) and Porter must also be interpreted in the same direction (Porter 1998, 2000).

The Norwegian and Nordic contributions to agglomeration research belong to the new tradition, Asheim and Isaksen have performed both theoretical and empirical studies (Asheim 1992, Isaksen and Spilling 1996, Isaksen 1997) and many studies have been made in the Porter tradition. A specific Nordic school has followed in the wake of Lundvall’s theory of national production systems (Lundvall 1992). Its geographical variant focuses on regional systems of innovation. Nordic economic geographers have generally been preoccupied with studies of learning and innovation under our specific small scale urban systems and dispersal of economic activity (Maskell et. al. 1998).

Agglomeration and cluster are used as concepts fairly interchangeably. Many scholars find no differences. Both agglomeration and cluster formation are about accumulation of enterprises in the same business line or production system – in larger cities and outside. With the understanding presented in this paper the cluster concept undoubtedly belongs to the new agglomeration thinking, which is knowledge and innovation oriented and therefore in its essence an evolutionary theory. In this context agglomeration does not only deal with transactional co-location advantages, but with the genuine and specific development potential inherent in clustering of related industrial activity (Malmberg et al. 1996). This theoretical direction thus explains dynamic relationships.

2.4 Producer services

The theoretical (and empirical) perspectives for formation, innovation and sustainability of modern industrial systems have traditionally been characterised by internal knowledge generation, informal learning in the business environment, direct adoption by the organisation in question of codified knowledge and transfer of knowledge through different network relationships. The role of external expertise, bought in the market, is increasingly growing in

importance, however. In theoretical analyses producer services have, in spite of this, up to fairly recently, played an inferior role. This relates to modern industrial systems in general but also more specifically to research on agglomerations and industrial clusters in particular. More recent research has demonstrated the importance of these services both in the operation of firms, institutions and organisations and in the wider clustering process. It has also showed the propensity of services to form clusters of their own.

Producer services are generally provided in close interaction between service agent and client. As a dynamic element in transfer of knowledge they are part of a never ending two way process. APS are combining formal and informal learning by collecting, translating and interpreting tacit knowledge from their clients. This knowledge is later codified, to be used and reused in further consultancy work. It has particularly been recognised of late how the role of producer services in the operation of industry has increased, to the point of mushrooming in fields like strategy and organisation, information technology, human resources and financial and administrative systems (Engwall and Pahlberg 2001).

As to the importance of producer services in the clustering process both producer services and their clients will as a rule profit from a short geographical and cultural distance. This is particularly so for necessary contacts at short notice (Lundvall 1992). Proximity is considered to be practical in the learning process and is often essential in periods of intensive innovation, in processes going on at a precodified knowledge stage, where much tacit knowledge is involved (Howells 2000). Producer service clusters are again an effect of vertical disintegration of the production process, which is characteristic of the late modern economy. Winners in this process are according to Allen and Pryke (1994) providers (and clients) who have located in service spaces where they through interaction can profit from a series of knowledge transfer points. These interactive and clustering trends are also in accordance with the existence in such environments of numerous weak ties, as claimed by Granovetter (1973 and 1985).

Although there may be tendencies in real world situations, there are in small urban agglomerations limits to cluster formation of producer services. Under conditions of industrial specialisation clustering may to some extent follow the pattern of locational economies, which is characteristic of some modern industrial districts (Asheim 1995), Asheim & Isaksen 1997). At the same time some decentralisation may be valid due to easier communications and development of modern ICT systems. Larger producer service organisations may also in this context take advantage of locating branch offices in smaller places in order to meet an explicit demand and to affect the existing potential demand. Independent enterprises originating in smaller urban places may also emerge. According to Illeris (1996) smaller consultant offices with a more profound understanding of local ideosyncracies and who share the business culture of the client, are better equipped to meet local demand. This may add to the clustering tendencies, although in a rudimentary way also in smaller urban environments and in some cases and for some industries (notably the tourist industry) even in rural communities.

3. A conceptual model

Summarised in a simple conceptual model, we focus on three groups of actors in the local production systems (figure 2). One is what we can call the basic sectors, where we try to identify external relations typical of clusters. Such clusters can consist of secondary and tertiary industries. In the present context we concentrate on manufacturing industries. The other group is the advanced producer services, where we also identify possible elements of research and relations to higher education. Also internally in this group we may search for tendencies to clustering. The third group are the public agencies, both specific development institutions and services of a more general character in education, planning and others. Public efforts can be both generally and selectively aimed towards APS or the industrial clusters. All these groups of actors are simultaneously externally related, as was described above: Towards central authorities, national centres of APS, head offices in enterprises and concerns or related enterprises in other regions.

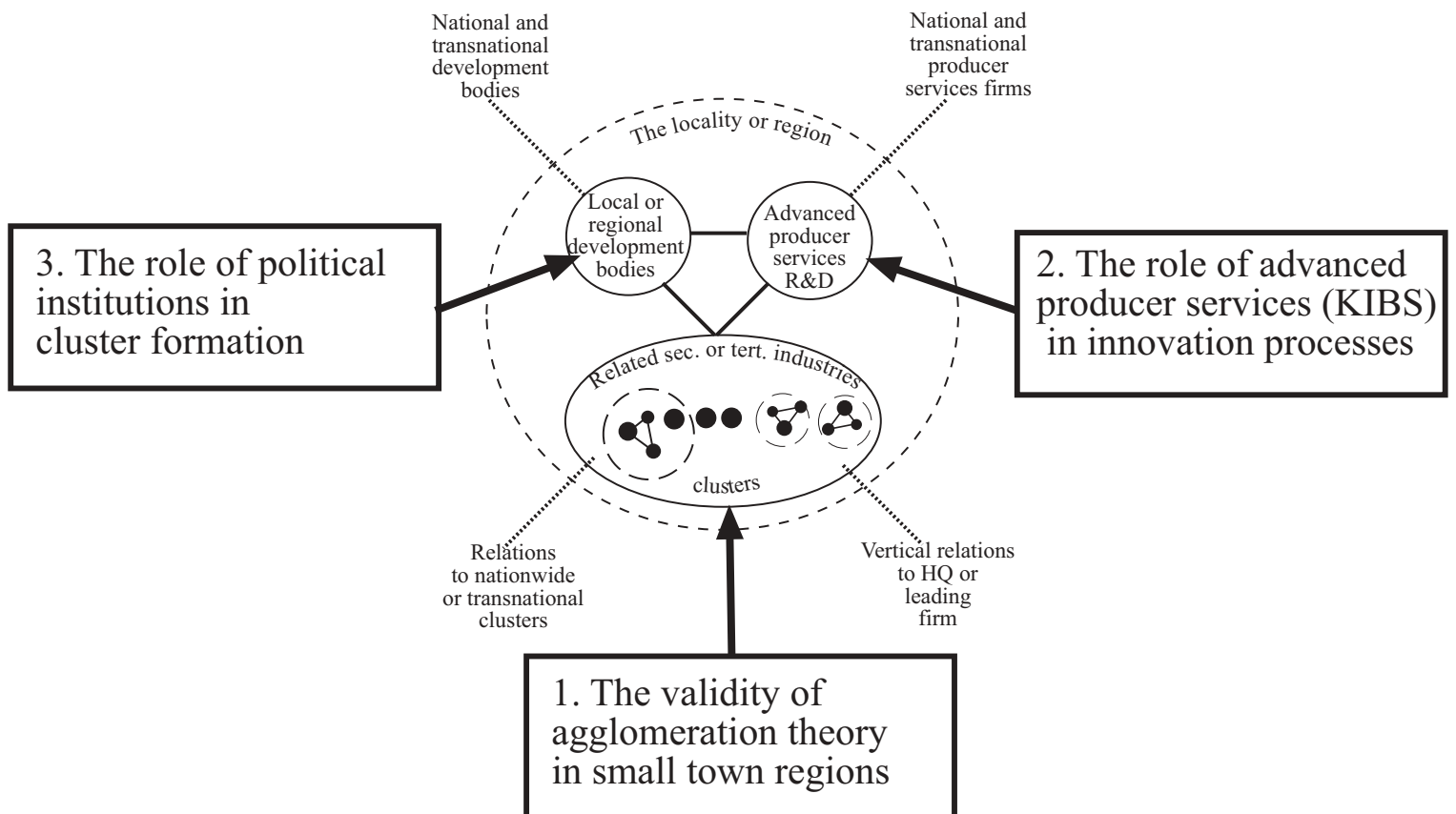


Figure 2. A conceptual model

4. Namsos – the old industrial district

The town Namsos is the regional centre of Namdalen, the valley region in the northern part of North Trøndelag – in fact this region is a part of Northern Norway, and bears all the marks of a truly peripheral region (figure 3). The town Namsos and its surrounding commuting area have had slow growth in employment and population during the last decades, while the inner part has lost important firms and people. Near the coast line aqua culture has created a new economic boom, and in some cases it is difficult to recruit new people to new jobs.

Like Norway, Namdalen is endowed with rich natural resources, forests and fish being the most important. As a modernisation factor, the exploitation of the forests was most important. Norway did not take part in the initial industrial revolution (partly due to British embargo on technology), while the «steam revolution» of the 1830s created a completely new round of investments — off shore and on shore. The first steamboats came in 1829, and soon initiatives were taken to install steam engines in traditional industries. However, old «mercantilist» regulation forbade all new establishments of saw-mills, which traditionally were located by the rivers, where energy was found. The rights to buy and sell wood and wooden products were restricted to merchants in the towns, and Namdalen had no towns. The new, liberal Norwegian state gradually developing after the Napoleonic Wars wanted to abolish old privileges, and Namsos was given city rights in 1845. In 1860 regulation of saw-mills was abolished, and from this date Norway became a leading modern wood exporting nation. Namsos stood in the frontline of this development.

The first steam saw was established in 1853, and during the next 50 years several new plants were established in every decade. In 1921, when the era reached its peak, Namsos had 12 steam saws in the city centre, and several more in the surrounding region. However, at this time a new round of investment had taken place.

Saw-mills normally only utilised big dimensional timber, while all smaller species were left in the forest. The growth in the newspaper industry in Europe spurred an enormous demand for paper, and this created in turn a market for small dimension trees. The first stage in the processing to paper was pulp production, and regions like Namsos had splendid conditions for this industry. In the years 1905-1920 five new pulp factories came into operation in North Trøndelag, and three of these were located in Namdalen. Of course, when the interwar recession started, also Namsos was hit by failing markets and reduction in production, but still Namsos was a rather prosperous wood region in Norway in 1940, when the Germans bombed the town to ruins.

Alfred Marshall formulated the concept industrial districts to describe and explain development of manufacturing regions in UK, and even if scale and scope are smaller in Namsos similar processes took place here. Wood, saw mills and pulp processing were “in the air”. Every workingman knew something about cutting, sawing or processing of wood, and



Figure 3. Namsos at the end of the 19. century.

the skills were transferred from generation to generation. Recruiting of skilled workers would never raise problems in this region.

The threshold of new establishments was rather low. Of course the production equipment demanded much more capital than smaller saw-mills, which were still in use during the summer season. However, capital was no big problem, because many merchants had become small landlords by buying up huge areas of forests. The forest capital could easily be transformed to real capital. The technological factor was a greater problem. Of course Namsos had no technological institutes, no class of engineers, in short had no *knowledge capital* to handle and adjust to the new industrial technology. Still the region managed its new technology. We must explain this by the learning factor. During the second part of the 19th century steam technology became common, it was even produced in the regional capital Trondheim. The technological university of Norway was later located in Trondheim, and this of course helped to prepare the more knowledge intensive phase during the pulp and paper era. However, economic historians tend to claim that the rural part of this manufacturing industry never regarded technology as a big problem, because they knew it from traditional flour mills!

To conclude this historical part, it is correct to contend that a traditional industrial district had been formed in Namsos, a district of the embedded type. The most important mechanism was imitation between the local actors. They learned the business as employees or partners, and learning covered economic as well as technological aspects. Formal institutions or specific services related to the industries were never established.

So, what happened to this agglomeration during the last 50 years? Already during the interwar period a tendency towards concentration in small concerns had taken place, and one of them, Van Severen (named after a previous Belgian owner), took a leading role. After Van Severen had bought many of its smaller competitors, Namsos changed to a one company town, and entrance of new actors became almost impossible. The state supported the concentration process during the rebuilding after World War II. The Norwegian economy was at that time broadly governed by a state planned fordism, where scale economy reigned supreme. Later Van Severen was itself sold to a leading Norwegian firm in this sector, today owned by a large Finnish group. The saw-mill has been modernised and enlarged several times, and production has been rising, while employment is sharply falling. Saw-mills today have semi automatic production lines, and their function as a job creator is very weak.

During the planning period after the rebuilding this was considered a great problem, and great efforts were made to attract supplementary employment. The state once again intervened and Namsos became a test site for new industrial estates during the 1960s. As a result one new firm was established, producing cables for the fast growing electricity sector in Norway. This was also a branch plant of a national company, which was later sold to an international group (Nexans). Namsos changed character from a one sided company town to a two sided company town and very soon the cable firm also became modernised and reduced its employment.

When we today examine the local economy by interviews, it is difficult to identify any links between the manufacturing firms, or between these firms and the group of producer services. The producer service sector is dominated by firms delivering only elementary services, for instance accounting services for small firms and farmers and IT-services. The large manufacturing plants get all their supplies of advanced services from the head offices or research departments within the firm, located outside the region. More advanced business services belong to the group of business development, which is a semi public sector. The local authorities have a plan to establish a local «industrial garden» which is a down scaled knowledge park for rural towns.

In Namsos traditional agglomeration economies and clustering are history, not future. It is possible to identify aspects of an old type «marshallian» industrial district, but not at all of a «neommarshallian» type dominated by many highly competent producers, supported by advanced producer services and R&D. Namsos' life during the last 20 years is marked by general deindustrialisation, and what has made Namsos slightly dynamic is not producer

services, but ordinary household services. It is a central place, not an agglomeration. For instance it has become a leading health centre in the region, also taking patients from the rest of Norway, even an eye operation bridge from UK is being planned! The globalised economy has many surprises..

Are there no hopes for Namsos as a production centre? Traditionalists look for the forests, but the truth is that Van Severen today buys 90 % of its timber from abroad – mainly from the Baltic countries! The main natural resource base today is fish — natural and cultivated. In the globalised economy the world expects fish products from Norway, not pulp and paper. Namsos is close to important fishing grounds, and has in some aspects developed specialised services for the aqua industry. A constant knowledge development is taking place within this industry, and one central aspect is veterinary services and medication. Namsos has become the site of a public laboratory doing research on parasites and illnesses, cooperating with a private firm producing and delivering medicine. The local drug store sells a large part of it to the aqua culture industry. By turning from wood to the sea, we can see the outlines of a new cluster where Namsos participates, but the configuration of this cluster is not completely local. It is outstretched along the coast and has several production sites. To recreate a local or regional agglomeration seems to be a regional utopia. At best there are prospects only of elements of an agglomeration economy in this area.

5. Steinkjer — regional and agricultural centre

Even if the creation of clusters in small town Norway seems to be an utopia, many localities still try. One of these is Steinkjer, which is the regional centre of the county, twice as big in population as Namsos (figure 4). If Namsos was the centre of forest industries, Steinkjer has been the centre of agriculture.

Steinkjer has its roots from Viking times, however the town fell into decay and did not rise again until it was re-established by Parliament in 1857. Steinkjer soon became the site of the state governor and the regional council, it was a military centre, and a centre for agricultural cooperative activities. And, of course, the town had some saw-mills, only one being left today. The town was never deeply industrialised, but at least developed some cooperative plants owned by farmers' organisations: A dairy, a slaughter house, a grist mill, and a system of wholesale distribution both of imported input factors and sale of finished products. An important institution is the county owned hydro electric company, with HQ in Steinkjer. During the last decades a state owned town college and a small research firm were established. The employment figures of the main sectors with regional shift and location quotients are shown in table 1.

Steinkjer undoubtedly has a rather big sector of producer services and together with research in the college and the research centre, this sector also has a substantial growth even if the location quotient (LQ) is below 1,0. Is in fact Steinkjer becoming an important APS centre, and are there any relations to the local industries and sectors?



Figure 4: Steinkjer today.

12 sectors:	Jobs		Change 1980-2000			LQ
	1980	2000	Registered	Calculated	Regional shift	
Primary sector	1513	871	-642	-618	-24	2,43
Resource based industries	898	363	-535	-175	-360	0,68
Mechanical industries	213	97	-116	-47	-70	0,23
Other manufacturing	212	288	76	-18	94	0,80
Construction, power, prod.	1003	1105	102	121	-19	1,58
Goods logistics	819	772	-47	352	-399	0,67
Travel and tourism	121	74	-47	75	-122	0,45
Post and telecom	372	153	-219	57	-276	0,88
Prod. services and R&D	187	445	258	579	-321	0,60
Retailing	1206	1094	-112	372	-484	1,19
Personal services	772	1613	841	897	-57	0,89
Education, media, culture	1903	2265	362	766	-404	1,28
Not classified	265	38	-227	-189	-38	0,58
Total	9485	9178	-307	2779	-3086	1,00
Specialised industries, ranked (LQ above 1,25):						
Power production	159	278	119	5	114	3,70
Agriculture	1507	870	-637	-652	15	2,80
Wood industries	347	122	-225	-124	-101	1,78
Public administration	1092	1048	-44	46	-90	1,68
Printing and publishing	155	211	56	85	-29	1,57
Renovation	36	155	119	30	90	1,50
Other:						
Producer services	164	424	260	646	-386	0,61
R&D	23	21	-2	5	-7	0,42

Table 1: Industrial development 1980-2000, shift share and Location Quotients

Another aspect we had to examine was the development of the IT-sector, designated by the local authorities to be the new growth sector in the local economy. The fact is that almost all the traditional cornerstone industries are failing. The steam saw and the dairy are gone, and even more serious: The military department has been closed down after the end of the cold war. Accordingly, Steinkjer has got a substantial transfer from a restructuring fund, aimed at helping crisis ridden industrial towns. Most of the fund in Steinkjer is allocated to the task of transforming the town from an agricultural centre to a modern IT-town. A special industrial agency is set up to perform this task.

Does the town succeed in its aspirations? So far our answer is no. We focused our interviews on the IT-sector to see what has happened during the last years. Undoubtedly, there is a general growth tendency in the APS sector, but what about the IT-sector? And what about the dot-com crisis, was it also felt here?

What we found was one IT-company rather large in our context, which had managed to get a position in the national and international markets. The firm, *Datapower*, was founded by an energetic gründer, who was very expansionistic. During the strong growth period at the end of the 1990s Datapower expanded, and established offices in many parts of the world. The local bank pushed the firm to the stock exchange, to collect money for new investments. However, at this point Datapower was hit by the general down turn in the IT-sector, and the firm had to be slimmed. The innovative founder was forced to leave the company, and has today started a new firm.

Datapower was the flagship in the local IT-cluster, and had a leading role in IT-forum, where the participants met regularly. It was supported by the Industrial Forum of Steinkjer, which was the development body of the town, designated to the task of transforming Steinkjer into an IT town. So far the cluster looks weaker than it did some years ago, and one reason is of course that the leading firm has contracted considerably. Some other firms have also closed down or have left Steinkjer, while most of the one-person firms are still in business.

The reason why this should not be called a cluster is that most of the firms interviewed had no strong relations to the other firms. We found some examples of two firms cooperating in projects, and thereby making them able to take more demanding jobs. There is of course a learning potential in such a cooperation. Datapower had stable relations to the graphic sector and APS specialised in marketing and advertising.

Most of the IT-firms in Steinkjer are directed towards their different markets, and we presume they have significant meaning as providers of competencies and solutions to their clients. But there are no cluster effects in these relations, neither among the IT-firms nor their client firms. The relations among the participants in the IT- forum are too weak to have a developmental effect on the cluster in total, and accordingly it should not be called a cluster. Of course we can expect that we will leave the dot com crisis behind us, and lay a new foundation for growth. However, it is difficult to see which knowledge core this growth should

be built on. Datapower still has a strong position in its sector, but the founding father doubted that the renewal of the knowledge base was sufficient to keep this position.

Another possibility is of course that the modernisation of the traditional sector, for instance the agricultural sector, will create new niches for IT-services. A special firm, Agronett, is formed to meet demand on this market. The main problem is of course that this is basically a contractive sector. A second problem is that cooperative agricultural industries are very centralised, developing their own services and competencies within the organisation but outside the region. Steinkjer is constantly losing position in favour of Trondheim and Oslo. A third problem is that cooperative agriculture is very regulated, and generally lacks the entrepreneurial spirit necessary in a dynamic economic system. Probably it will take many years before agriculture can form a new development block of demanding customers, giving rise to a strong APS and IT-sector.

In the meantime, we believe that Steinkjer will develop slowly as a central place, and not as an agglomeration economy within the IT-sector. That does not mean that the APS and IT-sectors are doomed to decline, far from that. Steinkjer has compared to other small towns a relatively strong position in these sectors, and that of course is an advantage even if the agglomerative effects are weak.

6. Stjørdal — the suburban centre

Stjørdal is the southernmost of the small towns and represents the place with the highest centrality of the three cases presented in the study. Stjørdal can be considered to possess suburban functions and qualities located as it is within the confines of the Trondheim city region (figure 5). Simultaneously, it is an urban place in its own right. Its birth and genesis occurred independently of the larger city, dating back as a small urban place to the first statistical records of urban population. It originated as a central place for the surrounding countryside, a status which from the late 1800s was reinforced through the development as a communication node (railway lines to Sweden and North Norway) and the establishment of a military training ground. From the early Post World War II period its communication functions increased dramatically by the location of the Trondheim Airport and its ancillary functions in the area.

Rather deficient in industry, apart from a medium-sized saw-mill, the urban area saw a significant growth in the sector from about 1960, partly as a locational overspill from Trondheim, to which still belongs the largest manufacturing firm after reorganisation due to bankruptcy, NOBØ (electrical equipment). As importantly, the three other relatively large industrial enterprises have been born as a result of endogenous entrepreneurship, instigated partly by one single entrepreneur, Ola Bakken, operating mainly but not exclusively in the field of plastics. Industrial dynamics have characterised economic and social life up to the present day, implying both new establishment and restructuring of firms.

Services dominate the industrial structure, though, making up about 70% of total employment as of 2000. About 40% of the service activity is partly non-local in customer and client destination, of which transport, trade and tourism are the most important, all making up very dynamic sectors. Although classified under manufacturing industry, the largest single place of work is mainly an administrative body and a service provider. The Statoil headquarters for offshore operations in the Mid-Norway region, counts ca. 350 employees. This is a branch unit of its main office in Stavanger and dates back to the early 1990s. It is the only example of a location motivated by regional policy in this area.

The urban dynamics are reflected through the growth of population. Nearly 6000 new inhabitants were added to the 12 700 existing in 1960 during the 40 years up to 2000, a growth for the whole municipality of more than 45%. In the last decade the municipality was the fastest growing in the county, but now only with a 6,5% growth over the period. The present urban population makes up 8 500 persons, according to revised figures. This is an increase of 80% during the last 40 years. To this should be added at least a couple of thousand inhabitants, who in reality belong to an urban-based economy and settlement.

The rather heterogeneous industrial structure and functional pattern of enterprises in this urban locality is important to stress when approaching the issue of agglomeration effects, network building and tendencies to clustering of activities. We can approach this issue mainly from three angles: 1) joint interchange and provision of goods and services, the old

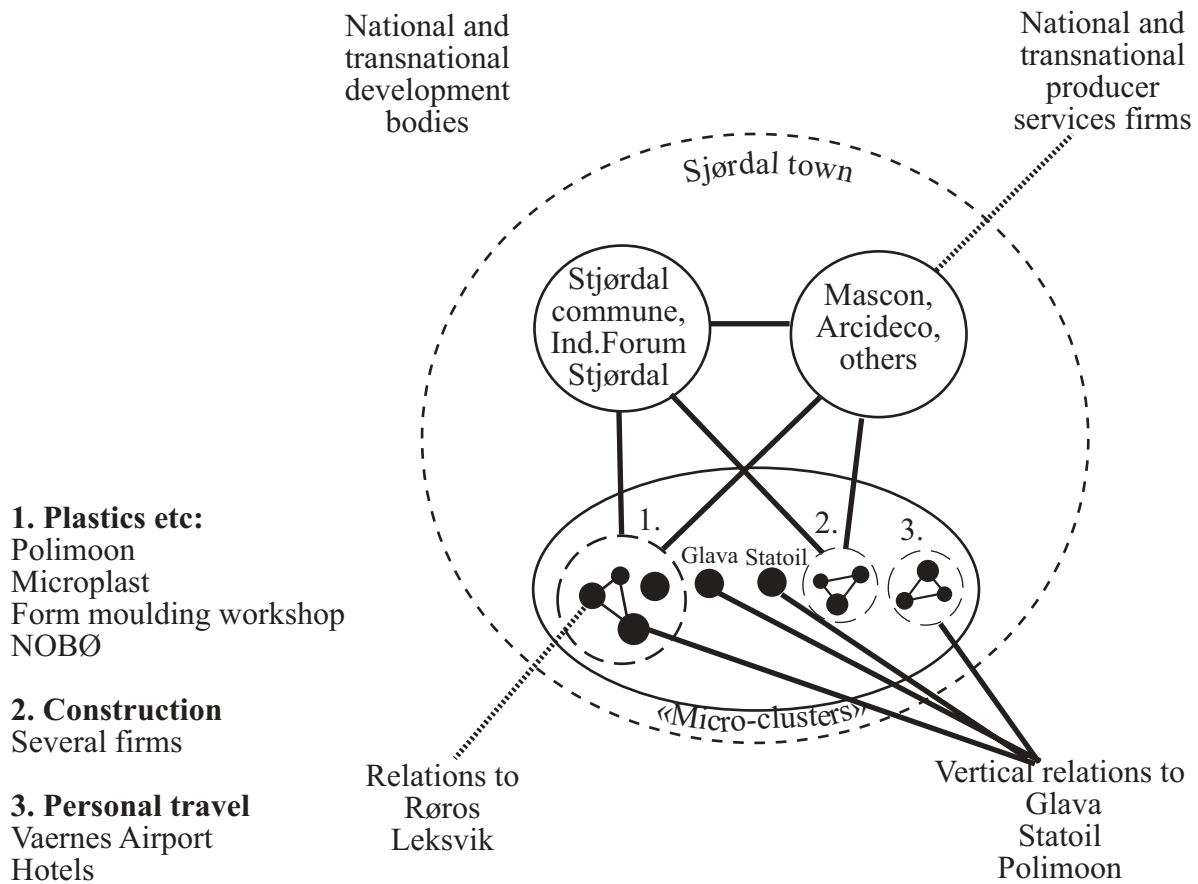


Figure 5: Micro clusters in Stjørdal

agglomeration theory tradition, built on transactions, 2) mutual learning and competence building, the new more dynamic tradition, built on clustering and 3) profit from a common institutional structure including enterprise milieu and culture. Seen in this light, our interviews give clear evidence of transaction of services between industry and service providers as far as material needs are concerned. Transport services are increasingly bought in the local area, and so are services linked to maintenance and construction. A rather strong building and construction sector has grown up in the urban area, patronized by most of the firms from which we have got information. Institutions like the Norwegian Air Traffic and Airport Management have been active in encouraging local participation, also by breaking up tenders so as to enable local enterprises to participate. Outside any significant transactional ties with the local economy is the Statoil Corporation. Its rudimentary integration is furthermore reflected by the fact that the bulk of employees still live in Trondheim with daily bussing to and from their place of work. In the same way, detached from local economic activities except for some local sales, is Glava, a branch office of a national concern, producing mineral wool for the construction industry.

In the field of more advanced producer services the local provision is far more rudimentarily developed. Financial services are both local, regional and provided by banks and other financial institutions on an even higher level. Typical knowledge related services are mostly imported, as the small urban community only provides consultancy services of a less advanced nature mainly in the field of law and as general business services, for example accountancy and auditing. One of the leading transnational combined audit and consultancy firms has recently located a branch office in the town. The sector is on the whole far weaker developed than the corresponding sector in Steinkjer. This particular pattern must be explained by the proximity to Trondheim with its rather well developed service infrastructure, but can also be due to inertia of development and thus represents some developmental potential.

As far as tendencies of clustering built on more dynamic linkages are concerned, there are clear rudiments in Stjørdal. Three clusters are shown in figure 6. The first of these can be characterised as a plastic cluster. Norplasta was founded in the years immediately after World War II in Stjørdal as the first Norwegian enterprise in this sector. It has later been reorganised first as a national than as an international concern, Polimoon. One of the technical leaders in Norplasta, Ola Bakken, left it to establish a firm of his own, Microplast and has later been engaged in plastic and other industries in many places in Mid-Norway. Quite recently the moulding workshop of Polimoon was separated from the mother firm. This micro cluster thus counts three enterprises.

NOBØ, a metal firm located in Trondheim needed after the war room for expansion and founded a branch plant in Stjørdal. This firm specialised in many lines of the business and was for a long time the leading “Fordistic” corporation in Trøndelag, in fact the largest in 1970. By 1990 the firm met with great difficulties and was threatened with bankruptcy. A local group in Stjørdal under Bakken’s leadership was organised to save the Stjørdal branch, which produced electrical panel stoves. By then the product had undergone a technological change to glass ovens, operated electronically. Designated NOBØ Electro, the reorganised enterprise has adjusted well in the market with flexible products for the construction industry. The new firm is very innovative, launching one principal innovation yearly. More than 100 models are offered and the factory has a ramified sales network in Europe.

NOBØ is supplied with components from the plastic industry. In processing the enterprise needs a flexible outfit for producing small series. This is provided by the Mascon consultancy firm. Mascon has also contributed to considerable innovations in Polimoon and Microplast. All these firms are ringed in as a little local cluster in the figure, although there are important linkages from the largest plastic firm to the national concern (Polimoon Norway).

A considerable building and construction sector is developed in Stjørdal, in fact larger than expected according to the location quotients in table 1. Seen in the context of architectural and building equipment services, this makes up a cluster of its own, partly in co-location. The small architectural firm Arcideco functions as a centre of competence. It characterized itself

as the spider in the web by organising and offering services in concert with closely related enterprises. There are also many producers of building material, ultimately belonging to the cluster.

The third, less marked cluster formation can be found in airport and hotel functions. But collaboration and contact are less frequent in this agglomeration. The airport with conference facilities and the two largest hotels in the town live from the same pool of business travellers. Contact has been initiated to take care of common development potential. Cooperation is evidently hampered due to competition and the fact that all the activities are managed from the outside. The airport is subordinated to the national air traffic and airport management and the hotels are part of wider chains.

Local authorities are also important in the industrial development process, and so is the common industrial and cultural milieu. The latter is marked by a particular industrial spirit of self-reliance. As expressed by several industrial leaders, Stjørdal is “vaccinated” against excessive public support, as contrasted with the situation in towns in most of the county, notably Namsos, but also Steinkjer. The municipality has its own industrial division and a partly voluntary and partly semi public forum, Stjørdal Næringsforum, exists in close contact with local industry. The building and construction micro cluster has developed a forum of its own under the larger forum. The vocational lines of the secondary school serve as a recruitment base for apprentices and other manpower, particularly utilized by the plastic industrial cluster. Stjørdal municipality and Nord-Trøndelag county are positively assessed as service institutions by industrial actors. Business orientation is strong in public institutions whose leaders have a positive attitude towards further development of an industrial milieu in Stjørdal.

7. Conclusions

Finally, our findings are summed up in some conclusions, some covering the substance of the problem, agglomeration economies in small towns. At last, we shall utter a remark on methodology.

The main question posed was whether we on the whole will find cluster formations in small towns.

- As a general conclusion, based on our three case studies, the answer is no. In our smallest and most peripheral community there are no tendencies at all, and even the two larger centres do not show clear local-regional clusters.

A couple of modifications are necessary, however to catch important nuances.

- At any rate, in one of the cases we found tendencies of formation of smaller clusters, in other words elements of an agglomeration economy. For lack of a well established concept we call this a micro cluster.
- In some cases there are tendencies to clusters if we look at the issue on a somewhat wider geographical scale, where the localities studied make up a part. We can define these as extensive, far-reaching clusters, to be understood as a part of larger regions, nations or transnational regions.

In many regions the question is raised whether local or regional clusters can be created by explicit planning – a regional cluster policy:

- Our general answer is that if not impossible, this is a very difficult task. Cluster formation is the outcome of long growth processes which public authorities only to a small degree are able to manage.

Also in this case some modifications are important.

- Regional development agencies can at best reinforce an existing development process and must therefore develop a sensitivity towards cluster formations in the regional economy. When these are observed, it will be easier to find an approach to the phenomenon also from the public side.
- Public institutions can only to a small degree manage the basic competence locally and regionally. Regional development agencies would function best as organisers of meeting places and arenas of contact between private actors and public institutions in R&D, universities and colleges.

Our study is restricted to a Norwegian context and part of its objective was to establish whether models based on grand theories can be applied in our situation, It is our belief, however, that the investigation can be of interest in a wider context where it is searched for a more knowledge and urban oriented regional policy. We therefore dare to put forward some tentative conclusions.

- Size is still important. Also among small and medium-sized towns it is evident that the largest succeed best as they are generally able to attract advanced producer services and in some cases R&D, universities and colleges.
- Position in relation to larger cities is probably also of importance. Conceptually, urban fields are more appropriate than towns and hinterland to describe this geographical configuration. Small towns near other towns, preferably cities, are more likely to succeed than small towns living by themselves outside such urban fields.
- Towns outside central urban fields are very much dependent on contact with central cities, and are therefore, not surprisingly, strongly dependent on a good physical infrastructure: airports, roads, railway and an ICT network. The latter cannot compensate for personal contact.

Finally, we want to give some short remark on grand theories, and methodology:-

In the literature discourses and positions are made, emphasizing dichotomous aspects of reality: Some only have eyes for the strong tendencies of capitalism to develop a functional hierarchical division of labour, interpreting the world as a global system of multi-national concerns and subordinated branches. Others believe so intensely in the idea of the regionalised economy, that they only see regional clusters, systems of innovation, learning regions etc. In the real world, however, perspectives are more mixed, where the models often describe extremes, which are rather rare in occurrence.

We are still convinced that phenomena like cluster formation, agglomerations, externalities and learning are important central concepts. To verify empirically such phenomena is very difficult when only applying one single method. We have therefore presented our cases from three angles: one historical, one statistic and one based on in depth interviews of actors. The presentation of the cases is definitely incomplete. But we are convinced that the theoretically difficult concepts applied are possible to describe empirically, when triangulating between different methods, in other words with an eclectic methodological point of departure.

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