

Building Regional Innovation Systems: Is Endogenous Industrial Development Possible in the Global Economy?

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Globalisation: A Challenge for Local Industrial Policy

Economic globalisation refers to the shift of the world economy towards an increasingly supranational functional integration co-ordinated by transnational corporations (TNCs) (Dicken et al 1997). In those sectors where these tendencies are strongest (such as the automotive industry and electronics), globalisation has led to a steadily increased influence of TNCs over national industries. In part, this takes place through corporations establishing or buying firms in different areas of the world, and in part through the linking of formally independent companies to TNCs as subcontractors and suppliers. In this way large numbers of firms are linked together in networks that are directly or indirectly co-ordinated by the headquarters of TNCs.

The expressed or implied message of many contemporary analyses of globalisation is that the balance of power in the economy is tipped in favour of TNCs at the expense of nations and regions, as more and more firms and regional production systems are incorporated in global commodity chains (Storper 1997). Decisions on, amongst other things, downsizing, closure and relocation of firms, are taken directly (for plants owned by TNCs) and indirectly (for suppliers) in remote headquarters and not by local entrepreneurs. Thus, as firms are tied into evolving international organisation structures, the continual reorganisation of global firms has the capacity to dramatically reshape the fortunes of regional economies. This is further emphasised by the fact that economic activity is perceived as increasingly placeless and de-territorialised. The potential of

endogenous growth based on regional resources and trust-based local relations is then seen to be threatened by the globalisation tendencies.

This article aims to analyse some of the possibilities and barriers that local communities face in promoting endogenous industrial development in an increasingly globalised economy. The analysis is based on the view that regionalisation is an important aspect of the globalisation trend and, therefore, a crucial economic trend in the international economy. In the second section, some theoretical issues are introduced and some policy background and dilemmas set out. In the third section, a description is given of the 1997 decision by the large transnational corporation, Ericsson, to move one of its development departments from a small Norwegian town to the Oslo region. The reversal of this decision caused by strong opposition from employees and the local area in general is then analysed. This example illustrates some threats that globalisation trends exert on the local economic development potential, as well as opportunities for economic development which it can create in certain areas. Finally, in the concluding section, the discussion departs from the 'Ericsson case' and discusses, from the perspective of regional innovation systems, development policies aimed at embedding units of TNC in local areas. The section also discusses how the case study may advance our understanding of the interplay of globalisation and regional dynamics.

Regionalisation as an Aspect of Economic Globalisation

Regionalisation is increasingly seen as one important aspect of the globalisation trend. Regionalisation refers to economic activity dependent on resources that are specific to individual places (Storper 1997). The principal empirical sign of the trend towards regionalisation is the apparent growth in importance of regional clusters and innovation systems over the last decades. Since the 1970s different types of regional cluster have established a strong position in world markets for both traditional products (e.g. Third Italy) and high technology products (e.g. Silicon Valley). This has led leading researchers and policy makers to observe that 'today's economic map of the world is dominated by (...) *clusters*: critical masses -- in one place -- of unusual competitive success in particular field' (Porter 1998: 78).

Porter's observation regarding the current importance of regional clusters may reflect the fact that the trend towards regionalisation is related to a discontinuity in recent economy history, namely the transition from Fordism to post-Fordism as the dominant form of production in industrialised countries. This transition has some important consequences for the organisation and localisation of industrial activity, and by extension for regional development processes and regional policy. Among other things, the transition is accompanied by changes

in the innovation process; in particular place-specific, local and regional factors have increased their significance in innovation processes and in economic development (Tödtling 1994). To a greater extent than in the 'Fordist' linear innovation model, innovation takes place as interactive learning between firms and their environment, stimulated by specific local resources and 'face-to-face' co-operation. As a consequence, Porter observes that 'paradoxically, the enduring competitive advantages in a global economy lie increasingly in local things – knowledge, relationships, and motivation that distant rivals cannot match' (Porter 1998: 77).

Despite clear overall globalisation trends, the apparent increase in importance of regionalisation has led to interest in the role of regional and local levels in studies of industrial development; it has also inspired the formulation of endogenous industrial policy. Regionalisation is regarded as an aspect of economic globalisation because some innovative, regional clusters are key nodes in the increasingly globalised arena of production. Clusters can take on this role because they may contain productive resources and assets (in the form of relations, rules and conventions) that are quite unique and place specific. These assets remain specific when they cannot easily be imitated, standardised or made accessible to others. This is the case primarily when the knowledge or cognitive framework required to produce or use the assets are embedded in particular concrete relations or cultures, or require uncodifiable information to apply (Storper 1997). Transnational corporations purchase existing firms, locate subsidiary companies, identify suppliers or find strategic partners in different knowledge intensive milieus depending on the need to connect their own knowledge with the locally based, often immobile, competence rooted in innovative regional clusters.

The crux of the regionalisation argument, then, is that the regional level may be important for firms attempting to achieve global competitiveness. The question arises as to what strategies local communities can initiate in order to raise the innovativeness and competitiveness of regional firms. The current discussion of appropriate policy tools seems, however, to suffer from weak conceptualisation. Researchers, as well as policy-makers, often have different interpretations of central concepts such as regional clusters and regional innovation systems, making sound analyses and discussion difficult. Therefore, in the following discussion, a precise definition of the central concepts is needed. With this in mind, we propose a hierarchy of concepts as shown in Table 1. This hierarchy can be seen as both an analytical tool and a practical metaphor useful in the formulation of endogenous industrial policy. In addition, this conceptualisation provides a framework for analysing the development of the ICT (information and communication technology) industry in a small Norwegian town.

What is a Regional Cluster?

The first concept, regional cluster, may be defined as a geographically bounded concentration of *interdependent* firms. Although firms in regional clusters may co-operate with firms, R&D-institutes, etc. in many places, the firms are part of

TABLE 1 Clarification of Concepts: A Hierarchy of Four Concepts

Concepts	Definitions and differences
Regional cluster	A concentration of 'interdependent' firms within the same or adjacent industrial sectors in a small geographic area
Regional innovation network	Increasingly organised co-operation (agreements) between firms, stimulated by trust, norms and conventions
Regional innovation system	Co-operation between firms and different organisations for knowledge development and diffusion
Learning regions	Increasingly organised co-operation with a broader set of civil organisations and public authorities that are embedded in social and regional structures.

local networks, often in the form of production systems.¹ These systems first and foremost tend to incorporate subcontractors, but may also involve horizontal co-operation between firms at the same production stage. Local firms exchange components and services followed by flows of information and knowledge. Utilisation of a common technology, knowledge base or source of raw materials may also connect firms in an area. Relations between firms, and not their mere co-location, are the decisive factor in defining a regional cluster. Rosenfeld (1997) emphasises that clusters should have active channels for business transactions, dialogue and communication. "Without active channels even a critical mass of related firms is not a local production or social system and therefore does not operate as a cluster" (Rosenfeld 1997: 10).

'Regional cluster' may be seen as a catchword for many types of industrial agglomeration, e.g. industrial districts, innovative milieus, local industrial complexes and new industrial spaces. Thus, 'regional cluster' is a broader concept than many of the other terms mentioned. For example, every industrial district is a regional cluster, whilst a regional cluster is not necessarily an industrial district. Both regional clusters and industrial districts generate external economies. In this context, the concept relates to the achievement of increased efficiency through extensive external division of labour within networks of specialised firms. Spatial agglomeration strengthens the advantage that occurs through division of labour and specialisation. While regional clusters can be fully defined by these principally economic mechanisms, they do not provide sufficient explanation as to why industrial districts occur and develop. A recent

1. The size of the geographical area constituting a cluster depends on where the firms in the local production system are located. Often a regional cluster covers a local labour market area or travel-to-work area.

OECD paper fails to take this into account and assigns too many 'local systems' to the same group: ' "Local productive systems", "clusters", "industrial districts", "enterprise agglomerations" -- while the terminology varies the phenomenon remains the same: all refer to geographical groupings of firms in related lines of business' (OECD 2001: 1).

The above quotation fails to note the differences emerging within research on regional production and innovation systems regarding the importance of specific regional resources for the growth and working of clusters (Storper 2000b). The development of industrial districts, for example, is based on a number of social and cultural factors, which are territorially specific (Asheim 1992). The existence of mutual trust and 'industrial atmosphere' are necessary ingredients in the definition of industrial districts. They are industrial agglomerations in which 'community and firms tend to merge' (Becattini 1990: 38), and where district success relies heavily upon the socio-cultural context in which it is rooted. The 'Californian school' generalised about the growth of new industrial spaces emphasising vertical disintegration of production chains in a new era of 'flexible accumulation'; this is said to bring about the agglomeration of firms in order to reduce inter-firm transaction costs and to the formation of specialised local labour markets (Scott 1988). Although initially a mainly structural approach referring to universal causal mechanisms and circumstances, attention soon shifted to examining the role of culture, institutions and governance in the creation of new industrial spaces (Lagendijk 1997). This approach came to consider the agglomeration itself as a source of industrial dynamics, and in particular saw the region as the locus of 'untraded interdependencies'; conventions, informal rules and habits that coordinate economic actors under conditions of uncertainty (Storper 1997).

Another example is the 'Nordic School' of the learning economy (Lundvall and Johnson 1994). It highlights innovation as the basis for achieving competitiveness by firms, regions and nations. Innovation is conceptualised as a complex, interactive, non-linear learning process. The importance of co-operation and mutual trust in promoting competitiveness is emphasised, and this is promoted by proximity. Furthermore, learning is seen as a mainly localised process, pointing to the importance of historical trajectories and 'sticky' knowledge (Asheim and Isaksen 2000). Regional divergence of innovative capabilities is the result of specific learning trajectories embedded in different institutional systems.

Regional collective learning occurs in some particular places involving 'the creation and further development of a base of common or shared knowledge among individuals making up a productive system' (Keeble and Wilkinson 1999: 296). In fact, one of the few remaining genuinely localised phenomena in the increasingly 'slippery' global economy is the 'stickiness' of some forms of knowledge and learning processes (Malmberg 1997). The 'stickiness' is due to the fact that some important types of knowledge are of an informal, tacit nature constituted by skilled personal routines, technical practises, norms of behaviour,

implicit and shared beliefs and co-operative relations in organisations, firm networks and local communities. This kind of knowledge cannot easily be isolated from its individual, social and territorial context; it is a socially embedded knowledge difficult to codify and transfer through formal channels of information. Thus, whilst 'information is relatively globally mobile (...) knowledge is remarkably spatially rooted' (Cooke et al 2000: 12).

The three above-mentioned theoretical approaches emphasise regional and place specific resources and institutional frameworks in order to explain the growth or decline of regional clusters. Trust, conventions, uncodified knowledge etc. are seen as factors of spatial binding. The main explanations for the dynamism of regional clusters in this literature have increasingly turned from 'economic' reasons, such as localisation economies, to 'social-cultural' reasons, 'such as intense levels of inter-firm collaboration; a strong sense of common industrial purpose; social consensus; extensive institutional support for local business; and structures encouraging innovation, skill formation, and the circulation of ideas' (Amin and Thrift 1994: 12).

Based on Porter's concept of industrial cluster (Porter 1990) a different, and more instrumental, approach emerged. Clustering is seen more or less as an independent spatial process with its own laws of development; it is implied that the 'laws' of successful clustering can be reverse engineered in order to imitate success stories (Storper 2000b). According to Porter (1998) companies gain competitive strength in regional clusters because of better access to specialised and experienced employees, suppliers, specialised information and public goods, and by the motivating force of local rivalry and demanding customers. However, this approach sees the region or the 'space' principally as a 'container' in which industrial processes unfold, rather than as a source of dynamism. The approach contains little systematic explanation of what exactly causes the spatial binding of economic activities within clusters besides the importance of spatial proximity.

From Clusters to Learning Regions

Starting with regional clusters as a mere 'economic' concept in Porter's tradition, the conceptualisations in Tables 1 and 2 attempt to integrate lessons from economic geography that focus upon the importance of place-specific and 'non-economic' factors. Regional clustering is seen as a first prerequisite for the emergence of a regional innovation system. However, to constitute an innovation system firms in the cluster have to form regional innovative networks involving more organised and formal co-operation between firms in innovation projects. For example suppliers do not merely produce components or modules to customers' specifications, but co-operate in developing new products. This kind of co-operation is facilitated by the working of social institutions; people know and follow the same established practices, routines and unwritten rules of business

behaviour and rely upon trust in relationships. This means that firms, for example, may co-operate without always requiring written contracts.

Complete regional innovation systems also involve co-operation in innovation activity between firms and knowledge creating and diffusing organisations, such as universities, colleges, training organisations, R&D institutes, technology transfer agencies, business associations, finance institutions etc. These organisations house important know-how, train labour, provide finance etc. which support regional innovation. Thus, regional innovation systems consist of (i) firms of region's main industrial clusters, including their support industries, (ii) 'supporting' knowledge organisations, and (iii) interaction between these actors. This conceptualisation of regional innovation systems corresponds with the one found in Cooke et al (2000). In their words any functioning regional innovation system consists of two sub-systems: (i) the knowledge application and exploitation sub-system, principally occupied by firms with vertical supply-chain networks; and (ii) the knowledge generation and diffusion sub-system, consisting mainly of public organisations.

Distinguishing between the two distinct concepts of 'regional cluster' and 'regional innovation system' is relevant and fruitful in particular when discussing policy implications. Regional clusters are seen as mainly a *spontaneous* phenomenon; a geographic concentration of firms often developed through local spin-offs and entrepreneurial activity. Regional innovation systems, on the other hand, have a more *planned* and systemic character. Thus, the change from a cluster to an innovation system requires a strengthening of a region's institutional infrastructure, i.e. more knowledge organisations (both regional and national) are involved in innovation co-operation. In this way regional innovation systems may be a tool to create a supportive system of innovation on a regional scale.

The fourth concept in our hierarchy adds another dimension to innovation systems as it broadens the type of actors involved in interactive learning. Asheim (1998:4) uses the concept of learning region 'to describe a region with an economy embedded in "institutional thickness', while Boekema et al (2000:12) similarly speak of learning regions when 'the actors in a region (...) collaborate closely with each other on an institutional level in order to develop and implement regional innovation strategies'. Learning regions must be created by a combination of collective political decisions and bottom-up local initiatives. The creation of regional development coalitions is of strategic importance, i.e. long-term, many-sided patterns of co-operation in support of innovation including actors such as local unions, local chambers of commerce, local venture capital, local education bodies, local research centres and local authorities. 'Learning region' implies increased public-private partnership in order to develop or regenerate the local economy.

The Need to Tailor-Make Regional Innovation Policy Instruments

What does the framework in Table 1 imply for the design of regional development policy? An important point is that concepts such as 'regional innovation system' and 'learning region' are not relevant instruments for the analysis and formulation of innovation support structures and policies in every region. One may of course analyse innovative activity, as well as develop innovation policy instruments, for many kinds of firms and regions. However, a learning based strategy of endogenous regional development cannot be applied across the board, as the necessary requirements concerning socio-cultural and socio-economic structures (as regional clusters) are to be found mainly in relatively well-off regions, and sufficient techno-economic and political institutional structures (such as research universities and knowledge transfer institutes) mainly in relatively developed countries (Asheim 1998).

Policy-makers should not focus uncritically, therefore, on creating *regional* systems to support firms' innovation activity irrespective of local conditions. There may be a danger to generalise too broadly regarding the extent and potential of regional innovation systems or learning regions on the basis of only a few well-known empirical cases. Regional innovation policy seems to some extent to have emerged from experiences and policy instruments in 'success stories' like Italian industrial districts with their centres of real services, Baden-Württemberg with its Steinbeis Stiftung and Silicon Valley with its Stanford University. These examples have depicted the stimulation of local networking and the development of regional technology support infrastructure within the framework of a general model of local industrial policy, without assessing if the appropriate requirements (for instance those outlined in Table 1) really are present or readily created.

These arguments point to the need to adapt innovation policy instruments to take into account the specific problems faced by a regional economy. There is no one set of policy instruments or a 'one-size-fits-all' policy portfolio that suit all types of region. From the systems perspective, innovation policy instruments must be adapted to distinctive characteristics in individual regions, building on analyses of regional innovation system barriers, e.g. factors which inhibit the regional industrial milieu, its institutional set-up, barriers related to attitude towards innovation and entrepreneurship, etc.

According to this perspective the innovation performance of a (regional) economy depends, to a large extent, on how firms utilise the experience and knowledge of other firms, research organisations, government sector agencies etc. in innovation processes, and on how they blend this with the firms' internal capabilities. Innovation performance does not only depend upon the capability of individual firms, although the know-how and attitude of entrepreneurs, managers and workers can be decisive. Firm level innovation seems to be determined, to a considerable degree, by conditions in the firms' environment, and specific contextual factors may hamper as well as promote innovation processes.

Regional Innovation Systems Barriers

There are three main types of deficiency in the regional innovation system that may hamper innovation activity within the firm (Table 2). In many areas a regional innovation system does not exist due to lack of relevant regional actors (i.e. organisational 'thinness'). This points to the fact that not all regions are important in terms of economic coordination. The attainment of such importance requires a sufficient number of firms, as well as knowledge infrastructure capable of supporting collective learning. An example of this would be a region with

TABLE 2 The Classification of Some Typical Regional Innovation System Barriers

Reg. innovation system problems	Type of problem	Typical problem region	Possible policy tools
Organisational 'thinness'	Lack of relevant local actors	Peripheral areas	Link firms to external recourses + acquisition
Fragmentation	Lack of regional co-operation and mutual trust	Some regional clusters	Develop regional 'club goods' and stimulate collaborative efforts
Lock-in	Regional industry specialised in outdated technologies	Old industrial regions and raw material based peripheral areas	Open up networks towards external actors + local mobilisation

sectors that have few technological complementarities and few important user-producer relations. Such a region 'will have no specifically regional technological dynamic from which evolutionary effects could emerge' (Storper 1997: 67). A lack of collective learning may be a problem particularly in peripheral regions with small industrial milieus and located a long distance away from relevant knowledge organisations. However, organisational 'thinness' also points to the fact that regions differ in their capacity to build or organisations to stimulate firms' innovation activity; this lack of relevant organisations can be a consequence of a region's decision-making powers, financial resources or policy orientation (Tödtling and Kaufmann 1999).

Policy directed towards stimulating regional innovation systems is probably misguided in most organisationally 'thin' regions. A more adequate approach may be to link regional firms to relevant national and international knowledge resources and firms, and to make efforts to attract and retain innovative firms and highly skilled workers to the region. This points to the need for broker organisations in the regional policy portfolio (Nauwelaers and Wintjes 2000). The situation in organisationally 'thin' regions also emphasises the fact that 'systems' should be understood both from a territorial and a functional perspective. From a functional perspective firms draw on ideas, know-how and complementary assets from customers, suppliers, consultants, universities, funding and training organisations, independent of geographical location (Tödtling and Kaufmann 1999). Thus, firms may innovate successfully without belonging to a regional innovation system as long as they find relevant competence milieus in

national or international innovation systems.

In other areas the relevant actors may be present without forming a working regional innovation system (i.e. fragmentation). The region may have an industrial specialisation comprising many firms as well as relevant knowledge organisations. However, geographical proximity only creates a potential for interaction, without necessarily leading to dense local relations. The interactive practices of innovation nearly always involve some form of qualitative communication, i.e. interpersonal linkages. The existence of social institutions facilitates collaboration and the exchange of qualitative information between actors. Thus, 'in networks and other kinds of "organised" market relations, people develop codes of communication, styles of behaviour, trust, methods of cooperation, etc. to facilitate and support interactive learning' (Gregersen and Johnson 1997: 482). However, in some regions interaction is hampered, leading to a fragmented system.

The first step to strengthening firms' innovation activity in 'fragmented' regions may be to improve relational assets that can lead to closer collaboration between regional actors. Asheim (1998) refers to empirical studies demonstrating that trust and co-operation between regional firms can be intentionally created. An important strategy in that respect may be the development of regional 'club goods', which are assets that are accessible and beneficial to specific groups of firms and organisations in a locality, and which sustain the collective learning capability of regional clusters (Lagendijk 2000). Relevant policy tools may be to invite and engage firms and knowledge organisations collectively in helping to formulate a regional innovation strategy, to create other nodes for local co-operation and collective organisation, as well as to provide bridges between firms and technological and knowledge resources.

In the third kind of region described in Table 2, regional innovation systems exist, but the systems are too closed and the networks too rigid resulting in a 'lock in' situation. This is the other side of cumulative learning and path-dependency that often characterises strong innovation systems: the institutional, social and cultural 'lock-in' of business behaviour. This may arise if a region has historically had a strong regional innovation system based on R&D institutes and vocational training organisations with specialised activities dedicated to a declining technology. Such a regional production and innovation system, which has become technologically mature, must upgrade its knowledge base and promote product innovations in order to break path dependency (Cooke 1998). There is also an inherent danger of 'lock-in' in regional innovation systems owing to a homogenisation of 'world views' (Grabher 1993), and these views may become an obstacle to adjustment when technological trajectories and global economic conditions change. This often creates situations where politicians and labour unions argue for protecting and subsidising firms in declining industries.

In this kind of region it may be relevant to 'open up' strong regional networks, to restructure local organisations or 'club goods', to fuel local mobilisation in order to prise local communities away from obsolete attitudes and knowl-

edge, and to foster access to resources outside the region. Policy tools may also aim to reorient the region's technology support infrastructure towards new technologies and sectors and to stimulate new firm creation as spin-offs from existing organisations.

The Ericsson Consolidation Attempt: An Illustration of Local Powerlessness and Opportunity in a Global Economy

Developments surrounding an Ericsson R&D department, located in a small Norwegian town, are used here to illustrate and analyse important aspects of the interplay of globalisation and regional dynamics. Two specific questions are investigated below :

- how has the fact that the department belongs to a large global company affected the regional dynamics and (lack of) regional attachment?
- what policy strategies are relevant in order to bind the Ericsson department to the regional economy and gain larger local spin-offs?

Ericsson is a large Swedish-owned telecommunications company, with more than 100,000 employees in 140 countries as of 2000. Ericsson has two divisions in Norway; one in Asker, just outside the Norwegian capital of Oslo, with about 550 employees, and another in Arendal, farther south, with 450 employees (Figure 1).² Both divisions concentrate on development; in part the development of new products and components for the Ericsson corporation, and in part the adjustment, installation, testing and servicing of Ericsson products for Norwegian clients (largely consisting of *Telenor*, the public telecommunications company in Norway). Both Norwegian divisions have the Ericsson corporation itself as their largest customer -- accounting for more than half of their activity -- and they compete for development activities with 30 other Ericsson product development departments all over the world.

The Ericsson consolidation attempt in early 1997 refers to Ericsson's plans to move their Arendal division to the then proposed technology park at Fornebu; the plan was to relocate both Norwegian divisions under one roof. Fornebu is the

2. In addition Ericsson Radar AS has around 100 employees in Halden east of Oslo.

former Oslo airport closed down in 1998. The Government has decided to develop Fornebu as a large technology park and incubation centre focusing on the ICT sector and including education, R&D, administration and producer services. The Arendal area found itself in a situation of heavy dependence on the Ericsson plant, not only for the future development of the ICT industry, but to some extent for positive development of the area in general. Apart from the loss of four hundred highly qualified jobs, the local area (both politicians and firm leaders) also feared being labelled a 'looser region'. The public image of a region not able to host a firm like Ericsson because of difficulties in recruiting highly educated personnel, a poorly developed physical and knowledge infrastructure etc. could be very harmful for future industrial development of the region.

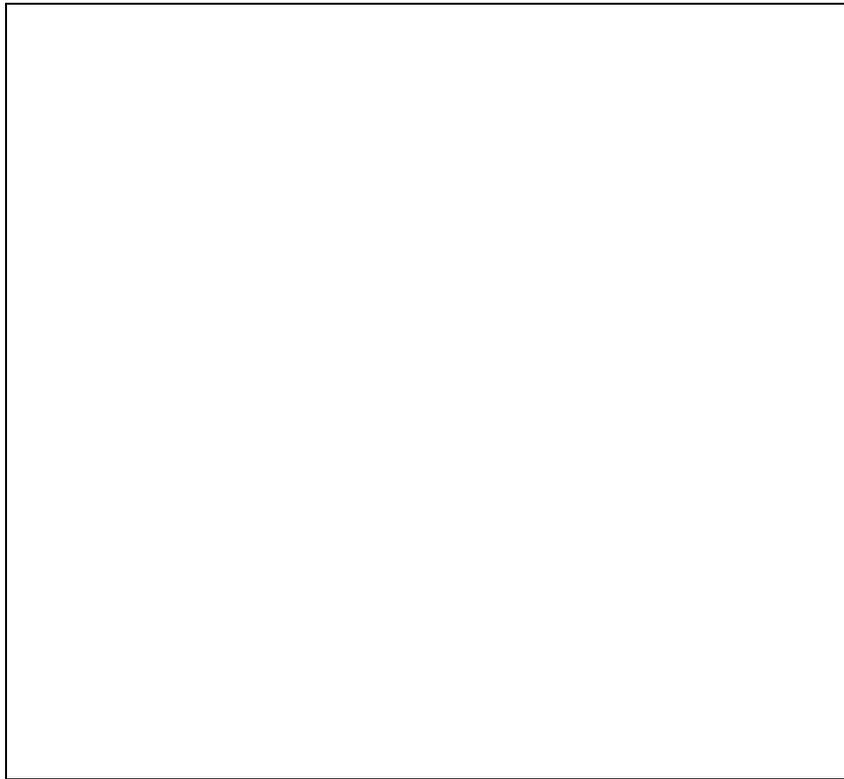


FIGURE 1 The Location of Fornebu, Asker and Arendal

Ericsson's management justified relocating the Arendal division on the grounds that consolidating all their Norwegian activities in one place would enable them to increase productivity sufficiently for Ericsson to maintain current levels of activity in Norway. In addition, they argued that it was necessary to be located close to *Telenor* -- their most important Norwegian client -- that had

decided to relocate its head office and much of its R&D activities employing 6,500 persons to the forthcoming IT-centre. A location in the Oslo region was also regarded as a great advantage as this region houses Norway's largest ICT research and development milieu.³

Workers and management at Arendal, as well as local politicians, argued that relocation was unnecessary as information technology makes it possible for the Asker and Arendal divisions to co-operate without physical proximity. Opponents also pointed out the benefits of having two divisions, namely that Ericsson has two recruitment bases in Norway -- one in a large city area (Oslo) and one in a town⁴ -- which makes it easier to attract qualified workers with different lifestyle preferences. Wage levels are also lower in the Arendal area, and attention was further drawn to the fact that the Arendal region has an active ICT milieu amongst firms and higher education institutes. Thus, the Ericsson department is far from a 'cathedral in the desert'. Arendal has seen the growth of a significant -- by Norwegian standards -- ICT sector, both in terms of number of employees (700 in addition to more than 400 at Ericsson in 1997), number of firms (10-15) and in terms of educational capacity (with, for instance, a technical college educating IT engineers). Although the area has a much lower number of people with higher education in IT than Oslo and some other larger cities, the region benefited from the fastest growth in the number of employees with formal IT competence among Norwegian regions between 1985 and 1996 (Braadland et al 1999).

The resistance met by Ericsson, from employees and from the area in general, led to a U-turn at a board meeting in February 1997. Ericsson's management in Norway claimed that a successful move depended on at least 80% of their employees agreeing to relocate, as the division depends on their firm-specific competence. However, very few of them seemed willing to move to Fornebu.

Ericsson's division at Arendal is a small unit in a worldwide corporation, and the Ericsson consolidation attempt can therefore be placed in a globalisation perspective. Ericsson's relocation plan clearly illustrates how vulnerable local areas can be to the strategic decision-making of TNCs. However, the change in the relocation decision also demonstrates that local areas may hold some power vis-à-vis TNCs, at least with regards to knowledge-based firms such the Arendal unit. This unit is to some degree anchored to its location, because much of its competitive advantage is conferred through the competence and experience of

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3. Ericsson in Arendal is classified as the sixth largest IT-firm in Norway in 1996 when measuring firms' number of employees with higher education in information technology (Braadland et al 1999).
 4. Actually, the Arendal region consists of two smaller towns (Arendal and Grimstad) within a distance of 20 kilometres and a commuting area extending 10-20 kilometres away from the towns. The total population is about 60,000. The area is referred to as the Arendal region although the Ericsson unit moved to Grimstad in 1999.

employees rather than, for example, through access to raw materials, cheap electricity or abundance of unskilled labour. An area can also draw great advantage from establishments that are a part of TNCs. Such establishments have greater opportunity for development than they would have as relatively small national companies. As part of a TNC an establishment has greater access to capital, competence, technology and partners for co-operation, as well as access to a brand name and a sales and marketing apparatus.

The Arendal ICT-Industry: Towards a Regional Innovation System

The framework in Table 1 is a useful tool for discussing the status of the ICT industry in Arendal and the way this industry could be developed into a more innovative industrial milieu. In 1997, the region's ICT industry could be classified as a regional cluster: in an attempt to identify (potential) regional clusters in Norway by the use of extensive statistical material, the electronics industry in Arendal appeared as one candidate in 1990 (Isaksen and Spilling 1996). However, the industry does not form a regional innovation network, nor a regional innovation system due to little formal co-operation between local firms and between firms and knowledge organisations. This fact also demonstrates the need to distinguish between the various types of regional cluster when the concept is used as an analytical tool. The Ericsson department had for several years been referred to as an engine of local industrial development. However, during the Ericsson event, the local managers at Ericsson spoke of the department as an engine without wagons to emphasise the lack of local collaborators. Ericsson is embedded in the sense that many engineers have made Arendal their home and are strongly committed to the place, as revealed in the Ericsson 'battle'. In 1997 its link to the region was mainly through the labour market, not through co-operative local networks: Ericsson had little impact on the endogenous development process.

With the Ericsson department, the ICT industry at Arendal (with some modifications) resembles the territorial production systems of type A and B in the typology of Maillat and Grosejean (1999). These are production systems with little or no territorialisation or with little or no inter-firm relations. Typical cases are subsidiaries of large Fordist firms, dependent on a hierarchy located outside of the region, and large firms that internalise almost all functions of the value-added chain without cultivating any substantial relations with other actors in the region. Typically, these types of production system do 'not favour endogenous development, because [they do] not engender a collective learning process in the region, nor [do they] favour the development of resources which are specific to the territory' (op. cit.: 5). The capacity to generate endogenous development in a regional production system or cluster depends on the intensity and nature of symmetrical relations between actors. In terms of the framework in Table 1,

clusters have to develop into innovative networks or innovation systems to raise their potential for endogenous development. What are the barriers to endogenous development in the Arendal ICT industry when seen from the innovation system approach? Have these barriers been lowered by local initiatives in the wake of the Ericsson affair?

In 1997 the ICT industry in the Arendal region suffered, to a certain degree, from all three barriers in Table 2. The ICT industry was first of all characterised by a lack of innovation interaction between local firms and between firms and knowledge organisations, i.e. fragmentation. This reflects a skewed firm structure consisting of the development department of Ericsson, two large contract suppliers of electronics components and several smaller firms within specific niches. The lack of innovation interaction also reflects the fact that the Ericsson unit has to deal with issues like secrecy and proprietary knowledge. The Arendal region was also organisationally 'thin', having no research institute or technology transfer organisation. The region had a technical college, although there was relatively little co-operation between the college and Ericsson or the rest of the local IT industry. The industry was not characterised 'locked-in' to any particular degree. Only the Ericsson engineers could be characterised as 'locked-in'. There were practically no spin-offs from Ericsson.

The barriers to a regional innovation system in the ICT industry in Arendal have actually been lowered since the Ericsson affair in 1997 by the development of 'club goods' that serve wider purposes than the local ICT cluster. This development is not so much the result of deliberate local public planning, but rather the result of several individual actions spurred by the mobilisation process in the wake of the Ericsson affair and backed by some national support organisations. An important initiative was the opening of a Technology Forum by Ericsson and nine other local firms in spring 1997. The Forum may be denoted as a 'support club' for the local industry, a lobby organisation and a 'meeting place'. The Forum stimulated collaboration and a learning culture between local firms and the local technical college (this point is made in Table 2). The Forum also initiated a local incubator organisation and a local venture capital fund that invests in new technology based firms, making the area less organisationally 'thin'.

A new specialised course at the local college also evolved as a direct result of lobbying during the Ericsson affair. Thus, the state owned college obtained the permission and resources (from the Government) to educate masters students specialised in ICT. Another important decision was the relocation of the Ericsson department to a new office building near the local college, strengthening collaboration with the college.⁵ The college, Ericsson, the local department of Telenor and two other firms started an ICT laboratory at the college in 1998 to

5. Ericsson recruits candidates from the college, researchers at the firm are supervisors for students' masters theses and Ericsson staff teach in the masters course.

stimulate common research projects and learning.

Ericsson and the college now form the centre of a new technology park. This local initiative is also assisted by the national support organisation SIVA, specialised in developing regional innovation milieus. The park includes more than 40 firms and organisations, among them the incubator organisation, the venture fund and around 15 small and 'new born' ICT firms. The incubator organisation also operates a national support programme to stimulate commercialisation of research college and research institutes results. The technology park quickly met the national criteria qualifying it as one of Norway's 10 science parks.

New local institutions or collective assets have appeared in the wake of the Ericsson event, and new ICT firms have been established. Ericsson itself outsourced a 50 person engineering and installations department to another TNC (the US based Flextronics) in 2000, locating its new unit at the technology centre. Ericsson judged that the demand for the department's services would fall as the products are becoming simpler to install. However, the outsourced department has acquired new customers and expanded its number of employees.

Conclusion:

TNCs as Interfaces Between the Global and the Local?

How may the Ericsson case advance our understanding of regional dynamics and globalisation? In answering this question we first have to keep in mind that economic globalisation may affect regional dynamics in a variety of ways. It may bring about increased world-wide sourcing based on the principle of comparative advantage and of lowest possible production costs; this may have negative welfare implications and low multiplier effects in the areas containing cost competing branch plants and subcontractors. World-wide sourcing has been enabled by developments in transportation and communication technologies, and further stimulated by liberalisation and de-regulation of international trade and financial markets.

On the other hand, globalisation offers new opportunities for firms in dynamic regional clusters to be included in global networks, for example to form specialised nodes of intermediate products in longer global production chains (Storper 2000a). Endogenous development processes are seen as the principal way for regional clusters to enter global networks. Firms become competitive through the mobilisation of location-specific resources, and it is now customary to consider that 'the regional context (...) to a large extent, determines how successful that firm is in the global competition' (Rutten et al 2000:248). Economic specialisation or the creation of regional clusters is seen as the only way for regions to overcome the 'globalisation trap', i.e. the risk of being outcompeted across the board (Lagendijk 2000).

The Arendal units' ability to continue to serve the Ericsson company, with its specific skill in the development of advanced ICT systems, reflects this second possibility. However, the continued competitiveness of these activities appears to require the support of a working regional innovation system. This enables the Ericsson unit, for example, to recruit highly qualified engineers and draw on knowledge and ideas from other specialised local firms.

At least two major policy initiatives may be important in order to enable 'fragmented' regional clusters like the Arendal ICT industry to 'climb up the hierarchy' in Table 1. A first proactive task is to increase co-operation between local firms in order to form regional innovation networks and increase collective learning and the competitiveness of local firms. When one or a few large firms dominate the local industry, this task may take the form of upgrading local suppliers from being 'jobbers', that produce according to detailed instructions, to being 'co-makers', that take part in the innovation and engineering process of their customer. As revealed by data from the Eurostat Community Innovation Survey, the most important external sources in firms' innovation performance are partners along the value chain, and in particular clients and customers. Thus, inter-firm relationships may be the best way to improve the innovative capabilities of local firms. This may, however, be a difficult task in areas dominated by TNCs. Indeed, corporate subcontractors are often assumed 'to develop no local collaboration that might inspire "learning" and instead remained tied to their partners in other locations. This analysis significantly undermines the idea of using corporate branches to kick start learning processes in backward and declining regions' (Vatne and Taylor 2000: 14-15). The Ericsson case reveals a need to qualify such a statement as a general conclusion as this corporate R&D department certainly is involved in local learning processes.

The next and more reactive task is to bind the units of TNCs more strongly to a local industrial milieu. The upgrading of local suppliers may also be important in this respect. Deliberate initiatives to create and upgrade local knowledge organisations and develop regional 'club goods' may further embed units of TNC. TNCs may then find it profitable to maintain some activities, and some innovative activities too, in what may become a dynamic regional innovation system. The local unit of a TNC may also have a stronger likelihood of winning the intra-firm struggle for additional activities and investment when located in a knowledge-intensive cluster. It will then have access to a competent work force and specialised local expertise, proximity to knowledge and training organisations, and new ideas and economically useful knowledge can come about through contact and co-operation between e.g. skilled workers, engineers and researchers. Corporations may tap the knowledge base of such a region, i.e. the knowledge intensive region becomes a 'listening post' for relaying back product development and marketing information to the TNC. Such a role may be especially important in new industries and in unstable external environments since 'when the content of knowledge is changing rapidly only those who take

part in its creation can get access to it' (Lundall and Borrás 1997: 34).

This interpretation of the Ericsson affair and the subsequent general discussion of relevant development strategies touches upon a recurrent, broader intellectual effort in economic geography. In analysing regional industrial development we need to understand both the general processes in the industry and society as a whole (as economic globalisation tendencies), how these may affect localities in different ways, as well as how historical social and cultural characteristics stimulate localised learning and the creation of region-specific competencies. This theme has to some extent been overlooked during the last two decades, leading to the danger of overemphasising the importance of local linkages and resources. The position of the region in the global economy is seen to rest upon the quality of social interaction and localised learning. However, non-local linkages are also essential in sustaining competitiveness by allowing for the incorporation of new ideas and knowledge into place-specific learning and innovation processes. In this sense, TNCs may act as interfaces between global production networks and regional economies. By being demanding customers, units of TNCs may for example be important channels for transmitting best practice management and production technique to local firms via user-producer interaction (Cumbers 2000).

From this viewpoint, the global economy is made up of intricately interconnected regional clusters which are embedded in various ways in different forms of corporate networks (Dicken 2000). The precise role played by TNC establishments in global networks, as dependent subcontractors or as R&D departments, will have very significant implications for the development potential of the regional cluster and wider communities in which the establishments are based.

References

- Amin, A. and N. Thrift. 1994. "Living in the Global", in A. Amin and N. Thrift (eds.). *Globalization, Institutions and Regional Development in Europe*. Oxford: Oxford University Press.
- Asheim, B.T. 1992. "Flexible Specialisation, Industrial Districts and Small Firms: A Critical Appraisal", in H. Ernste, H. and V. Meier (eds.). *Regional Development and Contemporary Industrial Response: Extending Flexible Specialisation*. London: Belhaven.
- _____. 1998. "Learning Regions as Development Coalitions: Partnership as Governance in European Workfare States?". Paper presented at the Second European Urban and Regional Studies Conference on *Culture, Place and Space in Contemporary Europe*, University of Durham, UK, 17-20 September.
- Asheim, B.T. and A. Isaksen. 2000. "Localised Knowledge, Interactive Learn-

- ing and Innovation: Between Regional Networks and Global Corporations”, in E. Vatne and M. Taylor (eds.). *The Networked Firm in a Global World. Small Firms in New Environments*. Aldershot: Ashgate.
- Becattini, G. 1990. “The Marshallian Industrial Districts as a Socio-Economic Notion”, in F. Pyke, G. Becattini and W. Sengenberger (eds.). *Industrial Districts and Inter-Firm Co-operation in Italy*. Geneva: International Institute for Labour Studies.
- Braadland, T.E., A. Ekeland and A. Wulff. 1999. “Norske IT-kompetansetiljøer”. *Working paper A-06-1999*. Oslo: STEP-group.
- Boekema, F., K. Morgan, S. Bakkers and R. Rutten. 2000. “Introduction to Learning Regions: A New Issue for Analysis?”, in Boekema, F., K. Morgan, S. Bakkers and R. Rutten (Eds.), *Knowledge, Innovation and Economic Growth. The Theory and Practice of Learning Regions*. Cheltenham: Edward Elgar.
- Cooke, P. 1998. “Introduction. Origins of the Concept”, in H-J. Braczyk, P. Cooke and M. Heidenreich (eds.). *Regional Innovation Systems*. London: UCL Press.
- Cooke, P., P. Boekholt and F. Todtling. 2000. *The Governance of Innovation in Europe. Regional Perspectives on Global Competitiveness*. London: Pinter.
- Cumbers, A. 2000. “Globalization, Local Economic Development and the Branch Plant Region: The Case of the Aberdeen Oil Complex”. *Regional Studies*, 34: 371-382.
- Dicken, P. 2000. “Places and Flows: Situating International Investment”. In G.L. Clark, M. P. Feldman and M. S. Gertler (eds.) *The Oxford Handbook of Economic Geography*. Oxford: Oxford University Press.
- Dicken, P., J. Peck and A. Tickell. 1997. “Unpacking the Global”, in R. Lee, and J. Wills (eds.). *Geographies of Economies*. London: Arnold.
- Grabher, G. 1993. “Rediscovering the Social in the Economics of Interfirm Relations”, in G. Grabher (ed.). *The Embedded Firm: On the Socioeconomics of Industrial Networks*. London: Routledge.
- Gregersen, B. and B. Johnson 1997. “Learning Economies, Innovation Systems and European Integration”. *Regional Studies*, 31: 479-490.
- Isaksen, A. and O.R. Spilling. 1996. *Regional utvikling og små bedrifter*. Kristiansand: Norwegian Academic Press.
- Keeble, D. and F. Wilkinson 1999. “Collective Learning and Knowledge Development in the Evolution of Regional Clusters of High Technology SMEs in Europe”. *Regional Studies*, 33: 295-303.
- Lagendijk, A. 1997. “From New Industrial Spaces to Regional Innovation Systems and Beyond. How and from whom should industrial geography learn?”. Working Paper. Centre for Urban and Regional Development Studies, University of Newcastle upon Tyne.
- _____. 2000. “Learning in Non-Core Regions: Towards ‘Intellegent Clusters’: Addressing Business and Regional Needs”, in F. Boekema, K. Morgan,

- S. Bakkers and R. Rutten (Eds.). *Knowledge, Innovation and Economic Growth. The Theory and Practice of Learning Regions*. Cheltenham: Edward Elgar.
- Lundvall, B-Å and B. Johnson 1994. "The Learning Economy". *Journal of Industry Studies*, 1: 23-42.
- Lundvall, B-Å. and S. Borrás 1997. *The Globalising Learning Economy: Implications for Innovation Policy*. Luxembourg: Commission of the European Union.
- Malmberg, A. 1997. "Industrial Geography: Location and Learning". *Progress in Human Geography*, 21: 573-582.
- Maillat, D. and N. Grosjean. 1999. "Globalisation and Territorial Production Systems". Working papers No 9906b. Neuchatel: Université de Neuchatel.
- Nauwelaers, C. and R. Wintjes. 2000. "Towards a New Paradigm for Innovation Policy?", in A. Isaksen (ed.). *SME Policy and the Regional Dimension of Innovation*. Luxembourg: European Commission.
- OECD. 2001. *Issues paper*. World Congress on Local Clusters: Local Networks of Enterprises in the World Economy. Paris, 23-24 January.
- Porter, M. 1990. *The Competitive Advantage of Nations*. London: Macmillan.
- _____. 1998. "Clusters and the New Economics of Competition". *Harvard Business Review*, November-December: 77-90.
- Rutten, R., S. Bakkers and F. Boekema. 2000. "The Analysis of Learning Regions: Conclusions and Research Agenda", in F. Boekema, K. Morgan, S. Bakkers and R. Rutten (eds.). *Knowledge, Innovation and Economic Growth. The Theory and Practice of Learning Regions*. Cheltenham: Edward Elgar.
- Rosenfeld, S.A. 1997. "Bringing Business Clusters into the Mainstream of Economic Development." *European Planning Studies*, 5: 3-23.
- Scott, A.J. 1988. *New Industrial Spaces*. London: Pion.
- Storper, M. 1997. *The Regional World: Territorial Development in a Global Economy*. New York: Guilford Press.
- _____. 2000a. "Globalization, Localization, and Trade", in G.L. Clark, M. P. Feldman and M. S. Gertler (eds.). *The Oxford Handbook of Economic Geography*. Oxford: Oxford University Press.
- _____. 2000b. "Regional Technology Policies in Europe: A Reflection on TSER Research Projects, 1998-2000, and Where to go From There". Paper prepared for the *Workshop on the Regional Level of Implementation of Innovation and Education and Training Policies*. European Commission, Research Directorate-General XII. Brussels, November 23-14.
- Tödtling, F. 1994. "The Uneven Landscape of Innovation Poles: Local Embeddedness and Global Networks", in A. Amin, and N. Thrift (eds.). *Globalization, Institutions and Regional Development in Europe*. Oxford:

Oxford University Press.

- Tödtling, F. and A. Kaufmann. 1999. "Innovation Systems in Regions in Europe -- A Comparative Perspective". *European Planning Studies*, 7: 699-717.
- Vatne, E. and M. Taylor. 2000. "Small Firms, Networked Firms and Innovation Systems: An Introduction", in E. Vatne, and M. Taylor (eds.). *The Networked Firm in a Global World. Small Firms in New Environments*. Aldershot: Ashgate.