

Localized Learning and Industrial Competitiveness

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Abstract

This paper attempts to place regional development within the context of modern resource base theory. Firms do not locate or relocate in order to make use of ubiquities, but to utilise appropriate differences in regional capabilities, and the paper discusses the nature of such capabilities in enhancing or abating the competitiveness of firms, emphasising the crucial role of collective learning and tacit knowledge of firms and markets.

Learning processes are inherently interactive in nature and generally characterised by uncertainty. Most new knowledge is related to problem-solving, often on a trial-and-error basis, and as such it is normally arrived at incrementally. The interactive processes of solving problems, where the needs of one party becomes the driving force for action of another, contain both codified and tacit elements. Indeed, we argue that in an era when codified knowledge is globally disseminated faster than ever before, tacit, and spatially much less mobile, forms of knowledge are becoming more important as a basis for sustaining competitive advantage.

Regional capabilities can be seen as the combination of the human and physical resources available, the structures established in the region through time, and the regions specific institutional endowment as it is shaped by the previous rounds of knowledge creation. By embodying knowledge useful for particular classes of activities the institutional endowment reinforces the path-dependent nature of regional economic development.

Over time, regional capabilities change as resources are exhausted, as structures decay and as institutions degenerate or become outdated leading to a deterioration of regional competitiveness. Others might even imitate some of the regions capabilities thereby turning them into ubiquities. Sustainable regional competitiveness implies that the process of asset erosion must be compensated by the formation of new capabilities through the replacement of decrepit resources, the rebuilding of obsolete structures or the renewal of outdated institutions.

The paper argues that the ability of regions to adjust their institutional endowment to meet contemporary demands of the firms increasingly require "un-learning". The process of unlearning necessitates the disintegration and removal of formerly important institutions which now acts as a hindrance to further development. This might jeopardise the interest of some individuals or larger groups with the power to prevent or impede the process, thus leading to regional lock-ins.

It is finally claimed, that in the ongoing movement towards a knowledge based economy the adaptiveness of regions to unlearn are of growing significance for a region's perpetual ability to participate in sustaining the competitiveness of an already established industry, or to build competitiveness afresh by developing new industries.

1. Introduction: Towards the knowledge-based economy

Recently, the social and institutional embeddedness of economic activity has become an area of growing interest in economic geography. What is sometimes termed 'socioeconomics' has brought geography closer to disciplines such as evolutionary and institutional economics, industrial economics and organisation, industrial sociology, business administration and political science (Amin and Thrift, 1994). Key concepts are learning, innovation, competence and institutions in this evolving research agenda.

This re-orientation of research reflects ongoing changes in production systems, and a recognition that such systems are not just fixed flows of goods and services - conducted by firms that are little more than stereotype converters of standard inputs into standard outputs - but rather dynamic arrangements based on knowledge creation (Patchell, 1993). It is the ability of firms - as well as regions and countries - to learn, change and adapt rather than their allocative efficiency which determine their long-run performance.

Changes in the international economy has gradually shifted the basis of a firm's competitive edge from static price competition towards dynamic improvements and are favouring firms that are able to create knowledge a little faster than their competitors (Porter, 1990).

As knowledge has become a crucial asset in modern production systems, the ongoing creation of new knowledge has become a key process when trying to sustain or increase competitiveness. The competitiveness of an increasing number of firms is no longer primarily obtained by cost-reduction, for instance in labour wages, but mainly by generating entrepreneurial rents (Spender, 1994) through innovations in the production process, by accessing new, distinctive markets in new and unconventional ways or by producing new, improved or redesigned commodities or services with a significant contribution to the perceived customer benefit of the end product (Prahalad & Hamel, 1990).

Sometimes the process of knowledge creation takes Schumpeterian proportions, and in such cases it:

... reforms or revolutionises the pattern of production by exploiting an invention or, more generally, an untried technological possibility for producing a new commodity or producing an old one in a new way, by opening up a new source of supply of materials or a new outlet for products by reorganising an industry (Schumpeter, (1911)1934).

Moreoften though, the knowledge creation is more humble and unostentatious in its appearance as an ongoing, incremental process that only gradually evolve the present economic system and its constituting elements. It is the speed and extent of the process rather than its instantly visible effects, that have increased, making profound changes in the competitive environment of firms in all parts of the world.

In this paper, we will discuss some notable elements of knowledge creation and its effect. We will focus on the role played by regions in promoting or retarding the competitiveness of firms. We are not denying, that the geographical reach of most firms has been expanding through a number of years and probably will continue to do so in the foreseeable future, nor that many firms today are heavily influenced by circumstances, events and decision in other parts of the world. But we do maintain, that the influence of the firms locational setting is significant enough to justify studying. We further assert that firms are progressively actuated by and dependent on regional capabilities in order to maintain and increase their competitiveness precisely because of the drive towards globalisation and the resulting homogenisation of the former important factors of production. The main argument to be advanced is that differences in national or regional capabilities to contribute to the competitiveness of firms should be seen primarily as the result of territorial specific differences in the ability to create and use knowledge.

2. Knowledge creation

Knowledge can be created by an intensional and resource-consuming effort. More often, though, knowledge is created by learning from experience, by trial-and-error and by repeating tasks whereby insignificant incremental improvements accumulate and gradually result in new and better ways of doing things. Furthermore, a lot of knowledge is created without cost as a by-product of other activities:

The overambitious plans of one period will be replaced by more realistic ones; market opportunities overlooked in one period will be exploited in the next. In other words, even without changes in the basic data of the market (i.e. in consumer tastes, technological possibilities, and resource availabilities) the decisions made in one period of time generate systematic alterations in the corresponding decisions for the succeeding period (Kirzner, 1973, p.10).

Knowledge is an input which in the production process distinguish itself from all others by its frugality: The use of knowledge never reduces the stock. On the contrary, knowledge is used *and created* as an integral part of the performance of all activities in the firm (Prahalad & Hamel, 1990). This process of knowledge creation has no upper limit: firms know only a tiny fragment of what they may find useful to know. And that again constitutes only a fraction of all there is to know (Lundvall, 1994)¹.

Knowledge creation is an activity with a basic element of uncertainty and with an absence of the necessary relevant information to facilitate rational decision making. This complicates intentional knowledge creation as the way to occasion conceivable solutions become unclear and the consequences of all action highly uncertain (Dosi & Orsenigo, 1988). Firms seem to handle such situations by developing internal procedures and routines when searching for possible solutions. These procedures and routines are based on the firm's interpretation of its successful behaviour in the past, and will continually be reproduced and reinforced as long as they seem reasonably efficacious (Nelson & Winter, 1982). Confronted with practice, some ways of doing things are rejected while others function comparatively well and are embedded as part of the internal routines.

Procedures and routines that a firm develop will determine the distribution of its specific actions within the range of possibilities that are open to it at any given time. In a similar way, the firm's previous experiences and competence will have an effect on how probable it is that the results of its actions can be utilised in the future:

Heavy investment in one technological route makes it less likely that alternate, even theoretically more attractive possibilities will be adopted (Zysman, 1994, p. 9).

Over time, generations of rounds of embedded knowledge and other sunk costs will solidify the once chosen distribution of investments and thus limit the range of possible avenues that the firm might take in the time to come (Dosi, 1990). Each new round of knowledge creation takes place on the basis of the perceived demand situation, but is strongly influenced by the successes and failures of former rounds. Knowledge creation is strongly *path dependent* as today's practises,

¹. The creation of knowledge is, however, not a process which challenge the fundamental notion of scarcity in economic theory because of its accompanying characteristics or peculiarities identified in the section: market failure, exchange inability, identification impediments and path dependency. These characteristics infer that the firms competence to identify or use knowledge will be scarce (cf. North, 1994).

routines and types of knowledge are related to those of yesterday, just as those of tomorrow will be related to those of today (Nelson & Winter, 1982²).

Some things are fairly easy to learn, but very difficult to describe or "codify"³. The point might be illustrated with the difficulties of writing a manual describing the process of riding a bicycle to someone with no previous understanding or knowledge of this fine art. Certain types of knowledge can only be learned through experience and can not amply be transmitted in any form (Arrow, 1962). Such knowledge remain exclusively as "tacit knowledge" within the firm (Polanyi, 1962, 1966⁴). The codifiable knowledge can be communicated by symbols and language. It thus has the necessary features to be 'tradeable' (Dosi, 1988), if and when the sufficient market conditions occur⁵.

It is a logical and interesting - though sometimes overlooked - consequence of the present development towards a knowledge-based economy, that the easier codified (tradeable) knowledge is accessed, the more significant becomes tacit knowledge for sustaining the heterogeneity of the firm's resources⁶. If all factors of production, all organisational blue-prints, all market-information and all production technologies were readily available in all parts of the world at (more or less) the same price, economic progress would dwindle (Nelson & Winther, 1977, Loasby, 1990). Resource heterogeneity is the very foundation for building firm specific competencies and thus for variations between firms in their competitiveness. Resource heterogeneity fuels the market process of selection between competing firms.

"The tendency to variation is the chief cause of progress" (Marshall, 1961, V iv 3 p.355).

Information "super-highways", on-line terra-byte databases, global markets for machines and for capital, standardised educational programs and highly skilled mobile labour etc. all erode the

². "Through the joint action of search and selection, the firms evolve over time, with the condition of the industry in each period bearing the seeds of its condition in the following period." (Nelson & Winter, 1982 p.19)

³. The distinction between tacit and codifiable knowledge is crucial to Penrose's (1959) theory of the firm, and thereby to the later so-called resource based theories within managerial economics (Wernerfeldt, 1984), that have taken Penrose as point of departure. "Codification of knowledge is a step in the process of reduction and conversion which renders the transmission, verification, storage and reproduction of information especially easy. Codified information typically, has been organised and expressed in a format that is compact and standardised to facilitate and reduce the costs of such operations (David, 1992, p.7).

⁴. Nelson (1987) and von Hippel (1988) show, however, that on a local level, where firms share the same values, background and understanding of technical and commercial problems, a certain interchange of tacit knowledge do in fact exist. Such ability to interchange otherwise purely internal information constitutes an important part of the competitive advantage of industrial districts (see further on this in section 5).

⁵. It should, however, be noted, that some tacit knowledge is always required in order to use new codified knowledge (Foray, 1992).

⁶. "A resource is said to be heterogeneous when its value (performance) is dependent on which other resources it is combined with" (Håkansson, 1994).

potential areas in which a firm can distinguish itself on the market. What is *not* eroded, however, is precisely the non-tradable/non-codifiable results of the knowledge creation - the tacit knowledge - that can only be produced in practice. It is this fundamental *exchange inability* of tacit knowledge that increases its importance as the internationalisation of business markets proceeds.

The market for information is by definition imperfect. The market mechanism might be fine for allocation of scarce resources, but not for allocation - or indeed for the exchange - of knowledge (Lundvall, 1994). In real-life situations it is often very difficult to determine a market price for information that will satisfy both buyer and seller. The buyer wants to establish whether the information offered is worth the requested price, but given this information he/she is no longer on the market, and the knowledge of this foreseeable reaction will discourage the seller from offering the information in the first place⁷. This *market failure* can only be overcome by developing specialised institutions which remove the interaction between firms from the world of pure market-relations. Without the development of such long-term trust-based relations between firms - secured by relation-specific sunk costs by both parties - a practice will develop, where the process of intentional knowledge creation is aimed only at satisfying internal demands within the producing organisation⁸. Even if such tight relations are indeed established the results of the process of knowledge creation are in many cases only traded in a very old fashioned, pre-capitalistic way: by barter. New knowledge is exchanged directly - without the use of money. You simply need to produce new knowledge in order to get new knowledge.

All economic processes are socially embedded (Granovetter, 1985), and most knowledge is created - and reproduced - through interaction in social networks. The embodiment of knowledge can, however, take different forms, some of which make it very difficult to identify the individual components or pieces of knowledge. Such *identification impediments* do not occur when knowledge is embodied in individuals as specific skills or in fixed capital, i.e. in machines that are used in the production process⁹. But when created knowledge is embodied in the organisation of the firm - in

⁷. "The cost of transmitting a given body of information is frequently very low...In the absence of special legal protection, the owner cannot, however, simply sell information on the open market. Any one purchaser can destroy the monopoly, since he can reproduce the information at little or no cost" (Arrow, 1962 pp. 614 - 615). See also Nelson & Winter, 1982.

⁸. It is partly to overcome such obstacles to exchange of information that new network relations between firms seem to be developing at a faster rate than ever before (Axelsson & Easton, 1992).

⁹. Such machine-embedded knowledge is typically associated with the technology of the product and its production, and it is of great importance in capital intensive industries. The concept production process is here defined in a broad sense, to include not only the physical transformation of inputs to outputs, but the entire scope of firm activities.

form of internal procedures, routines and the gradual building of a firm-specific culture¹⁰ - then it can be very difficult to identify precisely *where* in the organisation the actual changes have taken place - and *how* the embodiment takes place. Routines, culture and organisational skills thus always contain an element of tacitness that increases with the size of the organisation. Complex organisations are almost impossible to imitate (and often difficult to manage) because of such identification impediments related the knowledge embodiment.

3. Limits to learning

Sometimes the process of knowledge creation produces results that are surprisingly successful - even to the firm itself. Such successes give rise to routines of extraordinary durability. Experienced success results in a flatter forgetting curve and accepted best practices assume a life of their own, where yesterday's good ideas become today's policy guidelines and tomorrow's mandates (Hamel & Prahalad, 1994). It is simply difficult to unlearn yesteryear's successful habits, even when they without doubt hinder future success. It is an established fact of life, that it is a lot easier to challenge other's orthodoxy compared with challenging one's own, and firms are frequently lead by their former success into trajectory-specific lock-in situations (David, 1985, Arthur, 1989¹¹). Occasionally whole industries can find themselves in such situations for quite some time, until someone breaks the spell by introducing new ways of doing things.

Unused knowledge might then exist in some form or other - even within firms - because preferences, prices, or routines are not adapted to it (Abernathy et al., 1983). Case studies of differences in plant productivity between competing firms again and again reveal a lack of open communication channels for passing suggestions of improvements to the level of decision making through the filters between departments and between layers of the organisation. Individuals aware of potentially profitable, but unexploited, opportunities find that implicit organisational rules - functioning as self-imposed restrictions - prohibit them from pursuing such opportunities. The routines of the knowledge creating firm also contain a potential to encapsulate non-conformist plans of modifications in established working procedures.

¹⁰. The results of the knowledge creation processes increase the competence and competitiveness of a firm when the knowledge becomes part of its knowledge base.

¹¹. Imai et.al. (1986, p.373) contributes an important part of Japans economic succes to the ability to unlearn former organisational or institutional rigidities through the acceptance of managerial declerations of a state or emergency or crisis, which makes radical

The existence of internal barriers to change in the firm might limit the possibility of utilising knowledge that is already present in the organisation, since they create a firm-specific blindness, even to obvious ways of improvement. A single example from the semiconductor industry can illustrate the point.

Spare parts service for American factories from vendors was often during mid-1980s and late 1980s only 40 hours a week, despite the fact that fabs worked 168 hours a week. Since vendors carried many spare parts, production could be lost (at a lost revenue of several million dollars if the factory was operating at capacity) while a down piece of equipment waited for days for a spare part to be shipped in. The cost of getting the part to the fab more quickly, however, was only the cost of having a vendor's employee wear a beeper and the overtime required for that person to put the part on the plane to the factory. Indeed, many vendors began offering the service free once factories began to ask for it during the late 1980s and early 1990s. Why had no one ever asked before? This was simply not something that engineers in factories would have considered an option. (Flaherty, 1994, p. 21)

In his path-breaking discussion of "the social significance of knowledge about which nothing is known" Kirzner notes that:

Ignorance of knowledge that might be spontaneously, undeliberately absorbed can (...) never be explained in terms of anything other than itself. Such ignorance is simply there. It cannot be accounted for on the grounds of high search and learning costs, since no searching or learning is needed at all even, to repeat, at zero cost. (...) Ignorance of knowledge that can be absorbed without decision is simply the expression and the evidence of a sheer failure to notice what is there to be seen. It can be given a name - lack of entrepreneurial alertness - but it cannot be explained in terms of the standard economics of micro-theory, the theory of deliberate individual decisions (Kirzner, 1979, p. 145).

It is the conversion of knowledge from unused (unusable) to usable forms that create new business opportunities through the activities of entrepreneurs and intrapreneurs. An industry full of clones - or lack of generic variance - is an opportunity to be exploited for any firm that is not locked-in by the same frames of mind (Hamel & Prahalad, 1994).

The aggregate accumulation of competence in an economy is thus dependent not only on the knowledge creation taking place in each individual firm, but also on the speed in which

changes easier to swallow. Lundvall (1992, p.29) makes a distinction between "creative forgetting" and "just forgetting" thus emphasising the role of unlearning as part of the knowledge creating process.

path-dependent lock-in-situations are broken and knowledge creating activities are restored by entrepreneurial activity inside the firm, as well as outside¹².

4. Regional capabilities, institutions and localised learning.

National features and distinctions are not washed away by the formation of global markets. Even though governments imitate each other's successful policies, and adjudicate treaties in order to produce common outcomes, the (seemingly) convergent development of (some) product markets are constituted by firms rooted in distinctive national and regional settings (Zysman, 1994).

Firms do, however, differ extensively in their reliance on the regional capabilities at the place of location. Some firms develop competencies which are able to match their most favourable located competitors. Take a firm like Yamaha, based in a small community in a rural part of Japan, and now the world leader in music instruments. What possible initial advantage did a traditionally oriented region in Japan have to initiate and sustain such a development? Probably none. Still, the firm overcame substantial locational resource disadvantages and successfully challenged world industry leaders (Hamel & Prahalad, 1994). They did so by a superior ability to create and accumulate knowledge internally as a result both of research and development and of an acumen in the day-to-day operations carried out in their different branches or departments (product development, purchasing, production organisation, handling of labour relations, marketing etc). The perceived results of the internal processes were continuously adjusted in interaction with customers, suppliers and other actors in the global business environment.

Such learning processes involving parties throughout the world has always typified certain firms and sectors of industry where strong international network relations can interact with and improve the endogenous competencies of the involved firms and thus augment their competitiveness. In recent years, research in business economics has further called attention to the significance of a close contact to a group of demanding and advanced public or private customers, whose needs wholly or partly premise the development of the market (Porter, 1990). In this situation demand is primarily functioning as a qualitative factor. It is the contact with advanced customers, expressing sophisticated demands, that is of value in the knowledge creation, rather than the quantitative element of easy access to a large market per se. The advanced customers are, however, not

¹². The rate of new firm formation testify of such activity.

necessarily located in the same region as the firm itself, though this might often be the case (Karnøe, 1991).

Some types of knowledge creation depends, however, on a particularly tight relationship between suppliers and customers in order to ensure the necessary, smooth exchange of complex information. Such an exchange of information may be conducted long-distance, but in many cases it is less expensive, more reliable and easier to do so locally (Becattini, 1990). In addition, it is mainly at the local level that a firm's ability to create knowledge will enable it to interact with related firms in process of *collective learning*, where partly codified and partly tacit knowledge are somehow interchanged and utilised in each of the participating firms. The knowledge creation of even the most global oriented firms or sectors of industry are at least to some extent influenced by differences in the economic properties of the region(s) of location.

The competencies of firms are shaped in interaction with not only (global) market structures (Sutton, 1992) and with industry-specific technological trajectories (Teece, 1986, Dosi, 1982, 1990), but also with the resources, structures and institutions of the region of location. Knowledge creation in industrial networks between firms is promoted by social relations and institutions both at the local, the regional and the national level (Håkansson 1982, Storper, 1993, 1994). It is this process of interaction between different levels of the economy that leads to the emergence of specific national and regional systems of knowledge creation that remain and retain their role as key factors in the ascending global economy (Lundvall, 1992, Nelson, 1993).

It is the basic assumption of all studies of the spatial distribution of economic activity that the locational pattern can never be determined by the supply of ubiquities. Firms locate and relocate in order to utilise regional differences of consequence for their competitiveness. The accessible resources, the physical structures and the specific combination or set of institutions in the region define its capability to enhance or abate the competitiveness of firms located within it¹³.

Regional competitiveness¹⁴ can be defined as the capability of the region to attract and maintain firms with stable or increasing market shares in an activity while maintaining stable or

¹³. This holds even though the corporate strategic 'logic' can sometimes impair the specific role of the region of location as noted earlier in this section.

¹⁴. Regions or countries certainly do compete with each other, but when using the phrase "regional competitiveness" we must be aware that it is not a competition in the usual economic meaning of the word (though the increasing application of business-life rhetoric to meso- and macroeconomic problems tend to befog this fact). Firms compete in the sense, that the success of one is often accomplished at the expense of others. Not so with regions and countries. Sweden's present economic crisis have not benefited Denmark nor any other of its so-called competitors in Europe. Rather they have had to share the burdens by encountering declining

increasing standards of living for those who participate in it¹⁵. This capability is based on the resources available in the region¹⁶, the physical structures established in the region through time, and in the regions specific institutional endowment.

Each of the institutions might be created, transformed, eroded and recreated through the economic history of the region. The territorially specific institutional endowment epitomise the results of previous rounds of economic activity and at the same time comprise the setting for new rounds of localised knowledge creation¹⁷. The region's institutional endowment represent "the transmission in time of our accumulated stock of knowledge" (Hayek, 1960 p.27), which simultaneously spur and confine the development of the firms in the region¹⁸.

The institutional endowment of a region or a country should be defined broadly and include all institutions related to the:

- factors of production: capital, labour¹⁹, infrastructure, knowledge
- efficiency of the market for goods and services
- quality of the demand²⁰ and the bargaining power of customers
- governmental forms, the public sector, the political decision-making and implementation process, entrepreneurship

exports. And a high growth rate in the Japanese economy do favour - and not inhibit - the economic growth in Europe and the US (Krugman, 1994).

¹⁵. This is a slightly modified version of a definition advanced by BRIE for the US Competitiveness Council, quoted by Storper (1994). It has been demonstrated (e.g. Kaldor, 1978) that firms in the world's successful regions maintained competitiveness and increased their global market shares even during periods when costs have been rising (Japan, but also Switzerland, Baden-Württemberg). During the same time period, 1963-1973, other countries (Britain, USA) lost global market shares while at the same time reducing their labour costs and their relative export prices.

¹⁶. The extent to which firms may access resources have great influence on their competitiveness. The trade regime that a region is part of thus constitute an integral part of its capabilities. It might be noted, that the use of the term "capability" in the present paper differ from the use made of the same term in some of the resource base literature. According to Barney (1991), for instance, capabilities fall within the category of resources which in turn constitutes the fundamental building blocks of the firm's competitive advantage.

¹⁷. The relations of causality function both ways and form a decisive element the formation of industrial districts. These might be defined as *... a set of companies located in a relatively small area; ...the ... companies work, either directly or indirectly, for the same end market; ... they share a series of values and knowledge so important that they define a cultural environment; ... they are linked to one another by very specific relations in a complex mix of competition and cooperation*". (Brusco, 1990).

¹⁸. Such restrictions do always leave room for discretionary choices, *"...related to the propensities [of firms] to accumulate, to take risks, to trade-off present profits for market shares, to search in some directions and not in others, etc"*. (Dosi, 1988, p.125).

¹⁹. The case of the Nordic "solidaristic wage policy" illustrates that a given regulatory framework can in one situation promote a dynamic process of industrial renewal and technological upgrading, while in another situation it may have the reverse effect. In the 1960s, the national agreements to impose relatively high and equalized wages on all firms in all sectors regardless of productivity and profitability made many firms, and indeed sectors, go out of business, thereby "deliberating" resources (capital and labour) for other sectors. In the 1990s, when low wage sectors have by and large been eliminated, one might assume that the same system will instead tend to decrease the pressure for renewal/upgrading by preventing wages from increasing in highly productive/profitable sectors such as electronics/telecommunications, engineering and forest industry.

²⁰. The growth of firms like Waste Management in the US has not been possible in Denmark mainly because of the structure of the local market, where local monopolies newer got the incentives for specialization, knowledge creation and growth. In the production of energy the situation is different. There is no local monopoly and together with critical customers this have lead to the creation of knowledge and a resource base, resulting in the formation of firms like Crissplant Boilers, B&W Energy etc.

and the rules, practises, routines, conventions, culture, moral beliefs, religion and other basic values characterising the region or the country.

The region's institutional endowment interact with the available physical and human resources or the build environment and the regional infrastructure in constituting its capabilities, which in turn influence the competitiveness of the firms in the region. All of these constituting elements are moulded by historical processes: The present build environment and infrastructure can often be traced back through at least a century, while the physical resources are aeonian. And the region's or country's institutional endowment represent the intricate contemporary interaction between elements of very different age, from the very old (religion, beliefs, values) to the more recent (specific industry standards, regulations etc).

"All 'contemporarity' unite original movements of different cycles, the present emerge simultainously from yesterday, the day before and sometime" (Braudel 1969, p.56).

The regional instutional endowment have a directional effect on the firm's efforts by supporting and assisting some types of knowledge creation while hampering or preventing others. The existence of a well developed local supply base represent, for instance, a set of constraints and opportunities which in practise can be highly directional for the possible choices a firm might make. The process of regional economic development will, precisely because of this, tend to be path-dependent.

An example of such path-dependent development is given by Putnam (1993) who attempt to explain the uneven economic development in Italy by focusing on the differencies in institutional performance - why some democratic governments (in the north) succeed and others (in the south) fail. His main finding is that regions that enjoy effective government, and economic growth, in the 1990s have inherited a legacy of civic engagement that can be traced back to the early middle ages:

.. the regions characterized by civic involvement in the late twentieth century are almost precisely the same regions where cooperatives and cultural associations and mutual aid societies were most abundant in the nineteenth century, and where neighbourhood associations and religious confraternities and guilds had contributed to the flourishing communal republics of the twelfth century. And although those civic regions were not especially advanced economically a century ago, they have steadily outpaced the less civic

regions both in economic performance and (...) in quality of government (Putnam, 1993 p.162²¹).

The path-dependent nature of the regional development is confronted with firms' shifting demands for a specific regional institutional endowment. The outcome of this interaction²² is not determined by any general law and cannot be predicted even by the most sagacious. The process of knowledge creation in the firms may indeed follow existing lines and enhance the attractiveness of the region by adding to an already economically attractive institutional endowment. But it may also lead to entirely new locational demands, resulting in a general economic decline in the region. When analysing aspects of the institutional endowment or - as they phrase it - the "culture of the market" Haskell and Teichgraber (1993) add:

To speak of the 'culture of the market'... is not to assume that culture is merely a reflection of autonomous economic factors, or to suppose that the market is always associated with the same cultural forms, independent of time, place, tradition or human volition. There is no single 'culture of the market'. But, on the other hand, not all cultures are equally compatible with the needs of the market economy. To speak of the cultural implications of the market is to assume that markets, precisely because they are aspects of culture, have cultural concomitants, and that we are able to identify at least some of them. Just what those concomitants are, whether they are best understood as preconditions of market behavior or as results of it, and just how necessary or contingent their connection to market activity may be, are open questions.. (Haskell & Teichgraber 1993, p. 2).

In order to maintain or even increase the capabilities of regions a lot of interest have been directed towards pinpointing institutions (and cultural concomitants²³) which are believed to have an influence on the competitiveness of firms by supporting and assisting their knowledge creation

5. Enhanced knowledge creation: industrial districts

²¹. Other examples include Dore's (1973) observation that the divergence in economic performance between Britain and Japan are closely related to dissimilar institutional configurations, or Hirschman's (1970) application of institutions as trust and loyalty in explaining dissimilarities in economic development between countries and regions.

²². The discourse of institutional economics regard markets as embedded in political and social institutions (North, 1990) and even created by politics and government (Zysman, 1993). In marxian economics, institutions, governments and politics are seen as outcomes of the inner workings of the market.

²³. The unidentifiable cultural concomitants of markets mentioned by Haskell and Teichgraber represent the regional analog to the tacit elements of knowledge described in section 2, and which we will return to in section 6.

In recent years, a strong case has been made for the idea that spatial agglomeration of related economic activities - the formation of industrial districts - does promote firms' upgrading competencies and competitiveness. The mechanisms behind the formation of such systems has sometimes been traced in the logic of transaction costs, increasing returns and agglomeration economies (Scott, 1983, 1988, 1994). Others have directed the attention towards the influence of local milieux, defined broadly as to encompass economical, social, cultural and institutional factors (Aydalot, 1986).

Today, a significant part of the national volume of exports often derives from a relatively small number of geographically delimited and specialised regions in a country. More than a quarter of all the tiles produced by Europe's some 1000 manufacturers comes from the small Spanish town Onda, some 50 kilometres north of Valencia in the region of Castellón at the Mediterranean²⁴. And in northern Italy a few, but well-defined regions represent well over 50 per cent of the total European leather industry, while the total contribution from Germany and the UK only amounts to a miserable 7 per cent. There are also distinctive differences in the industrial profile between regions within individual countries. The British electronics industry is concentrated in a small belt in the south of England, just as the Danish pharmaceutical industry is concentrated in the Greater Copenhagen area, and half of Denmark's 18 biscuit factories are situated in the county of Vejle.

The agglomeration of Danish furniture and clothing industry in the area around Herning/Ikast (Maskell, 1992) constitutes an especially clear-cut example of how the demand of local firms creates a pressure to modify old and build new institutions specially designed to accommodate these sectors. The improved regional capabilities attract new firms of the sector thus leading to a sectorial concentration or clustering.

The concentration of firms in the furniture and clothing industry in Herning/Ikast has provided the basis for a specialised supply of services. This includes transport, logistics, market research, marketing, data processing, design, supply of raw materials and intermediary products, suppliers of machinery and other production equipment for the industry, specialised auditing and credit facilities. The concentration of specialised suppliers represents in itself a major asset for the furniture and clothing firms located in the region in their competition with firms located in less favoured regions. Even more far-reaching for the overall economic performance of the furniture and

clothing industry in the region is the qualitative aspect of specific knowledge creation taking place at all levels. An employee in a local branch of a national bank will, for instance, have been presented with a large number of loan applications from small furniture and clothing firms over the years, and will gradually acquire an extensive knowledge of these two local industries. Such experience will over the years enable the employee to identify unusual projects and specially promising firms. He/she will be able to grant larger loans than otherwise available without increasing the risk for the bank by utilising this accumulated knowledge and - more significantly - have a higher tendency on the margin in allocating of loans towards potential high-flyers. A clerk from the branch of the same bank in another part of the country - who only in exceptional cases has dealt with firms from the furniture and clothing industry - would have to rely solely on the formal requirements to security and credit rating and a general knowledge of the poor probability of survival for small and medium size enterprises like the ones in the furniture and clothing industry. The implication is that banks in Herning/Ikast are far more capable of financing the activities in this sector than banks in any other region. It is not differences in risk, interest level or capital stock, that are of importance, but primarily the differences in competence. Owing to the existence of 'competent capital' in Herning/Ikast along with the other specialised services, firms within the furniture and clothing industry have better conditions for growth and survival in this area than anywhere else in Denmark.

It is worth noting that the many firms within the furniture and clothing industry that were previously located elsewhere in Denmark have almost all disappeared within the last twenty years, while Herning/Ikast so far has been able to compensate for closures by the local formation of new firms. Such a regional 'transmission mechanism' (Nelson and Winter, 1982), by means of which even new firms reproduce the industrial structure of the past into the present, consists of two interconnected elements.

First, theory predicts and empirical investigations supports²⁵ the notion that entrepreneurs within a given business sector will concentrate in areas, where this sector is already strongly represented. Here, the potential entrepreneur has learnt the necessary, trade specific qualifications and gained the needed experiences. In addition, during this period of learning he/she has established

²⁴. The majority (some 55 per cent) of the production is, however, concentrated in the Italian region of Sassuolo in the larger province of Modena and Reggio Emilia (COM DG III, 1993).

²⁵. The phenomenon can be illustrated with data on new firm formation in Denmark. Consider a matrix, where all the 208 sectors (ISIC(69)) in manufacturing industry are placed on one axis and the 12 Danish counties (including the greater Copenhagen area) on

the imperative personal contacts and become familiar with the local institutions, which is a requisite to secure the process of opening a new business. Essentially, new businesses are reproducing the extant territorial configuration of industry rather than breaking it up.

Second, the path-dependent development in itself entails that a geographical agglomeration of firms within a given business sector will make the region involved especially suited to meet the specific location requirements of the firms within the sector. Even assuming that an incumbent is completely free in its choice of location, the optimal location would usually be exactly the regions with a long track record of servicing firms in just that sector: only they have had the opportunity to develop the desired capabilities.

These two factors has in recent years been used to forward the idea that spatial agglomeration of related economic activities - the formation of industrial districts - does promote firms' competence and competitiveness. Such an industrial district is sometimes described as a milieu, defined as a segment of the territory that is characterized by a certain coherence based on common behavioral practises as well as a "technical culture" - a way to develop, store and disseminate knowledge, technical "know-how", norms and values - that is linked to a certain type of economic activity (Coffei & Bailly, 1995).

Four basic characteristics of such milieux may be identified (Maillat, 1994):

- a group of actors (firms, institutions) that is relatively autonomous in terms of decision making and strategy formulation
- a specific set of material (firms, infrastructure), immaterial (knowledge, "knowhow"), and institutional (authorities, legal framework) elements
- interaction between local actors based on co-operation
- self-regulating dynamics that lead to learning, and the ability of actors to modify their behavior and find new solutions as their competitive environment changes.

The "innovative milieu" approach, thus emphasizes the interaction that takes place between economic, socio-cultural, political and institutional actors in a given place: the complex web of relations that ties firms, customers, research institutions, the school system, and local authorities to each other. The region, the territory, is not seen merely as a "container", in which attractive location factors may happen to exist or not, but rather as a milieu for collective learning through intense interaction between a broadly composed set of actors. The milieu is a "created space" that is both a

the other. Though the majority of the cells of the matrix were empty, 87 per cent of the new firms established between 1972-92 were

result and a precondition for learning - an active resource rather than a passive surface (Coffei & Bailly, 1995).

In a similar vein, but in different wording and with a slightly different emphasis, Andersson (1985) lists five preconditions that should be fulfilled if a regional milieu is to become creative:

- high levels of competence
- many fields of academic and cultural activity
- good possibilities for internal and external communications
- widely shared perceptions of unsatisfied needs
- a general situation of structural instability, allowing synergies

Given that firms embedded in the right kind of milieu will tend to learn faster and become more competitive, one should expect a general drive towards agglomeration in such milieux when knowledge creation becomes increasingly important for firm's competitiveness.

In the rapidly growing international literature on industrial districts, there is, however, a striking absence of clear empirically based statements as to precisely how these forces *in general* effect the locational preferences of firms. Thus, it seems relevant to ask: Do we find a dominant tendency towards sectorial agglomeration or not? Do firms that carry out related activities actually tend to cluster in space, and can we identify in the modern world economy "a mosaic of interdependent regional production systems" (Scott, 1994)?

Our own analysis of the development in the location pattern of manufacturing industry in Denmark and Sweden through the last 20 years do show, that although manufacturing industry as such are continually decentralising, there is indeed a general process of concentration taking place *within each sector of industry*. We are also able to identify a number of industrial districts in the two countries. The results reported in the **appendix** do, however, finally demonstrate that the popular Krugmanian way of analysing the clustering process - by using Gini indices or similar measures - may lead to the wrong conclusions.

found in "occupied cells" e.g. in the same sector and region as at least one incumbent firm (cf Maskell, 1994).

More generally we might paraphrase Barney (1991) in submitting, that an institutional endowment of a region can lead to sustainable advantages only if the resulting regional capabilities are valuable (they must allow the firm to create profit), rare (they cannot be in abundant supply), not subject to substitution and imperfectly imitated, meaning that policy-makers in other regions can not readily copy them.

Let us for a moment assume, that the features of Herning/Ikast or Maillats (1994) basic characteristics or Anderssons (1985) preconditions or other similar descriptions of desirable regional attributes reflect generally accepted important elements in a region's capabilities to enhance the competitiveness of the firms of the region. By definition such capabilities must be both valuable and rare: if all regions possessed them they could not constitute the basis for increased competitiveness.

But how easily can the whole institutional endowment of a region or a country be imitated? And are such capabilities not subject to substitution? We will address each of these questions in the remaining two sections of the paper.

6. Sustaining regional capabilities: the problem of replicability

Schumpeter ((1911)1934) argued that successful firms would be followed by an expanding group of competitors which would imitate them and ultimately "catch up". One might think that the same would happen with regions: once a successful combination of institutions was developed in a region, others would immediately start a process of imitation.

But if all regional institutions were instantly imitable, none of the long lasting differences in specialisation and generated income could exist²⁶. The sustainability of localised capabilities to enhance the competitiveness of firms within a specific sector through long periods of time indicate the existence of strong barriers preventing immediate or costless imitation of the total institutional endowment in successful regions²⁷. In fact, no country or region has to our knowledge succeeded in building a sustainable competitive position through imitation.

The present economic success of the ASEAN-countries is certainly not based on a carbon-copy of the Japanese or the American development path, but on a original combination of specialised institutions made to fit the countries own situation and tradition.

²⁶. See Kogut et.al. 1992 for a different approach to this discussion.

²⁷. In a similar line of thought Rumelt (1984) operates with certain "isolating mechanisms" in his discussion of what makes a firm's competitive position stable against imitation.

The Nordic countries represent a historic example of a similar shift of position within the European development hierarchy. These countries have only during the last century, gained their position as part of the economically advanced areas of Europe, with a GDP per capita more than twice as big as the average in the rest of the European OECD countries. This is a result - not of imitation - but of the successful building of specific capabilities through a process directed by governmental policy interacting with century-old, deep-rooted moral beliefs and other similar institutions. Analysing the process of economic development, Menzel & Senghaas (1980) and Senghaas (1985) discuss why some of the marginally located European countries became mature capitalist national economies, while others - despite high growth rates of export - degenerated to peripheries. They see Ireland, as well as southern, southwestern and eastern parts of Europe as representing the latter (peripheral) role, in contrast to which they identify a specific Nordic "development trajectory" characterised by - paraphrasing Amin (1970) - "autocentric development despite world market integration" (Mjøset, 1992).

The Nordic countries were, like many others before the first world war, linked to the world market through the export of staples: fish from Iceland and Norway, agricultural products from Denmark, iron from Sweden and forest product from Norway, Sweden and Finland. The lack of a single European currency enabled the Nordic countries to adjust to changes in prices and productivity vis-à-vis the main foreign markets. More important were perhaps a series of on the whole successful selective interventions, by which the national governments moved on an integration-related knife-edge path between *too little an exposure* to foreign competition, which could lead to inefficiency in the whole national industrial production system and thus necessitating further protection, and - on the other hand - *too great an exposure*, where superior international competitors would discourage the local entrepreneurs by demonstrating dramatically their inabilities, thus leading to an economically destructive "import of helplessness" (Röpke, 1978).

Sengass and Menzel see the egalitarian income distribution and similarly egalitarian distributions of land holdings, as the crucial feature of the Nordic development path, as it guaranteed that the income generated by stable export was distributed across wide social strata within the

various regions, just as it interacted with industry-specific characteristics in favouring the growth of manufacturing industries through forward and backward linkages²⁸.

The general aversion in the Nordic societies against conspicuous consumption (cf. Veblen, 1899) participated in ensuring that accumulated capital was directed into productive use²⁹. The income distribution is also seen playing an important part in the process of consolidating a domestic market, which developed further in the interwar years. The production and reproduction of a specific political, cultural and economical identity in the Nordic countries turned out to be a decisive factor in the local processing of growth impulses from the world market.

Such a historical development is unique in the sense that it does not represent any decisive element of imitation of a development path already used. And any full-scale imitation of the Nordic development path will, on the other hand, be impossible precisely because of the interaction between the current demands and the institutions of the past embedded in the culture of the countries. So it appears, that it is highly complicated and in reality perhaps even impossible to successfully transplant economic institutions from one environment to another - contrary to much thinking in international and regional development agencies.

But if it is true, that imitation rarely happens on a territorial, developmental scale, we need to identify some of the active mechanisms which prevents imitation. Following Dierickx & Cool (1989) - who discuss the competencies of the individual firm - three important factors which prevent imitation can be identified.

Asset mass efficiency is the first, and presumably most important factor. Regions that have already an important stock of R&D- and experience-based know-how, a specialised labour-force or infrastructure etc, are often in a better position to make further breakthroughs and add to their existing stock of knowledge than regions who have a small initial endowments of such factors. This is the traditional home ground of theories of regional economic development, captured by concepts such as external economies of scale, agglomeration economies and cumulative causation.

²⁸ . One might note, that there are probably more linkages extending from timber exports than from exports of olives - thus giving timber-regions (in Northern Europe) a greater development potential.

²⁹ . In this respect the theoretical framework of Sengass and Menzel reflects the works of Max Weber (1904-05). In the Nordic countries of today, it is alright to be rich as long as you constantly display some reluctance with the fact and, preferably, make a point in showing that you share the same values, tastes and ideas of those not so well of. If you brag of your fortune or display your wealth in an unmistakable, noticeable way, you will be penalized in business, as well as in society at large.

The second major reason why a favourable institutional endowment in a region is not readily imitated by others has to do with the phenomenon of *time compression diseconomies*, as illustrated by the classical dialogue between a British lord and his American visitor:

"How come you got so gorgeous lawn?" "Well, the quality of the soil is, I dare say, of the utmost importance." "No problem." "Furthermore, one does need the finest quality of seed and fertilisers." "Big deal." "Of course, daily watering and weekly mowing are jolly important." "No sweat, just leave it to me!" "That's it." "No kidding?!" "Oh, absolutely. There is nothing to it old boy; just keep it up for five centuries." (Dierickx & Cool, 1989 p.1507)

Regional institutions as infrastructure, skills, traditions, culture, legislation, language etc., have been constantly developing through a number of centuries vastly exceeding five, and the lack of any time compression device will in itself tend to discourage the initiation of any imitation process (Putnam, 1993).

The third safeguard against imitation is the *interconnectedness of asset stocks*, i.e. the complex web of linkages between the national, regional and local institutions. Some factors are needed in order to utilise others. A rival might acquire some of the vital components or ingredients but will in practice find it difficult to duplicate the more or less comprehensive pattern of internal coordination and learning as well as other similar institutions of a more or less tacit nature (Prahalad & Hamel, 1990). Institutions might even interact in the origination of derivatives with profound influence on the economic development of the region by being "in the air", but not contributable to any specific institution, formal or informal.

The structural role and specific functioning of some of the most important knowledge creating institutions might even be poorly understood by the economic agents in the region itself (Harrison, 1992). The discrepancies between scholars in identifying and decoding the decisive elements in the examined industrial districts are unmistakable, even when the studies draw heavily on interviews with local managers. Precisely because of the many tacit institutions involved the members of the local managerial class have no universal or generally accepted understanding and interpretation of the inner workings behind the apparent locational advantage of their district. The more important such tacit elements of knowledge are in the proper functioning of an economic system, the more difficult will it be to imitate: it is simply not transparent for a potential imitator which elements are important and which are not (Lippman & Rumelt, 1982).

Besides the barriers to imitation erected by asset mass efficiency, time compression diseconomies and interconnectedness of asset stocks it is never easy to construct new institutions even if all the relevant information were at hand. How can the necessary resources be acquired? How can they be combined? How can the desirable coalescence of new institutions be prevented from getting contaminated by the interaction with the receiving regions' old, depreciative or repugnant institutions? Problems like these necessitate careful consideration and a lot of effort to solve. Still the effort might not give the intended results. Even if in some odd case imitation happens to be possible, it just might not turn out to be desirable at all³⁰.

So firms that are dependent on localised institutions can benefit over considerable periods of time because institutions are transferable over time: their use lead to their reproduction and their transmission from one generation to the next. And by being non-imitable over space they continue to be rare, thus forming the basis for continual knowledge creation.

7. Deterioration of regional capabilities

History have taught us not to disregard the tenaciousness of regional capabilities. More often than not the regional capabilities have a potential to be more durable than assets on which they were built: the resources available in the region, the physical structures and the institutional endowment. Regions replace decrepit resources, rebuild obsolete structures and restore outdated institutions.

The firms in Detroit has retrieved some of their former competitiveness in car manufacturing and the watch-industry of Switzerland has recovered and even expanded its share of the world market after restructuring from fine mechanics to the world of the micro-chip (Coriat & Bianchi, 1995). Through a perpetual process of incremental replacements the individual assets in the region will be modified over time but the fundamental capabilities are preserved, nurtured and enriched with new dynamism and vigour. Once established, regional capabilities do not vanish easily.

³⁰. This point has previously been made in the theoretical debate within development economics: *"One aspect of development strategy that is all too often overlooked is related to the desired structure of consumption to which the society should aspire. If the goal is to 'catch up with the rich countries', and 'to close the widening gap', then the consumption patterns to which the society implicitly aspires are those of the developed countries. The ends of development, therefore, will be essentially imitative. But suppose it is precisely this imitative pattern which underlies the mechanisms of dependence?"* (Girvan, 1973, p.27).

This do not signify, however, that localised capabilities on which the firms depend, can continue forever. Capabilities can deteriorate for a number of reasons, thereby undermining the competitiveness of the firm located in the region. A decline in former strong regional capabilities can be the consequence of various specific and local reasons, which can be gathered under the headings of asset erosion (Dierickx & Cool, 1989), substitution (Porter, 1990) and lock-in situations (David, 1985, Arthur, 1989).

Asset erosion describe the process whereby hitherto important localised institutions are no longer reproduced in the same pace or to the same degree. The transmission mechanism can be curbed by the redirection of indispensable skills towards other types of jobs, for instance in a swelling public sector, or by changes in attitudes and values away from entrepreneurial activity.

The interaction between producers and users can be broken by structural changes (concentration and mergers, buy-outs, closures etc.) thus obstructing the knowledge creation which was based on the specially knowing, demanding and critical customers. The important Danish industrial strongholds in pharmaceuticals (NOVO, Ferrosan, Dumex, Lundbeck, Løvens etc) and medical utilities (hearing aids, hospital equipment) have developed historically in close contact with demanding medical staff in the hospitals. Cuts in public expenditure in the health sector and the present drive towards privatisation could easily strangle this decisive interaction. Asset erosion can also imply the exhaustion of imperative natural resources, the congestion of requisite infrastructure or the obstruction of essential channels of communication in ways beyond repair.

Substitution represent a special form of asset erosion where new technology rapidly devaluate former investments in for instance skills, education and infrastructure, thus undermining the region's capabilities. Regions in which the economic development was favoured by massive investments in channels were less fortunate when the technological development lead to the construction of railroads etc.

Normally, a region gradually develops its physical, social, institutional and cultural structure in correspondence with the needs of the existing industry. Even if we assume that each round of building new institutions or improving the old is based on and perfectly adjusted to the most advanced technological, organisational or market knowledge available at the time, there is always a risk that the resulting institutional endowment in the long run will turn out to become an obstacle to future development. Such hindrances may be physical, but, perhaps paradoxically, they

seem more often to be social and cultural. This phenomenon, that a region over time tends to develop institutions that hinder future success, as result of decisions that were in themselves very advanced in their time, is sometimes referred to as *penalties of taking the lead* (cf. Veblen, 1939, Gershenkron, 1962). Correspondingly, the fact that a region has previously been lagging behind, and thus has not developed the structures of the "last round of investment, and the ones before", might in certain cases turn out to become an *advantage of backwardness*. The absence of physical structures and social institutions adjusted to yesterday's level of technological and organisational development may become an advantage when trying to implement those of today or tomorrow. Today's "old industrial regions" are sometimes the "new industrial districts" of earlier phases.

Thus, not only firms experience difficulties when they face the need to unlearn former successful routines (see section 3). In regions, the process of unlearning will often necessitate the disintegration and removal of formerly important institutions which now acts as a hindrance to further development. This might jeopardise the interest of some individuals or larger groups with the power to prevent or impede the process, thus leading to *regional lock-ins*. Friedrichs (1993), in proposing a theory on urban decline, gives several examples of how "local élites", made up by corporate management, trade unions and urban/regional managers or politicians, tend to form alliances that will act to prevent structural change in periods when previously dominating industries decline. By trying to protect their vested interests, they will prolong the period of crisis and delay the efforts to develop or attract new types of economic activity, and thereby to shift the regional economy into a new track. Maybe this is most obvious in traditional "mono industrial" milieux dominated by large firms. In the steel industry, for instance, the "Ruhr patriarchy" in Germany or the "steel aristocrats" in Pittsburgh, U.S., have played such roles during an extended period³¹.

Nevertheless, there appears to be great variation in the ability of regions to unlearn. Evolution and adaption can seemingly be augmented through the specific institutional endowment, which makes it possible in some regions but not in others to inaugurate new and simultaneously dissolve impeding old institutions.

In the ongoing movement towards a knowledge based economy such "un-learning"-capabilities might turn out to be of paramount significance for a region's ability to attract firms and

³¹. In his analysis of changes in the rate of economic growth and development at the level of the nation state Mancur Olson (1982) present further evidence to suggest that vested interest increasingly encumber economies during periods of stability, and therefore results in a deceleration of economic growth (cf. North, 1994).

participate in sustaining their competitiveness in an already established industry, or to build competitiveness afresh by developing new industries.

8. Conclusion

The basic assumption of this paper is that long-term industrial competitiveness is related to the ability of firms to continuously upgrade their knowledge base and performance, rather than obtaining static efficiency through identification and exploitation of cheap resources and economics of scale. Inherent in this view is that knowledge is a key asset for competing firms, and learning a key process.

Learning processes are inherently interactive in nature and generally characterised by uncertainty. Most new knowledge is related to problem-solving, often on a trial-and-error basis, and as such it is normally arrived at incrementally. The interactive processes of solving problems, where the needs of one party becomes the driving force for action of another, contain both codified and tacit elements. Indeed, we argue that in an era when codified knowledge is globally disseminated faster than ever before, tacit, and spatially less mobile, forms of knowledge are becoming more important as a basis for sustaining competitive advantage.

The general character of learning processes has two implications for the argument put forward in the paper. The first is simply that history matters. In order to cope with the uncertain and incremental character of learning processes, firms develop various routines and procedures. Experienced success will tend to make such routines extraordinarily durable, and this, in turn, will tend to establish path dependent 'learning trajectories'.

The second implication is that proximity matters. The interactive character of learning processes will in itself introduce geographical space as a necessary dimension to take into account. Modern communications technology will admittedly allow more of long distance interaction than was previously possible. Still, certain types of information and knowledge exchange continue to require regular and direct face-to-face contact. Put simply, the more tacit the knowledge involved, the more important is spatial proximity between the actors taking part in the exchange. The proximity argument is twofold. First, it is related to the time geography of individuals. Everything else being equal, interactive collaboration will be less costly and more smooth, the shorter the distance between the participants. The second dimension is related to proximity in a social and

cultural sense. To communicate tacit knowledge will normally require a high degree of mutual trust and understanding, which in turn is related not only to language but also to shared values and 'culture'.

The benefits of proximity can be translated into a force of spatial agglomeration in relation to firms engaged in interactive learning processes. If the nature of the learning process contains elements that are enhanced by proximity between actors taking part in the exchange, it seems natural to assume that this is an important explanation to the well known fact that related industries so often tend to be attracted to specific places which thereby develop into more or less specialized industrial milieux. In such places, knowledge tends to become embedded, not only in individual skills and in the routines and procedures of organizations, but indeed in the milieu as such, or rather in the relations that connect different firms to each other and to the wider institutional context.

Hence, we can attach to the concept of regional capabilities, not only the general human and physical resources of a region, but also to the knowledge that is embedded in its industrial and institutional structure. If such regional capabilities are valuable, rare and difficult to imitate in other places, they translate into durable competitive advantages for the firms located in the region, as compared to firms located elsewhere. In analogy with a resource base view of the firm, we contend that regional capabilities are not easily imitated because of asset mass efficiency, time compression dis-economies, and interconnectedness of asset stocks.

The two main conclusions of the paper may thus be summarized. The path dependent and interactive character of knowledge creation is a key to the understanding of the contemporary emergence and reproduction of spatial agglomerations of related firms. We should emphasize here, that this does not apply only to the case of the narrowly defined small firm based industrial district, that has yielded so much attention in recent years. We argue that the process can be found in all industries where interactive learning is a key element in the reproduction of competitiveness, even if the industry is dominated by larger firms.

Regions distinct institutional endowment - embedding knowledge and allowing for knowledge creation - interact with the available physical and human resources in constituting its capabilities, which in turn influence the competitiveness of the firms in the region. The path dependent nature of such regional capabilities makes them difficult to imitate thereby establishing the basis of sustainable advantages.

The view of industrial and regional change that is implicit in the above line of reasoning is one of inert systems and gradual change. It is tempting to assume that path dependent processes of knowledge upgrading - and regional specialization - would go on for ever. History tells us, however, that this is not the case. In the final section of the paper, we identify three processes which can make regional capabilities deteriorate: asset erosion, substitution and lock-ins. While the strategy and policy implications of our two main conclusions would seem fairly straight forward - sustainable competitiveness of firms and regions is built on creation of specialized learning capabilities and gradual continuous upgrading of an existing knowledge base - this last element of our argument necessitates the addition of a third conclusion.

Then firms and whole regions enter a track of cumulative learning, there is a need to remain open for radical change which will sooner or later require, to paraphrase Schumpeter, a readiness for creative 'un-learning'.

* * *

Appendix: Industrial localisation in Denmark and Sweden

The degree of localisation, or regional concentration, of industries can be assessed through the use of various measures, such as locational quotients, localisation index, Herfindahls index or Gini index etc. In the following, the results of some calculations of Gini indices, based on regional industrial statistics for Denmark and Sweden will be reported. The results reported here emerge from a Nordic research project on regional production systems. Within this project, similar data is in the process of being prepared for Iceland, Finland and Norway, as well.

The Gini index is normally calculated so that a value approaching 0.5 indicates that an industry is extremely concentrated (all employment in one region), while a value close to zero indicates a totally even distribution. The Gini index for the manufacturing industry as a whole describes how much the regional distribution of manufacturing employment deviates from a totally even distribution (i.e. a hypothetical situation where every region have precisely the same share of the national employment). The Gini index for individual industries compares the regional distribution of the industry in question with that of manufacturing industry as a whole. The calculation procedure is described, e.g. by Krugman (1991a, s. 55f).

It is a well established fact that the post-war period has been characterized by an overall process of regional dispersal of manufacturing industry, in the form of a gradual shift of location from metropolitan areas and traditional industrial core regions, to smaller towns and less industrialized regions. This trend has been carefully documented for all the Nordic countries (e.g. Andersson & Malmberg, 1988, Lundmark & Malmberg, 1988, Maskell, 1982(1986), Skonhoft, 1982) as well as for other parts of Europe (e.g. Keeble et al, 1983) and North America (e.g. Norton & Rees, 1979). The "discovery" of this process attracted considerable interest in the 1980s, not least since it in such an obvious way contradicted some previously taken for granted beliefs regarding an almost law-like tendency to regional concentration of industrial capitalism:

Concentration within countries is the rule. This fact may signal the operation of a general localization principle in man's use of the earth: initial location advantages at a critical stage of change become magnified in the course of development. Geographical differentiation starts out as a matter of homeopathic doses of mild concentration and winds up as a system of massive localization based on a wide range of internal and external economies of scale. (Ullman, 1958 p. 196)

If measured with Gini index, this process of decentralisation is seen as a decreasing index over time, i.e., the distribution of manufacturing employment between regions becomes more even. Thus, in Sweden, the period from 1970 to 1990 meant a 15 per cent net job loss in manufacturing industry as a whole (150 000 jobs in absolute terms). At the same time, there was a 30 per cent decrease in the number of plants, from almost 14 000 to some 9 400. Consequently, the average number of employees per plant increased, from 62 to 82 during the period. In this process, where a shrinkage of manufacturing employment went hand in hand with a size concentration at the plant level, we can note that the overall regional distribution of manufacturing employment became more even. Calculated for Sweden divided in 270 small regions (municipalities), Gini-index fell from 0.290 in 1970 to 0.277 twenty years later. In Denmark, both the number of persons employed and the number of plants fell with some 13 per cent between 1972 and 1990, and Gini index, calculated for 275 municipalities, fell rather sharply: from 0.421 to 0.335.

This result would seem to indicate that Krugman's (1991b) recent effort to develop a theory that explains "why manufacturing in general might end up concentrated in one or a few regions of a country, with the remaining regions playing the 'peripheral' role of agricultural suppliers to the manufacturing 'core'" (p. 485), is of less urgency.

However, even if there has been a general trend towards regional decentralisation of manufacturing industry seen as a whole, it may still be the case that individual industries do exhibit a spatially clustered location pattern, and that this pattern is being reinforced over time. In other words, what has been registered as a process of overall spatial dispersal in manufacturing industry, might well be the net result of a restructuring process whereby individual industries become more localised.

Calculations of Gini indices for Denmark and Sweden (see table 1 and 2), support the view that this is a rather accurate description of a process that has been going on since the early 1970s. With manufacturing divided in 84 industries, most industries show remarkably high values on the Gini index. Furthermore, this strong localisation at the level of the individual industry is becoming reinforced over time. In Sweden, 64 out of 84 industries become more regionally concentrated over time, even though it should be admitted that the differences are fairly modest in most cases. The Danish pattern is even more clear-cut. Between 1972 and 1992, no less than 79 industries become

more localised (rising Gini indices) while only five industries become more dispersed (falling Gini indices).

There is thus strong evidence indicating that individual industries tend to become more localised over time. This is in itself an interesting result. What has been registered as a process of industrial dispersion at the level of manufacturing industry as a whole, seems to go hand in hand with a process of spatial concentration at the level of the individual industry, if sufficiently disaggregated. It is, however, not unproblematic to regard this as an uncontested empirical support for the argument that localised learning is not only a key process in sustaining competitiveness, but also a process that fosters agglomeration of related activities. There are several reasons for this.

First, there is a strong relation between the size of an industry and its degree of regional concentration. Small industries, i.e. industries with few firms and modest employment are normally highly concentrated regionally. The most regionally concentrated industries, often turn out to consist of only one or a few plants, and often these plants are located in different places (municipalities). Thus, in Denmark, none of the six most localised industries consist of more than ten plants, nationwide. Therefore, a very high Gini index often indicates that an industry is small or highly concentrated at the firm/plant level, and this does not necessarily mean that the industry consist of several spatially clustered firms/plants.

Second, more considerable changes in Gini index, seem primarily to show up in industries that have gone through intense restructuring processes over the twenty year period. Industries where the net number of plants increase tend to exhibit a lower Gini index in 1990, compared to 1970, and the opposite goes for the industries where a large number of plants disappear over the period. In the Swedish clothing industry (ISIC 3220), for instance, there was a net decline of 625 plants, and 27.000 jobs. Consequently, Gini index rose from 0.349 to 0.440. Among the industries where the Gini index fell, thus indicating diminishing spatial clustering, we find several of the most expanding industries such as production of cars (ISIC 3843), plastics (ISIC 3560) and instruments (ISIC 3851). This raises some doubts regarding the thesis put forward in much contemporary literature on flexible specialisation and new industrial districts: that localisation is a means for the firms in an industry to increase their upgrading ability and competitiveness. It indicates, rather, that the strongest tendency to increased regional concentration is found in industries where competitiveness has been low, and where, consequently, many firms/plants have disappeared during the twenty year period studied. If

this is a general tendency, then it seems doubtful to associate spatial clustering with industrial dynamism and strength.

There is also a third reason to question the appropriateness of Gini index as a measure of localisation, as it has been used by Krugman (1991a) and others. A regional production system is made up by a set of related firms that are spatially clustered. To use Gini indices - calculated for industries defined along the lines of ISIC classifications - in order to identify localised production systems therefore is problematic. Firms classified in the same industry need not be at all related (not even through competition on the same market), while, on the hand, we know several cases where firms in different industries (e.g. rubber, steel, glass) may be strongly related in the sense that they make up a functionally integrated production system (e.g. cars).

Even if we were to accept ISIC industries as acceptable approximations of "related firms", there might be other, better ways to identify industrial district type formations, than to look for industries with extremely high Gini indices. Thus, for example, one might use locational quotients to assess in which region a certain industry is "over-represented". We could, rather arbitrarily, stipulate that a region should have 3.5 times larger share of national employment in a certain industry than its share of national employment in manufacturing as a whole in order to be regarded as specialising in this industry. We can then decide that a region with this kind of over-representation in a particular industry, should have a minimum number of independent producers (e.g. ten) in the industry, to be seen as hosting a regional cluster. By such a procedure, 29 regional clusters can be identified in Sweden. Wood industry form the basis of eight of those, predominantly in various small towns in Småland, in the south east, while there are seven regional clusters in the clothing industry, with the city of Borås close to Gothenburg as the dominant centre, and three regional clusters in metal products, two of which (Gnosjö and Mora) have gained some national and international recognition as industrial districts. The remaining eleven clusters are connected to one industry each. In Denmark, the same definition, leads to the identification of 15 spatial clusters. Thus, there are clusters based on printing industry in Copenhagen, pharmaceuticals in the the northern suburbs of the same region, and furniture and clothing in West Jutland. It is, however, interesting to note that few of the spatial clusters identified through such procedure belong to industries with extremely high Gini indices.

By way of summarising, we might draw a number of conclusions from the results reported here. First, while manufacturing industry as whole tends to become more regionally decentralised,

most individual industries tend to become more localized. Second, this localisation process at the level of the individual industry cannot be regarded as an indicating that industrial district-type formation tend to evolve on a broad scale. Third, therefore, in order to define spatial clusters of related firms, we would need another division of economic activity than that provided by ISIC, and it may well be that we find industrial district formations also in industries that do not show high values when measured by Gini index.

INSERT TABLE 1
AND 2
FOUR PAGES

Industrial classification

For mining, quarrying and manufacturing industries
ISIC 4 digit-level (1969 version)

2301	Iron ore mining
2302	Non-ferrous or mining
2901	Stone quarrying, clay and san pits
2909	Other mining and quarrying
3111	Slaughtering, preparing and preserving meat
3112	Manufacture of dairy products
3113	Canning and preserving of fruits and vegetables
3114	Canning, preserving and processing if fish
3115	Manufacture of vegetable and animal oils and fats
3116	Grain mill products
3117	Manufacture of bakery products
3118	Sugar factories and refineries
3119	Manufacture of cocoa, chocolate and sugar confectionary
3121	Manufacture of other food products
3122	Manufacture of prepared animal feeds
3131	Distilling, rectifying and blending spirits
3133	Malt liquors and malt
3134	Soft drinks and carbonated waters industries
3140	Tobacco manufactures
3211	Spinning weaving and finishing textiles
3212	Manufacture of made-up textile goods (except wearing apparel)
3213	Knitting mills
3214	Manufacture of carpets and rugs
3215	Cordage, rope and twine industries
3219	Manufacture of other textiles
3220	Manufacture of wearing apparel (except footwear)
3231	Tanneries and leather finishing
3232	Fur dressing and dyeing industries
3233	Manufacture of leather products and leather substitutes
3240	Manufacture of footwear (expect rubber and plastic footwear)
3311	Sawmills, planing and other wood mills
3312	Manufacture of wooden and cane containers
3319	Manufacture of other wood and cork products
3320	Manufacture of furniture and fixtures (except primarily of metal)
3411	Manufacture of pulp, paper and paper board
3412	Manufacture of containers and boxes of paper and paper board
3419	Manufacture of other pulp, paper and paper board
3420	Printing, publishing and allied industries
3511	Manufacture of basic industrial chemicals (except fertilizers)
3512	Manufacture of fertilizers and pesticides
3513	Manufacture of resins, plastic
3521	Manufacture of paints, varnishes and lacquers
3522	Manufacture of drugs and medicines
3523	Manufacture of soap and cleaning preparations etc.
3529	Manufacture of other chemical products
3530	Petroleum refineries
3540	Manufacture of os miscellaneous products of petroleum and coal
3551	Tyre and tube industries

3559	Manufacture of other rubber products
3560	Manufacture of other plastic products
3610	Manufacture of pottery, china and earthenware
3620	Manufacture of glass and glass products
3691	Manufacture of structural clay products
3692	Manufacture of cement, lime and plaster
3699	Manufacture of other non-metallic mineral products
3710	Iron and steel basic industries
3720	Non-ferrous metal industries
3811	Manufacture of cutlery, hand tools and general hardware
3812	Manufacture of furniture and fixtures primarily of metal
3813	Manufacture of structural metal products
3819	Manufacture of other fabricated metal products
3821	Manufacture of engines and turbines
3822	Manufacture of agricultural machinery and equipment
3823	Manufacture of metal and wood working machinery
3824	Manufacture of special industrial machinery
3825	Manufacture of office, computing and accounting machinery
3829	Other machinery and equipment, and repair
3831	Manufacture of electrical machinery and apparatus
3832	Manufacture of telecommunications products
3833	Manufacture of electrical appliances and house wares
3839	Manufacture of of other electrical apparatus and supplies, and repair
3841	Ship and boat building, and repair
3842	Manufacture and repair of railroad equipment
3843	Manufacture of motor vehicles, parts and accessories
3844	Manufacture of motorcycles and bicycles
3845	Manufacture and repair of aircraft
3849	Manufacture of other transport equipment
3851	Manufacture of of professional and scientific instruments
3852	Manufacture of photographic and optical goods
3853	Manufacture of watches and clocks
3901	Manufacture of jewellery and related articles
3902	Manufacture of musical instruments
3903	Manufacture of sporting and athletic goods
3909	Manufacturing industries not elsewhere classified

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