THE COMPETITIVENESS OF FIRMS AND REGIONS 'UBIQUITIFICATION' AND THE IMPORTANCE OF LOCALIZED LEARNING

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Abstract

In traditional location theory there is a distinction between factors of production for which the costs differ significantly between locations, on the one hand, and production inputs which are in practice available everywhere at more or less the same cost (i.e. so-called ubiquities) on the other.

In this article, we discuss the process whereby some previously important location factors are actively converted into ubiquities. With an admittedly rather horrendous term, we label this process 'ubiquitification'. It is argued that ubiquitification is the outcome of the ongoing globalization process as well as of a process whereby former tacit knowledge gradually becomes codified.

Ubiquitification tends to undermine the competitiveness of firms in the high-cost areas of the world. When international markets are opened up and

Introduction

Since the early 1970s, it has become increasingly recognized that the location of economic activity cannot be properly understood in isolation from its wider socio-economic and technological context, and thus that we cannot understand spatial economic change without linking it to the overall processes of transformation of capitalist production systems, institutions and markets. Within this broader contextualization of economic geography, the 1990s have seen a marked turn towards the study of the role of knowledge in creating and sustaining industrial competitiveness, and the role of location in the process of learning. The advantages of being in the right type of local milieu in general and the benefits of spatial proximity between actors involved in business interaction have recently been

when knowledge of the latest production technologies and organizational designs become globally available, firms in low-cost areas become more competitive. In a knowledge-based economy, as a consequence, firms in high-cost areas must either shield some valuable pieces of knowledge from becoming globally accessible, or be able to create, acquire, accumulate and utilize codifiable knowledge a little faster than their cost-wise more favourably located competitors.

Focusing on learning processes, the article maintains that most firms learn from close interaction with suppliers, customers and rivals. Furthermore, processes of knowledge creation are strongly influenced by specific localized capabilities such as resources, institutions, social and cultural structures.

held to explain differences in the innovative performance of firms and industries (Feldman and Florida, 1994; Cooke, 1995; Saxenian, 1994; Morgan, 1997; Asheim, 1997), the existence of industry agglomeration (Lung et al., 1996; Malmberg et al., 1996) as well as the durability of patterns of regional specialization (Malmberg and Maskell, 1997).

In this article we focus on the impact of geographical location on the ability of firms to create and sustain competitiveness in an era of increased economic globalization.¹ The article addresses a series of questions related to industrial competitiveness on the one hand, and the development of regional and national economies on the other. Thus, the discussion will revolve around three inter-related questions:

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- What is competition about in today's economy, and how is the performance of firms and industries related to space and place?
- Why do geographical areas (local milieus, cities, regions, countries) tend to specialize in particular types of economic activity, and why are patterns of specialization, once in place, so durable?
- How can firms in high-cost regions sustain competitiveness and prosperity in an increasingly globally integrated world economy?

According to the emerging resource-based view of the *firm*² adopted in the article, competitiveness can only be built on heterogeneous resources or competencies: on the firm's access to and control over something wanted by others, or ability to do something which its competitors cannot do as well, as rapidly or as cheaply. The heterogeneity may be obtained by the firm acquiring some scarce resource in general demand (like a fishing right, a mineral deposit, a corner location, a wave-length for radio or television transmissions, etc.). Usually, however, heterogeneity is a result of the combination of initially homogeneous resources which through 'historical success translates into favourable initial asset stock positions which in turn facilitate further asset accumulation' (Dierickx and Cool, 1989: 1507).

No firm is completely self-contained in the sense that it can operate regardless of all factors in its environment. Some complementary assets are normally needed and firms engage with each other to obtain these. Firms also need resources acquired on factor markets at a local, regional, national or sometimes even global level.³ But as long as not all factors are acquired on global markets, the competitiveness of otherwise identical firms diverges as a result of the way in which difference in location shows up in their strategy. The specific combination of localized factors which influence the distribution of economic activity between and within each country or region constitute the area's localized capabilities. Thus, firms might differentiate themselves by their location and - as a consequence by being able to utilize dissimilar territorially specific resources and localized capabilities.

In order to enhance the competitiveness of firms, the specific localized capabilities of the area of location must represent a combination of assets of significant value and rareness. As the locational demand of firms changes over time, the localized capabilities must adapt and transform in order to remain valuable. Hence, capabilities are not just a passive reflection – an embodied historical recording – of what has happened in the region or country recently or long ago. Localized capabilities are also modified or reconstructed by the deliberate and purposeful action of individuals or groups within or outside the area.

Firms interact on markets which are social constructions, embedded in territorially specific institutions which define and secure property rights and enable economic transactions (North, 1994: 360). Furthermore, if not regulated, supervised, and controlled by painfully constructed public, semipublic or cooperative bodies operating at regional, national or supranational levels, most (if not all) current markets would sooner or later either disintegrate into chaos or deteriorate by the formation of oligopolies. A functioning market thus depends on a 'strong society'. Wigren and Persson (1996: 63-4) capture this in a nice way when they state that Adam Smith's much quoted 'invisible hand' can only do its job if firmly fixed at the end of 'the long arm of the law'. Well functioning and organized markets for products and production factors must be seen as a specific (non-tradable) localized capability. Localized capabilities thus link the concepts of regions and countries to the concept of the firm.

Firms of a certain kind find some localized capabilities more valuable than others. The originally chosen location of an industry might have been basically accidental. But once in place, the specialized locational demands from the firms will influence the future development of the localized capabilities, making it advantageous for the industry to remain in the area, and for outlying firms to relocate (Enright, 1994). The market selection mechanisms ensure that firms located in areas where the localized capabilities are specially suited to accommodate and satisfy their needs will have a better chance of survival and growth than similar firms located elsewhere. When firms of a certain kind gradually concentrate in areas with localized capabilities which they find valuable, the demand for future changes in these capabilities usually becomes rather manifest and unconfused. Modifications in the built structures, the skills and competencies of the workforce, or the institutional endowment of the area will all tend to make the

(new) localized capabilities even more valuable for the firms located there. Consequently their competitiveness vis-a-vis competitors located elsewhere is further augmented.

The process of territorial economic development will tend to be highly path-dependent because of relocation and new firm formation in the already principal industry. A well developed local supply base represents, for instance, a set of constraints and opportunities which in practice can be very directional for the possible choices a firm might make, just as some distinctive feature of the demand structure in the region or country might further enhance an already exceptional pattern of specialization. The differences in capabilities between regions or countries will (by definition) be revealed in discrepancies in the competitiveness of firms located there, with long-term consequences for their survival rate. Once in place, localized capabilities will continuously be retained and reinforced by positive feed-back loops, as long as they are considered valuable.

In the next section we discuss how and to what extent formerly valuable localized capabilities might be converted into 'ubiquities'. We argue that the process of globalization is in fact eroding the localized capabilities of the high-cost areas of the world, thus undermining the competitiveness of firms located there. When international markets are opened and the latest production technologies and organizational designs become globally available, firms in low-cost regions become increasingly competitive.

Globalization, ubiquitification and the knowledge-based economy

Globalization is an uneven and complex process in which, among other things, the production and exchange of commodities gradually expand beyond the territory of the nation state to include still larger parts of the globe (Dicken, 1998). The driving forces behind this process of globalization are the economies of scale and scope resulting from a deepened territorial division of labour. The process of globalization is fuelled by ongoing improvements in the efficiency of international exchange of goods and services. These improvements are in turn the result of several mutually reinforcing processes: investments and technological advancements in the systems of transport, communication and capital transfer; governmental agreements (GATT, WTO, EU, Nafta, Asean, technical standards, etc.) on the reduction of former economic and non-economic barriers (Sykes, 1995); expansion in the number, scale and scope of cross-border interfirm collaborations and of internationally operating firms (Dunning, 1958); and the escalating efficiency of downstream mass distribution and sales (Kline, 1991).

In traditional location theory (Weber, 1909), a distinction was made between two types of production input. On the one hand, there are factors of economic importance for the operation of a firm for which the costs differ significantly between locations, so-called localized materials. On the other hand, there are materials and other production inputs which in practice are available everywhere at more or less the same cost, which are called ubiquitous materials. Weber used the distinction between localized materials and ubiquities to determine the degree of market-pull on the location of industries: the larger the element of ubiquities in the final product, the more strongly would the potential savings in transportation cost pull the industry away from the sources of raw material towards a location near the customers.

The Weberian distinction still holds, even though changes have occurred over time in the list of critically important location factors. But for each and every location factor, the former significance of which is shrinking, the position of some other factor will be rising. For instance, when water power dominated as the source of energy in most industries, the flow of rivers and streams comprised one of the most prominent location factors. Later coal replaced rivers on the list of significant location factors, but the functioning of the transport system made waterways remain a fairly important factor, until the railroads finally pushed them almost into worthlessness. Today, access to motorways is a far more important location factor than rail-links for most industries. So when the location factors of yesterday disappear down the list, a new list of the currently most prominent location factors automatically takes shape.

Traditionally two processes have determined shifts in the relative importance of locational factors.

There may have been a cease in *demand* for a formerly important factor, perhaps caused by some innovation in the production process, leading to the use of new inputs or a change in the magnitude of various existing inputs. Alternatively, the *supply* of a localized input may have changed: natural deposits have become exhausted while new sources are discovered elsewhere; labour has become scarce where it used to be abundant; suppliers have relocated; the geographical concentrations of demand have shifted, etc.

As a repercussion of the ongoing globalization, a third process has recently emerged which actively converts formerly localized inputs into ubiquities. A large domestic market is no advantage when transport costs are negligible; when the loyalty of customers to local suppliers is dwindling; and when most trade barriers are eroded. Domestic suppliers of the most efficient production machinery are no longer an unquestioned blessing, when identical equipment is available worldwide and at essentially the same cost. The omnipresence of organizational designs of proven value makes, furthermore, a long industrial track record less valuable. Hence, the relevance of the Weberian distinction has not tapered off as globalization has progressed and transportation costs have diminished in relation to production costs. On the contrary, the Weberian distinction composes the pivotal linkage between locational theory and modern resource-based theory of the firm.

No firm can build competitiveness on ubiquities alone, and little economic progress would be made anywhere if everyone were able to do exactly the same in all places at once. In order to enhance the competitiveness of firms, a localized capability must thus be valuable, and in order to be valuable it has to be rare. Without being rare, there is no way in which a regional or national capability can be valuable. If, however, a formerly important and rare localized capability is somehow turned into a ubiquity - making the localized capability equally available at the same cost to all firms more or less regardless of location - the capability loses its importance. Firms whose competitiveness depended on it will be penalized in the market just as, at an aggregate level, the established patterns of regional or national specialization will be jeopardized. In other words: as ubiquities are created, localized capabilities are destroyed.

When the globalization process gradually converts many previously important location factors into ubiquities, the competitiveness of firms exposed to international competition will increasingly be associated with one of the remaining localized factors, upgraded by the process of globalization: labour costs. The intertwined process of globalization and ubiquitification thus presents genuinely new opportunities for domestic or foreign firms in low-cost countries. Some countries in South East Asia have, for instance, experienced extraordinarily high growth rates through most of this decade, while Eastern Europe has more recently risen in importance as a destination for direct investments and as a producer for Western markets.

In the same process, firms in the world's highcost areas might easily be eliminated by the process of globalization. Their benefit from an expansion in global demand can be more than offset by their loss of competitiveness as previous regional or national capabilities are turned into ubiquities. Firms in high-cost countries cope with such challenges in various ways. Some raise their capital/labour ratio through massive investments, while others outsource or relocate part or all of their activities to low-cost areas. 'Automate, emigrate or evaporate', as the saying goes.

Many firms do, however, meet the challenges in a less habitual way by no longer chiefly aspiring to obtain competitiveness through cost-reduction, but by generating entrepreneurial (Schumpeterian) quasi-rents through enhanced knowledge creation (Spender, 1994). This phenomenon as such is not new, but the extent to which knowledge creation influences and shapes the economy - and the extent to which this phenomenon is being acknowledged in economic research - is certainly increasing. Gradually a knowledge-based economy (OECD, 1996) is materializing, where the competitive edge of many firms has shifted from static price competition towards dynamic improvement, favouring those who can create knowledge faster than their competitors (Porter, 1990; Chandler, 1992). Following Carter (1994), the shift towards a knowledge-based economy may be characterized by three elements:

- the growing importance of economic transactions focused on knowledge itself
- the rapid qualitative changes in goods and services

 the incorporation of the creation and implementation of change itself into the mission of economic agents.

There is a spatial aspect to this transmutation. Some regional or national settings are more predisposed than others to support and advance the knowledge creation process in the industry of today (Mjøset, 1992; Gertler, 1997). This adds a new entry to the list of currently important location factors influencing the geographical pattern of industry: the knowledge assets and learning abilities of local, regional or national milieus.⁴

In the next section we will expand on this line of thinking. In doing so, we regard knowledge and knowledge creation in the broadest possible sense. Knowledge creation thus includes activities such as investment in R&D and the development and adoption of leading-edge technology. Equally important, however, are the 'low-tech' learning and innovation that take place when firms in fairly traditional industries are (more or less) innovative in the way they handle and develop resource management, logistics, production organization, marketing, sales, distribution, industrial relations, etc. Based on an analysis of some general characteristics of knowledge and knowledge creation and a discussion of the distinction between tacit and codified knowledge, we put forward the argument that the codification of tacit knowledge is a process very similar to the process of ubiquitification discussed above. We then go on to discuss how firms can go about protecting their knowledge assets from losing value by codification and its close follower: ubiquitification.

Knowledge creation

Knowledge distinguishes itself from all other input in the production process by its extraordinary durability: the use of knowledge never reduces the stock. Actually, the use of knowledge often creates new knowledge as an integral part of the performance of all kinds of activities carried out in the firm (Prahalad and Hamel, 1990). Firms get more knowledgeable about their products, their production process, their customers and suppliers, etc. as time goes on.

Learning from experience (Kant, 1787; Arrow,

1962; Lucas, 1988), by trial and error (Anderson, 1976) and by repetition (Scribner, 1986), give rise to incremental improvements in firms and markets. These improvements accumulate over time, and gradually result in new and better ways of doing things (Boldrin and Scheinkman, 1988). Experience is, however, no guarantee of innovation or even improvements as the 'solutions to some surprisingly simple technical problems appear to have eluded producers, despite centuries of repetitive activity' (Young, 1993: 444). Stagnation is indeed a very stable and sustainable condition, as long as it includes the entire economic system. Furthermore, even the process of piecemeal alterations does not always represent a gradual calibration bringing the firm or the regional or national economy still closer to perfection. Also false conclusions can be drawn by misinterpretation of the facts at hand. Some such faults correct themselves, while other erroneous deductions (sometimes based on extremely narrow samples) can become widely dispersed if everyone believes that others have made sufficient validation, and no lethal or instantaneous consequences prove them wrong.

New knowledge can also be created intentionally, as a resource-consuming effort, e.g. through public or firm-based R&D activities. Sometimes the outcome is of significantly less value than expected, while at other times pleasant surprises occur, partly because the outcome may enhance the ability to absorb and utilize already existing knowledge (Cohen and Levinthal, 1989). Still, deliberate knowledge creation is an activity in which the necessary relevant information to facilitate rational decision making is absent (Dosi and Orsengio, 1988). The time and cost involved in reaching the desired result are difficult to estimate, just as the possible economic gains may easily be distorted by some unforeseen turn of events. Knowledge is, furthermore, in itself always associated with some ambiguity as to what it is really about and what use can be made of it (Reed and DeFillippi, 1990; Alvesson, 1993).

Firms seem to handle this basic uncertainty 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 they will continue to be reproduced and reinforced as long as they seem reasonably efficacious (Nelson and

Winter, 1982; Salais and Storper, 1992; Hodgson, 1993). Some novel ways of doing things are rejected when an attempt is made to put them into practice, while others function comparatively well and are gradually embedded as part of the internal routines. Routines allow the firm to economize on finding facts and processing information, just as its procedures simplify the everyday tasks of making decisions (Simon, 1982; Heiner, 1983).

Procedures and routines that a firm develops will determine the distribution of its specific actions within the range of possibilities that are open to it at any given time. Each new round of knowledge creation is strongly influenced by the successes and failures of former rounds, and this limits the range of possible avenues that the firm may take in the future (Nelson and Winter, 1982; Dosi, 1990).

Intentional knowledge creation is thus strongly path-dependent (Arthur, 1994), representing 'the transmission in time of our accumulated stock of knowledge' (Hayek, 1960: 27). The path-dependence is furthered by the strong element of asset mass efficiency in knowledge creation and accumulation. Firms, regions or countries that already have a large stock of R&D and experience-based know-how, a specialized workforce or infrastructure and so on, are often in a better position to make further breakthroughs, to add to their existing stock of knowledge, than those that have only a limited initial endowment of such factors.

Both major, path-breaking innovations and insignificant incremental improvements accumulate in the organizational structure of the firm as routines and will gradually result in new and better ways of doing things. Other improvements from the process of search and selection are embedded in the individual employees as acquired skills, qualifications and training, while still others are embedded in the fixed capital of the firm through its investments in machinery, etc.

Sometimes the process of knowledge creation produces results that are surprisingly successful even to those directly involved in the process. Such results tend to beget routines of extraordinary durability. Success creates internal bonds and firmspecific commitments that can make routines more durable than needed: they are retained and sometimes even aggressively defended long after changes in the external conditions of the firm have made them redundant (Demsetz, 1988). It is difficult to unlearn successful habits of the past, even in cases where it is obvious to everyone concerned that they hinder future success (Imai et al., 1986, Hedberg, 1981). Lack of unlearning often goes hand in hand with an increasing resistance towards new ideas, a growing bureaucratic inertia and a general organizational degeneration, especially when the firm is operating in generous markets (Eliasson, 1996).

Occasionally, too, regions and countries get caught in specific, initially successful ways of doing things which later events convert into shackles hindering further progress (Elbaum and Lazonick, 1986). Entire industries can find themselves in such situations for quite a while, until someone breaks the spell by introducing new ways of doing things. In this way all firms, regions or countries can accommodate smaller or larger pieces of unused knowledge in some form or other because preferences, prices or routines are not adapted to them (Abernathy et al., 1983). Conventions, customs and habits epitomise the underlying imperceptiveness towards improvements.

The accumulation of useful knowledge in an economy is thus dependent not only on the knowledge creation that takes place in each firm, region or country, but also on the speed at which path-dependent, lock-in situations are broken and knowledge-creating activities are restored by the serendipitous or purposeful activities of undogmatic entrepreneurs (Schienstock, 1997).⁵

Codification and ubiquitification

Initially, most pieces of knowledge probably appear in a form which is exclusively tacit (Polanyi, 1958; 1966): a person gets an idea or becomes aware of some hidden relationship or new opportunity (Cowan and Foray, 1996). Such purely tacit knowledge is at first accessible to the individual only, and much new knowledge will remain that way (Eliasson, 1996). Sometimes, however, a piece of knowledge is shared with others who have the capacity to understand the idea and grasp its implications and importance. Still the knowledge remains in a mostly tacit form, existing solely within this smaller group of persons, who often share some common trait which made the original transmission possible (Vygotsky, 1962; Lave and Wenger, 1991; Antonelli, 1995).

Over time, many pieces of knowledge gradually become more codified. Codified knowledge can be communicated by symbols and language, and thus has the necessary features to be tradable (Dosi, 1988), if and when sufficient market conditions occur. What is actually codified depends on the scope of the codification process, whether deliberate or not, and on the idiosyncrasies of the agents involved in the process. Hence, codification is not merely a procedure for relocation of knowledge from one sphere to another (Hatchuel and Weil, 1995), but also a metamorphosis whereby the composition of the knowledge is irreversibly changed (Foray and Lundvall, 1994).

Codification can take place in different ways, some of which are mainly unpremeditated consequences of tacit knowledge being used. Sometimes, for instance, a new approach turns out under closer examination to represent a general phenomenon, which over the years might become formulated as a universal law or principle. More frequently, the new approach to a problem gets better understood by its use and refinement in practice. Gradually its constituent parts are identified as the new method is broken down to still more elementary segments. With each step of unravelling and simplification, the description of the ingredients in the new approach becomes easier, and the prospects improve for communicating them to individuals unacquainted with the specifications of the original problem.

Besides the mainly unintended or even unanticipated ways of knowledge creation and codification, quite deliberate efforts may also be made (Antonelli, 1995). Rent-seeking owners of new or old pieces of knowledge, which they envisage will be valuable to others, can feel a strong incentive to engage in a codification process in order to reach these potential customers. Codification is usually needed to embody the knowledge in software or in the hardware of a machine, sold later with some mark-up. The software or the machine is thus only a medium for the knowledge-owner's appropriation of rents streaming from the knowledge owned. The more a firm is able to codify its tasks, the less time and money are needed for instruction, guidance, training and supervision of the employees. Some

degree of codification is indispensable for obtaining economies of scale and scope.

Furthermore, codification is not just transforming knowledge into a form which increases its economic value. Codified knowledge often in itself represents a tool for producing new knowledge. The existence of a codified knowledge-base reduces the barriers to identifying and filling holes in the existing bulk of knowledge, and makes it easier to cultivate a line of thought still further, or to enrich an already diversified field of techniques, theories and data. This virtue of codified knowledge will in itself act as an incentive for still further codification. Technological progress is to a large extent the result of an interlinked process of knowledge creation and subsequent codification. Codification is thus at the heart of the whole philosophy of industrialization.

Market creation, cost reduction and intentional learning have in common that they are motives for rent-seeking owners of knowledge to engage in a process of codification. One would, perhaps, expect the accumulated effect of this effort to be a steady increase in the codified knowledge-base, and a corresponding decrease in the volume of seasoned tacit knowledge, still uncodified. This is, however, not the case for many reasons.

One reason is that not all pieces of knowledge are in fact potentially codifiable. A familiar type of barrier is seen in situations where the costs of codification evidently exceed the benefits. Such situations can arise from lack of demand for the codified piece of knowledge or from attempts to codify exceedingly complex pieces of knowledge. Certain things, which can be fairly easy to learn, can be very difficult and costly to describe or codify (von Hippel, 1994). Even knowledge shared by large groups of people - for instance the knowledge of how to use a language as a means of communication - cannot be codified at all easily. Such knowledge might remain for ages in a more or less tacit form within one or more countries, while linguists struggle to identify and disentangle its intricacies (Polanyi, 1958, 1966).

Uncertainty might also prevent the total elimination of the tacit knowledge-base. For some pieces of knowledge codification might be profitable, but the lack of sufficient information to calculate the pros and cons leaves this potential untapped and the knowledge uncodified.

Other more innate barriers to full codification can

also be identified. It appears that some tacit knowledge is almost always required in order to use new codified knowledge (Dreyfus and Dreyfus, 1986; Pavitt, 1987; Rosenberg, 1990; David, 1992; Foray, 1992; Gertler, 1995). It is difficult for people to learn certain things without at least some small but significant prior (tacit) knowledge, gained by hands-on experiments and training. The requirement of possessing tacit knowledge before being able to utilize any codified knowledge must, if universally true, necessarily lead to a cumulative growth in the tacit knowledge corresponding to the growth in the codified knowledge-base.

When Grossman and Helpman (1991) demonstrate how global access to knowledge leads to increasing convergence in real income growth-rates, one might add that any attempt to obtain aboveaverage growth rates will thus depend heavily on the ability to utilize some spatially confined tacit knowledge (Zander, 1992; Baumol et al., 1994). The size and composition of the tacit knowledge-base of a region or country do perhaps constitute fundamental ingredients in its ability to perceive and absorb any valuable innovation generated outside its borders.

The rent-seeking possessor of any piece of knowledge will have a strong economic incentive to prevent as much as possible of it becoming generally available. But even if or when the process of dissemination is slowed down by such action, neither firms nor individuals can hope to preserve the new codified knowledge forever. Any codification of a piece of knowledge will eventually lead to its diffusion, thereby undermining the present possessor's possibility of using it as an ingredient in sustaining competitiveness (Allen, 1983). When formerly tacit knowledge is converted into a fully codified form, a process is initiated which will sooner or later – usually sooner – turn it into a ubiquity by making it accessible on the global market.

The linkage between codification and ubiquitification has severe consequences for the firms in high-cost areas of the world. The more or less immediate effect of codification is the same as for all other former assets which have been turned into ubiquities: the knowledge loses its potential to contribute to the competitiveness of the firm. No firm exposed to international competition and located in a high-cost area can, therefore, depend solely on already fully codified knowledge. Two distinct processes of ubiquitification are thus simultaneously at work in devaluing previously precious regional or national capabilities: the process of globalization of factor and commodity markets and the process of codification of knowledge. But if all factors of production, all organizational blueprints, all market information, and all production technologies became readily available in all parts of the world at (more or less) the same price, few possibilities would exist for producing in a high-cost environment (Nelson and Winter, 1977; Loasby, 1990).

In high-cost as well as low-cost environments the process of ubiquitification thus erodes some of the potential areas in which a firm can distinguish itself on the market. What is not eroded, however, is the non-tradable/non-codified result of knowledge creation - the embedded tacit knowledge - that at a given time can only be produced and reproduced in practice. The fundamental exchange inability of tacit knowledge increases its importance as the globalization of business markets proceeds. It is a logical and interesting - though usually overlooked - consequence of the present development towards a knowledge-based economy that the more easily codified (tradable) knowledge is accessed by everyone, the more crucial does tacit knowledge become in sustaining or enhancing the competitive position of the firm.

Hence, the process of ubiquitification will help to cripple the competitiveness of firms in high-cost regions and countries of the world if not countervailed and compensated for in some way. In the current knowledge-based economy this infers that firms in the high-cost areas must either shield some valuable pieces of knowledge from becoming globally accessible, or be able to create, acquire, accumulate and utilize codifiable tacit knowledge a little faster than their cost-wise more favourably located competitors.

Knowledge exchange and the role of trust

If knowledge could be treated as all other commodities, its extraordinary durability should enable the owner of any piece of knowledge to sell it again and again without reducing his stock, and doing so at prices below the customer's cost of producing it in-house.

But quite the contrary does, in fact, apply. Knowledge cannot readily be sold or acquired through the market. The reason lies in the asymmetrical distribution of information between the seller and the buyer regarding the main characteristics of what is offered for sale. A potential buyer wants to establish whether the piece of knowledge offered is worth the requested price. First of all the potential customer wants to make sure that the knowledge offered is not already in his or her possession, in which case any asking price will be too high. One unit of any piece of knowledge is clearly enough (Carter, 1989), and the price for additional identical units of knowledge is always zero. Next, the potential buyer will want to ascertain the specific merit of the knowledge offered before purchasing it. The problem is that when fully informed of the content of the knowledge offered, she/he has in effect acquired it for free. The awareness of this foreseeable outcome might easily discourage the seller from offering the knowledge on the market in the first place. And, finally, even if the knowledge offered was in fact sold, any one purchaser would be able to destroy the monopoly by starting to reproduce and resell it at little or no cost (Arrow, 1962). This likely outcome, too, might discourage the owner from attempting to sell the knowledge.

Furthermore, the really valuable knowledge is the not yet fully codified and ubiquitous one: in other words, the knowledge that is still at least partially tacit. The transfer of tacit knowledge between the possessor and the buyer requires reciprocal and stable arrangements where the actors involved gradually come to trust each other, or at least behave as if they trust each other.

Trust-based relationships are primarily built as trust is not a commodity readily available on the market (Lorenz, 1992; Storper, 1995). When building trust-based relationships between firms, some forms of tacit knowledge might eventually be exchanged (Sako, 1992). In another context (Maskell et al., 1998), we proposed that four distinctive stages in this process can be identified:

- In the *first* stage, the transfer of knowledge involves the employment of a very old-fashioned, precapitalist exchange mechanism: barter.
- In the *second* stage, the partners in one transaction save some or all the search costs by keeping in

contact with each other, thus initiating a 'dyadic', stable relationship.

- In the *third* stage, the accumulated sunk costs align the incentives and make the partners in a dyadic relation behave as if they trust each other.
- In the *fourth* stage, the dyadic partnerships interconnect in building network-relations through which each participant might access knowledge while benefiting from the trustenhancing investments made by the initial sinking of costs in one or a few relationships (your-friendis-my-friend).

The four stages represent a taxonomy of ways to exchange knowledge. All stages will usually have to be travelled sequentially in order to reach the final stage. However, a firm can decide to stop at any one stage when either internal or external circumstances make this advantageous. All firms might also at one and the same time have external business relationships that will belong to different stages.

In the fourth stage, the firms in a closely knitted business network are placed in a situation where any infringement of trust is so severely penalized that in effect malfeasance becomes a non-option. On the global market for standard goods, where all customers and all suppliers can easily be substituted, an unsatisfied customer has no way of reaching all potential future buyers, and opportunistic behaviour can therefore continue indefinitely. Not so in the business-network, where any such wrongdoing will soon be known by all. The collective awareness of this mechanism makes it possible to exchange knowledge even between competitors within a network, to an extent which no outsider can aspire to achieve (von Hippel, 1987).

Thus, we argue that a business environment that enhances trust will make an economic difference: 'It saves a lot of trouble to have a fair degree of reliance in other people's word' as Arrow (1974: 23) puts it. The beneficial effects of trust are further enhanced as the traditional, static, cost-related international competition is superseded by competition based on learning and innovation (Lundvall, 1994; Fukuyama, 1995).

Shared trust as a localized capability

The mechanism of penalizing malfeasance within business-networks has a territorial equivalent in

some regions and countries, if and when two factors are simultaneously present: both the number of actors and the mobility (exits and entries) must be relatively small. As the number of parties decline, collusion and bargaining become easier, thereby promoting the fortunes of firms and the orderliness of their markets (Waltz, 1979). A restricted number of players in the business community in a region or a small country makes it very difficult to behave in an opportunistic manner without being severely penalized (Krebs 1970; Trivers, 1971; Douglas 1987). And in regions and countries where the majority believe that opportunism is penalized, firms act as if they trust each other (Granovetter, 1985; Saxenian, 1994), and may thereby benefit from the type of knowledge exchange discussed above as the fourth stage.

If the mobility is sufficiently low, the owners and managers of firms in most industries in a region or a small country will know each other either directly or indirectly. New firms are often started by former wage labourers, well known in the community and well acquainted with the unwritten rules according to which business in the area is conducted. Most managers in larger enterprises will meet regularly and many will have known each other personally for years. Even in sectors dominated by a great number of small and medium-size enterprises, all producers in such environments will have a remarkable degree of knowledge of most other domestic producers in the sector, their main domestic and foreign suppliers and the most important customers. All firms in the sector will typically be organized in at least one association or guild, with its own publications or newsletter and with regular meetings. Many of the managers will have received the same education and training, just as most will have participated in some sort of joint activity at the local, the regional or the national level. The communal history and culture often make managers share many of the same beliefs, values and convictions, which can make certain types of exchange and corporation easy (Aydalot, 1986). Lawyers or written contracts are rarely used and most likely never have been, as indicated also by earlier analysis (Macaulay, 1963: 61).

The relations between firms within a local or regional milieu differ extensively: from rapprochement to detachment and indifference or uncompromising rivalry. A relatively close business environment does not necessarily lend itself to cooperation and interaction. Small firms, especially, often envisage the fellow producer down the street as their main competitor and try hard to outsmart him without damaging their own firm's reputation. Local rivalry of this kind stimulates the entrepreneurial spirit and reinforces productivity in the milieu. But even though examples of noncollaborative attitudes are copious, the conduct of firms in these environments is usually constrained by knowledge of the unattractive consequences of misbehaving. Any attempt at opportunistic behaviour will immediately be noticed. Overutilizing asymmetrical information; or passing defective or substandard goods as first class; or creating hold-ups in order to benefit at the expense of others in the local milieu: information about such misbehaviour will be passed on to everyone, who in the future will tend to take their business elsewhere. Worse still, by becoming a local outcast the firm is deprived of the flow of knowledge, including its tacit parts, which can prove very difficult to substitute. So even if the business environment in regions and small countries does not force firms to cooperate if they are not inclined to do so, its intrinsic mechanism for penalizing opportunism encourages trustful cooperation and ensures low barriers to the exchange of knowledge, whether codified or tacit.

In fortunate circumstances an important transmutation takes place. By their day-to-day operations and established business practices, firms in these areas demonstrate their ability and willingness to submit to the local rules of the game. As they are thus constantly proving their continued trustworthiness, they also produce or reproduce a local climate of *shared trust*.⁶ Shared trust in this way becomes part of the local business culture as a collective investment, the rents of which are appropriated by the firms located there (Axelrod, 1981; Coleman, 1984; Teece, 1986; Winter, 1987), though in some areas of the world special rules will apply to newcomers, as a *rite de passage*, before they are allowed to enjoy the full benefits of the trust shared (Dei Ottati, 1994a, 1994b).

Outside such areas, the default is usually distrust. Firms must build trust-based relationships by piecemeal committing themselves economically and socially (Ford et al., 1986). In local milieus, regions or small nations characterized by shared trust, the default is trust if nothing is known of a firm in advance (Lorenzen, 1996). The individual firm inherits an already existing trust-based business environment, built by its predecessors through time (Adler and Jelinek, 1986).

The localized combination of incentives and penalties acts as the crucial component in a transmission mechanism preparing new generations to accept the existing environment and concede to its behavioural constraints. This localized trajectory implies that the initial distribution in demeanour and tenet is profoundly curtailed. And the more a population of firms, managers and workers shares the same preferences - whether related to trust or not - the easier it is for them to bridge communication gaps resulting from economic agents having heterogeneous individual knowledge endowments or heterogeneous preferences, or both. 'With different knowledge endowments and different preferences (determining individual responses) each individual will be unable to communicate all he knows, and unable to learn everything other agents know or will do' (Eliasson, 1996: 15). Thus, shared trust establishes an environment that facilitates the relatively easy exchange of knowledge, as well as augmenting the scale and scope for such exchange by reducing the degree of heterogeneity both in preferences and in individual knowledge endowments.

Regarding the latter point – the scale and scope of shared trust – Carter (1989) has suggested that the risks involved in using a piece of knowledge not completely understood might be unacceptable, and that this in turn might favour a pairwise barter arrangement. But while the risks might be unacceptable when dealing with an unknown third party, the reduced degree of heterogeneity in preferences and individual knowledge endowments within the same social environment make a third party look more like a compatriot than a complete stranger, and one who must be treated accordingly. This also affects the risks associated with using third-party knowledge which, therefore, might be reduced to a passable level.

Hence, shared trust resembles built trust as both enable a high-quality knowledge exchange at low costs, even for partly tacit knowledge (Scribner, 1986; Sandelands and Stablein, 1987; Weick and Roberts, 1993). But shared trust has additional qualities. When building trust, firms have to invest in the relationship, establishing tight limitation on the flexibility of networks. Not so in areas of shared trust where it is easy to relate to new businesses if external or internal circumstances make it propitious, as long as the break from old partners is done in a proper manner and in accordance with local beliefs of good behaviour. The risk of becoming a victim of a lock-in is thus less for firms utilizing shared trust than for firms relying on built trust in network arrangements.

Just like all other firms, transnationally operating corporations (TNCs) can become insiders in the local milieu where they operate. Sometimes, TNCs have built insider positions through long-term investment, but more often they become insiders by acquiring local firms with fully fledged operations and established local networks (Clark, 1993). In both cases the local branch of the TNC may be linked to other local firms in both formal and informal networks that provide the channels for dissemination of knowledge of many kinds. But the TNCs are, by definition, not only local business partners. By building internal procedures and lines of communication and creating a common set of corporate norms, values and routines, they are also increasingly able to coordinate activities and share knowledge across their geographically dispersed units (Hedlund, 1986; Prahalad and Doz, 1987; Bartlett and Ghoshal. 1990).

However, even when functioning most smoothly, internal organizational procedures and means can only partially offset the restriction that makes learning processes intrinsically localized. The results of, for instance, a research project might be effortlessly communicated from one section of a TNC to another on the other side of the globe, but the project itself is seldom a joint affair between departments at different locations (Holmén and Jacobsson, 1997). The uneven spatial distribution and the tacitness of much knowledge required when solving new problems oblige TNCs to be present at certain places regardless of how well this might fit with the overall corporate locational strategies (Häkanson, 1995; Holm et al., 1995).⁷

The more valuable and rare the localized capabilities are, the more attractive will that milieu be to external actors like TNCs, and the more difficult for TNCs to drain the milieu (Malmberg and Sölvell, 1998). TNCs too are dependent upon strong local milieus in the learning and innovation processes necessary for their long-term

competitiveness. Thus, rather than being in opposition to the notion of localized learning processes, TNCs do to a large degree follow the same 'learning logic' as their smaller counterparts in the local economy.

Conclusions

In the Introduction we raised three broad questions that have been directing our line of argument throughout the article. The first question was related to what competition is about in today's economy, and how the performance of firms and industries is related to space and place. The second was concerned with why geographical areas tend to specialize in particular types of economic activity and why patterns of specialization are so durable. The third question, finally, directed our interest to the question of competitiveness: how can high-cost regions sustain competitiveness and prosperity in an increasingly integrated world economy? In a way, we have provided the same answer to all three questions: it has to do with knowledge creation and with the development of localized capabilities that promote learning processes.

This answer is of course neither entirely original nor fully exhaustive. Rather than as a definite statement, the analyses and conclusions presented should thus be regarded as a draft of a research agenda in economic geography. This agenda must include research on the set of constructive theoretical issues relating to the integration of the theory of innovation with cognitive sciences. What is actually learnt in the interaction between organizations? Do we see 'sticky knowledge' (von Hippel, 1994) in a rather absolute sense where the division of labour and the combination of different capabilities is the main aspect of the interaction? Or, do we also see interactive learning (Lundvall, 1985) where the agents develop the competencies and skills as a major outcome of the interaction? In order to answer such questions there is a need to develop a theoretical basis for analysing learning and knowledge creation that must go beyond the existing insights (Nonaka, 1991; Foray and Lundvall, 1994; Gibbons et al., 1994; Lundvall and Johnson, 1994; Lazaric and Lorenz, 1998).

There is, furthermore, a great discrepancy

between, on the one hand, a general agreement that innovation should be understood as an interactive process and, on the other hand, very limited knowledge about the purpose and nature of this interaction or why it matters so much. The 'national systems of innovation' literature (Lundvall, 1992; Nelson, 1993) recognizes that interaction between firms in connection with innovation differs between nations. This recognition derives from rather sketchy evidence based on case-studies in a few sectors, but it has never been systematically tested. Thus it is still unclear to what extent the national and regional systems of innovation influence collaboration, and how this influence varies over space.

Another aspect concerns knowledge creation as a localized activity, embedded in the cultural context of an area. There is growing empirical evidence that, in Europe at least, some kinds of interfirm knowledge creation and operation take place within confined territories (Aydalot, 1986; Camagni, 1991; Salais and Storper, 1992; DeBresson, 1996) because technology leaders are present there, or because local authorities are particularly skilled in promoting learning among local firms.

The opposite side of locally embedded learning processes relates to globalization, which has by now become a catchword for a number of phenomena that increase international interdependence and also restrict the room for domestic policies at a regional level. The term may be misleading in that there are counter-tendencies making the local, regional, national and European arenas more important than before. But when it comes to interfirm cooperation and the formation of networks, there is a strong tendency to establish more and more linkages that go across national borders and even across continents. This reflects the need to speed up innovation - by combining special capabilities located at different places - and to speed up market introduction on a global scale. Information technology has made it possible to extend networks over great distances and the codification of knowledge has been one element in this process. Cooperative networks between independent firms in different parts of the world now emulate some of the characteristics formerly found only within TNCs.

The increasing importance of knowledge-based competition means that companies are placing a new premium on establishing cooperative relations with firms and institutions with complementary competencies. In this way they seek to stay abreast of increasingly rapid innovation involving the development of new products integrating diverse technologies. Our knowledge of the links between institutions and inter-organizational cooperation remains quite limited, however, as it is largely restricted to comparisons of a small number of matched firms in pairs of nations. As of now, there are no studies providing evidence across a large number of European countries based on the use of a common methodology while addressing questions such as: Do firms from different regions exhibit different patterns of interaction and cooperation? Will strong network relations internalize knowledge spill-overs, making underinvestment in innovative efforts less decisive? Do firms in some regions cooperate more because of incentives created by local or national policies, for instance within science and technology?

The domain of 'learning regions' is simply bursting with new challenges for policymakers as well as for researchers with an empirical inclination or an interest in theory. It is a domain where the object of study is characterized by interorganizational cooperation, and the scholars studying it will need a high degree of interdisciplinary cooperation in order to come to grips with its complexity. Much novel work is already under way and more will surely emerge in the years to come, making us learn more on what learning is all about and – perhaps more significantly – how learning processes relate to space and place.

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Notes

- ¹ For those who care about definitions, competitiveness can be seen as 'the ability of companies, industries, regions, nations or supranational areas to generate, while being and remaining exposed to international competition, relatively high factor income and factor employment levels on a sustainable basis' (Hatzichronoglou, 1996: 12).
- ² The resource-based view of the firm is rooted in the seminal contribution of Penrose (1959). It was revived in the mid-1980s by Wernerfelt (1984), Rumelt (1984) and others, but it was Prahalad and Hamel's (1990) outstandingly successful article which more than anything sparked the interest of the business community and signalled a still swelling stream of scientific contributions from a gradually broadening group of scientific disciplines. Foss (1996) gives an overview and interpretation of the complex roots of the present resource-based view of the firm.
- ³ The term 'region' is used to identify subnational territories only. More often than not, the analysis of such regions has through the last 50 years been conducted separately from the analysis of countries (nations), by scholars in separate departments with different training and publishing in different academic journals. This intellectual division of labour is nevertheless increasingly anachronistic. Recent advancements in economics, especially through contributions by Arthur (1994) and Krugman (1991a, 1991b, 1991c, 1994), have been important in demonstrating the obsolescence of such separation.
- ⁴ There is a certain amount of useful case-study evidence showing that differences in such national and regional institutions as the professional training system (Lam, 1998), the system of contract law (Arrighetti et al., 1997; Burchell and Wilkinson, 1997) and business and trade associations impact on the form and effectiveness of these new forms of inter-organizational cooperation and networking when engaged in knowledge creation.
- ⁵ The competitiveness of regions and countries is thus dependent both on continuous learning processes and on the speed at which lock-in situations are broken such that intra and interfirm knowledge-creating activities are given new vigour on an appropriate track.
- ⁶ Shared trust, as defined here, does not fit entirely into the 'stage model' presented above, and might be seen as a separate type of relation between seller and buyer enhancing the prospect of exchanging all forms of knowledge easily. The idea behind the four stages was that firms will normally have to go through each of the preceding stages before reaching the fourth and final stage. Shared trust is obviously different in the sense that a firm may benefit from it 'just' by being located in, and accepted as an insider of, the right milieu.
- ⁷ Though the activities and power of many TNCs surely necessitate a matching public control, still only in the

making, much of the literature within economic geography is evidently built upon a very crude and stereotyped 'capital versus the regions' image of TNCs, while the small and medium-sized one-locality-only companies are similarly tenuously espoused.

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European Urban and Regional Studies 1999 6 (1)

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