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embedding proximity in socio-economic space

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THE SPATIAL DIMENSION OF INNOVATION

– embedding proximity in socio-economic space.

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Abstract

This article discusses the role and meaning of proximity to knowledge exchange in the highly mobile and globalized society. It is suggested that proximity must be seen as a concept of various dimensions, namely *geographic proximity, societal proximity and cognitive proximity*. The proximities can be established on different spatial scales. They represent potentials that firms may or may not benefit from, depending on their *resources and capabilities* and their orientations. *Peripherality*, then, describes a complex situation in which geographic, societal, and cognitive distance from core regions of development is combined with low local, firm level resources and capabilities. The establishment of global linkages, along with the investment in local relational and absorptive capabilities, is suggested as a strategy of innovation and growth.

JEL codes

03 technological change, research and development

031 management of technological innovation and R&D

L26 entrepreneurship

R58 regional development policy

Key words

Geographical proximity, societal proximity, cognitive proximity, capability, resources, peripherality, regional development

Introduction

According to the territorialized innovation theories MOULART and SEIKA, 2003:49, the source of regional growth and competitiveness is to be found in the local environment. Based on inherited local competences, the innovative interplay among local actors and institutions is supposed to create competitiveness and growth of the local economy. The local theoretical perspective has resulted in the development of soft strategies of regional development focussing on the development of local networks and institutions. The local focus has been developed simultaneously with processes of economic globalisation and the development of time and space-shrinking technologies, and many efforts have been put into defining the particular role of the local environment, as the process of globalisation has led to the restructuring of firms and local economies.

In this discussion, focus is placed on knowledge as a key ingredient of growth. While the factors of production related to capital and materials are now globally accessible, the same is not the case of knowledge. Both inherited capabilities and innovative knowledge are seen as embedded locally in networks or clusters. These networks then represent points of departure for globally competitive innovations because proximity among economic agents is seen as favourable to knowledge exchange and innovation, particularly when intangible types of knowledge are involved. The logic is convincingly simple and, as it could be expected, criticism has begun to emerge from different sides LORENTZEN, 2007a; LORENTZEN, 2007b; MOULART and SEIKA, 2003.

Inspired by these critiques, this article will take a point of departure in the idea that a particular relation can be established between knowledge networks and space. The questions to be dealt with in the following are: Which mechanisms enable knowledge exchange between economic actors,

and where are these mechanisms situated in space and scale? Which preconditions enable economic actors to benefit from knowledge sources accessible to them? These questions will be discussed with a point of departure in notions of proximity, resources, and capabilities. As an introduction to the discussion, the role of knowledge and innovation will be revisited. The following section will thoroughly develop a relational notion of proximity and suggest a development of sub-concepts: geographic proximity, social proximity and cognitive proximity. After that, an understanding of resources and capabilities of the economic actors is developed without which it would not be possible to benefit from the proximities relating the actors to each other. Finally, implications for the understanding of peripherality will be discussed together with the scope of development that non-core regions have in the era of globalisation.

Knowledge and innovation

In a market economy, 'not to innovate is to die' FREEMAN, 1982. All actors on the market are under pressure to renew their activities in a way which gives them advantages over their competitors. Nelson and Rosenberg's concept of innovation encompasses the process by which firms master and put into practice product designs and manufacturing processes which are new to them NELSON and ROSENBERG, 1993. This notion of innovation concerns the diffusion or the application of new knowledge in the firm. Innovation is a process in which the firm is the key institution.

Innovation presupposes the access to knowledge, whether internally or externally developed. It also presupposes the ability to organise. The ability of the firm to apply new knowledge and to integrate it into the practice of the firm is the crux of innovative capability. An enhancement of the technological capability has been defined as technological learning BELL and PAVITT, 1993.

The knowledge of the firm is embedded in individuals and groups in the firm. The competences of the firm necessarily have limits. Often innovations require knowledge which does not form part of the existing knowledge base of the firm. Access to knowledge outside the firm is therefore of great importance to innovation LORENTZEN, 2005.

In existing literature on innovation, knowledge has been divided into two distinctive forms, namely tacit knowledge and explicit knowledge. This distinction has had implications for the understanding of the role of space in innovation. Polanyi 1966, suggested that we know more than we can tell. The individual possesses tacit knowledge which he or she cannot communicate. The tacit knowledge may be a foreknowledge of yet undiscovered things and their implications, for example in science. Tacit knowledge is thus a motive force in search processes which precede innovation. Nonaka and Takeuchi 1995 suggest that knowledge is created and expanded through social interaction in the organisation in which tacit and explicit knowledge undergo a social conversion process. Tacit knowledge is shared or socialised, translated into explicit knowledge, combined with other elements of explicit knowledge, and finally internalised into tacit knowledge in the practice of the organisation. The social knowledge conversion process may take place within the organisation, as the authors suggest. However, it may be suggested that this process also takes place between different firms or organisations.

Social processes of learning, involving either internal or external partners, require a social environment which enables and encourages knowledge sharing among individuals and groups. In the firm, group work and the rotation of personnel is a key to creativity NONAKA, 1991. In parallel, it can be suggested that knowledge sharing among firms may take place as joint projects or cooperation on common goals, while knowledge diffusion among firms takes place as staff turnover or the establishment of spin-off firms. In connection with cooperation among firms, the importance of spatial proximity has been emphasized. Mutual processes of learning are thus most likely to take

place within local economies MASKELL and MALMBERG, 1999b. As expressed by the authors, the more tacit the knowledge involved, the more important is spatial proximity MASKELL and MALMBERG, 1999a:180. On this background, the following section unfolds the notion of proximity.

Proximity

The idea that proximity among economic agents is important to innovation is based on two assumptions. One is that innovation is basically an interactive endeavour to involve more than one economic agent. The other is that cooperation is improved, the closer these actors are to each other. Accepting the first assumption, the question to be discussed is, what ‘close’ means.

A common denominator of the contributions on proximity is that the level of analysis is the meso level. Analyses deal with the linkages and relations between economic actors whether they are firms or organisations. These can be approached in different ways. Below it is suggested to group these relations in *geographic*, *societal*, and *cognitive* proximities.

Geographic proximity

The notion of proximity has its origin in spatial or geographic proximity. *Geographic proximity* is an expression of the kilometric distance that separates two actors in geographic space. Geographic proximity is relative in terms of cost and time and may therefore represent a constraint to interaction and learning TORRE and RALLET, 2005. Technological advances in information and communication technologies imply a change in the relative geographic distance DICKEN, 2003:92.

The advances in the time and space-compressing technologies increase the mobility of men, information, and goods HARVEY, 1990. Mobility has grown to the extent that an increasing number of people work by travelling (researchers, experts, salesmen) TORRE and RALLET, 2005. If physical presence between economic actors is needed on some point in the cooperation, short meetings and visits can be arranged in order to share knowledge and solve problems. Temporary proximity can be organised whenever needed. This temporary proximity is physical. However, much knowledge can be shared by means of electronic communication among persons who are not physically co-located. Experts may thus be present simultaneously in the same virtual space, sharing even tacit knowledge over long distances. Video conferences are among the representations that enable codified as well as tacit knowledge to be shared by distant actors.

The geographic proximity depends on the development of infrastructure and technologies able of bridging distance. This development again depends on the societal and private resources available for investment. Actors and societies are not equally well resourced. This means that kilometric distances which are negligible to some actors may be insurmountable to others. The actors or the societies in which they are embedded may lack resources of mobility. In sum, *geographic proximity* can be understood as the physical possibility of actors to interact in relation to their resources.

Societal proximity

A second dimension related to proximity can be labelled *societal proximities*. Institutional, organisational, and social proximity may be considered as societal proximities.

Societal proximity has to do with different aspects of social organisation. One of these aspects is *institutional proximity* KIRAT and LUNG, 1999. Institutional proximity is the assembly of agents

as parties to a common space. This space is formed by representations, models, and rules of the game, which are applied to thought as well as to action NORTH, 1990. Institutions may be formalised in legislation or contracts, and they may be governed by informal rules and values internalised in individuals, organisations, and societies. The institutional proximity is necessary to form sustainable relationships in which the actors can cooperate in a meaningful way, characterised by confidence. Institutions may be more or less developed as indicated in the notion of ‘institutional thickness’ AMIN and THRIFT, 1994. Institutional thickness is characterised by a strong institutional presence, high levels of interaction among actors, defined structures of domination, and a mutual awareness among the actors of their involvement in a common enterprise AMIN and THRIFT, 1994:14. The authors argue that local institution building is a necessity for regions to compete in the global economy. Local economies that are stripped of coherent and cohesive institutional infrastructure (and of any common cultural agenda) face a bleak future AMIN and THRIFT, 1994:19.

It can be argued that institutions are at work at the micro, the meso, as well as at the macro level. They operate at the local level, the national level and the international or global level. They help people cooperate within firms, between firms and organisations as well as in global fora. While Amin and Thrift 1994 deal with institutions at the local or regional level, it seems justified, in the light of the increased mobility discussed above, to consider institutional infrastructure as a relevant factor for learning related to various spatial levels. A firm intending to innovate is thus dependant on its internal micro institutions of co-operations, on the regional and national educational system and policies, on industrial associations, on the national research and development policies, and on international professional fora of knowledge exchange. Institutional infrastructures at the different spatial levels may be more or less developed, and they may conflict with each other within or across levels. They may also reinforce each other mutually, as when national programmes favour the

emergence of local export platforms. In his reading of POLANYI, 1944, Gertler 2003:91 suggests that institutional proximity overrides other forms of proximity in enabling workers or firms to share tacit knowledge. The shared norms, conventions, values, expectations, and routines, which constitute the institutional proximity, enable the sharing of tacit knowledge across occupational and cultural differences. Institutions (most often at the national level) even shape the social constitution of knowledge by distinctive labour market and education and training systems GERTLER, 2003:91. Understanding the impact of the institutional setting on the shaping of knowledge and on knowledge sharing is complicated by the fact that its influence is subtle, but at the same time pervasive. After years of training, the particular practices and attitudes are taken for granted GERTLER, 2003:93. In sum, institutions enable the sharing of even tacit knowledge among individuals on different spatial scales.

Another societal proximity is *organisational proximity*. An organisation is a group of agents involved in practising a finalized activity KIRAT and LUNG, 1999. An organisation is thus a space in which actors define practices and strategies and in which they imply these in cooperation with each other. Organisational proximity is relational TORRE and RALLET, 2005:49. The institutional setting defines the framework within which the organisations operate and position themselves.

Organisational proximity is the sharing among agents of common goals and practices. Agents may be individuals as well as firms and organisations. The sharing of common goals and practices takes place at various spatial levels. Firms, as one organisational form, differ in their spatial organisation. They may operate from one or from several locations, and still more of them are dispersed globally. Inter-firm relations equally exhibit various spatial patterns. As markets are becoming still more globalised, value chain relationships are seldom only restricted to a particular local area DICKEN, 2003. Agents in an organisation depend upon each other for the achievement of goals and the

carrying out of practices, and they thus have to cooperate to achieve their goals. These relationships are, for example, production relationships, characterised by vertical or horizontal interdependencies KIRAT and LUNG, 1999:30.

Organisational proximity implies stable relations between agents for a period of time. This period may be long, as it is in user-producer relations, or it may be short, as is the case of temporary projects. In both cases, the stable framework of cooperation favours confidence, the sharing of tacit knowledge, and the initiation of learning processes.

Organisational proximity may be more or less strong within or among firms. The actors may share goals and practices to a larger or smaller extent. This sharing of goals and practices is enabled by institutions. It may be established over long distances. It follows from this that co-location, as for example agglomerations, towns and cities, does not in itself facilitate coordination TORRE and RALLET, 2005:51.

The third dimension of societal proximity which is suggested here is *social proximity*.

Social proximity is a notion which draws on the work of Granovetter and Putnam

GRANOVETTER, 1985; GRANOVETTER, 1973 and PUTNAM, 1993; PUTNAM, 2001 .

Granovetter's concern is the sociology of economy. He focuses on actors and networks of personal relationships. There are network relations both within and between firms, regardless of the organisational form of the firm. Granovetter stresses the role of concrete personal relations and structures and argues that transactions of all kinds rife with social connections GRANOVETTER, 1985. In the perspective of innovation and learning, knowledge exchange does not only benefit from, but also requires social connections between actors. Granovetter does not consider the role of space, and in a mobile society, collocation is not a prerequisite for social relations to emerge.

Robert Putnam approaches the role of social relations in the development of society. He is the founder of the notion of 'social capital'. Social capital means connections among individuals. It refers to social networks and the reciprocity and trustworthiness which arise from these PUTNAM, 2001. Social capital can be understood as shared responsibility among a multitude of agents. It involves the development of social networks and mutual trust among the members of these networks. It is point of departure for shared norms and industrial culture (cultural proximity) and common institutions.

Cooke and Morgan, 1998; PUTNAM, 2001 focus on the meso level when describing the social relations enabling innovation and change. With the notion of 'the associational economy' they take a point of departure in Putnam's work on 'social capital' PUTNAM, 1993; PUTNAM, 2001. The associational economy is a mode of intervention which empowers the intermediate associations which lie between the state and the market. These associations may be groups of firms, trade associations, chambers of commerce, labour unions, or civic associations COOKE and MORGAN, 1998:22. The associational economy involves the devolution of power from the state to local and regional tiers. Furthermore, it involves principles of subsidiarity implying the delegation of tasks, like enterprise support services, to local and business-led organisations. The point is that social capital helps to 'lubricate associational action within the firm, in inter-firm networks and between firms and their institutional milieu' COOKE and MORGAN, 1998. The point of Cooke and Morgan is that more associational modes of economic organisation can be detected in prosperous regions in which the regional development policy has involved enterprise support and regional governance. Social capital can thus be seen as a prerequisite for regional economic development.

Social relations may, however, develop among social actors at different spatial levels. The notion of social capital is not connected to any kind of territorial determinism, but is linked to social space of

any scale. In relation to knowledge and innovation, the associations in which knowledge exchange takes place, are national and global. Chambers of commerce have local as well as national representations and trade unions work locally, nationally as well as internationally.

The notion of *social proximity* denotes the existence of social relations among actors participating in social spaces of different kinds plus the existence of social capital and trust among them. Social proximity may evolve at different spatial scales, and is a prerequisite for the exchange of tacit knowledge.

Cognitive proximity

While geographic proximity and societal proximity enable physical and virtual contact, either permanently or temporarily, they only represent a potential, unless *cognitive proximity* enables the agents to understand each other. Cognitive proximities exist among individuals.

Cultural proximity has to do with the sharing of beliefs, world views, and values among agents.

Norms and values are historically grown and change only slowly. Cultural proximity has often been suggested as one important aspect facilitating knowledge sharing HOFSTEDE, 1983. However, it seems that the meaning of the notion of 'culture' is taken for granted. At least, it is not further specified in the literature on innovation and proximity. In the literature on multinational enterprises (MNEs), cultural distance vs proximity have been applied to explain the success of MNEs. MNEs investing abroad tend to find locations which, to some extent, reflect the culture of the country of origin, in terms of language and habits DUNNING, 1993:534 ff.

Hofstede defines culture as 'collective mental programming' HOFSTEDE, 1983. According to Hofstede, culture is that part of our conditioning that we share with other members of our nation, region, or group, but not with members of other nations, regions, or groups. The relation between

culture and institutions has in the minds of people been crystallised in the institutions. The institutions, on the other side, reinforce and constraint changes in culture. Hofstede has developed four different dimensions of culture which he finds useful for describing national cultural differences in a business context. The four dimensions of culture suggested by Hofstede are: Individualism versus collectivism; large or small power distance; strong or weak uncertainty avoidance; and masculinity versus femininity. Cultural proximity among actors exists if they share the same mental maps. In the terminology of Hofstede, this means that they are more or less similar in terms of degrees of individualism, power distance, risk avoidance, and masculinity.

The dimensions have been applied in the study of management practices in different countries, and particularly in the analysis of innovative behaviour in Central and Eastern Europe DICKENSON, CAMPBELL and AZAROV, 2000. The authors found cultural characteristics in Central and Eastern Europe as less encouraging for innovation (for instance the tradition of risk avoidance). Cultural proximity can be seen as an enabling mechanism for the sharing of knowledge related to innovation, because it makes communication more efficient and expectations more transparent. The culture may, however, contain dimensions which are not favourable to innovation, as the study of Central and Eastern Europe shows. Cultural distance vs. cultural proximity is related to history and institutions, and it can be argued that neither is territorially bounded. Mental maps can be shared by actors at different spatial levels. As institutions and firms become globalised, so do cultures and mental maps.

One aspect of cognitive proximity which is very important in relation to knowledge sharing and innovation is *technological or professional proximity*. Technological or professional proximity is the mutual understanding among professionals having passed comparable educations or sharing professional experiences in comparable branches or functions. Such people can be said to share the

same knowledge base. Technological or professional proximity emerges at various spatial levels. Such proximities emerge within the firm, within or between departments, between colleagues from different firms in the locality, and between professionals who usually work in different countries. At the micro level, the investment in R&D departments involving numerous scientists is likely to boost the innovation of the company. Saxenian's work on Silicon Valley can be taken as an example of how technological proximities among co-located professionals stimulate processes of learning and innovation at a broad level in the region OINAS and LAGENDIJK, 2005; SAXENIAN, 1994. The existence of international consultancy and of international development projects represents an evidence of technological proximities working on the global scale. International fairs and conferences serve to bring experts together on a temporary basis in order to exchange knowledge. The internet as well as professional magazines bring experts together virtually. Websites and magazines represent arenas for learning. Professional and technological proximity that facilitates knowledge exchange and innovation is enabled by institutional, organisational, and geographic proximities.

Dimensions of proximity

In sum, the suggested dimensions of proximity can be summarised in the broad categories of *geographic proximity*, *societal proximity* and finally *cognitive proximity*. *Geographic proximity* refers to the physical possibility of actors to interact, by meeting physically or virtually, for shorter or longer periods of time. *Societal proximity* contains the aspects of institutional, organisational, and social proximity, which denote the different social mechanisms and structures that motivate actors to share goals. *Cognitive proximity* covers the cultural and technologically shared mindsets that enable the actors to understand each other.

All of these proximities have to be present in order to make actors interact, exchange knowledge, and embark on processes of mutual learning. It is not meaningful to imagine one being more important than the other, and they certainly cannot substitute for each other¹. The proximities can be established in different ways in time and space, but basically the idea is simple: different actors find it easier to relate to each other when they share some similarities, either in their operations or operational environment, even when this takes place at a distance OINAS and LAGENDIJK, 2005.

In this perspective, the notion of proximity is basically a relational one. It denotes the human relations that can be considered to be of importance for processes of knowledge exchange, and particularly for the sharing of tacit knowledge, to take place. The proximities are enabling mechanisms that make it possible for agents to involve in networks of mutual learning. Agents are involved in different kinds of networks. They are embedded in social, professional, or organisational networks, that may or may not overlap in terms or persons involved. The social, professional, or organisational space in which the actors are embedded may have different geographic characteristics, uniting more or less distant agents in common endeavours.

Based on the relational and complex understanding of the notion of proximity, in the highly mobile society of today, it is not possible to maintain the priority of any spatial level in knowledge exchange and the sharing of tacit knowledge. The mechanisms of proximity enables knowledge exchange and learning among agents at different spatial levels.

Resources and capabilities

While proximity perceptions deal with different aspects of inter-firm relations, there is no determinism connected to the theory on proximity saying that actors are actually able to share

knowledge if they are in close proximity to each other in the mentioned ways. Proximity describes the relational aspects of firms, but not their internal goals and characteristics. Firms have different options when it comes to collaboration, and these are rooted in the internal resources of the firm. This is due to the fact that the resources with which a particular firm is working will shape the productive services provided by its management PENROSE, 1995. Management tries to make the best use of the resources available. The resources of the firm consist in brand names, in-house knowledge and technology, employment of skilled personnel, trade contracts, machinery, efficient procedures, and capital WERNERFELT, 1984. The holder of resources is able to maintain a relative position vis-à-vis other holders, and the aim of the firm is to create a situation in which its own resource position makes it difficult for others to catch up. Teece, Pisano and Shuen 1997 see the goal of the firm as the development of dynamic capabilities. The firm's capability is its 'ability to integrate, build and reconfigure internal and external competences to address rapidly changing environment'. The capability is used for achieving new and innovative forms of competitive advantage. The capability can be enhanced through experience, investment, and new employment. In a market economy, the firms have to prove their value through the exposure to market processes. In the market place, the capabilities and resources constitute the competitive advantages of the firm RAY, BARNEY and MUHANNA, 2004:35. But if resources and capabilities are not translated into activities or routines, they cannot have a positive impact on the firm's performance. Some of the resources and capabilities of the firm may stay unexploited, and thus only present a potential of the firm RAY, BARNEY and MUHANNA, 2004:34. No firms are able to exploit their full potential, however. According to Penrose 1995:69, the full utilisation of all resources of a firm calls for an output much larger and more varied than can be organised by a firm at any given point of time. But the exploitation of resources is not only a matter of organisation. The difficulty to identify and exploit resources is, among other things, based on the fact that some capabilities may be intangible

and socially complex RAY, BARNEY and MUHANNA, 2004:35. In other words, tacit knowledge may stay tacit.

Knowledge is the most important resource of the firm. However, knowledge is only useful as a market asset if it is not imitated by competitors. To protect its knowledge from imitation, the firm needs institutional capabilities. It needs to know how to protect a trade secret LIEBESKIND, 1996. As Liebeskind states ‘ it is only because firms have these generalized protective capabilities that we observe so many different types of unique assets’ LIEBESKIND, 1996:104. Moreover, the protective capabilities are incentives to innovate. According to Liebeskind, it is the generalised institutional capabilities of firms that engender and promote strategic innovation LIEBESKIND, 1996:105. This line of thought focuses on the individual firm as the locus of development of competitive assets.

Another line of thought supplements this by suggesting that the capabilities of the firm can be developed through the interaction with other firms. Two perspectives are worth mentioning. One is the regional growth perspective BEST, 2004:105. The other is the network perspective HÅKONSSON and SNEHOTA, 1995.

The first perspective is the regional growth perspective BEST, 2004. This perspective is based on a Smithsonian understanding of wealth as resulting from increasing specialisation and division of labour. Specialisation leads to simplification of production, which again creates opportunities for improvement and innovation BEST, 2004:180. Internal co-ordination, however, must put a limit to the rate at which market opportunities can be exploited by the single firm, as pointed by PENROSE, 1995:69. In stead, the opportunities may be pursued by new entrepreneurs, thus adding to the population of firms. Today, the production of commodity involves thousands of activities. These are linked together on different markets in a long continuum of relationships between producers and

users of intermediate products and services in a chain between raw material producer and end-user BEST, 2004:184. As the internal dynamic of the firm leads to unique capabilities, the population of firms will represent a greater diversity of capabilities. Together, the total population of firms will represent an increased regional capability BEST, 2004:184. In this way the increasingly diversified potential capabilities of firms result in (regional) entrepreneurial dynamics of specialisation. 'Regional' in this context is not specified, and can be taken to mean any territorial space in which the population of specialised firms is located.

The growth perspective does not tell anything about the particular relations between firms. These are addressed by the network perspective. The network perspective suggests that firms develop networks with other firms. These networks are part of the resources of the firm because they can be used for mobilising additional external resources, as for example knowledge related to innovation HÅKONSSON and SNEHOTA, 1995. However, networks do not just exist out there, inviting firms in. Firms actively create networks, to the extent that they possess specific relational capabilities LECHNER and DOWLING, 2003. The use they are able to make of the externally sourced knowledge depends on their absorptive capacity. In relation to knowledge and innovation, this means that firms develop their own resources and capabilities through experience, investment, employment, and by networking with external organisations representing sources of knowledge. The access to external knowledge may be restricted not only by the quality of the external knowledge base, but also by the relational capabilities of the firms.

The regional growth perspective and the network perspective do not relate to any particular spatial scale, even though Best 2004 suggests a 'regional' scale of growth, and economic geography has understood networks as relating mainly to regions COOKE and MORGAN, 1998. As value chains and production chains become globalised, productive linkages become both global and local and

global specialisation patterns and networks emerge. Consequently, firms are likely to mobilise resources through networks on different spatial scales.

In a knowledge perspective, the growth perspective sees specialisation and entrepreneurship as mechanisms that enhance the regional knowledge base. The network perspective understands the relational capabilities as the key to knowledge exchange and enhancement of technological capabilities in firms and networks.

Peripherality

Proximity and capabilities are relevant issues in relation to a discussion of local development and peripherality. Peripherality is usually discussed in terms of accessibility in relation to time and costs of transportation. The idea is that areas with better access to the locations of input materials and markets will (*ceteris paribus*) be more productive, more competitive and hence more successful than more remote and isolated areas OINAS, 2002; SPIEKERMAN and NEUBAUER, 2002. The locationally advantaged regions are core or central regions, while the locationally disadvantaged regions are peripheral regions. Hence, an improvement of transport infrastructure, by enhancing accessibility for goods and people, is expected to have implications on regional development. The conventional understanding of the peripheral disadvantages can be summarised as high travel and transport costs and remoteness to centres of economic activity. There is an absence of agglomerative advantages. There will be low rates of entrepreneurship and innovation and the population will be sparse. The region will depend on primary industries and be characterised by a poorly developed infrastructure, little research and development and low political influence COPUS, 2001:540.

In development economics, peripherality is connected with structural patterns of development AMIN, 1977, with patterns of dominance and dependency on foreign powers and capital CARDOSO, URQUIDI and FALETTO, 1979, and with processes of cumulative causation MYRDAL, 1957. There is a lack of dynamic clusters and support organisations, innovation activities are at a lower level, compared to the core regions TÖDTLING and TRIPPL, 2005. Hence, peripheral regions are not in command of their own social, political, economic and technological development and are losing dynamics of development to the core.

Perceptions of peripherality have implications for the understanding of development dynamics in knowledge economy. In the knowledge economy, the accessibility to knowledge, and not as earlier, to materials, labour and markets, has become the key to economic development. Advantaged regions are regions with high accessibility to knowledge related to innovation, while peripheral regions have poor access to knowledge related to innovation. Advantaged regions are characterised by dynamics of agglomeration based on new knowledge and innovation, while peripheral regions lack such an opportunity. Their economic structure does not serve as point of departure for virtuous circles of development and generation of specialised competitive knowledge, and they depend on external economic and political forces and externally developed knowledge.

However, as Copus 2001 argues, today many 'aspatial' characteristics of regions influence their development, not only physical infrastructure and spatially based economics. By 'aspatial' characteristics, Copus 2001 means characteristics that are not territorially bound and that are not dependent on traditional accessibility. Particularly, the development of information technology changes the role of distance and accessibility and enables the development of global-local links. Local factors, like social capital, local business networks, the civic society, and institutional

networks, play a decisive role in the development of the regional economy. These characteristics are the same as those discussed in terms of proximity mechanisms above. These 'aspatial' characteristics may serve as a point of departure for the development of parallel, but linked trajectories of development, that bring growth to hitherto disadvantaged regions LAGENDIJK, 1999. While the notion of aspatial peripherality widens our understanding of peripherality, the notion is still rather vague and in need of theoretical clarification. This can be done based on the notion of proximity and on the understanding of resources and capabilities presented above.

Peripherality then characterises a situation in which actors in a location do not have access to resources, and in which they do not possess capabilities to mobilise these from outside. They have difficulties in embarking on dynamics of entrepreneurship, specialisation, and growth.

Seen from a proximity perspective, the economic actors of a locality may have problems of distance, isolating them from knowledge exchange and growth mechanisms. This distance can be seen as *geographic*, as *societal* and as *cognitive*.

The *geographic* distance is related to the resources of mobility which the society and the economic actors possess. Infrastructure is expensive, and is mostly developed in the core areas of the developed countries. These core areas are linked by various transport and communication technologies, leaving other areas behind. Poor areas are most often poorly equipped with infrastructure, making the economic actors suffer situations of geographic peripherality. Poor areas may, however, host economic actors that are well connected, namely affiliates of TNCs.

The *societal* distance which may characterize peripheral areas is related to the lack of local institutions of economic development and cooperation and decoupling from international and global institutions of knowledge. There may be a lack of local organisations of business development, and no participation in global organisations. There may, in the locality be a lack of social networks and

mutual trust, and no tradition for participation in networks at other spatial scales, due to weak organisational and institutional frameworks.

The *cognitive* peripherality characterising actors and localities is based on cultural and technological distance. The actors of the locality may not share the mental maps that enable entrepreneurship, growth and innovation, and they may not dispose of knowledge and training that make them able to benefit from new knowledge from external sources, or to develop knowledge for innovation.

At the micro level, firms and economic actors may dispose of few resources and capabilities which can be used as competitive assets on the market. They may not grow and develop capabilities which may serve as point of departure for spin-off. And they may lack relational capabilities which can be used for mobilising resources from outside.

Summing up the analyses of 5 European peripheral regions, LAGENDIJK and LORENTZEN, 2007 thus find that they are peripheral in the sense that they are located outside the main growth centres of Europe, and peripheral in their own countries. However, they are not peripheral in the sense of economically marginal, because they host economic dynamics that are linked to global actors and global knowledge bases. Among the proximity mechanisms enabling knowledge exchange for innovation, Lagendijk and Lorentzen 2007 particularly point at the organisational proximity which can be achieved through value chains. Global value chains are of particular importance to the development of local industries in peripheral areas, where the scope for local networking is limited due to low degrees of diversity and specialisation.

The policy conclusion that follows from this differs from the ones that usually is suggested by territorial innovation theorists, who suggest a strengthening of regional clusters and institutions TÖDTLING and TRIPPL, 2005. Such an inward looking strategy would perpetuate the weaknesses

of the periphery and deepen the gaps between the core and the periphery. In stead the strategic focus should be placed on the nurturing of local entrepreneurial and relational capabilities, in the context of global knowledge networks. The increase in the number of entrepreneurs may serve as a point of departure for enhanced dynamics of specialisation and regional capabilities. The number of potential network partners increase. But this process is likely to be slow. The already existing economic actors need to benefit from global networks, institutions, and production chains to achieve and develop knowledge. Therefore both mobility and capability investments are keys to development in the periphery of the knowledge economy.

Conclusion

The article has discussed the spatiality and scales of proximity mechanisms enabling knowledge exchange for innovation, with the particular perspective of the implications for peripheral societies. A typology of these mechanisms has been suggested, which grasp the different dimensions of proximity as related to physical, social and individual characteristics of the economic agents and their environment. The suggested dimensions are the *geographic* proximity, the *societal* proximity and the *cognitive* proximity. The proximities are basically relational and express the potentials of knowledge exchange as related to the mobility, the networks and the competences of the actors. The potential of sharing knowledge among actors as related to the proximity mechanisms can be realised to the extent that the actors possess relational and technological capabilities, and motivation. In the highly mobile and society of today societal and cognitive proximities can be established over long distances, and physical proximity can be established temporarily. Further, globalisation implies that companies are so specialised that partners for knowledge sharing must be sought globally. It follows that knowledge sharing for innovation is not primarily related to the regional or local geographic scale. Proximity mechanisms operate on all spatial scales.

This is good news for peripheral societies. Peripheral societies that are in distance from the economic core, and in which the infrastructures and the industries are weakly developed will find difficulties in developing competitive branches of industry through the recommended soft strategies of regional networking and institution building. Instead the global scale represents a short cut to knowledge for innovation for firms in the disadvantaged regions. Knowledge can be shared through virtual or temporary proximity with global customers, suppliers or global branch institutions. If needed enhancement of relational capabilities as e.g. the mastery of foreign languages and technological competences in existing firms could be a strategic focus. Support for local entrepreneurship will in the long run enhance the local industrial environment and specialisation, but global knowledge sourcing will in any case be important for innovation in firms in peripheral as well as in core regions.

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ⁱ In comparison BOSCHMA, 2005 approaches proximity from a functional perspective, in which proximities can be quantified, added in doses and which they can substitute for each other (like the factors of production in economic theory). Contrary to this the relational understanding of proximity implies that knowledge sharing among agents depends on geographic, societal as well as on cognitive proximity mechanisms at different spatial scales.