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Learning from Clusters

A Critical Assessment from an Economic-Geographical Perspective

edited by
Ron A. Boschma and Robert C. Kloosterman

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A Critical Assessment from an Economic-Geographical Perspective

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Preface

Jan Lambooy retired in October 2002. When Jan was asked how he wanted to celebrate this occasion, he was adamant that no great festivities should take place. Characteristically, Jan wanted just a scientific conference so he "could learn something from it" and, as he insisted, no great festivities. So that is what we did and a conference was organised in Amsterdam on 25 October 2002, hosted by the Faculty of Economics and Econometrics of the University of Amsterdam. Friends of Jan's from academia in the Netherlands and abroad participated and thus paid homage to Jan, both as a scientist and as a person. We are now very proud to present this *festschrift*, firstly as the palpable result of this conference and secondly as a token of sincere respect and great affection for Jan.

Edited volumes run the danger of being a hotchpotch of contributions on a wide variety of topics. Here, we have explicitly focused on a central theme in contemporary economic geography and regional science, namely the relationship between learning, innovation and clustering. Internationally renowned scientists made both theoretical and empirical contributions to this volume. We think this book constitutes a broad palette of contemporary thinking and research on the relationship between spatial concentration and innovation and hope it will play a significant role in future debates on this issue.

We would like to thank the Faculty of Economics and Econometrics of the University of Amsterdam and especially Joop Hartog for helping to organise the conference. We would also like to thank the AMIDSt research institute of the University of Amsterdam and the Department of Economic Geography of Utrecht University for financially supporting the publication of this book. We would like to express our gratitude to Howard Turner for his linguistic editing, to Christian Smid from UvA-Kaartenmakers for her editing work and to Eva Stegmeijer and Merijn van der Werff for completing the editorial process. Lastly, we want to thank Jan for his enduring inspiration. We certainly learned a great deal from clustering with him.

September 2004

Amsterdam, Utrecht
Ron A. Boschma and Robert C. Kloosterman

1 Clustering, Learning and Regional Development

Ron A. Boschma and Robert C. Kloosterman

1.1 Introduction

The issue of clustering, learning and regional development is subject to a recently initiated fundamental debate (see e.g. Martin and Sunley, 2003; Gertler, 2003; Phelps and Ozawa, 2003). The 16 chapters in this book give a unique overview of the latest developments . They reflect a kind of uneasiness many scholars have with the general model of 'local development' (or what we call the 'cluster' model) that has been so dominant in the field of regional economics and economic geography during the last two decades. Here, we are referring to all those concepts (such as clusters, innovative milieus, industrial districts, regional innovation systems) that, each in their own way, describe how a (loosely defined) region should be regarded as an important resource of competitive advantage. The criticisms of the dominant mode of understanding spatial concentration in this volume, both at the conceptual and empirical level, are expressed in many ways.

The conventional cluster model is often criticised because clusters tend to be treated as static, instead of dynamic, entities (Boschma and Lambooy, 2002). The development of clusters is often taken for granted and a great deal of emphasis is placed on the virtues of a cluster as if it were, and will ever remain, in a perfect state. Moreover, the fact is often overlooked that the current state of affairs in a cluster can only be understood by its history, that is, how it evolved. According to Feldman et al. (2005), "... we have a limited understanding of how innovative clusters emerge, take hold and transform regional economies" (p. 1). In this volume, many authors (e.g. Conti, Kloosterman and Stegmeijer, Taylor) make a plea for such an evolutionary analysis of clusters. For instance, the contribution of Bart Nooteboom and Rosalinde Klein Woolthuis, among others, goes beyond the cluster as a static concept (or what they call 'a once-and-for-all arrangement'), adding a dynamic perspective and incorporating insights from theories of learning and innovation.

Secondly, there is an epistemological point, namely an inherent tension in the cluster model between the general (as ideal type) and the particular (i.e. each cluster tends to be considered as almost unique). Either cluster-model approaches are too general to deal with the diversity of spatial

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concentrations in real life, or they are not able to transcend the particularities of a specific case. This tension is, for instance, felt in the contribution by Sergio Conti who argues that the development paths of local systems are specific, irreversible and irreproducible and therefore unlikely to be subject to universal laws.

Thirdly, many cluster-model approaches have an in-built normative stance since the emphasis has been on positive, rather than negative effects. Lock-in effects are, for example, taken for granted or ignored all together. When adopting a dynamic perspective to clusters, as advocated above, both positive and negative aspects of cluster formation can be taken into account. For instance, Pouder and St John (1996) argue that clusters at later stages of their evolution may be confronted with the erosion of agglomeration economies because they may become sources of inertia and inflexibility. This occurs at the expense of the innovative potential of clustered firms which are unable to anticipate and react to external shocks. Bjorn Asheim and Sverre Herstad, among others, deal with this issue during the course of this volume and explore whether globalisation (or extra-territorial linkages) may avoid such tendencies of lock-in in clusters.

Fourthly, there is another inherent tension in the cluster concept that is almost insurmountable. This is because a cluster is a spatial concept (a geographic concentration) in which a-spatial processes play a prominent role. On the one hand, such a definition implies that there is a need to determine at what spatial scale clusters operate. Porter's concept of clusters has been challenged by many, precisely because he was rather vague and inconsistent in this respect. On the other hand, there is increasing awareness that drawing geographical boundaries is an almost impossible task, because of the many processes (i.e. inter-firm linkages, knowledge spillovers, social networks) that take place at different spatial scales at the same time, and because the spatial range of these processes is unlikely to be stable over time (Martin & Sunley, 2003). Dealing with this dilemma, Roel Rutten and Frans Boekema suggest in this volume that researchers should take the spatial dimension as an outcome, instead of a starting point when analysing processes and activities of networks. In his contribution, Ron Boschma proposes a multi-spatial level approach to assess the impact of social capital on regional development in Italy. This is because the various sources of social capital (i.e. the family, the community, the political culture) that are expected to affect the growth of Italian industrial districts operate at different spatial levels simultaneously.

The contributors to this volume have also addressed shortcomings of the dominant cluster approach at the empirical level. More generally, the

cluster model has been developed mainly as a theoretical model, without being supported by much empirical work. To be more precise, hardly any comparative studies and concrete empirical testing of the main propositions of the cluster model have been undertaken. There is no consensus on the key variables and the method of identifying and mapping clusters (Martin and Sunley, 2003). Part of the explanation is that a lot of cluster studies have been based on just one or two case studies, providing insights into particular cases, but lacking any general validity, which ties in with the epistemological point made above. The comparative studies that have been undertaken to identify clusters also suffer from an empirical underdetermination (e.g. European Commission, 2002). Nearly all of these studies suffer from a shortage of data. In addition, they frequently differ in underlying methodology. Differences in definitions, spatial levels, key indicators and sources of information in particular have come to the fore (Nesta, Patel & Arundel, 2003). Moreover, there are very few studies that have rigorously tested whether clusters affect the performance of firms in a positive way and whether firms in clusters perform better than firms located elsewhere, with other factors being equal.

Many contributions in this volume aim to fill at least a part of this gap. Since the notion of agglomeration economies is at the heart of clustering processes, many of the contributions (most notably the ones by Roberto Camagni & Roberta Capello, Frank van Oort, Daan van Soest & Shelby Gerking, and Anet Weterings) in this volume go to great lengths to assess the economic impact of agglomeration economies in its various forms, such as milieu economies, dynamic urbanisation economies, Jacobs externalities and MAR externalities. Moreover, the contributions by Peter Daniels, Luc Soete and Pieter Tordoir explore whether recent trends labelled (rightly or wrongly) as the 'new' economy have affected the way contemporary urban agglomerations operate and function. More particularly, they discuss in detail the extent to which new ICTs have brought about the death of distance, as some have made us believe (e.g. Cairncross, 1997).

This volume, therefore, not only presents a critical assessment of the current state of affairs in this key body of literature in regional economics and economic geography but also gives some suggestions of how to proceed in the near future at both the conceptual and empirical levels. The main message that emerges is that we should be more careful and precise in describing how and why clusters emerge and develop, and always make sure that the propositions are tested empirically in a systematic and comparative way.

1.2 Structure of the book

This volume consists of two main parts followed by concluding remarks. Part 1 deals with the cluster model. It covers nine contributions (five conceptual and four empirical chapters) that, to a varying degree, take a critical stand toward the theoretical foundations and empirical foundations of this model. Part 2 consists of six (empirical) chapters that deal with the impact of clustering on the development of urban agglomerations. It covers chapters that not only present empirical results concerning the impact of externalities on the performance of firms in urban agglomerations. They also deal with the issue of how recent trends in ICT affect the way urban agglomerations function. Below, brief details of the contents of the chapters is given to explain how each contribution fits into the main focus of the book.

Part 1. The 'cluster' model

In Chapter 2, Sergio Conti develops a systemic perspective on local development. He elaborates the notion of 'local development', which is represented as a 'synthetic concept' that integrates several concepts in economic geography-such as clusters, industrial districts and learning regions-that have been dominant for some time now. His aim is to rediscover the role of external relations (and thus of agglomeration) as a factor of cooperation and collective learning. In his contribution, Conti builds on theories of complexity, in order to show that systems consist of subsystems that interact through a large, if not infinite number of relations and dimensions. This has two important implications. First, it is rather meaningless to analyse each component of a complex system separately, while at the same time it is impossible to construct a comprehensive and full explanation of a system made of so many elements and relations. Secondly, learning processes are produced through the organisation of the system consisting of a distinctive pattern of nodes and connections with a particular identity that makes the system specific, irreversible and irreproducible. Consequently, Conti stresses the multiplicity and dynamic character of development paths that are unlikely to be subject to universal and deterministic laws. Nevertheless, the capacity of local systems to find alternative development paths is highly dependent on the variety of local institutions.

In Chapter 3, Bart Nooteboom and Rosalinde Klein Woolthuis deal with cluster dynamics. In other words, they look at how clusters develop. They propose a preliminary outline of a theory of cluster development

that distinguishes various stages, each of which is characterised by peculiar configurations of competence, governance and network structures. This does not imply that they conceptualise clusters as uniform configurations, nor that clusters should be regarded as being subject to one single, universal path of development. Their aim is to identify 'an underlying 'logic of development' from which different paths of development can be derived' and which leaves room for the local specificity of clusters that depends on contingencies of technology, markets, institutions, etc. In general, clusters will develop through the following stages (although clusters may well fail to shift from one stage to the next). Broadly speaking, the emergence of clusters requires local embedding, with a high degree of local tacit knowledge, weakly formalised ties and governance based on reputation and personal trust. In the next stage, knowledge becomes more codified, ties become more stable and central (and more hierarchical), governance shifts to more formal, contractual forms and the relevance of the local dimension decreases. What happens next is uncertain: either the cluster may stagnate, or the cluster transforms itself, exploring new combinations and possibly setting in motion a new, first stage of development. Nooteboom and Klein Woolthuis conclude by saying that there is need for a greater understanding of the conditions under which deviations from this logic of development may arise.

In Chapter 4, Mike Taylor takes a critical stand toward what he calls 'the institutionalist theory of embedded local economic growth'. According to Taylor, this theoretical model (including its variants, labelled as clusters, regional innovation systems, innovative milieus, learning regions, etc.) runs contrary to the way firms in a capitalist society operate. For example, it overlooks the issue of inter-firm power inequalities. This model of local economic growth is also regarded as a rather static one, emphasising, for instance, the impact of what Taylor calls the 'institutional instantaneous', but ignoring the role of change and dynamics. In doing so, it tends to neglect the subtle influences of local and non-local factors on the performance of local firms. To make matters worse, this model puts forward influential concepts such as 'social capital' and 'institutional thickness'. According to Taylor, the usefulness of these 'chaotic' concepts is limited. They may be considered as a cause as well as a consequence of local economic growth and they may affect local growth in both a positive and negative way. Taylor therefore suggests the need for 'a fuller, deeper, more nuanced, and less ideologically driven understanding of the processes of local economic growth'. This can only be realised when issues like the role of power are incorporated into such an approach. Finally, he pleads for more thorough empirical testing based

on 'theoretically informed empirical modelling' rather than more qualitative analyses. These are based on detailed case studies and tend to add more complexity to the model and, ultimately, generate more conceptual and empirical confusion.

In Chapter 5, Frank Moulaert and Jacques Nussbaumer observe that in post-war Europe, industrial policy has gone through a 'regionalisation movement' consisting of various stages. The most recent stage of this development, that is regional industrial policy based on endogenous development and the learning region concept, shows severe limitations. Similarly to Mike Taylor, but based on different arguments, they criticise the same theoretical model, here referred to as the 'territorial innovation model', encompassing concepts like innovative milieus, industrial districts, clusters and learning regions. They claim that this model of development is too much oriented toward economic efficiency and technological opportunities for business capital, reflecting a 'market-led instrumentality of innovation, learning and institutions'. As a result, the value of other forms of capital (i.e. human, social and ecological capital) is only defined in terms of contributing to regional competitiveness. In order to correct this economistic and technological bias, Frank Moulaert and Jacques Nussbaumer propose a much broader 'communitarian approach' to development, based on the reproduction of various types of 'non-business' capital, independently from pure economic criteria. Such a community view of regional development requires, among other things, a multi-dimensional view of culture that fosters creativity and communication.

Gert-Jan Linders, Henri de Groot and Peter Nijkamp observe in Chapter 6 that institutions and generalised trust are increasingly recognised as key determinants of economic performance of countries. Although they acknowledge the importance of trust in explaining growth differences, they think there are conceptual and empirical questions that still need to be answered. A key question is how trust emerges. This task requires setting out the microeconomic foundations of the concept of social capital. From an evolutionary perspective, they explain how social norms evolve through the adaptation of individual behaviour based on experience and learning in a particular social structure. In efficient and effective social structures, such as a network, a cooperative norm may grow, yielding mutual trust and promoting self-enforced cooperative behaviour. Another key problem in research is how to link trust in a network context to generalised trust at national level and to macroeconomic performance. A potential solution is found in weak ties and open networks (such as associational involvement based on civil society) that may generate generalised trust and provide new

trade opportunities with strangers. Linders, de Groot and Nijkamp claim that combining microeconomic research (focusing on the emergence on a micro-level of network-specific trust) with macroeconomic questions (explaining the macro-emergence of generalised trust, and how to relate this to economic performance of countries) can provide real new insights. This requires a conceptual framework that not only explains more satisfactorily 'the causal chains between spontaneous cooperative action, effective norms, generalised trust and economic performance', but also allows for feedback mechanisms and interdependency.

In Chapter 7, Ron Boschma presents a long-term empirical analysis of the Third Italy. The first part presents empirical data on the spectacular rise of the Third Italy as an industrial region during the period 1951-1991. The second part links this form of industrialisation explicitly to the notion of social capital. It has often been mentioned that the particular social structure in the Third Italy provided a basis on which this particular form of industrial development could emerge. Social capital enables people to trust one another, which makes them coordinate economic actions in local networks, resulting in high economic performance of small and medium-sized enterprises (SMEs). However, despite this theoretical claim, social capital is a problematic notion both at a conceptual and an empirical level. With respect to the conceptual level, Boschma accounts for the many dimensions of social capital that operate at different spatial levels. He explains how the Third Italy type of industrialisation is simultaneously related to various sources of social capital at various levels (i.e. the family, the community and the regional level). The third part of his contribution presents a long-term spatial analysis of Italy that empirically assesses whether social capital has contributed to the emergence of this particular form of industrialisation in the Third Italy. The outcomes suggest that the Third Italy area was indeed a distinct but not a unique area with respect to this social-cultural dimension in the early 1950s. Boschma shows that the Third Italy, endowed with a favourable socio-cultural structure, did much better than the South of Italy in developing small-scale traditional-artisanal industries in the period 1951-1981.

In Chapter 8, Bjorn Asheim and Sverre Herstad stress the need for a reassessment of the concept of territorial agglomerations promoting localised learning and endogenous economic development. This is because globalisation has challenged, or even undermined, the importance of local learning in regional economic development. Their main purpose is how this interplay between local learning and globalisation 'should be theoretically conceptualised and thus applied in empirical research'. They discuss various

and even contrasting points of view: either globalisation forms a threat to local, embedded learning, or it reinforces the competitive advantage of clusters by avoiding lock-in at the regional level. Partly based on a case study by Jæren (Southwest Norway), Asheim and Herstad claim that local-system learning has increasingly come under pressure for a number of reasons. First, they observe a process of divergent specialisations among cluster firms due to international competition, in which knowledge becomes increasingly embedded within local organisations. As a consequence, learning processes remain locally embedded, but take place within, rather than between, local organisations. Secondly, non-local learning interfaces are becoming more important (but not less problematic), alongside, but also at the expense of, local learning. Both reasons limit the scope for local inter-firm interactive learning quite dramatically. Asheim and Herstad also claim that the impact of temporary project teams on interactive learning is largely overestimated, especially when they span individual experts from different places. Due to their temporary nature, these projects do not really accumulate knowledge, while the resulting knowledge is largely gained and appropriated at the individual rather than the organisational level. Finally, they argue that foreign ownership may contribute to localised learning in clusters, as long as they bring in capital that is patient, and its allocation is decided by local management.

In Chapter 9, Robert Kloosterman and Eva Stegmeijer describe how an innovative cluster of trend-setting architecture firms emerged and developed in the city of Rotterdam in the Netherlands. In their study, they make use of rankings of architectural firms based on the number of times they are referred to in leading (international and national) architecture magazines in order to determine the innovative capacity of architectural firms. As such, they make an important contribution to deciding how to measure innovation in services industries. These architecture top lists clearly show that Rotterdam may be regarded as an international centre for architecture in the Netherlands. This seems to be in line with theory that predicts that cultural industries (such as the architectural sector) concentrate or cluster in space. According to Kloosterman and Stegmeijer, a 'contingent combination' of two factors must be held responsible for the prominent position of Rotterdam in architectural services. One of them is the development of strategic local institutes, of which some were deliberately established by the central Dutch government. The other factor is the accidental presence of one of the world's leading architects Rem Koolhaas, whose firm OMA, due to its open structure, was an important incubator, generating many spin-offs in the Rotterdam area.

Chapter 10, written by Roel Rutten and Frans Boekema, presents a detailed case study of inter-firm collaboration on innovation in a regional manufacturing network. It concerns a study of the so-called 'Knowledge Industry Clustering' (KIC) project of Océ, one of the leading high-tech firms in the Netherlands. The main objective of this project, which was carried out from 1994 to 1998, was to involve 40 of their local suppliers more intensively in product development. The outcomes are used to question existing notions on learning, innovation, networks, knowledge and space. In fact, their study of the KIC project shows that 'there is no simple straightforward relationship between learning, competitiveness, and space'. Rutten and Boekema claim it depends very much on the phase of the innovation process as to whether inter-firm learning will actually lead to innovation. Moreover, it depends on the content of the inter-firm relationship (e.g. in terms of knowledge creation) as to whether spatial proximity will facilitate innovation. Analysing the spatial dimension of networks, they suggest regional economists should mainly focus on the processes and activities of a network. In doing so, they claim that its spatial dimension should be the outcome, instead of the starting point, of the analysis.

Part 2 The impact of ICT and externalities on urban development

In Chapter 11, Roberto Camagni and Roberta Capello explore the possibility of applying and extending the notion of innovative milieus to cities. Taking up a theoretical perspective in terms of relational capital, local interaction and processes of learning, they state that the City and the Innovative Milieu, as 'theoretical archetypes', share quite a number of features, although they have different levels of complexity. Both territorial concepts are believed to reduce dynamic uncertainty and provide assets that enable the transfer of tacit knowledge and interactive learning between local actors. In doing so, they make a sharp distinction between an urban innovative milieu (i.e. a common innovative milieu in a city that exploits the urban atmosphere, such as the fashion filière in Milan) and the city as innovative milieu (in which the entire city behaves like a milieu). Based on a database of firms located in five European cities (London, Paris, Amsterdam, Stuttgart and Milan), Camagni and Capello show empirically that urban milieus indeed exist. Whereas Van Oort et al. concentrate in their chapter on the importance of urbanisation versus localisation economies, they attempt to assess the impact of milieu economies (defined as the capacity of cities to produce knowledge based on

interaction between suppliers and customers) versus dynamic urbanisation economies (defined as the capacity to benefit from typical urban channels of knowledge acquisition, such as universities and research centres) on the innovative activity of firms. The main outcomes suggest that: (1) in all cities, some firms take advantage of milieu economies: cooperation with local innovative suppliers or customers are key sources of knowledge for their innovative activity; (2) the size of firms and their sectoral specialisation play an important role. Broadly speaking, small, specialised firms are the main ones to benefit from milieu economies. Large firms, instead, take more advantage of dynamic urbanisation economies, though large firms operating in more specialised sectors also exploit milieu economies.

In Chapter 12, Anet Weterings analyses the spatial dynamics of one of the fastest growing sectors in the Dutch economy, that is computing services in the period 1981-2001. What one would expect from a theoretical perspective is that this knowledge-intensive service sector concentrates in space, due to agglomeration economies. Her empirical analysis therefore focuses on two main questions. To what extent has spatial concentration taken place during the last couple of decades and to what extent have agglomeration economies shaped the spatial pattern of computing services industry in the Netherlands. Drawing on regional employment data, Weterings concludes that, during the last 20 years, a clear spatial concentration in the middle of the country (with Utrecht as the main centre) has taken place. By and large, the outcomes of the regression analyses show that static externalities (i.e. local access to high-educated employees and, to a lesser extent, high local demand) are largely held responsible for this emerging spatial pattern. Dynamic externalities (i.e. local knowledge spillovers) do not play a role, no matter whether knowledge spillovers come from within the industry (localisation economies), from other industries (Jacobs externalities), or are stimulated by strong local competition.

This latter outcome is somewhat opposed to the outcomes of the empirical study of Frank van Oort, Daan van Soest and Shelby Gerking presented in Chapter 13. Their contribution gives profound insights into the relationship between knowledge spillovers and economic growth in the Netherlands. Based on ideas from the endogenous growth theory, they empirically assess whether knowledge externalities foster economic growth, through which kind of mechanisms this takes place (i.e. does knowledge spill between firms in the same sector or between different industries), and whether competition affects growth levels. The paper provides empirical evidence from the Netherlands, using data on the level of municipalities for the period 1991-1997. In

addition, they carry out a more in-depth analysis of one core region in the Netherlands (the province of South-Holland), using data of individual postal zip code areas for the period 1988-1997, with the purpose of correcting some methodological weaknesses in the analysis of the Dutch municipalities. The main outcomes are the following: (1) Jacobs externalities (i.e. spillovers between industries) and competition do indeed affect the employment growth level of Dutch municipalities; (2) the analysis of South-Holland produces a markedly different outcome when accounting for growth in existing firms alone: while regional diversity (Jacobs externalities) still fosters growth, this is not true anymore for regional competition. The estimation results show that even a lack of competition (i.e. the possibility of rent capture) enhances growth in existing firms.

In Chapter 14, Luc Soete goes into the issue of to what extent new ICTs have affected, or are likely to affect, the use of economic space. In his terminology, this impact may range from reinforcing existing regional development trends (i.e. ICT acting as a group of complementary technologies) to challenging existing regional patterns (i.e. ICT functioning as a cluster of substitution technologies). First of all, he describes at length why ICT should be viewed as a set of converging technological breakthroughs which is unprecedented in history as far as speed and world-wide impact are concerned. Then, he elaborates on the potential spatial implications of ICT on production, distribution and consumption. To start with, Soete observes that the production of ICT concentrates in space, because agglomeration economies remain relevant, despite all the rhetorics on the death of distance. With respect to ICT and distribution, he concludes that the use of ICT (as a complementary technology) may increase the efficiency of existing transport infrastructures, but only up to a certain limit (such as congestion acting as barrier). With respect to ICT and consumption, Soete argues that ICT (as a complementary technology) may offer opportunities to save space and time, but once again only up to a certain limit. It is still hard to imagine though what the impact of ICT as a substitution technology may look like, let alone how this may affect regional and urban development in the long run.

The chapter by Peter Daniels further elaborates on the dichotomy between the 'new' economy and the 'old' economy. His contribution is a tentative exploration of the basis for this dichotomy and he assesses whether it really adds anything to our understanding of the contemporary economy and its ongoing development. Daniels takes a firm and critical stand toward efforts to interpret recent developments in terms of 'new' that is somehow distinguishable from the 'old'. Data on the historical trends in productivity

in the US, for instance, demonstrate that similar periods of high productivity growth (like in the periods 1917-1927 and 1948-1973) are quite common. Daniels is also very sceptical about the claim that recent advances in ICT have changed the way economies work and operate. For instance, geography still matters, for various reasons, despite the fact that the friction of distance has in theory lessened. He suggests it is more constructive to analyse the consequences of an increasing role of service industries in the economy. In fact, they are currently regarded as the 'key drivers' of economic change and development.

In a way, Pieter Tordoir takes up this last-mentioned challenge in Chapter 16, when searching for new growth engines that may be promoted by policy. First, he explains that the competitive strength of nations and regions lies in the combination of three core capabilities, namely physical market access, governance capability and innovation capability. Then, he applies these ideas to the Dutch economy. According to Tordoir, the physical market access is well organised and very much promoted by the government in the Netherlands. This is less true for the two remaining capabilities: governance capabilities are present (e.g. international decision centres) but not particularly strong, whereas innovation capabilities are rather underdeveloped because there are no efficient interfaces between key organisations. When specific economic activities are linked to each of the three capabilities, empirical evidence shows that the providers of these capabilities are concentrated in the Randstad conurbation. Pieter Tordoir ends his argument by setting out policy recommendations that are intended to strengthen the three capabilities at the meso-level of clusters, industries and regions.

In the closing chapter, Robert Kloosterman and Ron Boschma make some final remarks concerning the main topics that has been addressed in this book.

1.3 A tribute to Jan Lambooy

This book is first and foremost a tribute to Professor Jan Lambooy who retired in October 2002 after an impressive academic career. To honour his many achievements in the fields of regional economics and economic geography, a conference was held that same October at the University of Amsterdam, where he was appointed full professor in Economic Geography and Regional Economics in 1975. Some of the contributions collected in this *Liber Amicorum* were presented at that conference, and most of the authors have been closely

associated with Jan Lambooy at some stage in their careers. Many of them are now leading experts in this field, working in eight different countries.

The main subject of the book has been at the centre of Jan's long academic career. The relationship between spatial clustering, processes of learning and regional development brings together three leading principles Jan adhered to throughout his academic life.

The first leading principle concerns the importance of a multidisciplinary approach. Jan has always understood that issues of regional development, such as spatial clusters, can only be analysed in a fruitful way when several disciplinary approaches are combined (see e.g. Lambooy, 1969c). Today, this is almost common sense, at least in the field of economic geography, but a few decades ago, this open-mindedness was quite exceptional. He has shown an almost unprecedented capacity to absorb alternative views in economics, especially institutional and evolutionary economics, two heterodox approaches in economics that borrow insights from sociology, history and even biology (Boschma, Frenken and Lambooy, 2002), and apply them to the realm of regional economics (see e.g. Lambooy, 1982; Boschma and Lambooy, 1999). Jan has, hence, always felt a strong need to go beyond neo-classical theory (Lambooy, 1969a). This need to integrate insights from diverse scientific disciplines is still salient, as shown in this volume by, for instance, the contributions of Sergio Conti, Frank Moulaert and Jacques Nussbaumer, Gert-Jan Linders, Henri de Groot and Peter Nijkamp.

The second leading principle in Jan's academic work is the recognition of the crucial importance of processes of technological change and learning for regional development (Van Duyn and Lambooy, 1982; Lambooy, 1997; Lambooy, 2002). He understood at a very early stage that learning processes and innovations may have an explicit regional dimension. This interest came to the fore in the so-called GREMI group (whose members included distinguished regional scientists such as Philip Aydalot and Roberto Camagni) in the early 1980s. They introduced the notion of 'innovative milieu', laying the foundations for a rapidly expanding wealth of literature on learning regions and regional innovation systems since then. In this volume, several contributions follow in his footsteps and put technological learning at the centre (see e.g. the chapters by Bjorn Asheim and Sverre Herstad, Roberto Camagni and Roberta Capello, and Roel Rutten and Frans Boekema in this volume).

The focus on urban development is the third leading principle that Jan Lambooy has adhered to in his scientific activities. Even in the 1960s, he acknowledged the importance of agglomeration economies for the functioning

of firms in urban settings (e.g. Lambooy, 1969a; Lambooy, 1981). Recently, this debate has been revived. In this volume, the contributions of Roberto Camagni and Roberta Capello, Pieter Tordoir, Anet Weterings, and Frank van Oort, Daan van Soest and Shelby Gerking all share this interest. They focus on an empirical assessment of the economic impact of agglomeration economies in its various forms, such as milieu economies, dynamic urbanisation economies, Jacobs and Marshall, Arrow, Romer externalities. The contributions by Peter Daniels and Luc Soete explore whether recent trends labelled (rightly or wrongly) as the 'new' economy have affected the way contemporary urban agglomerations operate and function.

Although now retired, Jan Lambooy is still very active. We are extremely lucky that, for many years to come, he will continue to think and work on these and other fascinating topics, to which he has already contributed so much.

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Part I The 'cluster' model

2 A Systematic Perspective on Local Development

Sergio Conti

2.1 A narrative about complexity

The profound changes in the world economy in the last few decades have brought 'new' economic geographies to the fore: in the Third World, as a consequence of the displacement of considerable segments of production, and in the peripheries of North America and Western Europe. Alongside these significant shifts, the developed world has seen the emergence of numerous new industrial spaces, the expression of both the consolidation of Hillman, A. (such as Silicon Valley or Route 128), and the revitalisation of areas with a manufacturing tradition (Third Italy, Denmark, Baden-Württenberg). The rise of the 'world cities', around which intense interdisciplinary debate has developed, is part of this process.

These phenomena, accompanied by the weakening of the old industrial cores which had expressed and sustained the mass production system, cannot be isolated from a dual and dialectical process, which Ann Markusen defines as the paradox of "sticky places within slippery spaces" (Markusen, 1996): on the one hand, the hypermobility of financial capital and technology; on the other hand, the strength of the clustering (agglomeration) of industries and companies.

This is not the place to debate whether this is not a paradox but a real phenomenon. The duality between deterritorialising and territorialising forces is a question that those involved in economic sciences and geography have examined at length. Significant contributions have been made recently by geographers, and also by political economists, sociologists and international business scholars (Becattini and Rullani, 1993; Granovetter and Swedberg, 1992; Enright, 1998; Dunning, 2000; Storper, 1995; Veltz, 1996; Gilly and Torre, 2000; Hudson, 2001, to cite but a few).

The debate, as is well known, has seen two main contrasting discourses that deal with globalisation. According to the first, the processes in question are echoed in an increasingly placeless economy, where the economic development process "is passing from territorial institutions such as states to deterritorialised institutions such as intrafirm international hierarchies" that are

R.A. Boschma and R.C. Kloosterman (eds.), Learning from Clusters: A Critical Assessment, 19–50.

said to be gaining on territorial barriers, specificity, and frictions (Storper, 1997, p. 19). In the second case, by contrast, the fact is stressed that economic development is combined with continuing specificity in development patterns. Accordingly, faced with the liberalisation of both internal and cross-border markets and of growing globalisation of asset-exploiting activities of multinational enterprises, the further concentration of economic activities in dynamic agglomerative regions represents a fundamental feature of the new world economic map, against which regional authorities and practitioners must measure themselves (Dunning, 2000; Saxenian, 1994).

It is no coincidence, in fact, that one of the fundamental terms in contemporary economic and social research is *local development*, a synthetic concept that underlies a multitude of other terms around which there has been heated debate, such as industrial districts (Sabel, 1989; Pyke, Becattini and Sengenberger, 1990), industrial clusters (Porter, 1990), learning regions (Florida, 1995; Maskell et al., 1998), innovative milieu (Aydalot, 1986; Maillat and Perrin, 1992), local production systems (Abdelmalki and Courlet, 1996; Pecqueur, 2000), 'regional motors' and so on.

The concept of *local development* implies something that is both truly complex and at the same time fuzzy: against the background of growing awareness of the incapacity of the traditional models of analysis of regional development, the aim is to give meaning to the central role in contemporary development processes of an *intermediate entity* between the actor (the company, in particular) and the system as a whole, with respect to which the local system expresses both a space for co-operation between actors and the extent to which they are embedded in a given territorial context, from which they draw specific competitive and not easily reproducible resources and solutions.

The arguments expressed here follow an explicitly systemic perspective, in particular that of *complex systems*, which will gradually be developed as we proceed[1]. One *condition of complexity* - and this needs to be recalled here, albeit briefly - lies in the acknowledgement that reality cannot be reduced to the methods of simplification typical of orthodox modern economic and social science, where reality was broken down into *simple components* which are easier to study and understand. The theories of complexity mean attention has now shifted to more complex mechanisms of interaction between elements. In particular, it is maintained that the unpredictability of the system stems from precisely the fact that the sub-systems interact with each other through different types of relations and that they cannot therefore be analysed separately.

An assumption of this kind carries with it an important consequence on the epistemological level. With the assertion of the idea of a multidimensional reality, i.e. made up of a plurality, if not an infinity, of relations and dimensions, this very reality cannot envisage a complete explanation. It follows that the observer, who is not dissociated from its own culture and its cognitive - and political - project, thus irremediably returns to the scientific discourse. If reality is multidimensional, every interpretation of it will therefore be a point of view in a single process of understanding phenomena which, to be understood, must be observed in their many facets.

2.2 A changing context for territories

Perhaps the main drive to create a truly broad corpus of research starts from the consideration that classical Fordism no longer represents the dominant paradigm of socio-economic co-ordination, and reasons need to be found to explain emerging processes and configurations, i.e. the *new relevant unit of analysis* that serves as the basis for understanding economic change in a world characterised by information flows, knowledge, competence and capabilities and the community of practices. The rationale is the rediscovery of *external relations* (and thus of agglomeration) as a factor of co-operation and collective learning.

The analysis that follows necessarily owes a debt to a debate that has radically modified in recent years the interpretation of the world of the economy and production, thereby facilitating a different reading of the relations between territory and the economy. For this reason, it is necessary to introduce briefly a set of interpretations, identifying some major areas of reflection destined to have a profound impact on the paradigm of economic and social analysis: the relational turn, the cultural turn, the evolutionary turn and the institutional turn. This is a partial and subjective choice whose objective is certainly not to give a comprehensive explanation of the debate in course, but rather to identify the themes which we will refer to most frequently in the course of our reasoning.

The relational turn: changing worlds of production and consumption

Capitalism would thus appear to have entered a new age characterised by knowledge creation and continuous learning. This knowledge-intensive capitalism marks, in general, the clear-cut transition from the previous Fordist system or Tayloristic scientific management, in which manual work

was the main source of value and productivity (see, for example, Miller, 1996).

This is certainly not the place to put together the pieces of a jigsaw which is already sufficiently well known (Gordon, 1988; Hirst and Thompson, 1996; Howells and Wood, 1993), but it is necessary to understand some fundamental features which, on both the conceptual and methodological levels, open up the road for our reasoning. We will limit ourselves to reviewing some essential traits.

- Phenomena such as the decentralisation of production, the vertical disintegration of production cycles and the establishment of a varied range of non-competitive agreements between different companies have been described not as contingent phenomena limited to single sectors or countries, but as profound and irreversible changes in contemporary industrial organisation. The operating context of companies (and especially large companies) has thus tended to identify itself increasingly with the world economy. This means that the frame of reference of economic behaviour is more and more a *varied* (in space) and *variable* (in time) set of resources, markets, and technological knowledge, less and less restricted by national and continental borders.

  In the contemporary knowledge economy, in fact, what is crucial is not so much the speed of development and the dissemination of new scientific solutions as the *pluralistic and diffusive way* (in many countries and research centres) the innovative process occurs. Companies are therefore forced to be present in many contexts, i.e. extending the range of locational choices. The consequence is the formation of networks of global linkages, from ownership to alliances, production partnerships and various other collaborative manoeuvres aimed at organising externality, i.e. the relations with other companies and different socio-economic environments, which can no longer be mastered through the usual form of expansion in size (Håkanson, 1989, Alvstam, 1995). In evident contrast to the orthodox economic explanation, the reference is no longer to the companies as organisations governing the economy, but to the *formative processes* of the companies themselves which derive from collective behaviour (network, in essence) expressed both inside and outside the market, through the emergence of 'untraded interdependencies' (Storper, 1995).
- In these conditions, the problem of *competitiveness* assumes significantly new connotations, with a major effect on the territorial dimension. It is a well known reality that many companies operating in high labour cost countries, have responded to growing ubiquity and the relative reduction in

the cost of production factors, generating entrepreneurial revenues through the *creation of knowledge*. Above all in the industrialised countries with high production costs (especially labour), the problem of competitiveness depends increasingly on the capacity to create, accumulate and utilise knowledge more rapidly than competitors. This is the *creation of knowledge* (deliberate, strongly path-dependent on company and local practices and routines) and not knowledge itself (transferable in codified form) that represents the *great new location factor*, the source of competitive advantage in the contemporary globalised economy (Maskell, 1998).

This accompanies a reality which can disconcert traditional economic theory: the growing degree to which the different regions and countries manufacture different products, through processes and instruments that are themselves very different. It is a statistical fact that *international product specialisation* has grown consistently in recent years (Fageberg, 1992), above all in the economies of the industrialised world. This means that the growing specialisation of the national and regional economies is no longer dependent on economies of scale in production - and thus on competitiveness/price ratio - but on the nature of the products put on the market, on the know-how to make these products, on the type of needs that they satisfy and on the capacity to make the products themselves evolve continuously while preserving their originality (Salais and Storper, 1993).

- What has been upheld so far has its own litmus test. Globalisation (the formation of global company networks) weakens the economic sovereignty of the nation states and thus strengthens regional specialisation in competitive activities.

  For the region, the challenge is thus of an *organisational nature*, involving the actors and their rationale of action and communication. This is an aspect whose importance is on a par with that of the inability of traditional (and still dominant) economic theory to incorporate the actors' rationale of action, as this cannot be grasped by separating the economic dimension from other dimensions, which are historically and territorially specific: if a solution exists, it has to be sought inside the region itself, in other words in the capacity for *co-ordination* between producers, consumers, institutions and other local actors. In their turn, the regions bind themselves to the global economy by promoting their own specialisation. This explains the diffusion of political strategies and choices (often neo-mercantile) aimed at promoting and strengthening the systems - or *clusters* - present, i.e. the groups of actors and activities connected to each other and therefore generators of economic value.

The cultural turn: economy and culture

It is well known how the reasonings proposed hinge on the rediscovery of the Marshallian theses of the *industrial district*: in other words, a system whose formation depends on a long-term path based *on a process of collective learning* handed down from generation to generation, which is the origin of 'organisational quasi-rents', i.e. industrial atmosphere.

Regional analysis and, in part, economic and business analysis in the last twenty years, although following different paths and using different languages, is, in effect, profoundly indebted to Marshall's intuitions and are an explicit development of them. Such analysis is characterised by a fundamentally *plural* language and in this light the sharp change in direction in terms of method has turned out to be significant. While it is difficult to separate languages and multifaceted concepts that overlap each other in the various theoretical proposals, for our purpose it is necessary to focus briefly on each of them and thereby synthesise them thanks to their *shared attention for the cultural dimensions of economic processes.*

- With the recovery of the Marshallian position (Becattini, 1979 and 2000; Piore and Sabel, 1989), to which the regulation theory and the new institutional sociology have added new blood (with the emphasis on *embeddedness*), a debate has opened up solidly based on the *social characteristics* of territorialised production systems, on civicness (interpreted as associative thickness of participation in local community political life) (Putnam, 1993) and on the idea of *social capital* (a stock of collective values and behaviour expressed by a given community) (Coleman, 1990; Bagnasco, 1999) as a fundamental ingredient of development and modernisation.
- A second significant area of research has extended the neo-Marshallian theses to the interpretation of the phenomena of territorialisation of innovative processes, also drawing inspiration from evolutionary economic theory and the Schumpeterian approach to innovation. The concept of *innovative milieu*, supposed to act as an incubator for innovation, is explicitly defined as the dynamic version of Marshallian external economies, where *collective learning* depends on networks of synergy-producing interrelations in conditions of geographical proximity (Camagni, 1991; Maillat and Perrin, 1992; Crevoisier and Camagni, 2000; Ratti et al., 1997; Keeble and Wilkinson, 1999).
- The introduction of these sets of concepts would not, however, have been feasible without the specific recognition of the importance of *culture* in the economy (the basis, in its turn, of trust and collaboration), expressed in

attitudes and behaviours and, as such, embodied in institutions and forms of mediating factors in the policy process (Berger, 1987; Rasmussen and Rauner, 1996). The extension of these arguments to the level of (local) social dynamics has enabled, as is well known, a more complete systematisation of the complex dialectic between competition and collaboration. The latter, identified as a key feature of a competitively advantaged cluster (Enright, 1996) implies 'close-knit' sociocultural links, in addition, obviously, to a willingness to cooperate.

The evolutionary turn: evolution, systems, and innovation

The story is sufficiently well known: the proposal pivots round the seminal works of Nelson (1993), which are of an essentially empirical nature, of Lundvall (1992), which are more theoretically oriented and of Carlsson (1995), who summarises both an institutional/organisational framework and a cognitive/cultural approach.

The perspective is explicitly *evolutionary* and the approach *holistic*: innovation appears as a cumulative and path-dependent process: small events are, in fact, reinforced and become crucially important through positive feedback. This leads us to deduce the fundamental feature of the framework proposed: an innovative system is understood in terms of process and therefore of learning or, more correctly, of interactive learning (Nelson, 1995; Nelson and Winter, 1977).

The learning dynamic, in which tacit knowledge and codified knowledge are combined, possesses a local dimension not only because the local system transforms the codified knowledge generated outside its borders into knowledge that can be used for local production, but also because it transforms contextual (or tacit) knowledge into codified knowledge, i.e. transforming local factors into competitive advantage[2].

On these bases, much has been written in recent years on the *ideal scale* for the identification of a technological system, from the national one (Freeman, 1995; Lundvall, 1992; Nelson, 1993) to the regional and local one (Saxenian, 1994; Braczyk, Cooke and Heidenreich, 1998; de la Mothe and Paquet, 1998; Asheim and Dunford, 1997; Simmie, 2001), without managing to resolve the problem of the scale of reference. It is no surprise, therefore, how problematic it can seem to identify the boundaries of a single model of system of innovation (Edquist, 1997; Lundvall, 1992). In line with the theoretical perspective that has been briefly illustrated, there is neither consensus nor certainty about the many systemic dimensions, both as far as the elements are concerned and as regards the relations between the system's elements.

In this light, the approach in evolutionary terms possesses an essentially (and quite fertile) methodological value, presenting itself as a conceptual framework characterised by a rather uninhibited formulation of conjectures and *not* as a formal theory. From this, it is possible to draw at least two considerations on method, in themselves quite simple and related to each other, which are worth restating by way of a conclusion:

a) The first concerns the assumption according to which it is not possible to identify a single system of innovation, but that each one is, on the contrary, distinctive and *essentially sui generis*;
b) Secondly, an ethic is introduced into economic thinking according to which it is not possible to achieve full representation of the reality observed. This implies, in practice, the assumption of a *condition of complexity*, in other words the impossibility, when faced with an object made of many elements and relations, of reaching a complete interpretation of the system observed.

The institutional turn: on economic institutionalism

The proposal of evolutionary economics integrates and, at the same time, is *not* separable from the institutionalist perspective, which also opposes oversimplification of orthodox economics, assuming an evolutive vision in which relations are not organised according to the universal principles of marginalist and neo-classical economics.

The conceptual framework is, indeed, vague, despite the fact that growing attention has been paid in recent years to institutions in the functioning and change of economic systems, the various agents do not attribute the same meaning to the terms institutions. In practice, institutional economists (in reality a vast movement that only by simplifying could be called institutionalism) usually adopt a 'sociological' meaning of institutions, including in it routines, morals, shared expectations etc., in addition, naturally, to the market and companies (Nelson and Winter, 1982; Hodgson, 1993 and 1999).

In other terms, the institutions are the way of organising relations, around which there is a social consensus and whose value does not finish with the single relation but offers the basis for organising other relations at a later date. Institutions can, moreover, assume many forms and contents. First of all, they can be either formal (for example, a contract) or informal (for example, habits and customs). Other institutions can be both formal and informal. An example is business ethics. The imperative that "business must

be conducted ethically" is undoubtedly an institution in that it contains a statement that regulates the organisation of economic relations. It can also take on a formal status (through the definition of legal norms that regulate competition end even through the creation of a body responsible for this) just as it can be informal through the social condemnation of the entrepreneur that acts improperly (Johannisson et al., 1994).

2.3 'Likely' stories: nodes and networks

In the light of this picture, it would seem there are no longer doubts about the fact that in the contemporary economy *competitivity* goes beyond the limited frame of the single company and affects a set of *relations*, both inside the single company and above all between different agents. It follows that the relations that determine competitiveness are increasingly external instead of being managed inside the company. This corresponds to an *effective increase in the complexity of the economy and production*. If this is true - and that seems to be the case - competitive advantage stems from the organisation of these relations largely transcending individual actions and behaviour.

The means that the method of representing this set of relations, echoed in a more closely connected, more segmented and polycentric economy is, as is well known, the *network*, of which much has been said in recent years. The process even went so far as to propose - and not always coherently - an unlikely new paradigm (Castells, 1996; Cooke and Morgan, 1993; Simmie, 2001; Storper and Harrison, 1991).

Reasoning in terms of networks effectively has significant implications. In the ordered representations of traditional science, the economic system was conceived as an 'organic totality', a single system whose operating rules are valid in all places and at all times. The dynamics of development were thus identified by applying mechanical and linear categories (such as the heuristic one of core-periphery) which simplified and distorted reality. The world of economic orthodoxy and that of core-periphery and dominance-dependency gradients could, in fact, be represented ontologically in terms of areas (or fields, in the neo-Walrasian language) and thus of extension, delimitation and contiguity (i.e. a continuous space of a Euclidean type).

The 'design' of the network - or to put it perhaps more clearly, a way of viewing a world of intrinsic complexity (Potts, 2000) - divided into nodes and connecting segments breaks away from the idea of the spatial continuity

of phenomena and of the existence of a single order that regulates the organisation of *economic space*, to offer a more complex and realistic territorial organisation and 'order', which assumes the economic system to be the sum of different systems.

It is precisely in order to render this complexity intelligible, as well as to describe and represent the relationships between the whole and the parts, that the concept of network has been resolutely affirmed. The network is assumed here to be the representation of *social interactions between actors*, which by their nature cannot be measurable or quantifiable, taking on a *metaphoric meaning* quite different from the conventional one in marginalist and neo-positivistic frameworks.

A series of already sufficiently well known generalisations can help us to define the problem (Conti and Giaccaria, 1998). To this end, we assume - as an initial approximation - the *two possible levels* into which the system can be broken down.

a) The concept of *global networks*, firstly, aims to represent agents that can no longer be interpreted as self-sufficient islands. A *globalisation* strategy is characterised by reciprocal exchanges within a polycentric system, in which each centre (or node) contributes *specific resources* constituted by production competencies or skills developed locally through learning processes. By combining the co-ordination of learning processes (representing in all senses a *capability*), this therefore becomes an important source of competitive advantage.
b) The concept of *local networks* represents, consequently, a series of relations between agents who are self-contained and in a given 'place', with local meaning the *geographical scale* that enables the interactions typical of physical proximity (such as face-to-face relations, ones of reciprocity, trust etc.). However, this network can be explained not just in terms of mere geographical proximity, but rather by embeddedness in a specific economic, social and cultural context. In this sense, embeddedness goes beyond the mere location of plants and assumes a complex set of relations specific to the place in which the activity is physically located.

It follows that the concept of *global* does not have a dimensional character. It must not be thought of as 'extended' or 'general', but in relation to entities which distribute and interact with each other. The global system is therefore understood in a relational sense where its extension is not definable a priori, depending on the system of the relationships that occur between lower level (or local) systems. In other words, the global is composed of characteristics of the systems it connects, modelling upon their specific configurations[3].

The *local*, in turn, is not a mere segment into which the world can be subdivided, but a 'complex totality', capable of autonomous behaviour. It is a world in itself, endowed with its own identity which distinguishes it from the environment and from other systems. The local system is seen, essentially, as an aggregate of actors that in given circumstances can behave as a *collective actor.* The territory, in this sense, never creates networks directly, but favours the constitution of *relations between actors* which are socially closed. At the same time, the networks of local relations interact with other territorial levels (and networks) *by way of the intermediation* of the actors belonging simultaneously to a local network and a supralocal (or, by definition, global) network.

When represented in the *node/network form*, the local/global dialectic illustrates a *state of complexity* which occurs, as has been recalled, when a situation cannot be generalised using a priori theories but by integrating the different dimensions of reality. This makes sense of the idea of the 'multiplicity' of possible development paths, which consequently do not represent the adaptation to the eternal laws of capitalism.

At the same time, it is assumed that resources external to the firm are increasingly involved in creating competitive advantage. This represents an explicit evolution of the idea according to which competencies and capabilities are firm-specific resources. They must instead incorporate several entities with which they *co-evolve*: other firms, networks, territories, of which the actors adopt certain aspects and share common characteristics (Conti, 1997; Grabher, 1993).

The problem is that these externalities have *not* been identified, nor has their scale and dynamic process of change been defined. It is therefore necessary to set the idea of externalities in its foundations, identifying what they actually mean, that is to find some criteria of identification.

For this reason, it is not possible to ignore the *non economic* components of actors' actions, as traditional thinking has done for decades[3]. In orthodox thinking, in fact, the economic system, as Coase (1937) noted, is assumed as being co-ordinated exclusively by the price mechanism, as well as being characterised by the generalised insistence "on the deductive mode of explanation, including the unsustainable commitment to the 'whenever this then that' structure of 'laws'" (Lawson, 1997, p. 282).

It is therefore necessary to tackle broader questions of a theoretical and epistemological nature. The differentiation and specification of the territorial patterns of development and competitiveness pivots around the concept of *identity*, a term which will facilitate the attribution to the local system of an autonomy from the abstract laws of the economy.

2.4 Metaphors and omologies

On development: specification and irreversibility

We will briefly summarise the terms of the question. The evolutionary interpretation of economic development suggests that at the origin of economic change lies a (dynamic) learning *process*. This is interactive and relational, is not predictable and is subject, therefore, to possible bifurcations, although it is also characterised by a certain degree of inertia. In its complexity, it is *specific* and distinctive and therefore ontologically not reproducible. The fact that it is collective means that ideas, knowledge and technical practices are closely interwoven in a certain cognitive pattern, a 'red model' (Ziman, 1991) where knowledge is not stored in separate heads, but in the relationships that develop among the different layers of the process.

It follows that the *organisation of the system* is the base of the pattern of nodes (*organisms*) and connections that make up the learning engine, conferring on it a particular configuration - a *structure*, in the language of contemporary systems theory. In this light, the organisation co-ordinates tangible and intangible assets which, while evolving, can produce knowledge, routines and growing *organisational proximity* between the nodes of the system (i.e. the sharing of technical, organisational and economic knowledge), thereby making the assets available at a lower cost than the one generated by market transactions. It is clear that the organisational process confers *specificity* on the system, the capacity for permanent learning and therefore *irreversibility* (the process of specification generated by the organisational dynamic recalls in fact what authors of the evolutionist school define as irreversibility (Metcalfe, 1998). However, this is not enough to say that territoriality is a condition required to explain the origins of the economic dynamic (Rallet, 2000). The organisation can refer, in fact, to a company network with ramifications on the global scale or to a circumscribed district system.

The *institutions*, as we have seen, are positioned upstream of the organisation and refer to *latent factors* that cannot be contextualised directly in the co-ordination process. In other words, they contribute substantial 'inertia' to the organisation, i.e. a stability over long periods, and a structural resistance to changes. Put another way, they confer *reflexivity* on the system (Cooke, 1995; Gibbons et al., 1994) which can thus reproduce itself and react, without breaking up, to any shocks from the outside. As has already been discussed elsewhere (Conti and Giaccaria, 2001), reflexivity refers to the capacity of the system to *represent itself*, so that the actors that compose

it are aware of belonging to a larger whole that possesses given common characteristics. In operational terms, as Stiglitz (1987) argues, reflexivity gives the system the capacity of *learning by learning*, differentiating it from other systems.

Institutional proximity, i.e. a common space of representation and roles accepted by the agents (Bellet et al., 1988), creates and reproduces, specifying *latent factors and resources* that adapt to the new production configurations. However, even institutional proximity is not *at first sight* necessarily territorialised, although we can assume, as a start, that the shared languages, norms, values, rules are more easily contextualised at the territorial level, conferring inertia and reflexivity on the system.

Given these premises, it is now possible to state that the capability of a local system might be defined as what a (territorial) organisation is able to do better than others, including the ability to renew, augment and adapt its 'core competencies' over time. *Spatial proximity* is not therefore a sufficient condition, given that competitiveness is attributed to those territorial contexts that contain specific production factors, i.e. not available or more expensive if they go through the market. This does not mean denying the importance of co-ordination through the market, but rather that the territory, in given circumstances, is an entity that combines *organisational proximity* and *institutional proximity.*

Territorial competitiveness - and the very differentiation of geographical space - can in this way be traced back to the supply of assets or specific resources that, because they are latent, are unlikely to compete directly in the market. In order to understand this better it is necessary to reflect on a simple conceptual duality, which introduces us to the reasoning that follows.

The distinction between *generic resources* and *specific resources* is rather elementary: the former (such as raw materials, services, manpower etc.) can be used in a undifferentiated way, so the search for them can produce easily reversible location behaviour. From this point of view, the locational behaviour of economic actors could easily be explained in terms of the search for cost differentials, in addition to the availability or lack of these resources. The locational problem would thus appear as one aspect, among many, that go together to define the actor's strategic behaviour.

The argument is obviously overturned by assuming the concept of *specific resources*, i.e. "attached to a given production process consisting of learning and technical complementarities" (Colletis-Wahl and Pecqueur, 2001 p. 454), which make the territorial system a strategic resource in the development process. In reality, it is the complex interplay between organisation and

institutions that discriminates between a set of specific resources and generic ones. In contrast to the latter, specific resources are explicitly *localised*. It is unthinkable, in fact, to imagine that, being produced by a given context through the historical evolution of relation between actors, they could be reproduced in a different geographical area to their original one. As the depository of specific local resources, a given context differs from others and defines an environment of, again specific, economic evolution.

The duality between specific resources and generic resources is not separable from another pair of concepts, namely (territorial) *development* and *valorisation*. The distinction is not just nominal, but useful from the methodological point of view in that it separates two conceptions of regional development that traditional theory kept, instead, intimately united.

In the case of valorisation, the regional (local) system is understood to provide passive support for more or less pervasive general forces and processes. Territorial valorisation can, in fact, stem from variations in the distribution of comparative advantages. This means that the decisive actors in the transformation of the regional economy and society are in general (although not only) of external origin and find in the region the territorial conditions (production factors, externalities in the broad sense) essential to the pursuit of their own economic objectives. It follows that valorisation is a *reversible process*, which can be interrupted and cancelled if the conditions that generated it disappear (such as, for example, the discovery of factors at lower cost in other places, changes in legal, economic, geopolitical conditions etc.).

In the case of local or regional development there is instead the direct activation and involvement of territorially embedded forces, which react to the uniforming trends of external origin through their own organisation, capable of modifying forces and "disturbances" of exogenous derivation on the organisational and institutional conditions produced and reproduced by the system. This also helps us to understand why an increasingly international and global economy not only has a corresponding territorial uniformity, but also the contrary trend towards diversification which cannot be traced back to the simple mechanism of the division of labour as a response to the expansion of the market. (Dematteis, 1994, pp. 17-18)

We have thus reached an important thesis: the fundamental factors that define a process of territorialisation (and therefore of the differentiation of space) derive from the presence of *assets* and *specific resources* that enhance the efficiency of the local actors and transcend (although without denying) co-ordination only through the market.

Identity and autonomy

The question of identity can be solved by using some of the instruments of systemic analysis and, in particular, by the elimination of the duality between closed systems and open systems, with the introduction of the concept of *active open systems*. Defined in the biological sciences, it can be assumed here that *homology* means giving meaning to the behaviour of territorial systems. The framework of complexity envisages the similarity of laws between systems of different kinds which, precisely because they are systems, possess *similar general features*, that is homologous ones[4].

The reference here is to the mechanism of *autopoiesis*, through which it is possible to characterise the *organisation* and *identity* of a system. These are two inseparable concepts that were largely unexpressed in traditional system theory.

The starting point is the clear distinction between *heteronomous* and *autonomous* systems: while the former are characterised by an evolution according to the structure of the external world, autonomous systems are, instead, endowed with organisational closure, where the external world acts purely as a factor of disturbance. They thus appear *independent* of the forms of the outside world, with the exception of the flows that assume importance for the *self-reproduction* and survival of the system. In a system characterised by organisational closure, network interconnection between its components is the basis of the fundamental property of autonomy, which defines the closure and cohesion of the system with respect to the environment[5].

The local system will thus be distinguished on the basis of its own rules of operation which, instead of being dictated from the outside, represent invariants through which the system reproduces its own autonomy in its constant openness to the environment. These rules are dictated by the way in which the network of its constituents relations is *represented internally*, by a rather complex structuring of economic, political, cultural, social etc, relations.

The key concepts are *organisation* and *structure*. Although both concepts are of a relational nature, the sense is profoundly different. The organisation is, in fact, given by the ensemble of relations between the elements of the system that makes the system what it is and not something else. The structure is, instead, given by the material and historic qualities of these relations. It is the structure that modifies itself more rapidly, following stimuli from outside and inside the system. The organisation maintains, instead, a greater degree of rigidity, in that a radical modification of the relations that compose it can lead to the disintegration of the system. Obviously, organisations evolve over

time, according to its laws (it is in this sense that the system is autonomous and autopoietic).

For our purposes, we can say that the organisation represents the identity of the system, represented in Figure 2.1 by the vertical axis, where the term vertical relations express the complexity of the relations of the different actors with their physical and social environment. This identity does not have a binary character, meaning that it either exists or it does not. However, it is placed on a continuous axis that goes from a minimum, below which the system does not exist, to a maximum. In this continuum there are various values that identify:

a) a *high level of identity*, as the expression of a climate of trust and cohesion (institutional assets, in other words), which is expressed at the same time in marked reflexivity;
b) a *low level of identity*, the expression, in contrast, of low organisational capacity, which makes the system susceptible to destructuring.

Vice versa, the horizontal axis indicates the structure of the system, revealed by its configuration and organisation, from the higher or lower articulation of its relations with the outside. The term horizontal relations represents, in fact, the intensity and the quality of connections between economic actors (local and supralocal) which, as we have seen, cannot be created independently of the former.

It follows that the two dimensions described do not exclude each other reciprocally, but indicate a broad (not to say unlimited) set of possible attributes (or typologies of local systems), included between the two extremes of development and dependency. A high level of reflexivity of the system, together with high intensity of relations between the system and the outside hypothesises a condition of *development*, in which the local actors (and the system) express a high level of *autonomy*, moving successfully into global networks of research, innovation, markets etc. and thus improving the local perception and interpretation of horizontal relations.

The condition of dependency, in contrast, expresses the condition in which the dialogue of the system with global forces and processes is *dependent* and not complementary, although there may be forms of territorial valorisation. As is well known, this condition, or typology of local systems, responds to the search for conditions of simple externality (labour inputs, semi-products, political and legal conditions etc.) that can translate into easily reversible processes if the system lacks autonomy.

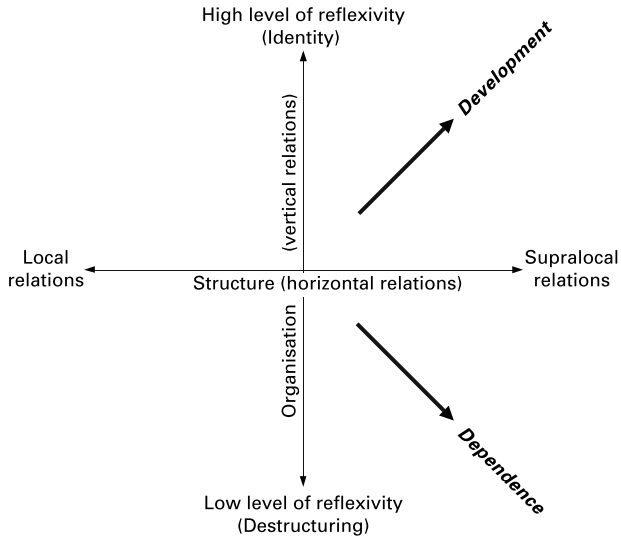

Figure 2.1 *Local development: a framework*

In this perspective, the object of enquiry is not the universal laws that produce territorial patterns of development, but the specific vertical and horizontal relations. They represent the identity of the local system, the nucleus of essential local relations with which a 'community' keeps itself distinct from others, thus opening up the idea of the multiplicity of development paths.

It is therefore clear that the emergence of local institutions must be a mainly internal process, the outcome of the interaction between the actors that make up the system (what, by homology, we defined as the organisation of the system). Only in a second phase does the system face the external world and adapt its own structure to the stimuli from it, while maintaining its own organisation. It is, in fact, clear that the local system must engage in dialogue with the external environment (the global scale), thereby creating relations of exchange (not necessarily mercantile) with it.

Represented in this way, the picture may appear fundamentally static, although it is legitimate to assume that in the space between the extremes (development and dependency) and in the four sectors of Figure 2.1 there may be room for a multitude of possible local identities - and forms of competitiveness - whose position changes with changes in the dialect between organisation and structure. Further reasoning is therefore needed to explain, even if in extremely generalised terms, the evolutionary dynamic, i.e. the different trajectories possible.

The identity of the system, as we have seen, is derived from its organisation and its structuring is the outcome - both dynamic and evolutionary - of collective action. In this light, territoriality and competitiveness are both the expression of a *temporal process* of self-organisation achieved by actors within a network and therefore expressing an evolutionary effect.

2.5 Evolutions and discontinuities

But how does a territorial system evolve? We have seen that the internal organisation dictates the rules of interaction with other systems, i.e. the structure's evolutionary path. However, for this to happen, the system needs to be able to create, starting from its own organisation, new and superior states of complexity. These are the conditions in which the system can develop. If this is not the case, it could initiate more or less rapid processes of destructuring and disintegration.

In the first case, the system uses the flows from outside. It can therefore modify its own structure (for example, shifting from one manufacturing specialisation to another), diversify itself qualitatively and quantitatively and make itself more complex. Thus, some major manufacturing regions have experienced, in different historical periods, processes of degradation of the old structures in order to endow themselves with new ones (a process that recalls the 'creative destruction' of Schumpeterian memory). In the second case, on the contrary, systems can destructure, setting in motion a spiral of dependency.

As will be remembered, institutional proximity endows the system's actors with a *common space of representation*, roles and models of learning and action, collectively internalised by the actors themselves and for this reason guides their behaviour. This process of identification - maintained already by Ayres (1953) and Hirschman (1958) - represents to a certain degree the system's 'memory', which in turn allows more or less effective development trajectories through the reproduction of knowledge.

This memory, or capacity to learn on the basis of the knowledge accumulated (and not dispersed or forgotten), obviously transcends the individual sphere and constitutes a specific and local latent resource (in contrast with other institutional components that are usually codified on the national or supranational level). Self-representing itself, the system is thus able to select the disturbances to which it is subject, adapting them to its own organisation.

Assuming the self-representation of the system in terms of a *cognitive domain*, a concept which indicates the possible responses that the system can give to external stimuli. This leads us to define the relations between the system and the environment (with other active systems) in terms of *structural coupling*. This is achieved when the system, because it is closed from the organisational point of view, selects the disturbances from the outside, while continuously modifying its own structure and thus releasing the potential already inscribed in the organisation's code. Graphic representation is again the most useful instrument for explaining the possible evolutionary trajectories, identified in the framework of a plane defined by the two co-ordinates of identity and openness.

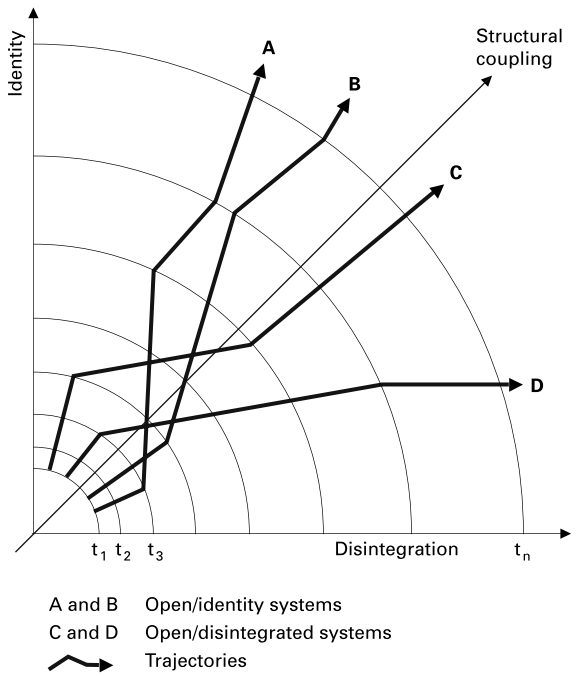

Figure 2.2 *Systemic evolutions and discontinuities*

To do this, it is necessary to consider the *space of the phases* in which the trajectories are represented virtually, while taking account of their respective positions at times *ti, t2, ...tn*, in correspondence with which discontinuities, or *catastasis*[6] which occur in the evolution of the system (Figure 2.2). They can originate through disturbances or shocks from the outside such as, for

example, location decisions that disrupt the socio-economic equilibrium, unexpected geopolitical events, etc.

Despite the generalisation, this way of proceeding has at least two rigorous and closely related implications:

a) the first further emphasises territorialised phenomena. In fact, while the capabilities of an individual actor can be transferred with more or less difficulty to others, even if located in other places, this is not true of regional (local) capabilities, based on specific patterns of relations between companies and interpersonal links (Lawson and Lorenz, 1999, p. 310).
b) secondly, it enables us to overcome one of the main simplifications of the orthodox social sciences, i.e. the definition of fixed periods. A local system, in effect, cannot be framed in the usual periodisations, given that it evolves in time while maintaining substantial continuity with its past and tradition. In fact, various forms of organisation of production and social life co-exist and interact, giving rise to an individual path. This is different for each local system, which is thus freed from the general laws of the great economic periods.

The assumption is that at time t1 each system is characterised by a condition of self-containment, i.e. substantially closed to the outside. The identification of possible evolutionary trajectories is again a form of abstraction whose purpose is purely to fix some possible discriminating factors in a framework that might appear excessively deterministic at first sight.

The evolutionary trajectory leads the system to adapt its own structure, i.e. to give specific (local) responses to general (global) stimuli. The flows established with the outside are therefore compatible with its operational closure. For example, the modification of production specialisations are nothing but *contingent modes* in which this self-reproducing function appears in the realm of economic relations.

In reality, the evolutionary trajectory responds to the complex game that is played out between organisation and structure, determining processes that, as we have said, can in time induce the differentiation of the various systems. For the sake of simplicity, the figure shows two possible evolutionary forms, each of a different intensity and nature, which underlie a rather broader scenario of possible transformations of the system's identity.

a) The first (*open/identity systems*) represents the condition in which, with the variation in the state of one or more components of the system,

the networks of relations reproduce, shifting from one equilibrium to another. By adapting its own organisation, the system extends the field of possible environmental interactions (or local/global dialogue) which, in turn, produce further complexity of the structure. The assumption of two possible trajectories included in this form of evolution has the sole purpose of envisaging a number of possible scenarios. The first (*case A*) can interpret, for the sake of simplicity, an industrial district that reproduces its classical form: institutional blockage does not question the identity of the system, but can delay strategic creativity and consequently inhibit the potential for dialogue with the environment (global). This does not occur (or in any case occurs only to a lesser degree) in the second case (*B*), in which the changes in the structure (usually of an incremental type) respond to a learning process that is more compatible with the organisation and lead to an extension of the capacity for dialogue with the outside (for example, a 'mature' industrial district or an advanced technological system can respond to the characteristics described).

b) The second (*open/disintegrated systems*) express, in contrast, the condition in which disturbances of environmental origin affect the system's memory, making the adaptation of the system problematic, while significant changes in the structure occur at the same time. Again in this case, the range of possible paths of evolution is fairly broad and it is only possible through a trivial simplification to prefigure the pattern of an old manufacturing region (*case C*), in which radical changes in the structure are found in harmony with the organisation, or that (*case D*) in which shocks from the environment, having an impact on the organisation, trigger a gradual loss of identity for the system.

2.6 Politics and policies

The lesson of history

The definition of territorial system in terms of autonomy is a fundamental methodological discriminant. It does *not* follow that any possible portion of the earth's surface can be understood in terms of a system, as this term refers *purely* to those contexts that possess an *identity* that distinguishes it from the environment and from other systems.

However, it would be naive to imagine having reached in this way a representation that can go deep below the surface of reality. A claim like this would be senseless in the light of the dramatic turn in scientific thinking that,

with the introduction of the notion of complex systems, has moved towards the denunciation of the claim to scientific certainty. This means that what we have achieved so far is nothing other than a *plausible* interpretation of a decidedly complex reality. We still need to tackle the ambivalent relationship that local development has with the themes of politics and policies.

Emerging literature looks at regions as an important base for co-ordination at the meso-level and the introduction of the cluster concept as the instrument to give impetus to local economies in an increasingly globalised world (Acs, 2000; Cooke, 1995; Cooke and Morgan, 1998; Enright, 1996; Nooteboom, 2000). At the same time, recent years have seen countries and regions adopt actions seeking to enhance their competitive potential through supporting clusters of interrelated industries (Amin, 1999; Blakely, 1994; Braczyk et al., 1998).

In reality, these cases differ greatly from each other, and this would be enough to support the thesis of how unjustified it would be in our complex world to put forward a unitary "model" to be transferred elsewhere. It is, however, legitimate to assume, without any claim to completeness, some *generic reasons* for their success on which there is now sufficient consensus.

First of all, the regeneration of the economy of the region did not occur through the random promotion of activities, but by pursuing (and this is the significant aspect) the use and 'regeneration' of technological resources historically embedded in the region's economy, promoting both *specialisation* and *functional differentiation* (Rehfeld, 1995). Secondly, it is also undoubtedly true that in these 'winning' cases, *network strategies* of financial and technological assistance aimed at encouraging interaction between actors have been pursued and implemented. The creation of so-called *social capital* expresses, in particular, forms of intervention which support the formation of entrepreneurship and the preparation for conditions of *learning*, characterised by collaboration and interaction at the regional level between enterprises and the science base, whether public or private.

In summary, if a lesson can be drawn from all of this, it is that economic regeneration has not been reduced, on the one hand, to a set of restricted economic factors (which are, in any case, essential), but by major involvement of institutional, cultural and social factors. On the other hand, it has to transcend any hypothesis of 'generic' industrial policy in order to give priority to, in contrast, selective strategic solutions. If, for decades, policy was directed more at curing the symptoms of regional problems (such as unemployment) rather than the causes (such as low innovation potential), more recent strategies have tended to provide a practical expression of network

logics. These are aimed at fighting *institutional inertia* (Dunford, 1994; Laville, 1997; Morgan, 1997) in order to pursue the strengthening of inter-industrial co-operation in a system of actors (clusters, in the broad sense) which together possess capacities to spend on the international level, drawing advantage (again together) from existing or produceable environmental conditions.

These rapid references to a well known situation are part of a local development perspective characterised by two shifts: a) *from government to governance*, and b) *from politics to policies*.

As is already known, while the concept of government refers to a form of management of the public sector entirely entrusted to local and national political administrations, the idea underlying governance is based on a radically different perspective. When we talk of governance, attention is focused on a form of local government and management that is based on the interaction of many actors on the local scale (Bagnasco and Le Galès, 1997): local and transnational companies, associations, labour unions, universities and research centres, in addition, obviously, to local and national institutions.

This transformation is also the origin of the shift from politics to policies. The centre of attention is no longer the political discussion - or conflict - between actors representing alternative projects for constructing social structures. The interest is rather in the construction of concrete policies to encourage the development of local communities .

The self-representation of local policies

Taken together, these argumentations are reflected in the conceptual framework that we have constructed so far: if reality is complex and multidimensional, every interpretation of it will be a point of view in a single process of understanding phenomena which, to be comprehended, must be observed in their many facets. It follows that knowledge is no longer conceived as predetermined, but can be developed only through the interaction between the subject-observer and the object of knowledge.

It will be remembered that, by the idea of *self-representation of the system*, the question was posed explicitly of the *point of view*, i.e. the position from which one describes the system. A point of view *external* to the system leads to representing and interpreting the relationship of the system itself and its environment in linear terms, following an input-output model. In this way, the territorial (local) system is seen as a mere sub-system of the global system, depriving it of its own conceptual autonomy. The concept of self-

representation introduces instead the possibility of characterising the system in terms of organisation, of identity, inducing one to adopt a point of view *internal* to the system itself (Dematteis, 1990).

Local policy as the mere expression of a development ethic that accepts the laws and dynamics of contemporary capitalism produces nothing other than a simple - local - specification of standardising processes and forces. In this case, although turning attention to places modifies our vision of development process, it cannot change the concept of development itself. To state that places (whether they are defined as clusters, industrial districts, milieu innovateur, or yet other metaphors) play a fundamental role in the contemporary economy is not yet a reaffirmation of their centrality.

The thesis that now emerges is fundamentally different. The systemic perspective is the bearer of the idea of a place that reproduces its own identity, given by the organisation of those social, cultural and economic relations that make that place 'unique'. In this case, if the arbiter of development is no longer the market, but the local system, it follows that the benefits of local development are evaluated in terms of the maintenance of the system's identity. It follows that the political solutions possible are those compatible with the identity of the local systems, i.e. with their capacity for self-reproduction. Otherwise, as we have seen, there would be a shift from a logic of local development to one of mere valorisation, and thus of possible destruction of the system.

This means that there will be a multitude of development paths which depend on the multiplicity of local institutional assets and therefore on the *perception* and *judgements* that the actors have of the network of relations in which they are included and of the consequent evolutionary trajectories. In this sense, the concept of territorialisation assumes full and unambiguous meaning. It is in the field of political choices that the local perspective becomes intelligible in terms of a system that includes different actors belonging to different institutional contexts, to networks that express different perceptions, objectives and strategies. The system, in other words, depends on the networks of institutions, which co-create a policy through dialogue between 'equals', based on a process of reciprocal interactive learning (Wikstrom and Normann, 1994).

In conclusion, the relationship between the local scale and possible development paths and policies appears fundamentally dialectic. A development path is not valid on all scales, nor does a temporal succession exist of hegemonic models of development, each of which dominates a given historical period. On the contrary, they co-exist at the same time and in the

same place. This depends on the position one takes in order to decide, i.e. on specific institutional assets. These are what, in fact, define the way local actors organise socio-economic relations internally, the exploitation of local resources and the relationship with other scales.

In conclusion, this means upholding the view that a local system is not a Pandora's box that encompasses all possible relations, projecting itself outwards as a monolithic entity. In this sense, *institutional biodiversity* (i.e. a vast range of different institutions) represents a fundamental condition for ensuring the availability to the local system of the greatest possible number of development paths. Institutional biodiversity implies a process of selection of the institutions. This could be considered as a process of learning, remembering and forgetting.

If it is true that learning implies the capacity to forget, then it is equally true that the process of forgetting institutions and traditions that appear obsolete can threaten institutional biodiversity. Forgetting in fact means reducing the variety and wealth of local institutions: in a situation where the future is uncertain, this cancellation can prejudice the capacity of the local system to find alternative development paths.

Notes

1 It is obviously not possible here to take into consideration the paradigmatic shift towards a condition of complexity and the consequent condemnation of the 'science of the simple' typical of the Cartesian tradition. Without claiming to being comprehensive, we limit ourselves here to recalling the fundamental works by Le Moigne (1992 and 1994), Mirowski (1988), Morin (1977), Simon (1981), Waldrop (1992), von Foerster (1982).

2 The largely tacit nature of much of the knowledge underlying a regional capability, which makes imitation difficult. This point has been clearly enunciated by Maskell and Malmberg (1999), for example, who observe that in the current context, where the rapid diffusion of new information technologies has eased the world-wide transfer of codified knowledge, tacit knowledge, which is difficult to transfer in the absence of face-to-face contacts, arguably becomes a more important source of regional or local competitive advantage (See, for example, Foss, 1996).

3 Even recently, the so-called *geographical economics* has effectively given back centrality to many traditional components. Accordingly, instead of encouraging the dispersion of production plants the drastic reduction in transport costs means that the other factors of agglomeration are free to act (economies of scale and market externalities, the indivisibility of some 'public assets' such as infrastructures, services etc.) (Krugman, 1991 and 1995. See also Helpman and Krugman, 1985).

4 As a conceptual model, *homology*, that is allowing isomorphism between systems of different kinds, is opposed to the determinism typical of *analogy*, in which the transferability of

concepts between the sciences radicalises the separation between different disciplines, setting itself in contrast with contemporary systemic thought.

5 The theory of autonomous systems, already suggested in the post-war period by N. Wiener (1956) and later reformulated by H. Atlan (1972) and H. von Foerster (1982), owes its most mature structuring to H. Maturana and F. Varela (1980 and 1987), with the introduction of the concept of *autopoiesis*. It indicates the capacity of the system to plan and reproduce itself though the reproduction of its components. Having begun life as a biological theory, the theory of autopoiesis is metatheoretically applicable to social systems to the extent to which they are self-organised systems. In reality, a human and a social system (cities, companies, regions etc.) has characteristics *epistemologically analogous* (homologous) to those of other living systems: in other words, it is capable of reproducing and adapting itself, conserving itself either passively or actively. In other words, a social system possesses autonomy.

6 The change in the parameters of the function f (Time, Openness, Identity) is often identified as 'catastrophic'. In reality, in the framework of the theory of complex systems, these phases of discontinuity can be interpreted not so much in terms of a 'catastrophe', but of *catastasis*, in other words of a sudden disruption in the system's trajectory (De Freitas and Woolmington, 1980).

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3 Cluster Dynamics

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3.1 Introduction

This contribution is partly based on a workshop on 'cluster methodology', organized in July 2002 for the Dutch Ministry of Economic Affairs. It focuses on cluster dynamics: how do clusters develop? It is structured as follows. First, it considers a variety of definitions of the notion of a 'cluster' and the content and aims of a cluster. Second, it asks what perspectives there are 'after Michael Porter'. The main shortcoming of Porter's concept is that it does not give any insight into the development of clusters and thereby offers almost no basis for public policy. Thus, a priority is to develop an insight into cluster dynamics by using a theory of learning and innovation developed in earlier work (Nooteboom 2000).

3.2 Definition of clusters

Which definition of clusters is seen as the 'correct one' strongly depends on the scientific background of the researcher and on the purpose of the study. While economists and management scholars emphasize the economic and technological features of a cluster, spatial economists and geographers emphasize spatial effects of localization. Some, partly overlapping, definitions of clusters are the following:

- Marshallian 'industrial districts'
- regional concentrations of related activities, including a knowledge infrastructure.
- structures of supply
- networks of firms with more or less durable linkages
- input-output connections between industries
- a portfolio of technologies
- firms connected with a certain domain of technology

According to Boekholt (Technopolis), a cluster is a group of firms that share certain characteristics, such as:

R.A. Boschma and R.C. Kloosterman (eds.), Learning from Clusters: A Critical Assessment, 51–67.

- a product or service to which all parties contribute (e.g. an automobile cluster)
- a technology which all parties employ (e.g. a biotechnology cluster)
- a combination of the two (e.g. multimedia or biomedics)

According to Belussi:

> 'The positive performance of firms may be related to the local context, where firms have developed a network of historical, path-dependent, locally based, specific interactions: a nexus of productive relationships, and a wide net of social relationships conducive to fast innovation activity.'

According to Visser (2002):

> Clusters are geographical concentrations of firms involved in similar and related activities (according to Porter 1998, Enright 2001)

According to Gault (2002):

> Clusters are groups of private and public institutions linked together for a common purpose, which may be innovation

Cooke offered the following definition, which was considered useful by many participants of the workshop, and which we will employ (Cooke & Huggins 2002):

> *'Geographically proximate firms in vertical and horizontal relationships involving a localized enterprise support infrastructure with shared developmental vision for business growth, based on competition and cooperation in a specific market field'*

This definition is useful because, among other things, it provides a possible handle for policy: the facilitation of a 'support infrastructure', the furthering of a 'shared vision' and the (sometimes paradoxical) task of furthering both competition and collaboration. However, when contemplating this definition, one should keep in mind the importance of external linkages in a globalizing world (Paivi Oinas). Here, the dynamics of clusters becomes crucial: as they emerge and grow an expansion of input and output markets, distribution systems and knowledge sources is needed (Boschma & Lambooy 2002).

3.3 Content and aims of a cluster

There was consensus in the workshop that there is an especially important distinction between two levels of analysis. The one concerns the meso-level of industries that are connected in input and output, in a country or region. The second concerns the micro level of individual actors (firms, public bodies, individual people), embedded in specific, local conditions (markets,

institutions, agglomeration, urbanization). This distinction has consequences for all the questions that were put to the workshop concerning clusters: their definition, identification, data, methods of research, dynamics en policy. The micro level concept includes spatial effects of localization, while the meso-level concept does not. As regards policy, at the meso-level one could consider central, national industry or technology policy, while at the micro level one could consider local bodies (provinces, municipalities) for the configuration of actors and for the local support infrastructure. To avoid terminological confusion, we reserve the notion of a cluster for the micro level. This does not imply that there is no connection between the two levels. At the micro level, knowledge of industries, technologies and markets remains important. Results from the one level can yield insights for the research agenda at the other level. Thus, research on the relationship between service and manufacturing industries, in innovation, (Broersma 2001) suggests that one might also consider such relations at micro level since clusters entail connections between manufacturing and services at that level as well. In the remainder of this chapter the focus is on clusters at micro level, because it is especially there that the dynamics of clusters and the role of firms emerge.

A cluster often includes (parts of) different value chains. A *value chain* contains all firms that add value in the production and marketing of a given product. For example, to make potato chips one needs the growing of potatoes, an auction, transport, distribution centers, machines to cut the potatoes, etc. This entails a multitude of related sideline activities that connect with other value chains. Together, these constitute a *value system*. For example, potatoes also form an input for chemical industries, with a wide variety of end products. In strain-improvement there may be cooperation with commercial research institutes and universities, growers and patent specialists, to keep up with fast technical development. There is also collaboration with formal and informal investors and R&D subsidies are used to support risk taking. Thus, there are not only connections between value chains, but also with supporting institutions.

A *network* is a collection of collective and/or individual actors who are connected in a certain structure (with characteristics such as size, density, structural holes, centrality) with ties that may have a variety of content and strength. The 'density' of a network indicates the extent to which participants have direct connections (Coleman 1988). With participants, the maximum number of direct connections is n(n-1)/2. Density is measured as the actual number of such connections, divided by the maximum. Few direct connections entails 'structural holes' (Burt 1992). Parties may be connected indirectly by

being members of the same association, of the same value chain, or by sharing customers or suppliers. There is high centrality in a network when one or a few members have many direct connections to others that themselves have few connections. In a network, linkages or ties can be more or less strong, more or less formalized (in contracts or hierarchy of ownership) and more or less based on trust.

A network is a general concept which includes value chains, value systems and clusters. Thus, a cluster is a network of a certain kind. For example, a network of members of supervisory boards of a corporation is a network but not a cluster, though it may be part of one. A network may consist of a well-delineated, small group of firms. Often these are similar firms around a supplier (e.g. a franchise), or different ones around a user (a supplier network). The aims of networks may be simple information exchange, joint advertising, distribution, political lobbying, joint product development, or joint research. Simple aims, such as information exchange (e.g. in personnel management, quality assurance, market information) are often achieved in informal networks or knowledge platforms, perhaps provided by industry associations. More complex aims, such as the development of a new technology, or the sharing of strategically sensitive knowledge, are often taken up in smaller, tighter forms of collaboration (2 to 5 partners). These may emerge from or may be part of larger networks.

When does a network become a cluster? In a cluster, *different types of activity* are often combined, with a *shared purpose*, in *vertical, horizontal, and lateral linkages*, including *linkages with markets of inputs and outputs and with institutions* (see the above definition offered by Phil Cooke). There is also the idea that a network with high centrality and hierarchy or asymmetric dependence would no longer be called a cluster. An example would be an arrangement of more or less captive activities around a central coordinator, in a hub and spoke structure. The network of a cluster makes the cluster more than a collection of firms that happen to be in the same location, industry or technology. The network yields added value by synergy effects of complementary competencies or assets, for improved products, efficiency or market access. In a cluster there is a joint purpose, but there are also individual purposes which may be in conflict with each other, while there is *no overarching authority* that yields hierarchical control. There is dependence but it is overall, mutual and more or less balanced. Thus, the notion of a cluster is loaded with an appealing connotation of equality or democracy and a lack of suppression which may be part of its attraction as a concept and thereby might inspire wishful thinking rather than a realistic model.

While the conceptual boundary between networks and clusters is not always sharp, it does yield considerable scope for distinction. A franchise or supplier network, mentioned before, would not by itself be a cluster for two reasons. One is lack of variety of activities. The second is that franchises and supplier networks are typically dominated by the franchiser or the buyer, in principal-agent relationships. In the same vein, we would not call the 'Benetton cluster' a cluster if the network were actually governed by Benetton as the principal and the autonomy of other actors were to be constrained in the sense that they act largely as agents for the principal. The flower cluster in the Netherlands has a limited joint purpose, in the collection of flowers for auctioning. Yet we call it a cluster because of the diversity of activities brought together, the joint purpose, limited as it is, and the lack of a hierarchy.

In a cluster, the joint purpose may be limited, and *tight and loose ties may co-exist*. Cluster members do not have to know each other, need not all have direct connections and do not all collaborate with everyone. However, they are connected - at least indirectly. The strength of ties has several dimensions (Nooteboom 2003): scope, i.e. the type and range of activities involved in the tie, intensity, i.e. commitment of financial or other resources, the relation-specificity of investments, frequency of contact, duration of the tie, exclusiveness (lack of other direct ties) and mutual commitment or loyalty.

The final word has not been said on the distinction between cluster and *'industrial district'*. They appear to share the features of connectedness, shared purpose, variety of activity, limited hierarchy and centrality, and local embeddedness. However, a 'district' suggests that activities are bound to a region and cannot have an extended spatial reach. The notion of a cluster does allow for that and this may indeed be a crucial feature of cluster dynamics.

3.4 Perspectives 'according to Porter'

A dominant concept is that of Porter's (1990) 'diamond'. The main value of the concept is that it is simple and appealing and therefore useful as a 'sensitizing tool' to indicate the importance of: connections with markets of inputs ('related and supporting industries') and outputs ('demanding consumers'), firm conduct ('strategy and rivalry') and the 'local context'. However, it does not offer much assistance when it comes to acquiring a more concrete insight into the working and the development of clusters. A problem with Porter's notion of a cluster is that it covers so many divergent situations and configurations (Martin & Sunley 2001).

Porter's work does not give much insight into the working of clusters at micro level. As regards the local embedding of clusters, one should recognize that there can be considerable differences between types of clusters depending on the types of market and technology involved and on a cluster's stage of development. In biotechnology, for example, geographical roots are of limited importance. From the beginning of development, it operates in an international arena. Thus, there also appears to be a distinction between international and national clusters. 'Embedding' need not always be tied to location and can also occur in 'communities' that are to some extent virtual, with frequent travel and communication at a distance. A central question is whether impulses for innovation come from inside or from outside, and how this depends on stages in the development of a cluster. Especially at the early stage of cluster development, frequent meetings are needed to establish the trust that is required, especially at that stage. However, as clusters develop, they typically have to extend their geographical reach and must become dis-embedded to some extent. This is related to the condition that in later stages the basis for governance of relations tends to shift from informal, trust-based governance to more formal, contract-based governance, as we will argue later.

The main objection to Porter's notion of clusters is that it does not provide an insight into the dynamics of cluster development: their emergence, development, growth, stagnation, decline or transformation. The consensus in the workshop was that the most important policy issues lie in cluster dynamics. An important question is, in particular, when local embedding is needed/useful, and when a cluster should reach out in the context of globalization (Boschma & Lambooy 2002). At that stage, the role of national policy becomes dubious. Cluster dynamics also has important implications for a cross-national comparison of clusters. If one can meaningfully compare clusters only in the same stages of development, how does one identify those stages, and how can one gear evaluation to them? We will return to that question later.

3.5 Identification of clusters

Within the general characterization of (micro-) clusters according to Cooke, a further refinement is needed, on the basis of, among others (Oinas 2001ab, Oinas and Malecki 2002):

- The type of activities on which clustering is based: the specific competence and resource needs

- the relation between new and mature activities, the degree of renewal (radical or incremental), and their relation to existing structures
- the nature of the local context: specialized or diversified, agglomeration and urbanization effects
- the structure of the cluster: density, closure (barriers for entry and exit), heterogeneity, diversity of knowledge and 'cognitive distance' (Nooteboom 1999, 2000), presence of central actors, the presence of structural holes, and the bridging of them to generate Schumpeterian 'novel combinations', and to generate access to markets of inputs and outputs.

Cluster analysis requires a combination of a perspective of *competence* and a perspective of *governance*. These are both connected with the structure and the embeddedness of the networks in a cluster. We will also argue that cluster dynamics is associated with shifts in both competence and governance. The first aspect, that of competence, depends on the nature of knowledge (tacit or codified), the capacity of parties to absorb each other's knowledge (absorptive capacity, cognitive distance), the radicalism of innovation, the measurability of inputs-outputs, the question of whether technology is 'systemic' (with strong, tight constraints on interfaces) or 'stand-alone' (Langlois & Robertson 1995). The nature of knowledge, cognitive distance and absorptive capacity affect 'dynamic transaction costs' in the sharing or transfer of knowledge. The degree to which technology is systemic affects the structure of networks in a cluster and the nature of ties: the density, strength and duration of ties and the possible need to guard systemic coherence. The aspect of governance relates to 'relational risk' and instruments to manage them. Relational risk can result from dependence due to a lack of alternative options (monopoly/monopsony), or from specific investments (which can yield the 'hold-up' problem) and problems of appropriability and spillover: the danger of a partner running off with one's knowledge. Possible instruments for governance are, hierarchical control, contracts, hostages, balance of dependence, go-betweens, reputation mechanisms and trust (Nooteboom 1999).

The connections between competence, governance and structure can be illustrated as follows. In a dense cluster, with many and strong connections and few structural holes:

- there is much 'redundancy' of relations, which may add little value (Burt 1992)
- the redundant relations provide a strong reputation mechanism, yielding a basis for trust and possibilities to craft coalitions to limit opportunism.
- the strong ties give a basis for the building of relation-specific trust.

- there are many avenues for spillover
- there is a basis for detailed, efficient division of labour
- there is a danger of exclusion of innovative impulses from outside, the decline of cognitive distance and variation of knowledge and the lock-in of parties, preventing them from exiting and establishing novel outside ties.

An important issue is the delineation of clusters. The following possibilities were mentioned:
- economic-geographical boundaries
- actors within the boundaries should have a significant tie with the 'core' of the cluster
- a 'portfolio' of related technologies or technical trajectories.

A question here is what one understands by the 'core' of a cluster and a 'significant' tie. A tie can refer to streams of products, information, investments, ownership or supervision (the 'scope' of the tie). Which ties matter depends on the aim of the study and on the issues of competence and governance mentioned before. One pitfall is to exclude 'peripheral' actors, with few direct connections with the cluster 'core', only because they are peripheral. In the light of the above discussion, of the importance of bridging structural holes, a peripheral actor can be of crucial importance if he provides a connection with other clusters or networks, as a 'boundary spanner'. An example is an actor who contributes little technology but provides vital access to a distribution channel.

3.6 The specificity of cluster development

The dynamics of clusters is connected with cluster-specific, local conditions, issuing from a history of development which can cause problems for the transplantation of a successful form from one institutional context to another. A cluster may arise as a compensation for local weaknesses that do not arise elsewhere. Several examples can be given. The widely applauded development of networks or clusters in Italy can be attributed, at least in part, to a lack of reliable legal institutions and a climate of corruption. Then there is no opportunity for generalized institutions-based trust and one has to fall back on personalized trust in specific relations. The emergence of some clusters was due to the lack of public research institutions (Belussi). Moreover, one

cannot conclude from the success of those clusters that we should break down our public R&D institutions in order to enable the development of such clusters in the Netherlands. One should beware of ambitions for a generic blueprint for clusters that can be applied anywhere. Clusters yield solutions to specific problems/opportunities and clustering gives parties an ability to solve specific problems in specific contexts. This connection between performance and local, historically grown institutional conditions yields problems not only for the transplantation of cluster models, but also for their international comparison. This does not imply, however, that nothing can be done. It implies that we must look closely at past and present conditions, in our evaluation of the need, viability and performance of clusters, in relation to alternatives.

A second aspect of the dynamics of clusters is that a cluster should not be seen as a once-and-for-all arrangement. A key question is how clusters can adapt to changing internal and external conditions. The question now is whether, in spite of the local specificity of clusters, we can still identify general stages of development and can develop a battery of measures to assess performance by stage of development. Here also we do not expect one universal path of development (Boschma & Lambooy 2002). Yet, it seems possible to identify an underlying 'logic of development' from which different paths of development can be derived. Such differences depend, again, on contingencies of technology, knowledge, markets, institutions and instruments for governance. We will outline this logic, with different possible configurations of the three aspects - competence, governance and structure (Nooteboom 2000) - that we indicated before for different stages of development.

In spite of these caveats concerning the local specificity of clusters, we propose that a cluster that emerges from new technology market combinations will in general develop in four stages, namely exploration, consolidation in a dominant design, exploitation and subsequently a possibility of stagnation and a possibility of transformation for renewed exploration. In the exploration stage we can make a distinction between technological exploration, followed by an exploration of organizational forms for exploiting emerging technology. That leads to dominant designs in technological standards, organization and surrounding institutions. In the exploitation stage we can distinguish between local exploitation and market expansion, with adaptation of the organization in different markets which, in turn, can form the basis for new exploration (Nooteboom 2000, Gilsing & Nooteboom 2002).

3.7 Exploration

The first stage of exploration often goes together with organizational disintegration: new elements that do not fit in existing structures (of production, organization, market, distribution channels, institutions) need to shield themselves off in a niche where deviation from established structure and process is feasible. In terms of innovation theory: disintegration is needed to allow for the variety needed for Schumpeterian 'novel combinations', in 'creative destruction'. In terms of evolutionary theory: novel species often arise in seclusion from the niche of their parents, in 'allopatric speciation' (Nooteboom 2000). This often requires the emergence of new firms which are not imprisoned in existing structures and interests, spin-offs from existing firms that try to escape from such prisons, or 'external corporate venturing' where large companies facilitate spin-offs that may be temporary, with the option of later re-integration into the parent company. Relations between such more or less autonomous units are needed in order to utilize complementary competences, spread risks and develop a joint momentum. In the beginning, the focus is typically on technical feasibility. In this stage there is considerable uncertainty about technical success, the design and standards that will ultimately prevail and the market. Competence includes the ability to deal with such uncertainty. At this stage, knowledge is often tacit. Parties have to invest in each other to cross cognitive distance, building mutual absorptive capacity in the process, and to build trust in competence and intentions. This requires a certain intensity and frequency of interaction. However, what is important in this stage is the maintenance of flexibility of configurations in technology, product and organization, the utilization of diversity of knowledge, and cognitive distance. Note, here, that variety has two dimensions: the number of different units and the size of differences between them ('distance').

For governance, the high level of uncertainty severely restricts opportunities for detailed formal contracts and monitoring. There is not yet a relevant reputation mechanism in place. In view of uncertainty concerning future relations and dependencies one will, however, be motivated to build up a good reputation. It is not yet clear to what extent investments will turn out to be specific or generic. The need for mutual understanding, risk sharing and joint exploration goes together well with the need to build trust, in interaction. As is known from the trust literature, high mutual need stimulates the building of trust. Ties between partners are strong, in terms of intensity and frequency of interaction, but are not so durable as to block re-configurations needed in the

exploration of novel combinations. The network may be dense, but it remains open, with new bridges crossing structural holes between newly linked fields of knowledge. The network is limited in size and is locally embedded. The reason for this is that one cannot rely on existing insights and standards, there is no reputation mechanism in place, contracts are limited, one has to make use of local gossip and has to be closely connected for the sharing of tacit knowledge and the building of personalized, relation-specific trust. Spillover risk is present, in principle, with the chance that partners expropriate knowledge. The tacitness of knowledge that often accompanies this stage limits spillover, but spillover can still take place by poaching staff, or by staff spinning off in a venture of their own. However, it may be that in this stage knowledge changes so fast that by the time a potential competitor has absorbed and implemented it, the knowledge has already shifted. As a result of the limited size of the network, the reach of possible spillover is limited to a small group of insiders, where reputation is important. Within that group of intensive ties, knowledge is likely to spillover anyway, so that spillover is not necessarily an argument not to collaborate. In view of intensive interaction, within the core of the cluster, there is also an opportunity to monitor closely what happens to knowledge when it is exchanged. Furthermore, in this stage of market uncertainty, production for a market is hardly relevant yet. Moreover, there tends to be symmetry in risk of both hold-up and spillover, as a result of mutual specific investments because all participants need to make specific investments in mutual understanding and trust building and need to exchange sensitive knowledge in order to employ opportunities for complementarity. Opportunism can be retaliated against and that deters opportunism. Sensitive knowledge can be used as a hostage. A potential problem in this stage is that, in the absence of a clear selection mechanism in a market, for lack of clear demand, one may be unable to get out of a 'chaos' of successive, proliferating, competing designs, which further hinders the emergence of demand, since potential users postpone purchase until a dominant design has emerged. In other words, technical and commercial uncertainty can be mutually perpetuating.

3.8 Consolidation

In the second stage, that of consolidation, technology converges to one or a small number of 'dominant designs', exploration shifts to market demand, access to an emerging market (distribution, competition, entry barriers),

efficient production and new appropriate forms of organization, to exploit dominant technical designs. As a result of reduced uncertainty, demand increases and new producers jump on the bandwagon. Related industries and existing distribution channels go along, and adapt, for fear of missing the new boat. An illustration of this, in the development of multi-media, is that publishers finally went along with the digitisation and electronic distribution of text for fear of losing their position (Gilsing & Nooteboom 2002). The new technology/product/market combination develops into a dominant design or 'dominant logic' (Bettis & Prahalad 1995) of organization, including network structure and 'industry recipes' (Spender 1989). There is limited change, in the sense of second order learning and the emphasis is in first order learning, for more efficient exploitation. New entrants exert pressure on price and, for the sake of efficient production increase of scale, the division of labour and associated specializations emerge. Specialization increases the size and stability of the network. The network becomes more closed, with attempts made to block new entry. Knowledge becomes more codified and that enables faster and wider diffusion. Typically, the network expands with more impersonal relations, at a longer distance. An important question is whether the cluster is able to achieve this shift of structure and culture.

3.9 Stagnation or transformation

Depending on the nature and size of effects of scale, increases of scale for the sake of more efficient production are accompanied by horizontal concentration. The growth of demand in the original market stagnates and there is pressure to extend the market. With the entry in new markets, one needs to access wider distribution channels and there is a need to adapt products and organization. This requires knowledge from outside. Experienced Multinational Corporations may be needed to gain access to new markets and outside sources of information. Large firms, utilizing their resources of volume and market reach, may occupy central positions in the transformation of the newly emerging network. This, we suggest, is how Benetton emerged as the central player in the hub of a network. The question is whether the cluster is able to make such a shift to a new network structure. Given our earlier definition of a cluster as having low centrality and hierarchy, the question is whether at this stage we can still speak of a cluster. There is also a shift in forms of governance.

The diffusion of knowledge reduces cognitive distance and increases mutual absorptive capacity. As a result of the increased size of the network, the reduction of cognitive distance, the codification of knowledge and the slow-down of knowledge change, spillover risk increases. Interaction becomes less intensive and shifts from being developmental to being transactional. Interaction becomes less intensive due to the diffusion of knowledge and stabilization of the network, in its dominant design, and the routinization of established practice and the emergence of standards. However, due to a shift towards efficient production and distribution, the size of investments typically increases. With regard to governance, there is less need for relation-specific trust and a basis is created for institution-oriented trust. Reduced uncertainty concerning technology and markets and more codified knowledge creates a basis for more detailed and formal contracts. As a result of the diffusion of knowledge, reduced uncertainty, emerging markets and the adaptation of market structure and institutions, there is both an opportunity and a need to loosen activities from their local embedding. Again, the question is whether the cluster is able to make this shift to different styles of governance.

A potential obstacle in this stage is that the cluster is unable to go along with the codification of knowledge, expansion and transformation of the network, horizontal concentration, loosening from local context, increase of scale and a shift from personal to more formal, impersonal governance. Local embedding and local interests may contribute to such obstacles.

We note, however, that there is no single, universal outcome in terms of network structure, type of ties and governance. The outcome depends on contingencies of the type and extent of markets (e.g. differentiated products or commodities), type of technology, the degree to which activities are systemic or stand-alone, the size and sunkenness of investments, the type of knowledge, extent and type of scale effects, external economies and institutional settings (e.g. relating to competition policy, financial regimes, contracting or trust as a basis for governance). Depending on these contingencies, there are different ways to turn exploration into exploitation. In particular, the outcome depends on the extent to which exploration and exploitation are combined and that depends on the contingencies indicated above. To the extent that exploration and exploitation go together, there will be hybrid forms of networks that combine elements form the present analysis and the one in the previous section. A further analysis of this is beyond the scope of this chapter (see Nooteboom 2000).

The analysis is in line with Boschma and Lambooy's (2002) analysis of developments in Italian industrial districts. They identified the role of MNCs

as 'bridging enterprises', to carry activities into international markets and access outside sources of knowledge. During the workshop, Bjørn Asheim presented examples of Norwegian clusters that had to make a shift from local to global operations (Asheim and Isaksen 2002).

3.10 Break-up and new exploration

Whatever the outcome of the previous stage is, in the subsequent stage experience gathered from expansion in differentiated markets, or invasion of radical innovations from outside, generates new options or needs and this returns us to the first stage. Here, the rigidities of established structures, which offered an advantage for exploitation, become a liability. Emerging novelties cannot achieve their potential under the systemic limitations imposed by existing structures, practices and ways of thinking. An obstacle here is that the cluster or network is locked into its previous success. If the cluster or network is unable to cope with this, it needs to be broken up so that different elements have more scope to adapt, in different ways, to new conditions. Here, a cluster that has not gone the way of integration under the wings of a large MNC, but has managed to maintain its less systemic, more modular nature, with informal governance, is at an advantage since it offers more flexibility for re-configuration. In such cases, it matters which options for reconfiguration are at hand. Here, perhaps, we encounter the notion of 'Jacobs externalities' (Boschma and Lambooy 2002). In urban regions with a large variety of different activities and a rich, varied, complex infrastructure with a wide scope of spillovers, new ideas and activities that become complementary in new ways, there is more scope for new exploration.

3.11 Conclusions

This chapter attempted to contribute to a clarification of the notion of a cluster and its relation to the notions of a value chain/system and a network. A cluster always entails a network with a variety of possible structural features and dimensions of ties. This chapter proposed calling a network a cluster to the extent that it has the following characteristic features: variety of activities, direct and indirect ties between them, including access to markets, shared goals, local embedding, limited hierarchy and largely informal control.
The chapter also proposed that a priority for research lies in cluster dynamics.

Building on a theory of learning and discovery, it proposed an outline of a theory of cluster development, in different stages. It also attempted to specify how the central features of competence, governance, network structure and type and strength of ties change in the process.

It is proposed that typically clusters emerge from local embedding, with a high degree of local, tacit knowledge, weakly formalized ties, dense but also open structures of ties, ties that are strong in terms of frequency and intensity of interaction but weak in the sense that they do not carry heavy investment, have limited durability and maintain flexibility of re-configuration. Governance is largely based on reputation and personal trust. That is one of the reasons that local embedding is needed.

When success of innovation materializes, knowledge becomes more codified, attention shifts to consolidation and efficient production and distribution and the enlargement of market reach. A clear division of labour arises, with fairly stable ties, in less dense structures, with more centrality, as in a hub-and-spoke structure. Governance shifts to more formal, contractual and less personal forms. This, in turn, facilitates market extension. Some disembedding from local conditions is both needed, to enlarge the market reach, and also facilitated by more formal control and codification of knowledge. Here, MNCs may offer both a challenge and an opportunity. One can ask whether in this stage the network still has the characteristics attributed to a cluster, as specified above.

Next, market extension yields new experiences, with new incentives, needs and inspiration for exploration of novel combinations. When these come to fruition, the utilization of their potential may require disintegration of existing network structure to allow for the exploration of novel clusters. This brings us back to the first stage, with a re-embedding in local, more fluid and informal exploration of novel patterns of collaboration. Environments that offer a greater variety of possible components of new structures seem to be at an advantage here ('Jacobs externalities'). However, the mere presence of a variety of networks does not guarantee that opportunities for exploration of novel configurations will be taken. A network in the stage of break-up may not be able to access and 'pry loose' components of a network in the stage of consolidation.

The stages of development indicated above do not yield a universal, inexorable march of logic. What happens, precisely, is highly dependent on contingencies related to the local institutional environment, infrastructure, history, entry and exit conditions and possible roles of multinationals. This theory of cluster development is also still highly speculative. It requires

empirical testing and further study of what variations or deviations form this development path arise under what conditions.

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4 Embedded Local Growth: A Theory Taken too Far?

Michael Taylor

4.1. Introduction

Currently, economic geography, along with many other areas of the social sciences, is firmly linked to a theoretical approach that seeks to explain local economic growth in terms of the embeddedness[1] of business enterprises in small-firm social networks. These networks are conjectured to mobilise knowledge, stimulate innovation and create competitive advantage through enhanced productivity. Variants of the approach are labelled as 'regional innovation systems', 'innovative milieu', 'learning regions' and, of course, 'clusters' (Porter, 1998, 2000). These increasingly self-referential, institutionalist literatures emphasise the social construction of economies, the importance of social capital and the fundamental role of institutional structures in shaping and driving those economies. The layers of reasoning in these approaches amount essentially to a 'soft' version of the endogenous growth theory that economists have built around the stylised facts of 'local human capital', 'specialisation', 'competition' and 'agglomeration' (Glaeser 1995, 2000). The 'embeddedness' approaches, however, use a different but equally stylised set of facts as explanators; 'institutional thickness', 'trust', 'learning' and 'social capital', for example. It can be suggested that what has been created is an institutionalist theoretical straightjacket, a complex edifice that is weakly and selectively grounded in reality.

The straps of this theoretical straightjacket are pulled ever tighter by the strong policy appeal of this embeddedness explanation of local economic growth. Now incarnated as 'cluster' policies in many developed economies (DTI 2000, Bergman *et al* 2001, Porter and Ketels 2003) and as World Bank development policies in developing countries, the policy appeal of the theory stems from its underlying contention that local economies are the authors of their own fates. Current wisdom is that, with the right local networks, local levels of trust, learning, competencies, social capital, and institutional support, a place can generate local social capital and can become innovative, productive and internationally competitive within a global mosaic of economic activities. Set the right conditions in place, it is implied, and growth and local prosperity

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will follow. However, if no growth occurs then obviously that 'place' did not set the conditions appropriately and growth will only be achieved when those settings are right. By inference, therefore, globalisation has marked the end of exogenous economic exploitation since even transnational corporations, it is argued, must necessarily be as locally embedded as their Small- and Mediumsized (SME) counterparts, and must be somehow 'less foreign' (Yeung 1998): would mean that planning was so simple, or business so naïve.

As this 'embeddedness' model has been transformed into a mantra, a major question that has not yet been asked is whether the model provides a reasonable explanation and understanding of local growth processes. Or is it, instead, an explanation built on a small number of exceptional case studies overlain by layer upon layer of interpretation, re-interpretation, conjecture and extrapolation? The purpose of this chapter is to begin to address these two questions. The approach is to elaborate the major shortcomings of the model that severely limit its usefulness, even as a heuristic. The argument of the chapter is that the embeddedness model of local economic growth is significantly over-drawn, and over-drawn to the point of being functionalist.

4.2. 'Embeddedness': The model in brief

The institutionalist theory of embedded local economic growth recognises successful local economies as islands of superior productivity, integrated into a global mosaic of production that brings the reward of sustainable local accumulation. That productivity, it is argued, stems from complex processes of 'embedding' - the incorporation of firms into place-based networks involving trust, reciprocity, loyalty, collaboration, co-operation and a whole raft of untraded interdependencies (Storper 1997, Cooke 1998). These are processes that create 'social capital'. They are socially constructed relationships that generate information, ideas, products, services and processes that are, in turn, shared within the system rather than being appropriated by any one individual (Leborgne and Lipietz 1992). They are in this sense the home of classically defined local external economies. The whole is a system of heightened place-based capacities for learning, information and knowledge exchange, technological change and innovation (Maskell and Malmberg 1999, Bergman *et al* 2001). Here, tacit knowledge is exchanged, extended and blended with codified knowledge. The resultants are places of networked knowledge and 'soft capitalism' (Thrift 1998) involving specific assemblages of competencies. They are regional innovation systems driven by intense local processes of

Schumpeterian creative destruction that endow locally networked firms with commercial resilience and the ability to cope with constantly shifting factor mixes (the 'ubiquification' of Maskell *et al* 1998).

However, the secret of local economic success is seen not only in networked inter-firm relationships, but also in the reinforcing of those socio-commercial relationships by a '... supportive tissue of local institutions' (Powell and Smith-Doerr 1994, p. 370). 'Appropriate' institutions, it is suggested, can ease and facilitate network relationships and foster knowledge exchange and learning. They are said to add to and sustain the Marshallian 'atmosphere' of an economically successful place (Amin and Thrift 1994a, 1994b).

This is no more than a very brief caricature of a model that is constantly acquiring new layers of meaning, interpretation and embellishment. Indeed, as a model, its complexity seems to grow exponentially as processes of learning are elaborated, concepts of social capital and intellectual capital and competencies are added synergistically to the stylised facts of trust, reciprocity, proximity and institutional thickness on which it was built and which lie at its core. The purpose of this section has been simply to lay out the main elements of the model as a backdrop to the criticisms that can be levelled against it. Those criticisms are elaborated in the remaining sections of the chapter.

4.3. The questioning

It is argued here that the frenetic publication that currently surrounds the elaboration of the institutionalist model of embedded local economic growth, in all its variants, needs to be tempered with caution concerning both the assumptions on which it is built and the policy outcomes it can achieve. In essence, it is a model developed on the basis of a particular interpretation of a set of apparently successful case studies that has been inappropriately universalised.

The model is now being questioned on a number of accounts. That criticism is challenging the nature and extent of local embeddedness as the foundation of local economic growth. The symmetrical properties of trust, reciprocity and loyalty in buyer-supplier relationships are argued as being either temporary or even illusory and as being fundamentally at odds with the existence and impact of power asymmetries within and between firms (Bresnen 1996, Pratt 1997, Baker 1996, Taylor 2000). The model is seen by some as an a-historic, idealised and romanticised view of inter-firm relationships that

inappropriately extends notions of flexibility, is policy driven, functionalist and is perpetuated by selecting case studies 'on the independent variable' (Bianchi 1998, Hudson 1999, Staber 1996, Lovering 1999). What is more, the qualitative research on which the model is built appears capable only of accreting layer upon layer of added complexity without ever questioning whether the conjectured processes are necessary or sufficient, essential or trivial (Plummer and Taylor 2001a, 2001b, 2003).

In this chapter, the model is questioned on six grounds. It is argued that its shortcomings have been created both by omission and commission. By omission the theory is over-drawn in the sense that it fails adequately to consider: (1) the imperatives of capitalism; (2) the impact of unequal power relations and (3) the exigencies of time. It is argued that these parameters impact strongly on the operations and performance of individual firms and enterprises. By commission the model is over-drawn in the sense that it: (1) fetishises proximity; (2) promotes the chaotic concept of '*institutional thickness*' and (3) labours under the limitations of the equally chaotic concept of '*social capital*'. These purportedly key drivers of local economic growth are all open to question. Each of these six areas of criticism are explored in the remaining sections of the chapter.

4.3.1 Neglect of the Imperatives of Capitalism

Principal among the limitations of the embeddedness model of local economic growth is its neglect of the imperatives of capitalism (Hudson, 1999). Fundamental to the operation of the capitalist system is the generation of profits to achieve a rate of return on investments in order to accumulate capital. Something that is essential to the generation of those profits is the operation of the price mechanism that mediates between firms' inputs and outputs and the relationship between capital and labour.

Profits might not be the precise motive for executives' actions in corporations or for the business operations of owners and partners in SMEs. That motive is perhaps now best seen as 'personal wealth creation', in much the same way that Starbuck (1971), amongst others, recognised over 30 years ago that the principal correlate with firm growth is not profits but levels of executive remuneration. Judging from the reports of corporate financial scandals in the US and Europe perpetrated in the past ten years, there is little of the altruism in this motivation that matches with the co-operative communities of interest built on trust that lie at the heart of the embeddedness model of local economic growth. Indeed, the only communities of interest evident in the past decade have been collusive communities of self-interest

that have fuelled the excesses of corporate enterprise, commercial banking and financial services throughout the 1990s (The Economist 2003).

It might have been fashionable in the dot.com era of the 1990s to see the 'burn-rate' of capital as more important than profits themselves and to see trust, loyalty and reciprocity as the foundation stones of business and the commercial transactions between firms, especially for e-commerce and e-business. That may well have been the case for at least some of the time during the last decade's period of global economic buoyancy, but the workings of the price mechanism are just as imperative to capitalism as are profits. A number of studies suggest, in fact, that the level and persistence of trust in inter-firm relationships might be rather more illusory than real. Studies as different as investigations of the garment industry in New York (Uzzi 1996, 1997) and business services in provincial cities in the UK (Search and Taylor 2002) suggest that price considerations are always a shadowy presence behind the trusting, embedded and loyal relationships that the embeddedness model promotes. What these studies suggest is that trust and loyalty are important in business only as long as the price is right. Thus, in a period of economic buoyancy, embedded ties may seem paramount. However, in a period of recession, when the chips are down, the primary role of price becomes clear.

Equally central to the capitalist project are capital : labour relationships and the control of labour. At one extreme, these relationships refer to mechanisms for the extraction of surplus value. Put differently, they reflect attempts to control costs in order to maintain profits. Advocates of the embeddedness model, however, emphasise paternalism in labour markets to mobilise labour's tacit knowledge, to enhance learning and innovation and to promote local growth (Brusco 1996). In so doing, they choose to ignore the long-standing processes involved in the New International Division of Labour, the long history of corporate down-sizing and job loss, the history of union struggle, the casualisation of labour, heavy handed workfare schemes, labour's fight for wages, and the self-exploitation of labour associated with new project forms of production and working.

4.3.2 The Underestimated Impact of Power Inequalities

An implication of the embeddedness model is that inter-firm relationships within collaborative networks are benign. However, there is longstanding evidence that this has rarely, if ever, been the case. Power inequalities impact significantly on the way firms do business, a situation recognised in economic geography over 20 years ago in Taylor and Thrift's (1982, 1983) enterprise

segmentation model (Dicken and Thrift 1992, Taylor 2000, Bathelt and Taylor 2002). That impact can take at least four forms. First, it has the ability to restrict firms' freedom of action, cementing subordination in buyer-supplier relationships and restricting opportunities for capital accumulation. Second, it can create lock-ins and the ossification of transaction relationships (Grabher 1993b, Glasmeier 1991). Third, it has the capacity to generate uneven spatial development and place-specific spatial divisions of labour (Hudson 1999, Massey 1984). And fourth, it can restrict the skill base and information pool that informs strategic decision-making in business, in particular through class-based appointments to boards of directors (McNulty and Pettigrew 1999).

The variants of the embeddedness model, especially the 'learning regions' variant, treat capital : capital as well as capital : labour relationships as benign. It is cooperation and collaborative equality between firms in industrial districts that is reckoned to mobilise knowledge, induce learning, generate innovation and produce local growth. What is downplayed is the impact that power inequalities have on the way firms do business (Bathelt and Taylor 2002). There is now mounting empirical evidence that suggests that large sections, if not most, of the business environment are far from benign. Instead, asymmetries of power within and between firms are used to exclude, exploit and control network relationships so that the powerful can extract monopoly rents from the powerless.

The use of power to exclude businesses from enterprise networks has been demonstrated recently in relation to business activity in Fiji (Taylor 2000, 2002) and Israeli Arab entrepreneurs (Sofer and Schnell 2002, Sofer et al 2001, Schnell et al 1995, 1999). To achieve rates of return set by overseas parent firms, transnational corporations (TNCs) in Fiji were willing to develop what would otherwise be called 'embedded' relationships, involving trust, loyalty and repeat business with only larger local businesses. The smallest local firms were excluded from this form of business and were restricted to cash-only, single transactions. In Israel, Jewish business has been shown to exclude Israeli Arab businesses from their buyer-supplier networks (Sofer and Schnell 2002), leaving Israeli Arab business to become 'over-embedded' in the Arab community in order to cope and subsist. Indeed, embeddedness as 'coping', as it is found in developing countries, is hard to reconcile with the embeddedness model and the processes that are supposed to generate social capital.

The use of power to exploit is evident in studies of the nature of employment in the burgeoning cultural industries, including advertising and marketing, publishing and popular music (Ekinsmyth 2002, Grabher 2001)

that have most fully embraced the emerging 'project' approach of production. Pulling together short-lived project teams to advertise, publish and create music, for example, can be interpreted as the self-exploitation of labour. The creation of those teams depends on friendship networks, word-of-mouth recommendation and proximity, coupled with insecurity, impermanence, a reluctance to turn down work and a need always 'to be there'. This current variant of self-exploitation is just as much a treadmill as sweat-shop production and subcontracting in the garment industry, but one that forces people to ratchet up their own work rates in a way that Taylorism was never able to do. This same self-exploitation of labour born of enterprise embeddedness was also evident in Openshaw and Taylor's (2002) exploration of UK electronics subcontractors, where agency workers and homeworkers are used as mechanisms to bring flexibility to the labour market and to facilitate the avoidance of sunk costs in business.

The use of power to control business relationships is a well-established and important business tactic. It condemns businesses to performing tightly defined roles in enterprise networks in the manner outlined by Taylor and Thrift (1982a, 1982b, 1983) in the enterprise segmentation model they proposed twenty years ago. Empirically it has been shown that the subordination of firms within enterprise networks limits who they can deal with, the contractual arrangements under which they can do business and the sources of capital available to them (Taylor 2000). Nowhere is this control of business relationships clearer than in buyer-driven commodity chains. It has been demonstrated by Wølneberg (2002) in relation to Argentina's tanning industry and by Taylor (2002) in relation to Fiji's garment industry, though Gereffi (1994, 1999) and others would argue that network relationships also have the potential to stimulate learning and technological upgrading in commodity chains.

4.3.3 Time and the 'Institutional Instantaneous'

At the heart of the embeddedness model of local economic growth is the implicit assumption of what might be termed the 'institutional instantaneous' - the unproblematic and atemporal translation of socially networked inter-firm relationships into structures of instant knowledge mobilisation and exchange, learning, innovation and social capital. The 'institutional instantaneous' is, in this sense, the equivalent of the assumption of the perfect mobility of capital in economics. Its effect, however, is to all but deny the path-dependent, sequential development of socially constructed economies, notwithstanding the significance of those mechanisms as they have been recognised in evolutionary economics.

Staber (1996) has remarked that studies of embedded local growth have tended to select case studies 'on the dependent variable'. In other words, they have selected localities, like the Third Italy or Baden Württemberg, which are considered to be 'successful'. That success is then attributed to the nature of the current business and social environments of that place and the network relationships that link firms locally. In short, these types of study extrapolate cross-sectional analyses to conjecture dynamic relationships. The key question is whether the revealed relationships between businesses in a place are:

- the currently prevalent relationships that can create growth;
- relics of past relationships that once created growth, but are now being superseded; or
- portents of future business relationships that might bring a very different local economic outcome?

Empirical studies suggest that any of these situations might be the case. For example, embedded ties might currently be creating local growth in Spain (Pallares-Barbera 2002). However, in South Hampshire, in the UK, embedded ties have been interpreted as no more than a relic of a successful past (Openshaw and Taylor 2002).

This ambiguity surrounding the role of time in the model undermines some of its key elements. A central plank of the embeddedness model and the cluster policies it has spawned is that the 'local engagement' or local networking of businesses (what was once called 'local linkage' (McDermott and Taylor 1982)) is the key to local economic growth. Cross-sectional studies and the implicit assumption of the 'institutional instantaneous' do nothing to challenge the plausibility of this assertion and there are few longitudinal studies to challenge its veracity. One of the fullest sets of evidence on this issue is from the West Midlands in the UK. The evidence draws on re-surveys of a panel of firms. It suggests, however, that growth at firm level is associated with their disengagement (disembedding) from the local economy, with the corollary that those that do not disengage fail (Taylor 1978, Taylor and Thrift 1982b). When added to Curran and Blackburn's (1994) exploration of 'the death of the local economy', there is every reason to suggest, therefore, that the inadequate treatment of time in the embeddedness model has the potential to be seriously misleading.

4.3.4 The Fetishising of Proximity

The assumption implicit in the embeddedness model is that 'embedded' equals 'local'. Oinas (1997, p. 29) has argued that there is no reason why this

should be so and that entrepreneurs and business people can be embedded in social relations at different spatial scales. As she has argued (p. 30), we need to know how firms are locally embedded, whether being locally embedded helps or hinders change in both firms and localities and whether extra-local embeddedness can encourage or inhibit change under different circumstances.

The results of empirical analyses allow no clear-cut conclusions to be drawn. The weight of cross-sectional studies supports the need for proximity to achieve growth (see Maskell *et al* 1998, Braczyk *et al* 1998). However, a number of recent studies add caveats to the importance of proximity as a driver of local growth. Search and Taylor's (2002) study of non-metropolitan business services in the UK shows that proximity is important but only for small firm solicitors and accountants. A study of the UK electronics industry (Openshaw and Taylor 2002) also supports this interpretation. However, the support it gives is strongly time-dependent. In this study, the strongest embedded local business relationships persisted only as long as government policy continued to invest heavily in the defence industries of southern England, where the case study was conducted. However, proximity need not be spatial, it can also be emotional. This point has been made forcefully by Hardill *et al* (2002) in a case study of Asian businesswomen in the UK. The study showed strongly that the connections of these businesswomen were with an imaginary and emotional 'home' extending beyond the UK to the Indian subcontinent, not a 'home' based on juxtaposition and proximity in a narrow geographical sense.

What these studies suggest is that 'proximity' is in some cases necessary for the creation of embedded business ties and local growth, but it is rarely a sufficient condition to achieve those goals. Time, social relationships and institutional support are seemingly intimately intertwined with the issue of proximity and, together, they are just as likely to generate economic ossification and 'lock-in' as growth.

Indeed, does learning within business networks require proximity and 'locational integration'? Gereffi (1994, 1999) and others have argued strongly that the transnational organisational linkages of global commodity chains have the potential to facilitate knowledge transfer and 'learning' that is not dissimilar to the processes identified as economic drivers in 'clusters'. Notwithstanding the power asymmetries in these commodity chains, it has been suggested that these learning processes can foster 'industrial upgrading' in the lower levels of the commodity chain (Gereffi 1999, Hsing 1999). This upgrading can involve firms engaging in product elaboration and a shift

to complex, expensive, large volume, high end products, a shift to flexible production, beginning with original equipment manufacturing (OEM) and original brand manufacturing (OBM) and, at a regional scale, the development of a locally integrated production system (Gereffi 1999, p. 51-52). Whether the world is always so simple is open to debate, but the suggestion is quite clear that 'learning' in economic systems and the creation of social capital need not always involve proximity.

4.3.5 Institutional Thickness

'Institutional thickness' is a frustratingly imprecise and profoundly unhelpful concept that appears to have grown, amoeba-like, in meaning to accommodate ever-changing interpretations of this 'supportive tissue' which is said to lie at the heart of embedded local economic growth. It is argued here that it is a chaotic concept that obscures more than it illuminates.

For Amin and Thrift (1994a), the economic success of a locality is heavily dependent on its "proven institutional capacity" (p.16). Moreover, that capacity or 'thickness' is said to derive from: (1) a numerous and diverse mix of institutions (local firms, public initiatives, private institutions and so on) (2) frequent interaction to promote collaboration and knowledge transfer (3) structures of coalition to control behaviour and (4) a common agenda among those local institutions. These factors are reckoned to create institutional persistence and flexibility, heightening trust and reciprocity and local inclusiveness.

However, appealing as this specification might appear, it does not stand the test of empirical scrutiny. A growing number of studies suggest that 'institutional thickness' does not always bring economic success to an area or endow it with resilience when hit by recession. It can also serve to exclude rather than collaboratively include enterprises in a local economy. In this respect, interesting questions arise as to whether 'institutional thickness' pre-dates or post-dates economic growth or whether institutions always remain supportive.

MacLeod (1997), working in the Lowlands of Scotland, has described the area as having "... a strong institutional presence, a commitment towards partnership, governance sociability and the sense of a common enterprise (p.302). However, this had not been sufficient to bring economic success to the region. The region had developed as a low-wage manufacturing region and jobs created by inward investment had been associated more with quantity than quality. The subsequent drive by localist and central state institutions to increase the innovative capacity of the area was at odds with

these existing institutional arrangements and led to 'institutional overkill' (MacLeod 1997).

In Turkey (Eraydin 2002), the institutions of government and civil society appeared to create 'institutional thickness' along with local enterprise networks, learning and information exchange. However, recession and the almost immediate retreat of firms to long-established cost-cutting strategies showed that this 'supportive tissue' in fact provided no economic resilience.

Wølneberg (2002) has shown, in the context of the Argentinean tanning industry, that not only can local institutions be ineffective in generating self-sustaining local growth, but the actions of international institutions (in this case the World Bank and the EU) can erode what little local benefit they might have created. MacLeod (2001) has identified this same scalar conflict in the actions of institutions in his study of Lowland Scotland. And, Raco (1998) has identified a similar situation in Cardiff, not least because in this case "... localist and central state institutions may promote very different objectives" (p.989). Indeed, the failure to consider the impact of state decisions has been viewed by MacLeod (2001) as a major flaw in the institutional thickness concept.

Nevertheless, there is also evidence that in some cases 'institutional thickness' can marginalise and exclude some groups within local economies. This tendency has been shown in Sheffield by Raco (1998) and Fiji by Taylor (2002). Indeed, as Raco (1998) has shown for Sheffield and Hudson (1994) has shown for the Northeast region of the UK, 'institutional thickness' can ossify local social, economic and political relations and divisions, stifling mutual co-operation and halting progress.

Further undermining the usefulness of the concept is the question raised in some empirical analyses as to whether 'institutional thickness' actually post-dates economic growth rather than pre-dating it, as is usually assumed. Henry and Pinch (2001) have raised this complication based on their research on Motor Sport Valley. Growth in this specialised engineering cluster was based on institutional *thinness* rather than thickness - two core institutional configurations, the network of firms and the knowledge pool of the labour market. Success came from a process of churning of staff, firms and linkages. Economic success in the absence of thick institutional structures has similarly been identified in Cambridgeshire's hi-tech cluster (Keeble et al 1999), Bristol's natural history film industry (Bassett et al 2002) and the British high fidelity industry in South East England (May et al 2001).

Compounding this awkward issue of whether institutional thickness is a cause or a consequence of local economic success is the additional complication that

the motivation and goals of an institution may change dramatically over time. This situation has been spelled out in detail in Leonard's (2002) examination of training provision in London, and it serves to underline the complexities of time inherent in the institutional thickness concept.

However, at the core of the concept of institutional thickness is the issue of what exactly are institutions? Are they simply organisations by another name as Jessop (2001) has complained, or are they something more subtle and as yet imperfectly understood.

4.3.6 Social Capital

An equally problematic and chaotic set of ideas that plays a central role in the embeddedness model of local economic growth is the concept of social capital. Social capital relates essentially to networked social and business relationships in a place based on trust, reciprocity and loyalty. It has been defined by Putnam (2000) as the, "connections among individuals - social networks and the norms of reciprocity and trustworthiness that arise from them." (p.19). According to the World Bank (2002), "social capital refers to the institutions, relations and norms that shape the quantity and quality of a society's social interactions". For Bowles and Gintis (2002), "social capital generally refers to trust, concerns for one's associates, a willingness to live by the norms of one's community and to punish those who do not" (p.1).

These quotes, however, serve to illustrate Durlauf's (2002) contention that this is a confused and chaotic concept because it mixes both causal and functional elements. The functional element is evident in the set of norms and values social capital is said to provide which facilitate co-operation and efficiency. In this sense, social capital can, for example, reduce networked firms transaction costs. The causal element of social capital emerges because the co-operative behaviour of others makes the co-operative behaviour of individuals a rational choice. Woolcock (1998) has expressed this same concern in different terms. While, on the one hand, social capital can be understood as the ties and norms that bind individuals in and across groups it can, on the other hand, act as a moral resource used to define different status groups in a community. Defined so widely, it is difficult to identify whether social capital is the infrastructure or the content of social relations - it becomes impossible to separate what it is from what it does.

Nevertheless, even in a causal context the concept of social capital has been challenged. While rational choice theorists regard it as an interaction between rational agents resulting in mutual benefit (Glaeser *et al* 2002), network theorists see social capital as social ties that can be non-rational

(Woolcock 1998). Here, a further element of confusion appears because it is unclear whether that choice is made because of altruism and fairness in a community, or because of fear of retaliation. Just to add more shades of complexity and confusion, there is no reason why social capital should only be positive and not negative (or 'perverse') - as with the activities of the Mafia or the restrictive social structures of some societies and immigrant groups (Portes and Sensenbrenner 1993). Indeed, there is an instrumental bias in the social capital literature that highlights its positive impacts while neglecting or ignoring the 'free-rider' and opportunist potential of network relationships.

It is hardly surprising, then, that social capital is difficult to measure. It is theoretically vague and has the potential to both enhance and destroy human and physical capital. It is difficult to know whether it is a causal or a functional concept and whether it refers to the infrastructure or the content of social relations. Is it the product of rational choice or irrational decision-making? Indeed, it can be argued that the meaning of 'social capital' is so vague that it is, in fact, meaningless. Perhaps Arrow (2000) is right and the term should be abandoned in favour of exploring alternative forms of social interaction.

4.4 Conclusion

Quite clearly, the currently fashionable theory of embedded local economic growth and 'clustering', and associated 'cluster' policies, have significant disabling limitations.

The theory neglects the imperatives of capitalism, ignoring or downplaying issues of profits, prices and control of the means of production. It is blind to the role of inter-firm power inequalities in shaping business relationships, choosing to privilege collaboration over competition. It inadequately incorporates issues of time, change and path dependence into an understanding of local economic dynamics, and remains transfixed by the 'institutional instantaneous'. It fetishises proximity, and neglects the subtleties of place, space and spatialities in the functioning of businesses.

More worryingly, the theory has at its heart two chaotic concepts that bring to it a level of indeterminacy that has the potential to render it meaningless. The first is 'social capital', which has been criticised for simultaneously embracing functional and causal elements (Durlauf, 2002). The second is 'institutional thickness' that is plagued with the same issues of ambiguity and indeterminacy, and is a concept lime 'social capital' that might best be abandoned.

Against the backdrop of this critique it can be suggested that what is needed is a fuller, deeper, more nuanced and less ideologically driven understanding of the processes of local economic growth. At least eight issues need to be unpacked. First, there is a need for a better understanding of the nature (both economic and social) of inter-firm and enterprise/institution relationships and second, the interplay between 'structural', 'cognitive', 'cultural' and 'political' embeddedness needs to be more fully theorised. Third, it is important to recognise more adequately the exclusionary as well as the inclusionary tendencies associated with embeddedness local business relationships, and fourth, the relationship between firm embeddedness and labour market conditions needs to be more fully developed. Fifth, the pivotal role of corporate power and power inequalities in both global commodity chains and local networks need to be more fully theorised, along with a sixth issue, the interplay of power and reciprocity in complex economic systems. Seventh, there is an urgent need to refine ideas on the processes of institutionalisation as they shape local economic growth and finally, our understanding of the spatialities of embeddedness and the spatialities that operate within firms' actions needs to be refined.

However, embeddedness theory and the model of growth it has spawned needs not only to be unpacked, it needs to be more thoroughly tested against appropriate empirical evidence. Only through testing will the theory shed its conceptual obesity and the layers of contingency it continues to accrete. Qualitative analyses seem mainly to add to those layers and there would seem to be a good case for the application of the theoretical scalpel of theoretically informed empirical modelling.

Notes

1 Embeddedness has cognitive, cultural, political, and structural forms (Zukin and Di Maggio 1990, Grabher 1993a,b; Heidenreich and Krauss 1998; Glasmeier 1991). Cognitive embeddedness identifies economic actors' bounded rationality and place-based knowledge. Cultural embeddedness refers to the importance of shared collective understandings amongst businesses in a place. Political embeddedness recognises firms' struggles with non-market institutions that can both help and hinder them. Structural embeddedness refers to the incorporation of firms into place-based commercial networks that facilitate and promote information exchange and learning. It is recognised as having four essential characteristics; reciprocity, interdependence, loose couplings and asymmetric power relations (Grabher 1993a, pp. 8-12).

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5 Beyond the Learning Region: the Dialectics of Innovation and Culture in Territorial Development

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5.1 Introduction

Following the historical pattern of the crisis in the Fordist production system in the 1980s, the call for local and regional development strategies led by regional and local agents has grown increasingly loud in most European countries. National regional development policies have become regionalized and traditional state industrial policy instruments have been replaced by new policy tools focused on technological innovation, training and institutional partnerships. *This transition towards a more regionalised and innovative regional industrial policy was accompanied by a change in the scientific approach to regional industrial policy.*

The regionalization of regional industrial policy has passed through several stages that should be interpreted in terms of a variety of variables, such as state involvement, as well as policy views, instruments and institutions.

During the first stage, once the 'reconstruction' of the productive apparatus in most Western European countries had been accomplished, the black spots in the industrial structure became visible: traditional sectors and regions with these sectors as leading activities began to lag behind and the national centre-periphery model, which has been described in detail by authors like Alain Lipietz for France and Doreen Massey or Ray Hudson for Great-Britain, began to materialise (Massey 1984; Hudson 2000; Lipietz 1977). In reaction to this, many European governments launched a 'national' regional policy approach, developing infrastructure and providing investment subsidies for (manufacturing) industry. This policy has been evaluated in quite contradictory terms, as e.g. positive for France and negative for Great Britain. *The scientific basis for this policy was diverse and ranged from location theory to growth pole models* (Lambooy 1980).

In the second stage, the role of the national state in regional policy came under considerable pressure. The fiscal crisis of the state - the state paying the

R.A. Boschma and R.C. Kloosterman (eds.), Learning from Clusters: A Critical Assessment, 89–109.

huge bill of failing Fordism, the failure of national policy in many countries and the call for more autonomy by the regions and localities, paved the way for a proper regional and local development policy. The definition of industry became broader, to include services along with manufacturing activities. Traditional instruments such as the restructuring of old industries and investment subsidies were replaced by policies stressing innovation through investment in new technologies and activities. The endogenous potential of regions and localities in terms of human and social capital was highlighted as the core of the new style regional development strategy. Networks fostering the learning region, mobilising different types of innovative agents in both the public and the private sector were propagated as the typical institutional configurations for regional progress. *A significant body of academic literature on endogenous development, Milieux Innovateurs, Industrial Districts, Regional Innovation Systems and Learning Regions provided the scholarly foundations for the new approach. These models are referred to by the generic term of Territorial Innovation Models (Lagendijk 1998; Moulaert and Sekia 2003). Not only did they endogenise technology into regional development, they also showed the need to accompany them in an institutional way* (Lambooy 1984).

In the third stage, the shortcomings of the Learning Region model and its regional policy view became visible. Even if the model proved quite useful for the restructuring of 'winning regions', it often failed to design policies capable of solving the problems of declining regions or of city neighbourhoods with long-time restructuring difficulties. The view and practice of development based on technological and organizational innovation meant to increase regional and local competitiveness began to show their limits. *The learning region is held to be too economistic and too technological in its view of development.* Despite the recognition of the role of institutional dynamics and culture, the fate and future of regions and localities is read in terms of economic efficiency and technological opportunities for business capital, whereas other dimensions of balanced existential development - such as sustainable development - are overlooked. As a consequence, social, human and ecological capitals are geared towards a market-competitive logic only, creating a new polarisation in the development of regional and local societies.

To correct this technological and economistic bias of the learning region, a broader existentially encompassing view of development is needed. To this end, the authors suggest a communitarian approach to development that is based on the reproduction of various types of 'non business' capital according to their own existential logic: ecological, human, social. Culture

should be freed from its compulsory role of steering only market-economic development. It should be reinvented as multi-dimensional social capital fostering creativity and communication of various kinds. Such a multi-dimensional view of culture could then become the basis of a comprehensive model of innovation, including all types of capital, to the benefit of balanced development of territories and their communities.

This, of course, means a reconceptualization of the region, not only as a regional economy, but also as a regional society - a constellation of various human communities and settlements. However, it also implies an evolution in the notion of industrial policy, which today is geared much more towards spurring innovation in a variety of activities, where formerly it was confined to technology investments in manufacturing activities only. The notion of innovation used in the theoretical underpinnings of regional industrial policy today is still too predominated by technological concepts and the instrumentality of institutions which envisage improving regional competitiveness as the exclusive ultimate economic criterion.

5.2 The shortcomings of Territorial Innovation Models

The 'territorial innovation model' (TIM) is used here as a generic name for models of regional innovation in which *regional and local institutional dynamics* play a significant role. In general, three families of TIM can be identified[2]. The French model of *Milieu Innovateur*, which was the basis for the territorial development synthesis produced by GREMI (Aydalot, 1986) emphasises the role of endogenous institutional potential to generate innovative dynamic firms. The same basic idea is found in the industrial district model, stressing even more the part played by co-operation and partnership in the innovation process (Becattini 1987). Other models of territorial innovation lie in the tradition of the systems of innovation: a translation of the institutional co-ordination principles found in the sectoral and national innovation systems to the regional level (Edquist et al., 1997) or an evolutionist interpretation of the regional learning economy (Cooke, 1996; Cooke and Morgan, 1998). A third tradition stems from the Californian School of Economic Geography: the New Industrial Spaces (Storper and Scott, 1988; Saxenian, 1994). Finally, a residual category with little affinity to regional analysis, but which lies close to Porter's clusters of innovation, is the 'spatial clusters of innovation'.

Figure 5.1 summarizes the meaning of territorial innovation in most of

these models[3]. The Learning Region model has been omitted in the figure because it can be considered as an essential synthesis of the features of many of the other TIM models, i.e. with a stress on evolution in innovative processes embedded in a networked regional economy (Morgan 1997).

Model **Features of innovation**	Milieu innovateur (Innovative milieu) (MI)	Industrial District (ID)	Regional Innovation Systems (RIS)	New Industrial Spaces (NIS)
Core of innovation dynamics	Capacity of a firms to innovate through the relationships with other agents of the same milieu.	Capacity of actors to implement innovation in a system of common values.	Innovation as an interactive, cumulative and specific process of research and development (path dependency).	A result of R&D and its implementation; application of new production methods (JIT,etc.).
Role of institutions	Very important role of institutions in the research process (university, firms, publicagencies, etc.).	Institutions are 'agents' and enable social regulation and foster innovation and development.	As in the NIS, the definitions vary according to authors. But they all agree that the institutions lead to a regulation of behaviour, both inside and outside organisations.	Social regulation for the co-ordination of interfirm transactions and the dynamics of entrepreneurial activity.
Regional development	Territorial view based on 'milieux innovateurs' and on agent's capacity of innovating in a co-operative atmosphere.	Territorial view based on spatial solidarity and flexibility of districts. This flexibility is an element of this innovation.	View of the region as a system of 'learning by interacting/ and by steering regulation.'	Interaction between social regulation and agglomerated production systems.
Culture	Culture of trust and reciprocity links.	Sharing values among ID agents - Trust and reciprocity.	The source of 'learning by interacting'.	Culture of networking and social interaction.
Type of relations among agents	The role of the support space: strategic relations between the firm, its partners, suppliers and clients.	The network is a social regulation mode and a source of discipline. It enables a coexistence of both co-operation and competition.	The network is an organisational mode of 'interactive learning'.	Interfirm transactions.
Type of relations with the environment	Capacity of agents to modify their behaviour according to the changes in their environment. Very 'rich' relations: third dimension of support space.	The relationships with the environment impose some constraints and new ideas. Must be able to react to changes in the environment. 'Rich'relations. Limited spatial view of environment.	Balance between inside specific relations and environment constraints. 'Rich'relations.	The dynamics of community formation and social reproduction.

Source: Moulaert, Sekia and Boyabé, 1999.

Figure 5.1 Views of innovation in territorial innovation models

Most of the TIM models stress the instrumentality of institutions for economic restructuring and improved competitiveness of regions and localities. But none of these models make reference to improving the non-economic dimensions and non-market led sections of the economy in localities, unless these improvements were to contribute to the competitiveness of the territory. According to the TIM, the quality of life in local communities coincides with growing prosperity and will be produced as the positive externality of higher economic growth; no distinction is made between well-being and growth, between culture and business climate, etc. Moreover, the regional economy is considered as coincidental to the regional market economy, excluding not-for-profit or social economy activities.

Consequently TIMs reflect a certain view of economic development: innovation and learning will improve the market-economic performance of a region or a locality and, in this way, will contribute to the achievement of other development goals. There is no doubt that TIMs, and especially the Learning Region Model, are superior to other models of territorial economic development (e.g. neo-classical regional growth models) in that they recognize the explicit role of institutions (including firms) and their learning processes as key factors of economic development. In consequence, TIMs replenish the black box of the neo-classical model of the firm, which disregards the institutional dynamics of innovative agents, and only considers their logic of individual rational economic agency. *TIMs are therefore trickier than neoclassical regional growth models, for they make all institutional dynamics (culture, learning organizations, networks) immediately useful in improving the market-competitiveness of the local economy. (In orthodox development discourse, one could say that they make 'development' functional to 'growth'; the neo-classical adage turned upside down!)*

In other words: TIMs do not implicitly consider the multi-dimensional nature of the economy - that in reality is much broader than the capitalist market economy - and of the other existential (non-economic) spheres of local and regional communities such as the natural environment, the social-cultural (artistic, educational, social services) and the socio-political sphere. Despite their devotion to institutional dynamics, they swear by a market-based economic ontology and technological view of development. In this way, they work with an impoverished view of economic finality, investment, innovation, culture and institutional dynamics.

5.3 A communitarian view of regional and local innovation

Figure 5.2 summarizes the concepts used in Territorial Innovation Models and suggests how the reading of these concepts changes when they are linked to a community-based instead of a 'market competition' led ontology.

A community-based ontology as defended in this chapter starts from a different concept of capital and innovation. In the TIM, the logic of capital obeys mainly the criteria of profitable investments and financial returns. This does not, of course, mean that in this approach capital is reduced to machines or workshops - physical capital - or just business capital (see section 5.3.1). *In fact it includes any type of capital (human, social, cultural, etc.) as long as it contributes to the achievement of the market-economic behavioural norms of efficiency, productivity and technological and organisational innovation.* In this way, TIMs fill the neo-classical black box that hides the nature and diversity in the functionality of capital for regional and local development. However, they fill it according to a market logic, meaning that:

- they exclude economic activities that are not market-oriented;
- they make capital exclusively functional to profitable activities and in this way ...
- they provide a narrow reading of innovation of capital.

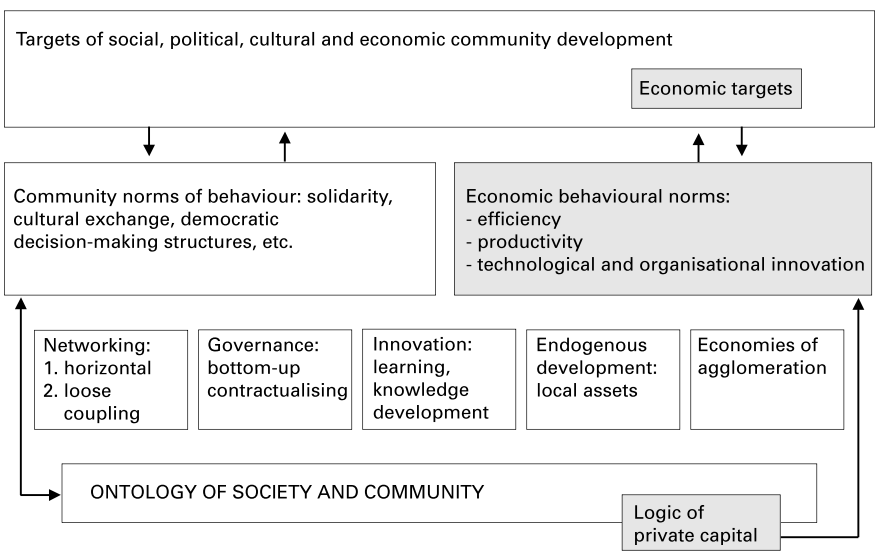

Figure 5.2 Institutional instrumentality: a community-based and a market-led view

Whenever capital and its reproduction (innovation) obey community norms of behaviour, or are embedded in a community logic of reproduction, their meaning for development changes (see e.g. Schramm, 1987). By abandoning, or integrating the market logic for capital reproduction (and innovation) into a community logic, the range of economic activities increases because other *agency principles* in addition to economic efficiency and competitiveness are taken into account and *new criteria for governing production and distribution* in addition to the market-efficiency criteria are introduced. In fact, a wide range of economic activities become directly linked to the implementation of the community logic of development, which is based on a new view of social innovation. From the community development perspective, social innovation receives a double content.[4]

First, it refers to the satisfaction of basic or human needs. This is the meaning adopted in the social economy, but also in the alternative development literature (Laville, 1994; Moulaert and Ailenei, 2002). Human needs are much broader than only jobs and incomes for a large majority of people in the territorial community, as the TIM literature would stress. *Second*, it also refers to innovation in social relations between humans and groups of humans in communities - social innovation in the sense of Max Weber, when he compares technical with social inventions. Whether referring to a locality, a neighbourhood, a community, a city, or a region etc. various types of social relations exist, including relationships between, within and among ethnic groups, professional relationships (crafts, commerce), labour relationships (between firms and their workers), market relationships (between firms and their markets and market partners, including clients) and governance relationships (government relationships between constituency and local authorities; relations of self-governance and collaborative governance). These innovations in social relations imply governance dynamics and institutional innovations that go far beyond territorial governance in TIM.

Nevertheless, we should be careful not to polarise TIMs and community-based territorial development. Territorial innovation models cover a large group of agents, involved in investment, learning and innovation meant to improve the institutional capacity and economic performance of the local economy. It would be wrong to represent TIMs solely as networks of 'private entrepreneurs' because they also cover and theorise the networks of all public and private agents relevant to innovative behaviour in order to improve the productivity of private capital as they define it. But, as indicated, there are significant differences between the ontology and structure-agency relations in TIM and regional/local development models based on the community logic.

5.3.1 Public or private, collective or individual capital?

In this community logic, various concepts have to be considered from a different point of view. The content of the key terms of economic analysis and the rationality they involve must be broadened and adapted to the requirements of an appropriate development approach. As far as the conditions of social innovation are concerned, in the community rationale *private capital* exists in combination with *public capital*, in a way that is different from the instrumental view - public serving private capital - in TIM. And although today the distinction between private and public capital, has become a bit blurred, it is clear that both analytically and politically speaking it remains very relevant. This distinction is blurred in the sense that the ascription of each role is no longer so clearly defined. The transformations of the role of the state from top-down governing to cooperative governance calls for a redefinition of what is public and what is private. Maybe in order to grasp the distinction between public and private capital we should return to the basic social question about the finality of investment in activities: *who benefits in the end?* Who are the ultimate user groups and does the provision of goods and services by these activities guarantee the satisfaction of the users' needs? By doing so, we not only reopen the debate on the distinction between public and private, but also between collective and individual, and in addition on the links between both binomes. We have neither time nor space to report on this debate in detail (but see Moulaert and Nussbaumer 2005). For the sequel, we will work with the following distinctions.

We make a plea to reserve the term *public capital* for any combination of capital including the state that has been designed to satisfy private and collective needs by way of an allocation system other than the capitalist market, or that controls or redirects market allocation functions. But public capital does not necessarily serve the collective interest.

Defining *collective capital* then, starting from a community ontology, means that investments can be made to benefit all or significant groups and members of a community, or particular groups and members of a community that are excluded from the benefits of the market-profit logic. Collective capital can include state capital, an association of private capitals based on principles of reciprocity and solidarity, but also private capital that not only follows the norms of market competition but of other socio-economic norms as well.

These *collective investments* are in most cases made by 'other' types of agents than those portrayed in the TIMs: public departments for social integration, public housing agencies and social housing developers, natural

park administrators and neighbourhood community development agencies etc. These will, in general, invest in activities that serve needs only marginally revealed by the market. Therefore, if a TIM were to follow a community logic, this would extend not only its variety of agents, but also and especially, the plethora of strategy agendas to become more oriented towards socio-cultural, socio-economic and socio-political development and innovation.

5.3.2 The social logic of community governance

The community logic of development, as we have seen, is based on the satisfaction of basic needs and the institutional innovations needed to enable this. The linking of developing new activities to institutional innovation is as old as regional economics itself[5].

Institutional capacities for social innovation of a community include community decision-making mechanisms and strategy as well as policy delivery mechanisms. They also imply needs revealing processes. It is inherent in the community logic that the market is considered only as one system of needs revealing and goods or services allocation. The community logic of governance prioritises other needs revealing mechanisms and allocation systems, based on neighbourhood direct democracy and collective and public capital as a provider of goods and services. At the level of (urban) regions, territorial development plans or collective agreements can establish the links between neighbourhood or community-based institutions. The prioritizing of this community logic obviously has consequences for the allocation of finance to activities outside the 'uncorrected market', to the benefit of subsidised allocation of individualised goods and services, as well as public allocation of collective goods and services.

The community logic of needs revealing and satisfaction also involves neutralizing paralysing power mechanisms such as the market mechanism, in a highly inegalitarian economy and a state governance in which powerful private (or in origin public but privatised) or public bureaucratic interests predominate. True communitarian democratic control and public administration include control and decision-making mechanisms, which seek to counter perverse power relations. In this, the state - especially the higher-level scale state institutions - can play a monitoring role, as was already observed by Gustav Schmoller a century ago (Schmoller 1905).

5.3.3 Redefining capital and innovation

The critical revisiting of the roles of public and private, collective and individual capital, the complexity of communitarian needs revealing and

decision-making mechanisms and the multitude of human activities involved in community reproduction has consequences for the definition of capital and innovation according to a community development logic.

What is capital?

A new theory of capital and innovation fitting the community development logic defended in this chapter should start from the following premises:

- it should include the tension between private, collective and public interests and between individual and collective needs satisfaction;
- it should encompass the various types of capital as they refer to the spheres of existence of humanity: natural, biological, and social-cultural (and sometimes also called strata of existence)
- it should support the various activities of human reproduction within each of these spheres: production, consumption, distribution (economic); governance and government (political); communication and artistic creation (cultural).

Cross-tabulating each of these dimensions could lead us to an interesting 'tableau de bord' of which types of capital are to be considered in local development agencies and how their reproduction and innovation will work.

Following O'Hara (1997), inspired by Veblen (1899), we distinguish four types of capital: ecological, social, human and private business capital. Although this classification deserves some criticism with regard to its structuring criteria (collective or individual, private versus public ownership relationships combined with organisational and ecological considerations), this typology reflects the tensions between four domains of development essential to the future of humanity. It also lays the groundwork for a discussion on the concept of innovation that is broader than the one embodied in '(private) business capital'. Figure 5.3 provides definitions of each of these categories of capital and suggests a number of interesting discussions about the synergies, destruction and substitution that are possible between the various types of capital. Less well known and analysed are the *positive* trade-offs between various types of capital at the regional and local level: for example, regions with a qualitatively outstanding social capital, or/and a good ecological system, which have a higher level of wellbeing than other regions with a much vaster business capital stock and higher level of income (cited by O'Hara, op. cit.).

The capital needed for local development is necessarily multidimensional. An innovation strategy for a local or regional community is only partially a business (capital) innovation strategy. Other forms of capital need regeneration and

Influence: from ⟶ to	ECOLOGICAL CAPITAL	SOCIAL (OR INSTITUTIONAL CAPITAL)	HUMAN CAPITAL	BUSINESS CAPITAL
ECOLOGICAL CAPITAL 'the stock of all environmental and ecological resources. It is a dynamic stock involving the biosphere, the gene pool, plant and animal species, the weather, the cycles of nature and the physical environment'	Reproduction of ecological Capital-Ecosystem	Environmental impact on human interaction patterns and norm systems	Improvement of quality of physical and natural environment - Health fostering creative human capital	'Green' capitalism - Ecological production and consumption systems
SOCIAL (OR INSTITUTIONAL CAPITAL) 'comprises those norms, mores, relationships and organisational arrangements which help to bond people together. Some minimal degree of trust, respect, dignity and communication between people are necessary with this form of capital'	Administration and norm development vis-à-vis Ecosystem	Social dynamics Building of norm systems	Learning and co-operation processes	Valorisation of social dynamics in economic activities
HUMAN CAPITAL is usually related to those skills and knowledge that are capable of general application, although 'firm specific' human capital and 'learning by doing' are of considerable importance [5]	Improved knowledge and skills to reproduce environment	Knowledge impact on institutional capability Improved Institutional dynamics	Skills and knowledge growth	Valorisation of human capital in business system
BUSINESS CAPITAL 'this category includes the creation of durable structures within corporations, such as machinery, factories, tools, warehouse, buildings and inventories'	Investment in eco-economics	Codifying of institutional capital to economic logic	Training of manpower for economic activities	Investment in machinery, factories, etc.

Figure 5.3 Interaction between various types of capital

innovation. Moreover, the ultimate synergy would be that business capital becomes instrumental to the development of collective wealth in the Veblen sense. Business capital is therefore not per se private business capital. To improve the typology, we would prefer to change the content of O'Hara's private business capital to business capital tout court, reserving the qualifiers private and public for property relations or relations of control exerted by private or public interest groups, or by individual or collective institutional arrangements, including the State (public) or not (private) - see section 5.3.1.

To be in tune with the community view of spatial development and innovation set out in this chapter, the history of the locality, the power relations and the spatial scales must be included in the analysis of the interaction between types of capital: capital has a history, has spatial scales and is embedded in power relations including the tension between public and private and collective versus individual control. The 'dynamic stock of durable structures' is a historical, spatial and socio-political concept and must be theorised as such. Path dependency involves much more than the neo-institutional economics' path of institutional change (North, 1990), it includes the development trajectory of the local system in all its dimensions and spatial scales (Moulaert et al., 1994; Moulaert and Leontidou, 1995; Moulaert, 1996). This ontological stance has significant consequences for the methodology of regional analysis (Moulaert, 1995).

Figure 5.3 was designed as if each type of capital had (partly) an autonomous logic which it can (partly) valorise in synergy with other types of capital. This is a positive logic: human capital can illuminate knowledge of the environment and therefore contribute to an improved ecological capital; institutional capital can foster learning processes for human capital, etc. Of course, these 'improvements' can only receive a solid orientation if the community view of territorial development is really filled in. Norms and objectives must be defined for ecology, social relations, solidarity, production and distribution of economic assets, etc. In the social view of territorial development, the dynamics of the various forms of capital must be existentially orientated and the trade-offs between the orientations evaluated. For example, a local community can choose to invest less in large-scale urban regeneration projects and spend more resources on neighbourhood actions, including decent primary schools, social services and individual (social) housing.

The meaning of investment

Investments can be made in any of the four types of wealth or capital, to aid regeneration of its own or other capitals. For example, investments

can be made in business capital to produce more marketable consumer goods. However, more investments may be made in business capital for the purpose of sanitising the environment or improving labour skills. In the logic of the semi-autonomous interaction of these various types of capital, investments in one type should not necessarily follow the 'pure' logic of that capital. Capitals should be reinvested not only to regenerate their own type (more business capital to produce more business capital - Marx' circuits of capital - or more ecological capital just to improve the quality of the natural environment, etc.) but also to establish creative synergies with other types of capital. Therefore, investment decisions involve various types of capital and necessitate evaluations of their combined use or mobilization.

The balance of synergies and use of types of capital by each other is to be made in accordance with a four by four approach: e.g. human capital can be expanded in the medium or long run. However, in the short run there should be an allocation of labour needed for the reproduction of all types of capital. Given the uneven availability of skills, reproduction may not be easy for all types of capital. For example, in the short run there will probably be a shortage in human capital for the purpose of sustaining ecological and institutional capital and a surplus of certain types of human capital suitable for the purpose of employment by business capital. Therefore, investment in human capital should not only be an individual, but also a collective and public strategy. The various skill needs in accordance with the diversity of logics of capital should be developed in individual and collective educational plans and actions.

Society not only needs engineers and managers for business capital, but also for the reproduction of other types of capital, including human capital (education, training) and institutional capital (including governance relations, institutional capacity, etc.). Similar considerations hold for the allocation and reproduction of other types of capital: there needs to be institutional capital for good governance of communities, but also for among others good governance of business, learning (human capital) and ecological preservation and regeneration.

Therefore, various types of capital, their agents and their organizations are involved in the community logic of territorial development: that much we can extrapolate from O'Hara's approach. As in other approaches in classical economics, O'Hara's scheme leaves the reproduction of capital to the circuits of capital that continue flowing according to their own logic and in interaction with the logic of other types of capital. What then does it mean to innovate in each of these circuits, according to the community logic of territorial development?

A community logic of innovation

What does innovation mean for each of these categories of collective wealth? To bypass the tautology of mutually interacting semi-autonomous circuits of various types of capital, leading to the definition of innovation as a reproduction of the stock of capital in a more advanced form, *we have explicitly chosen to make social and institutional innovation, i.e. innovation in social and institutional capital predominant.* To this end we dynamise the notion of social and institutional innovation by using the double dimension of social innovation as we introduced it at the outset of section 5.3 - and as the German Historical School, and especially Schmoller, already foresaw more than a century ago. Social innovation therefore means innovation in social relations of governance combined with the satisfaction of basic needs as revealed by the new relations of governance. In other words: innovation in institutional capital implies in the first place innovation in needs-revealing processes, forms of cooperation, communication and good governance, geared towards the satisfaction of needs requiring the reproduction of the four types of capital.

In this community logic, therefore, innovation is in the first place *institutional* and *social*: social choices and institutional processes are adapted so as to clarify and highlight basic needs and coach the processes that should satisfy them. Basic needs are to a certain extent context and community bound and needs revealing processes are therefore a generic ingredient of institutional innovation in a community context.

What then does this mean for the innovation of other types of capital? Several consequences to be developed in more detail later are relevant here.
Not only the market logic of competition, but the broader logic of community development will determine the innovation processes for the various types of capital. Human capital also serves to govern, to assist, to be artistically creative, to coordinate social services, etc. in order to improve social cohesion (institutional capital) in local and regional communities. Will human capital become humane again?

The end of technological determinism. Not technological, but social-institutional norms will determine innovation processes. As many TIM analysts had pointed out, even business capital has suffered from the technological bias that had downgraded the importance of social and institutional innovation for improving the quality of business and the levels of productivity and efficiency.

The revalorization of ecological capital. The reproduction of ecological capital is no longer considered an inevitable constraint on the survival of

society and economy, but a fully-fledged component of communitarian development. Ecological capital forms part and parcel of the collective wealth of a community that seeks individual and collective health and an environment that will foster creative social interaction. ("Healthy governance in a healthy environment.")

The organization of the innovation process: here lies a real challenge for the future of regions and their communities. A multi-logic, multi-agent but community-oriented view of innovation should be translated into visionary innovation systems at all spatial levels. There is a need here for a new Utopia that will inspire new approaches to innovation strategies, networks and policies. Provocative buzzwords could be: laboratories for social capital, learning beyond-scientific knowledge, territory-based arts as a creative process, solidarity as an economic norm, community solidarity culture, human communication and corporate governance etc.

Reconceptualising innovation processes

This community-based view of capital and innovation has consequences for the meaning of the concepts put forward in Figure 5.2. Networking, governance, learning and culture - to cite maybe the most important - receive a different content than in the TIM literature. Their instrumentality is no longer exclusively geared towards improving institutional thickness and institutional dynamics to the benefit of the market-led innovation system. Capital and its innovation respond to a variety of functionalities and logics, in which community social innovation predominates. Figure 5.4 - only partially explained in this chapter - anticipates a more detailed discussion on what these concepts embody in a community oriented social innovation context.

For the reconceptualization of the innovation process along community development lines, we should first devote some more attention to the meaning of culture, for culture is at the core of social dynamics. If communities are to be analyzed from the point of view of their own existential, social and institutional logics and trajectories, culture is a key-concept for any theoretical approach of their development. For this purpose, we basically follow the analysis of cultural interaction by Mouzelis (1997). Mouzelis focuses on four basic strategies [integrative mechanisms] by which a complex multi-cultural whole can accommodate its differentiated parts: (i) compartmentalised; (ii) monologic; (iii) syncretic; and (iv) multilogic or communicative. The new view of territorial development, based on social innovation, necessarily adopts the communicative integration strategy. Not only does this mean that different ethnicities and cultures should develop a language and a system of

Notions	Features
Networks	- Agents: belonging to various spheres of the community; - Agendas: diversity possible; - Rationales of networking: predominantly social innovation, geared towards overall development of community; - Creation of institutions: see community culture; - Power relations: are inherent in human communities and cannot be rationalized away; need for countervailing power, mobilization and political organization; - Communication: see community culture.
Governance	- Collective and public decision-making mechanisms; - Horizontal communication between governance agents; - Coordination of governance networks; - New roles for public sector: promoting various logics of capital; and their integration, R&D on social innovation.
Learning	- Learning is not only rational, but is meant to acquire scientific knowledge or knowledge directly useful to scientific discovery and efficient organization; - Learning is not only a scientific activity; knowledge and skills should be multi-purposeful or just for social and personal emancipation; - Science is not the only activity producing knowledge. Others are arts, poetry, literature, intuition, etc. - Learning is a vehicle to socialization, not to monopolising knowledge; - Learning is not the only experience building activity of human kind: creation, enjoyment, communication, etc. are equally valuable.
Community culture	... communicative integration strategy ... [Mouzelis, 1997] [...] Different ethnicities and cultures should develop a language and a system of communication, but also [that] a new balance between their logics of existence must be sought. Cultural integration is only possible if the fundamentalism of market logic is limited, and if other views of economic development responding to the needs of various cultural groups, enter the picture of community communication and development design. Communication and decision-making systems must involve community-rooted views of economic, social and cultural development. They should include constraints on the influence of dominant views and practices.

Figure 5.4 Enriched notions of cultural dynamics in a community-oriented innovation

communication, but also that a new balance between their logics of existence must be sought. Cultural integration is only possible if the fundamentalism of market logic is limited and if other views of economic development responding to the needs of various cultural groups, enter the picture of community communication and development design. Communication and decision-making systems must involve non-compartmentalized community-rooted views of economic, social and cultural development. What then does this mean for other concepts in innovation analysis, like networking and learning? Let us make some preliminary observations.

a) Networking

Normatively speaking, it looks quite straightforward to 'design' a network configuration that fits the multi-logic and communicative strategy of cultural interaction responding to the community based view of social innovation. The finality of the network is the integration of existential logics and agenda of emancipation. The institutional environment in which a communitarian network develops is basically democratic and should catalyse cooperation and interaction with other networks and with coordination agents responsible for fine-tuning agendas and actions between networks. Agents in the networks will be individual, collective and public, representing various logics of capital (business, ecological, institutional and human). Communication occurs through horizontal flows and democratic collective meetings where information is exchanged and proposals for further action are prepared, etc. From a blueprinting humanist or communitarian point of view, this all sounds very interesting. However, in reality, as we pointed out before, communicative strategies of networking can only materialise if the institutional and human capital of the communities allow it. In other words: path dependency of institutional and human capital interferes with the potential to design 'true' communicative community relations.

b) Learning

The learning society, the learning region or locality, life-long learning. Do these categories still have a meaning in the community based ontology and view of innovation? According to the TIM rationale, humans should individually and collectively learn to reproduce individual human capital, to innovate in organization, co-ordination and technology and in institutional capital so as to ensure that local innovation systems perform better.

But what does all this mean from a community-based perspective? First of all, given the importance of knowledge of all types of capital and their interaction, and the primacy of social innovation, the way knowledge is organized and 'learned' will change. Scientific knowledge will become one among many types of knowledge and modes of learning (Feyerabend, 1975). Therefore, a variety of modes of learning should be introduced and combined. These modes refer both to the social organization of the community and to the types of knowledge and how they are 'best' acquired. Shared and collective learning, individual creativity, communicative strategies, decision-making procedures, philosophy, theory and practice, etc. should be integrated into the learning strategies and styles.

5.4 Sequel to the research agenda

In this chapter, we have defended an alternative view of regional innovation systems. In doing so we have replaced the market-led instrumentality of innovation, learning and institutions with a community view of regional innovative development. This view rests on a binomic conception of territorial social innovation, i.e.(i) satisfaction of neglected basic needs - individual and collective; (ii) innovation in social relations of community life - including community governance in its various dimensions. From a cultural perspective - culture as a universe of communication - this means that community-development explicitly opts out of compartmentalized co-existence of the spheres of community life, in favour of a communicative integration strategy between development agents, agendas and spheres. This, of course, has major consequences for reconceptualising the innovation process, to transform it into a concept that is useful to inspire development strategies of regions and communities as a whole, and not only of their market-oriented economic segments.

Reconceptualising innovation processes for a broader ontology, like the one put forward in the community based development logic, needs careful theoretical reformulations, new contents for existing concepts as well as new concepts to complete the picture of a multi-dimensional territorial development approach. Most of this work still needs to be done.

Notes

1 We wish to thank Mrs Bernie Williams for her valuable editorial advice.

2 For details see Moulaert, Sekia and Boyabé (1999).

3 For more details see Moulaert, Sekia and Boyabé, op. cit.

4 More details on social innovation and local development can be found in Moulaert et al. (2000) and Moulaert and Nussbaumer (2002).

5 The German Historical School already provided challenging insights on this topic at the turn of the 20th century. Gustav Schmoller's analysis of local communities shows that local needs can be tackled at local level. Schmoller emphasises the local emergence of institutions that are designed to answer the local basic needs of the populations and that they can do so more adequately than higher institutional levels. (Schmoller, 1905; Nussbaumer, 2002).

6 The author refers to Tomer (1999) who suggests that human capital, at least the part 'organisational learning', could be considered as belonging to organizational capital.

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6 Economic Development, Institutions and Trust

Gert-Jan M. Linders, Henri L.F. de Groot and Peter Nijkamp

6.1 New governance systems

The 'invisible hand' in economics prompts a permanent drive towards greater efficiency in a competitive market, reflected inter alia in mass production in relation to labour specialisation, or industrial districts in relation to flexible specialisation. Several theoretical frameworks have been developed to map out the industrial and market implications of a given economic system, such as the technological, the institutional, the industrial-organisational and the evolutionary approach (see also Sabel and Zeitlin, 1985 and You, 1995). In all cases, a decisive factor for successful performance of an economic system has been 'good governance' (not only in the form of the public sector, but also reflected in municipal and paternalistic modes of control). The history of economic development in many regions of our world bears witness to a variety of policy or control systems and managerial arrangements that are often culture-specific and geographically determined. For example, the emergence of public-private water management boards ('waterschappen') in the Netherlands is the result of a long-lasting struggle of centuries against the water threats facing the 'low countries'.

Currently, we are observing new forms of decision-making agencies in our ICT age, such as virtual and network organisations, which seem to be substituting fordist institutional constellations. Learning and - in relation to embeddedness - control play a key role in these new economic arrangements (see also Raub and Weesie, 1993). In these new conceptual frameworks, trust relationships between different actors are essential. For example, Granovetter (1985) calls for a focus on the question of how far a trustor can adjust his expectations to the behaviour of a trustee on the basis of past experience. Networks are then information mechanisms that serve to reduce uncertainty regarding the behaviour of other agents. In addition, networks call for tailor-made institutional support systems, such as clustered control structures, bilateral pricing strategies, etc. (see Hagen and Choe, 1998).

All these new modes of governance configurations lead to an unprecedented variety in the appearance and functioning of economic systems, in which social,

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cultural, geographical and institutional factors are essential ingredients. As a consequence, we observe a high degree of heterogeneity in regional economic development. To account for this variation across nations or regions we need to go beyond neoclassically oriented growth theories.

Empirical research in economics increasingly recognises the decisive importance of institutions and policy mechanisms as background variables for productivity and productivity growth. Hall and Jones (1999) label these factors as social infrastructure. Good governance has often been identified as the main concept in these investigations (Olson, 1996). In many economic analytical frameworks, property rights enforcement, an autonomous state and sound macroeconomic policies are seen as a *conditio sine qua non*. This approach is only partially satisfactory, however. The emergence of good policies or good governance is usually not sufficiently addressed. Most notably, the critical question is: why do some countries or regions fail to install good policies and why do other countries or regions fail to perform well in spite of good governance? For recent investigations into the spatial variation of institutional and organisational features, and the implications for regional development, we refer to, for example, Lambooy, 1997 and 2002; Lambooy and Boschma, 2001, and Boschma et al., 2002.

Recently, macroeconomic research on growth has also started paying attention to the effects of social structure and social relations on economic performance. This has led to a revival of interest in 'old' institutional and evolutionary approaches to institutional change, which focus on culture and informal, social norm systems (see, for example, Hodgson, 1998). Much of the literature appears to be clustered around the concept of social capital and one of its main constituents, namely interpersonal trust. In this chapter we present an overview of the concepts 'social capital' and 'trust', as well as their link to productivity and development. We will also illustrate the main theoretical and empirical questions that remain to be answered in future research.

This chapter is organised as follows. In section 6.2, we present the basic argument for the importance of cooperative behaviour in economic life and the resulting pivotal role for social capital. Section 6.3 shifts the focus from a general notion of social capital to trust as its operationalisation. A synthesis of the insights from research into the emergence of interpersonal trust is the aim of the next section, after which section 6.5 aims to show how trust can be transferred from 'microeconomic' networks to a macroeconomic setting. We stress the possibility of negative consequences of network-based trust for macroeconomic performance, and the relation between the generalisation of

interpersonal trust and formal institutions, imposed and enforced by the state. In this way we return to our central questions of the emergence and effect of good governance. Section 6.6 presents concluding remarks and suggests some questions that remain to be answered.

6.2 Social capital and trust in economic transactions

People engage in economic transactions because these are beneficial for all parties. The benefits of specialisation and trade are well-established pillars in traditional economics. Still, the quid-pro-quo inherent in any (market) transaction is by no means automatic. When we adopt the postulate of economic man, who decides purely on the basis of self-regarding considerations, the Hobbesian problem of order arises (Granovetter, 1985; Ostrom, 2000). Free-riding, theft, malfeasance and other conflicts will arise when given a chance, not only in collective services but also in markets. Market transactions can be considered to embody elements of prisoner's dilemma games, because cooperative behaviour is involved. The solution of neo-classical economics to this problem of order has been the assumption of perfectly competitive markets. Close social relations between transacting parties that might lead to misuse and fraud generally do not occur in atomistic markets. Agents interact at arm's length and can only successfully realise a transaction at the market price. Malfeasance does not pay off and the prevention of theft merely requires effective property rights, which are easily defined given the assumptions of perfect insight and atomistic, one-dimensional transactions. In other words, the invisible hand of the price mechanism cannot be tampered with.

However, economic transactions cannot be completely captured by the atomistic model of perfect competition. In a setting of imperfectly competitive markets, imperfect insight, uncertainty and asset specificity, in which many transactions are conducted over time and repeated with some frequency, cooperative behaviour matters. Granovetter (1985) argues that under such circumstances the discipline of competition is insufficient to safeguard mutual interests in transactions. We need additional theory to explain cooperative outcomes and good economic performance - or the lack thereof - amongst different societies.

Several explanations have been provided in economic theory for the occurrence of successful cooperative outcomes. These all point to factors that we have identified above as part of the social infrastructure. The first solution

has been offered by new institutional economics. Formal institutional arrangements are invoked to solve complex contractual problems and reach cooperative outcomes. A second solution tries to underpin the emergence of, in particular, social norms from concrete social relations or networks. Although both approaches have a different focus, the lines of demarcation are not as strong as they are purported to be. We will argue that formal rules may complement social norms, rather than substitute them. We will focus on this second type of solution and discuss the role of formal institutions within the framework that results.

Social capital is an important concept in the literature on social relations. While often being attributed to Loury and Bourdieu (for example, 1986), social capital has since become a rather elastic concept. Portes (1998) notes an emerging consensus towards the formulation of a definition. He defines social capital as "...the ability of actors to secure benefits by virtue of membership in social networks or other social structures." Hence, it is the ability of people to work together for common purposes. Portes stresses the importance of identifying social capital as ability rather than as the resources that follow from the use of networks. The latter practice, which is regularly found in the literature, can lead to tautological reasoning.

The definition above is conceptually neat, but does not offer much help in the context of exploratory analysis. In this light, Knack and Keefer (1997), quoting Solow, argue that 'if social capital is to be more than a "buzzword" its stock "should somehow be measurable, even inexactly", but "measurement seems very far away"'. Efforts have been made, however, to assess the critical dimensions or origins of social capital and at least to suggest operational proxies. Paldam and Svendsen (1999) choose to focus on the density of trust as a definition of social capital, determining how easily people work together. The relevance of trust is best acknowledged, according to them, by the fact that its level differs across societies and in time. However, trust is a factor that causes social capital and determines its extent, rather than the equivalent of social capital. Still, focusing on trust is a sensible choice. In comparison to the overarching concept of social capital, variables such as trust can be operationalised more easily into a proxy that is measurable across survey respondents. For example, Knack and Keefer (1997) have used indices from the World Values Surveys to represent interpersonal trust and a related variable for civic norms.[1]

6.3. The impact of trust on economic performance

Besides the advantage of its more concrete and measurable nature, trust seems the binding factor in successful cooperative behaviour. As we have argued, explaining cooperative outcomes is crucial for the clarification of divergence in economic performance. Many authors have emphasised the central position of trust in their analysis of cooperative behaviour and social relations (for example, Fukuyama, 1995; Granovetter, 1985; Coleman, 1988) and its implications for economic performance (for example, Olson, 1982; Landes, 1998). Let us briefly consider some of their statements. Granovetter refers to Hobbes in saying that 'conflict-free social and economic transactions depend on trust and the absence of malfeasance' (p. 484). Ostrom (2000, p. 144) reminds us that 'most contractual relationships - whether for private or public goods - have at least an element of this basic structure of trying to assure mutual trust' since, if trust is lacking, '[both] players will end up with lower payoffs than if they had been able to trust and cooperate'. Knack and Keefer (1997, p. 1252) cite Arrow, who strongly advocated the link between social capital and economic performance: "Virtually every commercial transaction has within itself an element of trust, certainly [...] (when) [...] conducted over a period of time. It can be plausibly argued that much of the economic backwardness in the world can be explained by the lack of mutual confidence".

The mechanisms along which trust can affect economic performance can be classified into two categories. The first category builds on the notion that trust can lower *transaction costs*. High trust reduces, for example, the resources spent on contractual safeguards, litigation and protection from violations of property rights. Furthermore, if trust is low, the activities of firms and entrepreneurs may be biased towards monitoring and enforcement of contractual obligations, rather than towards adapting to changing opportunities. Complete control of the present, predictable situation is preferred to innovation into risky, uncertain new situations for which confidence in spontaneous cooperative behaviour is necessary. Finally, a healthy level of trust reduces the need for formal institutions to safeguard abidance by transactional agreements. The second category emphasises *government performance* and the *quality of economic policy*. In more trusting societies government officials may likewise be seen as more trustworthy. As a result, policy announcements will be seen as more credible, thus having a greater effect in the sense of reducing perceived uncertainty and increasing perceived stability. This should induce more substantial investment, both in

physical and human capital that is meant to be optimal over the long run. Trust can also be related to all kinds of increased associational involvement, including the level and character of political participation (Putnam, 1993). The active participation and voice of citizens potentially improve government performance and the quality of (economic) policies.

The arguments so far rely heavily on the intuitively appealing idea that the circumstances shaped by trust enhance economic performance by promoting cooperative behaviour. The argument is often supported with case-study evidence from underdeveloped, traditional economies, or not-so-recent historical situations. Still, the literature also uses the concepts to explain contemporary differences in performance across time and across countries of both the developed and developing world (for example, Fukuyama, 1995; Knack and Keefer, 1997). To provide a more solid ground for including trust in cross-country comparisons, we need to explore the development of trust and the relation between social capital and formal institutions. After having done that we can return to the links between trust and macroeconomic performance and assess the empirical evidence at hand.

6.4 The genesis of trust

Coleman (1988) and Paldam and Svendsen (1999) essentially define trust as *the mutual expectation within a group or community of cooperative behaviour, which is based on shared social norms, such as reciprocity and reliability.* The question for the rationale of trust is twofold. First, why should it arise and second how does it evolve? We refer to two approaches to answer the first question. To begin with, one may postulate that people are moral beings, with underlying values that propagate trustworthiness and hence validate the rationality of trusting one's fellow citizens. The second view stresses the potential mutual advantages of deviating from narrow norms of selfish short-run optimisation (Paldam and Svendsen, 1999).

Although the first view has been criticised as an over-socialised interpretation of human interaction, with people being over-sensitive to moral acceptance by others (Granovetter, 1985), we argue that both solutions to the 'why' question are necessary and complementary. This view is taken by Coleman (1988) who attempts to reconcile rational individual motivations (an engine of action, in his words) with the importance of social structure. Trust and trustworthy behaviour are only rational if the benefits of malfeasance are somehow checked. For this, we need effective social norms to evolve, which

bind the acceptability of behaviour. Knack and Keefer (1997, p. 1254) state that these norms of civic cooperation 'act as constraints on narrow self-interest' and 'alter the costs and benefits of cooperating and defecting in prisoner's dilemmas'.

Both trust and trustworthiness are based on moral valuation as well as objective valuation of cooperation as an instrument to obtain economic payoffs. In other words, as Nooteboom (2001) remarks, both internal and external values matter in the cost-benefit considerations of investment in cooperative norms and trust. But how do norms arise and generate interpersonal trust? On the one hand, you have to be able to expect trustworthy behaviour to be beneficial for each agent you deal with: the present value of rewards from cooperative behaviour should outweigh the benefits of defecting. This determines the extent of trust you will have in others. On the other hand, you yourself must be trustworthy. Only then will cooperative behaviour persist.
Ostrom (2000) offers a compelling analysis of the evolution of social norms and spontaneous cooperative behaviour that closely parallels this idea. She starts from a setting in which the presence of internal value towards social norms has evolved to some extent. The pervasive advantages of cooperation that existed in early human history serve to motivate such a situation. This evolutionary argument motivates the development of social norms as *shared understandings about actions that are obligatory, permitted, or forbidden* (Ostrom, 2000). Subsequently, she advocates an 'indirect evolutionary approach' to explain the surprising extent of cooperative behaviour in micro-evidence on collective action problems in both field- and experimental research.

Central to this approach is the adaptation of individual behaviour in the presence of social norms, through experience and learning. In such circumstances, the use and effectiveness of a cooperative norm within a group of people may grow in strength, which yields trust and, consequently, promotes self-enforceable cooperative behaviour. How does this process operate? As we saw before, both expectations towards others' actions and own behaviour depend partly on external (economic) payoffs to cooperation over time, but *also* on internal values that some people attribute to fairness and honesty. One without the other will not suffice. Without internal values, trust would be irrational, if the pure economic payoff to defection exceeds the payoff to cooperation, whatever the other agents decide, thus preventing a social norm from developing. This would, in a prisoner's game setting, lead to the non-cooperative and socially inefficient Nash equilibrium. Internal values shared by part of the population are needed to alter the payoff structure for

other players. The *a priori* trustworthy players will value the outcomes of cooperative behaviour above the value of outcomes in which *they* themselves defect (Henrich et al., 2001; Ostrom, 2000). Their valuation of cooperation helps to explain the evolution of trust, because they at least enter the market with intent to cooperate. They set a cooperative norm and can be trusted. High relative external values of cooperative outcomes are necessary to incite others to contemplate cooperation. If the economic payoff to cooperation is lower than to theft, cooperation will not be likely to sustain over time. Given that those people without internal value towards cooperation will defect, trustworthy players will increasingly abstain from cooperation too. In the end, they are *conditional* cooperators (Ostrom, 2000).

What determines whether the cooperative norm will be adopted and grow in strength, thus reinforcing cooperative outcomes, or that cooperative behaviour will decline because 'rational egoists' take advantage by appropriating quasi rents in the process? Ostrom points out the importance of contextual factors with regard to altering external (or objective) payoffs of cooperation and defection, and to incite the adoption of norm-reflecting internal values: 'We need to understand how institutional, cultural, and biophysical contexts affect the types of individuals who are recruited into and leave particular types of collective action situations, the kind of information [...] available about past actions, and how individuals can [...] change structural variables so as to enhance the probabilities of norm-using types being involved and growing in strength over time' (Ostrom, 2000; p. 154). Generally speaking, context refers to several important factors of social structure that have been highlighted earlier by Coleman (1988) and Granovetter (1985). Besides specific external background factors such as uncertainty, much of the context in which social relations occur has to do with the design of social structure. For effective norms to develop, a social structure has to succeed in making information available internally on behaviour and on opportunities for collective gain. The former involves setting up monitoring rules that alter the external payoff structure for all players by enabling collective punishment when norms are not abided by. The latter is put forward in Rauch (2001) as a factor that motivates and strengthens social structures for collective action. Coleman captures these aspects of information and effective monitoring in two related design aspects of social structure: closure and appropriability. Closure essentially refers to the existence of sufficient mutual ties within a relevant group of people to ensure the existence of an *effective* social norm, which supports persistent cooperation. Because of the existence of social norms and repeated interaction within the group, tightly knit social relations

evolve that generate a common background and understanding between the group's members. Closure generates trust that generalises the social relations between members. In a way, the organisation is fungible, and appropriable for other beneficial purposes (Coleman, p. 109; Portes, p. 6). Investment and cooperative participation in such a network of relations thus becomes more profitable in the presence of closure and appropriability.

Granovetter (1985) further emphasises the focus on such networks of social relations. He criticised the atomistic view of human behaviour in both the undersocialized model of 'homo economicus' and the oversocialised model of exogenously instilled generalised morality. Instead, like Ostrom, he argues for the importance of social context and history in shaping 'concrete, ongoing systems of social relations [...] (in which actors') attempts at purposive action are embedded' (Granovetter, op. cit., p. 487). He then explicitly states that these structures of personal relations (networks) generate trust and discourage malfeasance. Using networks, people base trust on information about past behaviour that indicates whether a particular agent can be expected to deal honestly with them. This information most reliably follows from their own personal relations with the individuals in question or from trusted informants' experiences. Concrete networks facilitate this kind of concrete information, whereas formal institutions and organisations would only help to provide information on reputation as 'a generalised commodity' (p. 490).

The discussion of the role of networks in international trade by Rauch (2001) further clarifies the network concept. A network can be defined as *a group of agents that pursue repeated, enduring exchange relations with one another* (Podolny and Page, cited in Rauch, 2001, p. 1179). This definition conforms closely to the ideas of Coleman in which cooperative norms evolve best in tightly knit, closed groups. A second definition, from an earlier article by Granovetter, defines a network as *a set of actors who know each others' relevant characteristics or can learn them through referral* (cit. in Rauch, 2001). This definition links up better with the description by Granovetter mentioned above. The latter type of network is also contained in the former, thus giving rise to the identification of "strong ties" for the former type of network and "weak ties" for the latter structure of personal relations.

The network design is an effective and efficient social structure in a particular situation where collective investment in mutual trust is called for. As Ostrom (2000, p. 152) puts it, 'conditional cooperation and mutual monitoring reinforce one another, *especially in regimes where the rules are designed to reduce monitoring costs*. Over time, further adherence to shared

norms evolves and high levels of cooperation are achieved without the need to engage in very close and costly monitoring to enforce rule conformance' (italics added).

In short, networks generate trust and consequently reduce the transaction costs of interaction. Paldam and Svendsen (1999) stress the importance of trust (following from effective social norms) for self-enforced cooperative behaviour. To a large extent agreements need only be informal, which significantly 'lowers the level of transaction costs, eventually giving significant benefits to everybody'. Portes (1998, p. 6) emphasises the importance of closure and strong norms to facilitate transactions 'without recourse to cumbersome legal contracts'. A notable finding in an experimental context is that networks that generate endogenous cooperative behaviour tend to be crowded out when an external authority imposes formal institutions and 'third party' monitoring as a substitute for internal rules - i.e., social norms (Ostrom, p. 147). Because external rules of the game enforce cooperation without leading to the spontaneous formation of internal norms, reinforcement of cooperative behaviour by moral effects and mutual monitoring does not arise. Self-enforced cooperative behaviour that has an endogenous rationale does not unfold. As a result, cooperation enforced by exogenously imposed formal institutions can dissolve easily. The transaction costs of persistent cooperative behaviour are accordingly higher in this case.

The analysis of the genesis of trust that was illustrated in this section leads to valuable insight in the nature of interpersonal trust. The importance of both moral value and objective payoffs for persistent cooperative behaviour illustrates that trustworthiness in itself is not an internalised value, but a behavioural norm. Trust, which is based on the credibility of this norm of trustworthiness, is not only founded on internalised moral virtues, but is most of all a rational calculation within the context of a specific network. Some actors may attach value to fairness or honesty, and these internal values may indeed spread to other participants in successful collaboration (see, for example, Bowles, 1998 on endogeneity of preferences). However, even pure egoists will expect cooperative behaviour and find it in their interest to reciprocate these expectations spontaneously. In a suitable context they will trust and act trustworthily, which is in complete contrast to the predictions of standard atomistic economic theory.

Yet, the question remains as to when and why the context is just right for trust and effective norms to arise spontaneously. If we do not address this question more fully in future research (cf. Ostrom, 2000, p. 154), we will continue to run the risk of committing a fallacy pointed out by Portes (1998).

When voluntary cooperative behaviour occurs, it is scientifically insufficient to attribute this to effective norms and high levels of trust. In this case we would end up re-labelling the issue to be explained: if we see voluntary cooperative outcomes, trust must have pre-existed. In such a reasoning trust becomes both cause and effect. The identification of closure and appropriability that affect payoffs in a network context is, however, a step forward in explaining cooperative behaviour on a specific micro scale. The problem re-emerges, however, when we try to relate trust to macroeconomic performance.

6.5 From networks to performance

6.5.1 The generalisation of trust

Often, social capital and trust are interpreted as a feature of collectivities or nations instead of as a feature in networks. The authors that focus on the macroeconomic effects of trust all emphasise such generalised trust (Fukuyama, 1995; Knack and Keefer, 1997). But in this way, social capital, or trust, easily becomes an all-encompassing factor that 'leads to positive outcomes [...] and [...] is inferred from the same outcomes' (Portes, 1998, p. 19). The problem is impelling because the leap from a network explanation of interpersonal trust to a nation-wide ease of cooperation remains to be explained. Simply starting with good economic performance and reducing this to the beneficial effects of civic norms and trust 'turns out to be an explanation that is a logical corollary of the effect to be explained' (Portes, 1998, footnote 8). To prevent, wherever possible, the use of social capital or trust being an explanatory factor for macroeconomic performance becomes a tautology. What is needed is an explanation for the generalisation of network outcomes at the societal level.

A promising potential explanation for the generalisation of trust from networks can be found in the concept of weak ties. If exchange transactions are not excessively embedded in (extended) kinship relations, the scope and nature of a network will promote investment in new trade opportunities. The focus of such an open network is on information about the expected trustworthiness of existing and new transactors, without explicitly seeking narrowly repeated interaction and morally tight relations. There is a trade-off involved in choosing to focus on weak ties and openness. Information on trustworthiness will be less detailed and up-to-date than in the case of relatively tight and small networks based on strong ties. Still, Ostrom argues that even noisy information on player-type can help sustain cooperative

behaviour. Moreover, the expected payoffs of cooperative behaviour in an open network may be higher over time, because it is more flexible towards extending its activities to new markets - both geographically and in terms of activities (cf. Rauch, 2001, in particular on the role of information provision on market opportunities within business group networks).

How does the openness of networks fit in when the feature of closure is emphasised as important for the development of norms and trust? Openness to new partners and opportunities does not contradict the closure aspect of networks. Closure only refers to the circularity of ties within a network. Even weak ties have this central feature. Their purpose is to generalise access to information about the characteristics of all partners by referral mechanisms that build on closure. Furthermore, since weak ties rely on knowledge of players' characteristics (Rauch, 2001, p. 1184) rather than on the specific pattern of interaction itself (as strong ties do), their fungibility and appropriability for other purposes, new entrants and new activities is larger. This promotes the generalisation of trust from a specific context to the level of interaction with comparative strangers.

The leap to transactions with comparative strangers may not be as big as it seems. Forsgren and Johanson (cited in Rauch, 2001, p. 1179) claim that 'markets are more or less stable networks of business relationships'. Even comparative strangers have to abide by the norms of the network that they enter if they want to be successful and benefit from expanding trade opportunities over time. In itself, the incentive structure ex-ante generates expectations of reciprocative behaviour which is equivalent to generalised trust.

It can also be argued that Fukuyama (1995) indicated the importance of openness for the development of generalised trust. Akin to the network view, he stresses the importance for economic performance of the ability to form organisations. He distinguishes two possible sources of trust that support the formation of economic organisations. The most natural cornerstone for organisation is the (extended) family. Such kinship bonds are rather close, strong ties. The second form of trust is spontaneous sociability, or generalised trust: the ability of strangers to trust one another and work together (Fukuyama, 1995a). Spontaneous sociability coincides with weak ties and open networks.

Fukuyama argues that - based on a comparison of cultures - a trade-off seems to exist between the strength of family ties and the strength of spontaneous sociability (the strength of 'weak' ties, that is). He motivates this trade-off by the claim that the emergence of spontaneous sociability is inhibited in cultures that emphasise kinship relations above all. He states that

spontaneous sociability depends on 'a prior sense of moral community, that is, an unwritten set of ethical rules or norms that serve as the basis of social trust'. A moral community emerges habitually from civil society and is rooted in nonrational factors such as culture, religion and tradition. Like Putnam (1993), Fukuyama ascribes a large role to society's intermediate associations, varying from private business organisations, private schools and literary clubs to Bible study groups and choral societies. Although his argument appears to suffer from tautological reasoning (cf. Portes, 1998) and an oversocialised view of social norms (cf. Granovetter, 1985), the link to intentional and rational network constellations and an 'openness explanation' for generalised trust can be made. Cultures that build their norms and networks mostly on family bonds are likely to be less open. Correspondingly, less civil activity will ensue. As a result of a lack of experience in interacting with strangers, moral community will not arise and reliance on this type of interaction will remain low. Not surprisingly, generalised trust (spontaneous sociability) will not be widely prevalent.

Following our discussion in section 6.4, it is clear that Fukuyama's 'moral community' should not be seen as merely exogenous generalised morality. Yet, part of it starts with internal moral valuation. The endogeneity of preferences to social structure (Bowles, 1998) implies that moral valuation can grow intentionally in a network constellation and can even evolve to have an independent staying power. Thus, if participation in civil society has positive effects on the internalisation of cooperative norms, Putnam's and Fukuyama's seemingly oversocialised faith in the appropriability of experience in intermediate associations for economic interaction may not be inaccurate. Henrich et al. (2001) provide empirical support for the ex-post context- independence of social norms. The results of their field experiments into the existence of cooperative values suggest that a wide diversity of norms exists between different cultural groups, which seem to be persistent to standardisation of the context. People consistently follow their pre-existing norms in an experimental context, characterised by anonymity and the absence of mechanisms for collective sanctioning.

6.5.2 Negative aspects of trust in a network

Up to now we have worked on the basis of the assumption that trust within specific networks is a socially beneficial asset. However, networks can often have negative implications for macroeconomic performance. They may create a type of trust that does not promote generalised trust, but rather undermines it, either inadvertently or intentionally. One example of networks that can

turn out to have negative effects for economic performance is a family or parochial-based network. As Fukuyama illustrates, family ties indeed create kinship trust at the expense of generalised trust.

Both Granovetter and Portes acknowledge the scientific importance of explicitly dealing with the negative aspects of network constellations. To prevent the analysis of social capital from falling within the bounds of moralising statements rather than serious sociological research, Portes says we must not present networks and collective sanctions as unmixed blessings (p. 15). We can distinguish two negative effects of network structures that are especially relevant for macroeconomic performance (cf. Portes, 1998, p. 15). To begin with, networks can intentionally serve to foster a partial interest at the exclusion of others. Furthermore, networks, and the normative structure they create, generate beneficial opportunities for internal free-riders, or constrain strategies of behaviour to redistributing the resources controlled by the network.

The former source of scepticism towards economic networks has a long history in economic theory. Knack and Keefer (1997) refer to its modern roots in Olson (1982). His proposition is that networks often act as special interest groups or lobbies that narrowly seek preferential treatment at disproportionate cost to society. This view comes into conflict with the positive role ascribed to civil society networks (associations) in generalising trust, by Putnam and Fukuyama.

Second, networks based on strong parochial moral community (Rauch, 2001, p. 1181) may become inward looking when community or group closure is unduly emphasised at the cost of - rather than combined with - openness towards new opportunities and members. In such a circumstance, success and cooperative norms are not measured against the standard of economic accumulation and expansion of resources, but instead in terms of internal assistance and obligation within a static environment of fixed resources. This gives excessive power to the hierarchy of community relations and accordingly puts a high degree of pressure on the opportunities for entrepreneurial success. This type of privileged access to the resources of fellow members within the group stifles competition on the basis of own achievement. It leads to downward levelling norms (see Portes, 1998, p. 16).

Berry (1989) gives a convincing illustration of how redistributional rentseeking both within and between groups leads to inbred stagnation. She emphasises the role of social institutions (social norms) regarding access to productive resources, for the strategies of resource use and the perpetuation of the agricultural crisis in many African economies. During the transition from

traditional tribal society, through colonial rule, to independence, cost saving 'indirect rule' by the colonial authorities to a large extent led to the survival of traditional kinship and community based polities and their extension into higher levels of governance. As a result, both in productive enterprise and state governance, access to resources still depends heavily on strong community-based social relations. Berry (1989, p. 46) summarises the effects of this type of social organisation on economic activity as follows: 'Strategies of production and accumulation are directed towards establishing or strengthening social relations, which in turn affect the terms on which people gain access to resources'. The 'perpetuation of access via social identity leads to further investment in (social) institutions as potential channels of access' (Berry, 1989, p. 51). This proliferation of social claims for access distracts resources away from productive investment and into *redistribution*.

Fukuyama (1995) and Knack and Keefer (1997) identify patronage and rentseeking with low generalised trust. When interactions become locked-in in a social structure characterised by parochial vested interests and patrimonial channels of access to resources, the political and economic sphere will be dominated by nepotist rentseeking, stagnating productivity and potential social conflict. The question that remains is whether we can identify factors that determine when networks are conducive to economic performance by generating sufficient generalised trust. We may argue that strong ties of repeated interaction are more likely to be associated with possible rentseeking. However, even weak ties (for example, the indirect referral of opportunities to access resources) may be accompanied by an excessive emphasis on redistribution and thus economic stagnation. Inclusive networks usually start from strong group ties, but the competitive incentive to increase the relative size of any such network may render the ties somewhat weaker. Nevertheless, this does not affect their redistributional intentions. For now, we can refer to some key proximate factors behind the effects of networks on the generalisation (or lack thereof) of trust. They are whether the moral community is linked to parochial or family ties or to broader community cooperation (cf. Fukuyama, 1995) and whether accompanying social norms emphasise open venturing or consolidation.

All in all, the spectrum of theoretical considerations clarifies that it would be too easy simply to transpose trust within specific networks to generalised trust in random transactions. Just ascribing trust and social capital to individual people and adding up to the societal level, as Paldam and Svendsen (1999) do, is theoretically unsatisfactory. We have seen that the origin of interpersonal trust has to be sought in deliberate, purposeful networks of social relations.

But, as Granovetter (1985, p. 491) admits, the 'embeddedness position' is 'less sweeping' than its under- and oversocialised alternatives as a solution for the problems of general order in economic life. 'Networks of social relations penetrate irregularly into different sectors of economic life, thus allowing for what we already know: distrust, opportunism and disorder are by no means absent'. Moreover, he recognises that 'while social relations may indeed often be a necessary condition for trust and trustworthy behaviour, they are not sufficient to guarantee these and may even provide occasion and means for malfeasance and conflict on a scale larger than in their absence'. This means that we have to keep searching for ultimate explanatory factors to solve the problems concerning cooperative behaviour and economic performance more fully. Although the answers provided by theory may appear inconclusive, the approach followed is to be preferred over more decisive and normative under- or oversocialised statements of exogenously generalised morality and self-fulfilling formal institutional prophecies, which are more prone to the Portes-critique.

Let us now turn to the relation between the formal institutional framework and generalised trust. Sometimes, close ties and networks appear to be a constraint rather than a condition for the generation of general interpersonal trust. Should we prefer paucity of ties after all, or is there some way for the central public authorities to foster the 'right' ties?

6.5.3 The role of formal institutions

At first sight, market competition appears to foster a situation in which ties are not close and oligarchic, but rather impersonal and directed towards objective payoffs. Indeed, sufficiently competitive markets are a necessary condition for desirable cooperative behaviour between economic partners upstream and downstream in a commodity chain, or towards consumers. Excessive market power may, after all, lead to or coincide with specific interests and unproductive rentseeking, fostering the wrong type of ties, networks and cooperation. However, as we saw before, markets are no guarantee for cooperative behaviour and good macroeconomic performance in real-world economies. Even competitive, atomistic markets may not suffice. Some form of closure is also needed to enforce conformance to cooperative norms.

An example may serve to illustrate this. Caballero and Hammour (1996) describe a situation in which investment levels and growth in the economy are lower than socially optimal. They capture a realistic feature of the dynamic process of production and investment in market economies. In part of the economy, some part of the investment made by a firm is specifically

tied to labour in production. Labour is non-specific and has an opt-out to employment in the 'non-specific' sector or to unemployment benefits. As a result, the production factor capital cannot appropriate all of its ex-ante opportunity costs. This so-called asset specificity creates a hold-up problem in investment, which leads to a lower growth rate of the economy (for example, Grout, 1984; Van der Ploeg, 1987). This *atomistic* situation of relations between owners of units of capital and individual labourers can be analysed using the tools from *network* theory. A cooperative norm is not likely to arise in the market relation described above since there is no closure. Eventually, when capital and labour enter a transaction relation, the latter can defect on such a norm by ex-post appropriating part of capital's ex-ante reward (often labelled as quasi-rents). Defecting cooperative 'agreements' is in the best interest of labour, whatever capital chooses to do, although the cooperative outcome is socially preferable. We have a classical prisoner's dilemma situation in a setting of impersonal ties.

To reach the preferable cooperative outcome would require investment in some effort designed to close the system. Producers in a market could merge in a network, perhaps together with labourers, in an attempt to develop an internal social norm, mutual monitoring and collective punishment. From a theoretical point of view, such effective norms may be difficult to develop in an atomistic market (cf. Olson, 1965). Moreover, they could evolve into a lobby for the redistributional interest of a sector as a whole, against other industries. Alternatively, the Hobbesian alternative for generating a generalised incentive to cooperate in the market is to install a public authority (the state) that enforces formal institutions.[2] Knack and Keefer (1997, p. 1279) quote Hardin: 'In a Hobbesian view [...] trust is underwritten by a strong government to enforce contracts and to punish theft.' He even goes as far as to argue that government regulation is indispensable for the generalisation of trust: 'Without such a government, cooperation would be nearly impossible and trust would be irrational'. Formal institutions aim to reach external closure of social relations. Instead of closure through spontaneous networks with 'sufficient ties' (Portes, 1998), closure is imposed externally by 'third party' enforcement of cooperative behaviour.

As we have seen before, there is a tension between external rules and social norms (Ostrom, 2000). What is the relation between formal institutions and generalised trust? Can formal institutions substitute or complement network-induced trust? On the one hand, formal institutions may be necessary for a widespread generalisation of trust and dynamic efficiency in a complex market economy. Strong impartial formal institutions induce more confident

use of weak ties that are based on impersonal, objective payoffs. They promote generalised trust, since enforcement of cooperation in economic behaviour is no longer dependent on strong community ties. In this way, as Rauch (2001, p. 1184) concludes, formal institutions substitute network ties as well as influence the way networks operate. They help to rationalise generalised trust and motivate closed networks to open up.

Greif (1994) is more drastic when he emphasises the importance of a *lack* of ties in generating a need for the development of formal institutions. These institutions supported the openness of organisations towards new opportunities in trade and towards new members. Expansion and specialisation thrive more in societies characterised by a lack of ties and by well-developed formal institutions that strengthen trust. Greif thus identifies formal institutions as essential for a good dynamic performance of economies and sees (strong) ties and networks as inefficient in the long run.

On the other hand, Ostrom (2000) pointed out that external involvement in cooperative dilemmas tends to crowd out social norms and the development of internal values, acting as an imperfect, more costly substitute for self-enforcing trust. Endogenous closure, after all, cannot be created on the basis of formal institutions and will even be prevented from emerging. This led Granovetter (1985, p. 489) to conclude that '(formal institutions) do not produce trust, but instead are a functional substitute for it' and 'institutional arrangements alone could not entirely stem force or fraud'. If we stick to the egoist nature of 'homo economicus', constrained by formal rules only, we should expect continuous large-scale attempts to circumvent these rules. This would yield a vicious circle of an ever-increasing level of transaction costs, with progressively more complex rule systems and monitoring practices. In reality, we see both tendencies of loophole search and self-reinforcing cooperative behaviour. For the latter to dominate, effective social norms and voluntary networks with weak ties appear to be as indispensable as strong, impartial formal institutions. Hence, for the emergence of generalised trust, state regulation somehow should blend with or complement spontaneous cooperative norms. How should the advantages of both norms and external rules be accomplished without the latter crowding out the former?

Paldam and Svendsen (1999) refer to this as the basic policy dilemma of social capital (viz. trust). Concluding their paper they say: 'Social capital is self enforcement and thus contrary to third party enforcement. Attempts by third parties - as public authorities - to enforce social capital may thus be counterproductive'. Some researchers argue that the state cannot do much to complement social norms positively and that trying to substitute for

spontaneous trust will be unsuccessful and potentially detrimental. Fukuyama (1995a) advocates that, 'while state power can effectively undermine civil society [...], it is much less able to promote strong bonds of special solidarity or the moral fabric that underlies community'. This conclusion reflects the tendency in Fukuyama (1995) and Putnam (1993) to rely on (an oversocialised) generalised morality to explain generalised trust. Fukuyama's main conclusion on generalised trust is that the lack or abundance of it is determined by cultural factors. Somehow, civic virtues determined by the level and character of civil, associational activity, as opposed to the reliance on family ties, translate into cooperative behaviour in the economy and the democracy. This process, according to Putnam, could take centuries to mature. Similarly, Paldam and Svendsen (1999) state that 'it appears that social capital is rarely produced in a deliberate way. At present, we hardly know how it is produced - it comes about through activities with another purpose'.

The analysis in Berry (1989) suggests the relevance of situations in which the cultural context determines whether there is scope for beneficial institutional changes, either of formal effective rules or of social norms. Traditional societies in which cultural values have been instilled intentionally into the cooperative norms of production and distribution can be resistant to changes in the economic or political context. In an era of global industrialisation and newly found independence, vested interests stepped into the space opened by these changes. Today, rentseeking and stagnation characterise these developing countries. Khan (1991) refers to *transition costs* as the costs of resistance to institutional change imposed on society by the vested socio-economic interests. The extent of transition costs is determined by the effectiveness of cultural norms, the changing of which constitutes a new collective action problem. In Khan's analysis, only a strong state can overcome a situation in which the traditional ruling elite and its socio-economic system of norms prevent socially beneficial changes in norms from arising and breaking the paradoxical situation in which formal rules are ineffective in changing behaviour.

This already suggests there is more to be said about generalisation of trust and the role of government regulation. However, we must do so cautiously. Rather than outright statist theory, we have to take account of the importance of explaining the emergence of spontaneous trust in providing guidance for state regulation. The gap between micro network theory and sweeping stories of general interpersonal trust can be filled more satisfactorily. Ostrom (2000) made it clear that the rationalisation of cooperative behaviour not only has to rely on exogenously internalised values. She stressed the centrality of the

external, non-cultural, economic values of cooperation and its interrelation with internal values in the genesis of effective norms and trust. Furthermore, the possible negative effects of network ties also add an element of their own to the dynamics of generalising trust. Too much emphasis on civil society might lead the state to retreat from its responsibilities. The temptation for government to wash its hands in innocence regarding economic failure cannot be denied. The state need only refer to the lack of moral community, or deduce from poor macroeconomic performance a seeming disappearance of civic virtues, to relegate stagnation to factors outside its own realm of influence (cf. Portes, 1998, p. 19). A more balanced view recognises that the state is able to contribute to the emergence of general trust, while it can also break down social and economic cohesion.

Certainly, the state can obstruct cost-efficient cooperative behaviour if it tries to substitute endogenous social norms (or the lack thereof) with overly specific, intrusive state engineering of cooperative behaviour. A historical example can be found in the massive communist experiments of the twentieth century (some of which are still ongoing). In these societies, the role of strong community ties was substituted by a strong dependence on state bureaucracy. Instead of being an impartial regulator, the state became the predominant party in the socio-economic sphere. The authoritarian or totalitarian regimes tried to determine what people should do, with whom and even where they should live. Not surprisingly, payoff structures with respect to cooperative behaviour became totally dependent on the strength and involvement of the state. This undermined the development of effective social norms and internal values and did not provide a focus on openness of economic activity. As a result, the level of spontaneous cooperation and generalised trust was low.

However, a weak or soft state will also fail to provide the required complementary regulation for cooperative behaviour. A soft state acts to conserve vested interests. Depending on the context, a soft state may lack autonomy and become a governance tool that extends the influence of a ruling oligarchic elite. Alternatively, in a highly unstable, polarised context, it may fail to set an impartial, consistent standard of regulation in a continuous attempt to satisfy the wishes of competing interests. A soft state thus tends to promote or enforce spontaneous cooperation that takes the form of rentseeking. As a result, the level of generalised trust will be low and cooperative ties will be relatively conservative and closed. A weak state attempts to set an autonomous regulative stance, but fails to enforce these rules sufficiently when challenged. Ostrom (2000, p. 147) describes the consequences of weak intrusiveness: '..the mild degree of external monitoring

discourages the formation of social norms, while also making it attractive [...] to deceive and defect'. She even argues that state intrusion without strong monitoring and sanctioning would be 'the worst of all worlds'. A weak state leads to the discouragement of weak ties and general cooperation. Consequently, parochial ties gain importance, which leads to the possibility of unproductive rentseeking. Moreover, if strong kinship, ethnic or civil ties are absent, the inconsistency and uncertainty of a weak state may lead to a breakdown of cooperation as such. A fragmented society (cf. Fukuyama, 1995a) with low generalised trust will be the result.

Although state intervention can obstruct the formation of general trust and is sometimes ineffective in correcting less desirable forms of spontaneous cooperation, the government can fulfil a positive role. Vested interests are not imperturbable. Kikuchi and Hayami (1999) show that external developments in technology may trigger institutional transformation in a traditional society, contrary to the alternative findings by Berry (1989). Technological change, entering from abroad, acts as an external shock to the payoff structure of alternative forms of cooperation. As Khan (1991) argues, this may eventually lower transition costs and the effective barriers to institutional change. Restrictive cultural norms may loosen as a result, as cooperative structures are evolving towards investment in weak, generalised market ties and general cooperative norms. The state can fulfil a positive role by accommodating beneficial cooperative norms. Important for achieving complementary formal institutions is the strong autonomy of the state. Moreover, the type of intervention should be general regulation and provision of public goods rather than specific intervention. The state should not substitute the market mechanism, collectivising and controlling access to resources. Moreover, the function of formal rules is not to substitute for generalised trust, but rather to encourage spontaneous cooperation and contribute to the generalisation of norms and trust. Designing formal institutions as substitutes can lead to the specific engineering of cooperation and crowd out effective norms. For example, promoting involvement in civil associations by giving financial incentives may have exactly the opposite effect from that desired: rentseeking instead of civic virtue and general trust. Ostrom concludes that, in any case, 'it is possible that past policy initiatives to encourage collective action that were based primarily on externally changing payoff structures for rational egoists may have been misdirected - and perhaps even crowded out the formation of social norms [...]'. The recipe for successful formal institutions includes the following requirements: formal institutions should reflect impartial (i.e., neutral) authority and stimulate decentralised authority in specific norms

of cooperative behaviour. Complementing and 'increasing the authority of individuals to devise their own rules may well result in processes that allow social norms to evolve and thereby increase the probability of individuals better solving collective action problems' (Ostrom, p. 154).

In the end, the interplay between social norms and formal institutions in the emergence of generalised trust seems to depend on a set of context variables. We may classify within this set of variables with regard to, for example, the extent of social polarisation in society, the level of state autonomy (measured by the quality of formal institutions) and the level of civil activity. Whereas network design, such as closure and appropriability, help to explain the micro-emergence of network-specific trust, these general context variables are ultimately important for the payoffs of generalised cooperative behaviour and of investment in network building. For example, social polarisation and ethno-religic homogeneity are important factors in determining the extent of uncertainty with respect to the security of property against 'third party' confiscation. The level of general trust is, after all, not only dependent on the expected norm-abidance of direct partners in transactions. Either by direct conflict or indirect taxation, competition for the redistribution of resources in a rentseeking process will lower the security of property and the level of trust with respect to the expected benefits of any economic transaction.

6.6 Concluding remarks

The search for the ultimate causes for divergent economic performance has led us to consider the importance of social infrastructure: policy, governance and social norms. This chapter presented an overview of theory and evidence on the role of norms and trust for economic performance. Over the past decades, a lot of progress has been made in research on the emergence of cooperative norms, trust and self-enforcing agreements on a micro or meso level, emphasising the importance of a specific structure of social relations: networks and their design aspects (see Granovetter, 1985; Coleman, 1988; Ostrom, 2000; Henrich, 2001; Rauch, 2001). Extrapolation to the importance of trust for the general level of cooperative behaviour and economic performance in society as a whole, is a natural next step (see Putnam, 1993; Greif, 1994; Fukuyama, 1995).

The analysis of the generalisation of effective norms and trust is still under construction. The search for key general contextual factors is promising and points at factors such as social polarisation, associational involvement and

the quality of formal institutions. Yet, analysis of generalised trust and the role of formal institutions are at risk of becoming merely a restatement of the cooperative dilemmas to be explained. The context variables that we have identified admittedly contribute to a sound cause-and-effect analysis. But, more has to be done to develop formally a closed simultaneous system to explain the causal chains between spontaneous cooperative action, effective norms, generalised trust and economic performance. Contextual factors influence the structure of expected payoffs to cooperation and, consequently, in some way set the chain in motion. However, during the process, emerging trust and effective norms also influence the payoff structure. The ex-post identifiable payoffs are endogenous themselves. Moreover, context variables themselves are interdependent. Social polarisation affects civil activities and the quality of governance and vice versa.

In the end, we have to identify in more detail which external factors determine the direction in which the payoff structure develops, and whether they can be influenced politically by 'the development of public policies that enhance socially beneficial, cooperative behaviour based in part on social norms' (Ostrom, 2000, p. 154). A complementary role for formal institutions in fostering and promoting self-enforced agreements is possible, but is not a self-evident consequence of state interventionism.

The primacy of social structure, although mostly exogenously generated or missing, may even put into doubt whether government can effectively reform policy and formal institutions to foster successful development in countries that have failed so far. This is also highlighted in the literature that stresses the role of geographic factors in explaining the variation of income (for example, Gallup et al., 1999). In any case, this chapter has shown that social structure is not as exogenous as the above statements suggest. Deliberate investment in cooperative norms can emerge with objective economic gains in sight. The government can positively influence expected payoffs to cooperation. Our list of contextual variables suggests that a diverse spectrum of government regulation could be beneficial, varying from traditional statist intervention to reduce income and land inequality, to neo-liberal impartial and autonomous governance, to ensure property rights and reduce uncertainty. But, as Fine (2001) argues, political economy is underrepresented in the literature on social capital. Insight into the regularities that govern how transition costs of social and political change follow on from the interaction which is needed between government autonomy and societal interest groups.

Portes (1998, p. 21) argues that, as yet, social capital theory has not succeeded in providing a persuasive answer to the question of how and when

network outcomes generalise positively. Similarly, Durlauf (2002) argues that, as yet, the empirical literature that aims at an understanding of macroeconomic phenomena on the basis of some form of generalised trust suffers from conceptual problems, a lack of theoretical guidance, a lack of attention for potential reverse causality and a lack of attention for potential parameter heterogeneity.[3] Some of the cornerstones for this explanation have been laid out in this paper, in the emphasis on network design (for example, openness and closure; appropriability), context and the relation between formal rules and social norms, introduced by various authors. To improve our theoretical insights and gain reliable empirical assessments, future analyses should try to establish 'some controls for directionality' of causation (Portes, p. 21) in order to disentangle and clarify cause-and-effect sequences. In any case, if trust proves to be a crucial factor on which the observed differences in economic performance are based, building, fostering and supporting society's capacity for cooperation will be no less difficult for policymakers than any other, or otherwise motivated, development strategy that is available. Neither can policymakers ignore their responsibilities and regard the importance of social structure as a justification for a deterministic view of development potential. Social capital is neither a ready remedy for major social problems, nor does it legitimise a mere shifting by the state of its responsibility for, and funding of, providing a civil society structure.

Notes

1 The specific question asked respondents to assess the level of interpersonal trust: "Generally speaking, would you say that most people can be trusted, or that you can't be too careful in dealing with people?" The indicator Knack and Keefer constructed from the responses is 'the percentage of respondents in each nation replying "most people can be trusted" (after deleting the "don't know" responses).'

2 As it turns out, formal institutions, like contracts, are an imperfect solution for the problem. In real life, complete contracts are impossible and transaction costs of contracting complex situations can quickly become prohibitive. This points to the need for a combination of internal norms and formal rules to ensure cooperative behaviour. Social norms succeed in lowering transaction costs by promoting self-enforcement through either strong or weak ties; formal institutions can safeguard against rentseeking and may help to overcome the collective action problem of forming ties by reducing uncertainty. Although desirable, this complementarity is not as straightforward in practice.

3 See, for example, Knack and Keefer (1997) and Putnam (2000) for attempts to empirically analyse macroeconomic phenomena with trust as explanatory variable. The extent of robustness of this literature is illustrated in Beugelsdijk et al. (2004).

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7 Social Capital and Regional Development: an Empirical Analysis of the Third Italy

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7.1 Introduction

Scientists from a wide range of disciplines, such as (economic) sociologists, political scientists, geographers, historians and anthropologists show considerable interest in the social foundations of economic development (Gambetta 1988; Fukuyama 1995; Landes 1998). Mainstream economics has ignored this cultural or non-economic dimension of economic growth for a long time. This is not to deny that some economists have highlighted its importance in the past (e.g. Arrow 1972). However, neo-classical economics regarded actors merely as individual persons who act independently and maximise their utility. As such, their actions are not affected by social context, such as norms, social networks and trust (Coleman 1990).

In development studies, however, there is growing awareness of the role social capital may play in the economic development of Third World countries and which forms of relationship among state, civil society and the market are most conducive to sustainable growth (World Bank 1997; Dasgupta 1998). Social capital is believed to be a major asset because it would lower transaction costs, favour the exchange of knowledge and stimulate the effectiveness and responsiveness of institutions of governance.

Economic geographers have eagerly embraced these ideas. It was the experience of the industrial rise of the Third Italy which began to be documented from the 1970s onwards (Bagnasco 1977; Bagnasco and Pini 1981) that made scientists realise that cultural and organisational factors may play an important role in regional development (Saxenian 1994). Not only is social capital often found in locally embedded communities that share values and norms, it is also best developed at regional level where a high intensity of interactions is likely to take place (Harrison 1992). In a world of globalisation with more complexity and competitive pressure, regions endowed with social capital help to lower costs that go along with an increasing need for co-ordination between more specialised firms. In this respect, Maskell (1999) claims that the competitive advantage of firms is increasingly dependent on social capital as a

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valuable resource, because it is one of the few inputs besides labour that has largely remained heterogeneous (i.e. non-ubiquitous) and immobile. For these reasons, there is a growing recognition that regions are fundamental socio-economic units (Storper 1997).

However, despite these ambitious theoretical claims, social capital has remained a highly problematic notion both at the conceptual and empirical level (Bolton 1998). First of all, the notion of social capital encompasses so many diverse dimensions as social ties, networks, trust, institutions, cultural practices, norms and political contexts at different levels that it needs further conceptual refinement. Especially when social capital is defined in functional terms (as it often has been), it runs the risk of confusing the forms of social capital with its consequences (Woolcock 1998). Second, economists have associated social capital with economic development of countries in general (Knack and Keefer 1997). By doing so, they not only disregard the fact that it may constitute a resource in specific circumstances (e.g. in Third World countries), they also neglect the fact that different spatial levels (especially the sub-national level, as stated above) may play an essential role.

Third, it has proved difficult to measure accurately the stock of social capital. Few studies have been carried out to provide empirical support for theoretical statements concerning the importance of social capital for regional development. Many detailed case studies have addressed this topic and have provided insight in the actual relationship between trust and economic development on the local level. However, they often remain descriptive and do not allow for a comparison to be made between different areas.

An empirical study of Italy provides an excellent opportunity to deal with all these issues. Although generally portrayed as one of the few Western countries with a relatively low general trust (Misztal 1996), it would be a mistake to analyse its consequences at national level. Italy is not only a country with long-standing regional differences, the varying levels of regional economic performance have also been attributed to different stocks of social capital (Leonardi 1996). Moreover, it is important to acknowledge that social capital should be related to specific economic activities rather than economic growth in general. We therefore narrow our attention to its link with the particular form of industrialisation that emerged in the Third Italy in the post-war period, that is, the development of a lot of local networks of small and medium-sized enterprises (SMEs) specialised in craft-based industries. It has often been suggested that these industrial districts emerged on the basis of a distinctive social structure that encouraged interaction and co-ordination between local actors, which was largely missing in the South of Italy.

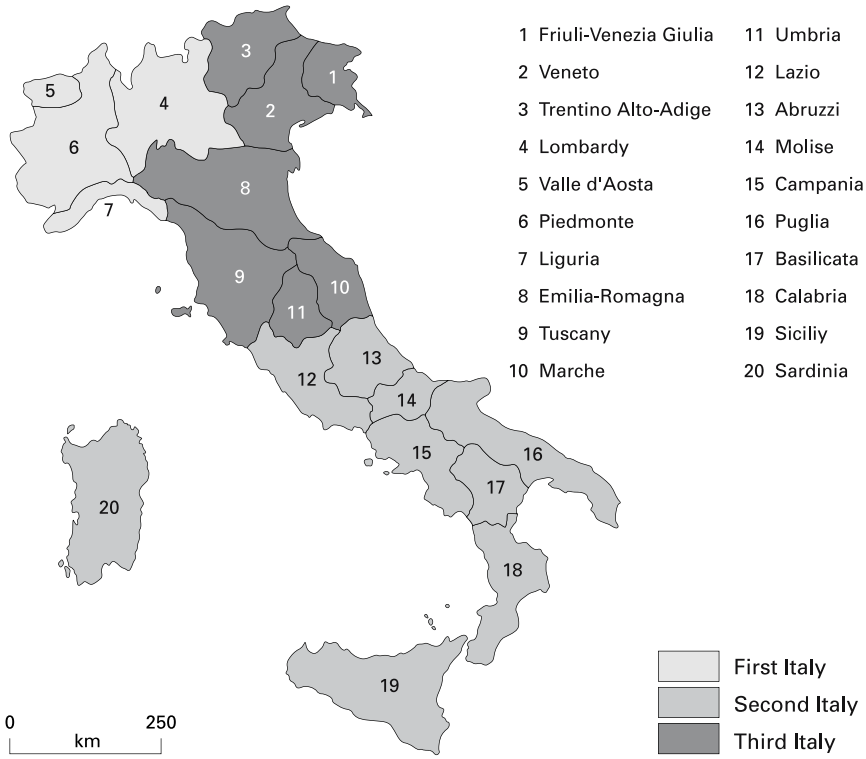
This chapter has three objectives. First, we explain how this type of industrialisation may be simultaneously related to various sources of social capital at different levels, such as the family, community and regional levels. These different forms of social capital are then conceptually linked through the notion of trust to regional development: social capital enables people to trust one another and this makes them co-ordinate economic actions in local networks resulting in economic performance. Second, our empirical analysis directly links social capital to the aforementioned form of industrial development in which it is expected to play a crucial role. This is in contrast to other regional studies on Italy that associated social capital with economic growth in general (Helliwell and Putnam 1995).

Third, this study attempts to fill the above-mentioned empirical gaps in the literature. We make an effort to measure social capital at macro-regional level (rather than the micro-level of individual districts). We determine the extent to which the Third Italy area could be considered a unique area with particular socio-cultural characteristics during its initial stage of development, as compared to the First Italy (the industrial heartland in the Northwest) and the Second Italy (the backward South). Finally, we examine whether social capital may have contributed to this type of industrial development across the Italian regions in the post-war period.

The chapter is divided into three parts. To start with, we briefly set out the main features of the particular type of industrial development that took place in the Third Italy during the post-war period. In particular, we focus attention on three features, that is small-scale industrialisation, a predominance of craft-based and engineering industries, and a spatially concentrated form of production in industrial districts. The second part links this form of industrialisation explicitly to the notion of social capital. We focus on problems of how to define social capital and the ways this may have an impact on regional economic growth. By doing so, we explain that social capital acquires a different and more direct meaning when linked to this type of industrial development. In the final part, we present the empirical results of the long-term spatial analysis.

7.2 The industrial rise of the Third Italy

As Map 7.1 shows, the Third Italy is located in the Northeast and the Central part of Italy, which includes seven of the twenty standard administrative regions in Italy. The First Italy concerns the old industrial heartland in the

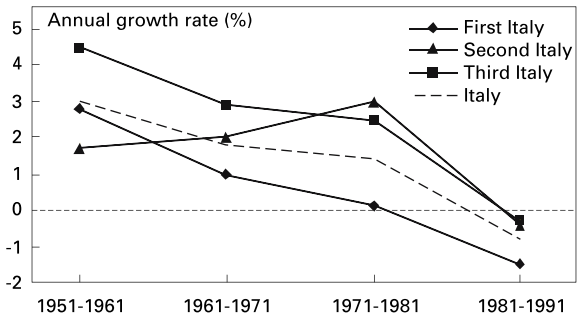


Map 7.1 The three Italies

Northwest of Italy, which consists of the regions of Lombardy (including the metropolitan area of Milan), Piedmonte (with the city of Turin) and Liguria (with Genoa). The Second Italy (or 'Mezzogiorno') concerns the remaining part in the south, including the region Lazio with the capital city Rome.

Figure 7.1 examines the post-war industrial development in the three Italies by comparing the annual growth rates of employment in the manufacturing industry. The Third Italy area enjoyed the highest industrial growth during the period 1951-1991 (with the exception of the period 1971-1981). In particular, the regions of Emilia Romagna, Marche, Tuscany, Veneto and Friuli-Venezia-Giulia demonstrated above average industrial growth levels throughout the whole period. Since the 1960s, the South of Italy has also done remarkably well (especially the regions of Lazio, Abruzzi-Molise and Puglia). By contrast, the Northwest (that is, the First Italy) performed quite poorly. However, in the 1980s, all areas, including the Third Italy (see e.g.

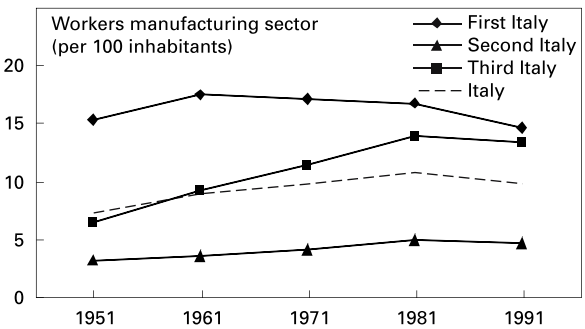
Cossentino et al. 1996; Boschma and Lambooy 2002) went through a period of industrial decline.



Sources: own elaborations from ISTAT (1951; 1961; 1971; 1981; 1991)

Figure 7.1 The annual growth rates of workers in the manufacturing sector in Italy by region 1951-1991

Figure 7.2 shows the degree of industrialisation (measured as the number of workers in the manufacturing industry per 100 inhabitants) by region throughout this same period. It clearly shows how rapid this process of industrialisation had advanced in the Third Italy area. The Third Italy had almost reached the same level of industrialisation of the First Italy by 1991. The South, however, continued to lag behind in this respect (with the notable exception of the region Abruzzi-Molise).



Sources: see Figure 1

Figure 7.2 The number of workers in the manufacturing sector per 100 inhabitants in Italy by region 1951-1991

Although the Third Italy experienced the highest industrial growth in Italy in the post-war period, this is only part of the story. This process of industrialisation has been associated with a particular form of industrial development described as 'flexible specialisation' or 'post-Fordism' (Piore and Sabel 1984; Scott 1988). In short, it has been based on the development of networks of small and medium-sized firms in mainly craft-based industries that were spatially concentrated in industrial districts.

First of all, a remarkable feature turned out to be the relatively small size of the industrial firms. The importance of SMEs for industrial growth was something quite unexpected. In the 1970s, SMEs were mainly seen as marginal (pre-capitalist) and inferior activities as compared to large firms in terms of technology, scale economies, access to capital, capability to export, etc. (Bianchi and Gualteri 1990). Our empirical data confirms that the Third Italy (like the Second Italy) is over-represented by manufacturing firms with less than 50 employees throughout the period 1951-1991. As expected, large-scale firms are over-represented in the industrial heartland of the First Italy. However, the South of Italy showed a remarkable increase in the importance of this latter category in the period 1951-1991, which is probably due to the massive transfer of branch plants from North Italy in the 1960s and 1970s (Giunta and Martinelli 1995).

Another feature of this form of industrialisation was its specialisation in design-intensive, craft-based industries, such as clothing, footwear, leather goods and furniture (Bellandi 1989). Table 7.1 confirms that the Third Italy showed the highest growth rates of employment in some selected traditional, craft-based industries as compared to the other two Italies for the period 1951-1991. This spectacular growth was quite remarkable since a poor future had been predicted for artisanal industries in Western countries: these sectors were believed to be most vulnerable to competition from low-wage countries as a result of their low rates of added value and low intensity of technology.

A third feature has been its spatially concentrated form of industrial organisation. This type of industrialisation often appeared in relatively small (often rural) areas in the Third Italy where the small firms formed highly dynamic and efficient local production systems that sometimes succeeded in conquering world markets. These networks of mostly small and medium-sized firms, characterised by extensive local inter-firm linkages, have been referred to as 'Marshallian industrial districts' (Becattini 1987; Bellandi 1989). The idea that the competitiveness of localities could be associated with a particular form of industrial organisation was in considerable contrast

with the then common view that economic performance of localities should be defined in terms of costs of transport and location.

	Leather goods	*Textiles*	*Footwear and clothing*	*Wood and furniture*	*Non-metallic mineral prod.*	*Metallic engineering*
First Italy	-0,2%	-0,8%	0,2%	0,3%	-0,1%	3,4%
Third Italy	8,4%	1,9%	3,8%	2,7%	1,3%	8,9%
Second Italy	3,2%	0,6%	-0,0%	2,5%	1,9%	6,6%
Italy	3,0%	-0,1%	1,3%	1,0%	1,0%	5,4%

** small and medium-sized firms: < 500 workers*

Sources: see Figure 1

Table 7.1 The annual growth rates of employment in small and medium-sized firms in some craft-based industries in Italy by region 1951-1991*

Several attempts have been made to estimate the number of industrial districts across the Italian regions (e.g. Becattini 1989; Sforzi 1989; 2000; Paniccia 2002). Brusco and Paba (1997) used four indicators to examine whether the 955 labour market areas in Italy could be related to a type of industrial development associated with industrial districts. In order to fulfil this condition, the scores of each area would have to be higher than the national average with respect to the degree of industrialisation, the rate of small-scale industrialisation (less than 100 employees), the degree of industrial specialisation and the rate of smallness of the industrial specialisation involved. They counted a total of 149 industrial districts in 1951, employing 360,000 workers (10 per cent of manufacturing employment). The districts were fairly evenly distributed among the Italian regions, including the south. However, the situation changed in 1991: the 238 industrial districts identified, employing 1.7 million workers (32 per cent of manufacturing employment) were mainly found in the Third and First Italy, as opposed to the South of Italy. A study by Sforzi (2003) confirms these outcomes. Table 7.2 shows that most of the industrial districts (both in terms of numbers and employment) are located in the Third Italy in 1996.

We should bear in mind that these studies are subject to serious drawbacks due to a lack of data. The most serious shortcoming is that these analyses do

not account for two of the most essential characteristics of industrial districts, that is the organisational and cultural dimensions. For example, they ignore the linkages that may have developed between SMEs: there is no distinction made between firms operating independently and firms that are part of a dynamic network.

	Number		*Employment*	
	Absolute	***%***	***Absolute***	***%***
First Italy	*59*	*30*	*884,829*	*41*
Third Italy	*123*	*62*	*1,223,019*	*56*
Second Italy	*17*	*9*	*66,053*	*3*
Total	*199*	*100*	*2,173,901*	*100*

Source: Sforzi (2003)

Table 7.2 Industrial districts in the three Italies in 1996

In sum, the Third Italy experienced strong industrial growth during the period 1951-1981. The evidence suggests that the nature of industrial development in the Third Italy is, to some degree, distinct from the two other Italies, although we have to keep in mind that the three Italies are anything but homogenous areas (Bianchi 1994). Despite its predominance of small-sized firms and craft-based industries, the South of Italy did not experience by any means the same development of industrial districts as the two other Italies. The Third Italy differs from the First Italy in terms of the importance of small-scale industrialisation in craft-based industries. However, the First Italy (especially Lombardy) is also well-endowed with industrial districts (Garofoli 1983). Below we will go into more detail as we consider the peculiar socio-cultural characteristics of the Third Italy. In this way, we will clarify the role social capital may have played in the rise of this form of industrialisation in the Third Italy.

7.3 Social capital and the Third Italy

The so-called Florentine school (Becattini 1987; 1989; Becattini et al. 2003) has interpreted the industrial rise of the Third Italy as an endogenous growth process. In essence, this growth process was achieved through interaction

and co-operation on the level of the industrial district based on economic, geographical and cultural localness. In particular, they stressed the advantages of the organisational features of these local production systems. The efficiency of the local networks was explained in terms of a combination of competition (stimulating innovation), specialisation (enhancing productivity) and co-operation between local actors (minimising uncertainty and opportunism, while stimulating transfer of knowledge) (Bertini 1994). In this way, the small, vertically disintegrated firms operating in industrial districts could benefit from the unique co-existence of (external) scale economies and flexibility (Piore and Sabel 1984; Fabiani et al. 1998). Therefore, they were particularly suited to respond to the differentiation of demand (that is, demand for more varied and customised goods, produced in short series) since the 1970s.

Many authors (e.g. Fuà and Zacchia 1983; Pyke and Sengenberger 1991) claimed that this endogenous growth process necessitated a particular socio-cultural structure which was typical of the Third Italy. This distinctive social structure provided a basis on which this form of industrial development emerged. It not only facilitated interaction and co-ordination between local actors, it also enhanced flexibility in many respects. We will explain how below. By doing so, we will relate this form of industrialisation to the notion of social capital. We begin with the problem of how to define social capital and in what ways it may have an impact on regional economic growth.

What is social capital?

There is much confusion about the notion of social capital, due to its intangible nature (Bolton 1998). Many broad and imprecise definitions have been given (Putnam 1993; Morgan 1997; World Bank 1997). These definitions tend to incorporate many aspects, such as networks, norms and trust that are hard to disentangle. This multifaceted nature of social capital makes it hard to separate the forms of social capital from their consequences (Woolcock 1998). It goes without saying that this makes it difficult to arrive at a 'tight conceptual and empirical definition' (Bebbington and Perreault 1999).

So, what is it then? We believe the 'social' part of the notion refers to a rather stable, cohesive structure of social relations between people in which (often unwritten) norms and values are shared. This social structure may exist at different levels, such as the level of friendship, the family, the community, the ethnic group, the organisation (or web of organisations), the country (e.g. the institutional and political framework), etc. In other words, contrary to other, more individual forms of capital, social capital resides in groups based on social ties, cultural practices or political contexts.

The 'capital' dimension refers to the fact that these social structures may perform an asset function or constitute a resource for people that belong to it (Coleman 1990). For example, they may shape opportunities or constraints for individuals seeking economic advancement. This is a complex process that needs to be unravelled. In a nutshell, (informal and formal) structures of social relations do, or do not, enable people to trust one another. Trust, in turn, allows these members to co-ordinate their actions for mutual benefit. Accordingly, trust is a mechanism that overcomes market failures which arise because of uncertainty (Ostrom 1990). In turn, this capacity to resolve collective action problems may bring about many advantages, such as economic prosperity, good governance and safety.

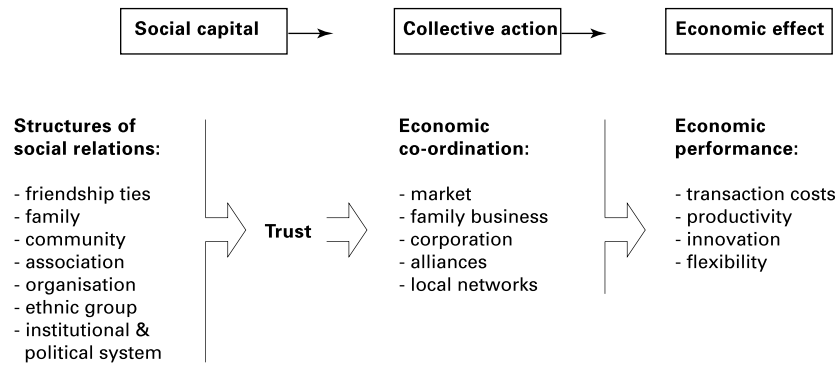


Figure 7.3 The 'asset' function of social capital in the economic realm

This asset function of social capital is summarised in Figure 7.3 for the economic realm. We realise this scheme is far from complete. For example, mechanisms of economic co-ordination may itself induce trust-building. Moreover, the more (societal) levels of social structures (beyond friends and family groups) are involved in generating trust, the greater the potential for economic development. We explain this scheme in more detail below when elaborating on the relationship between social capital and regional development in the case of the Third Italy.

What is essential here is that the availability of social capital (like physical and human capital) is unequally distributed. With a certain stock of social capital, one can save time and resources needed to build trust-based relationships between and within firms. In contrast, where social norms are not based on mutual trust, a low stock of social capital is likely to exist which cannot be called upon to undertake collective action. Italy provides an interesting case, because the persistence of a large economic gap between

north and south has been related to deep-seated socio-cultural differences. Leonardi (1996) has given the example of the South of Italy where individual actors are not likely to engage in co-operative agreements and, therefore, operate on an individual level because social norms of mutual trust are largely missing. Similarly, Putnam (1993) has expressed different regional levels of social capital in Italy in terms of two ideal types: vertical social structures based on authority relations in the south versus horizontal social relations based on trust and shared values in the north.

To provide a more comprehensive explanation of regional differences in Italy, it is helpful to make a distinction between various sources of social capital at different levels with different development potentials (Woolcock 1998). We believe three structures of social relations at different levels have supported the particular form of industrialisation found in the Third Italy: the extended family (kinship network), the local community at the industrial district level and the existence of a political subculture at the regional level.

Like the Second Italy, the first source of social capital, that is the (extended) family, is strongly present in the Third Italy as illustrated by the substantial number of family businesses in the industrial districts. However, a major difference with the South of Italy is that the Third Italy could build on various (mainly non-kin) sources of social capital that extended the family level. In this respect, the notion of 'amoral familism' introduced by Banfield (1958) has been applied to describe the socio-cultural environment in southern Italy (Leonardi 1996). Here, the poor economic performance is directly related to the fact that trust is limited to social relations based on family members and blood relatives, in addition to the Mafia with its devastating effect on the local economy (Gambetta 1993). There is a strong parallel here with studies on ethnic entrepreneurship in relatively poor communities. These studies observed that trust built on strong ethnic and tight family ties is not enough to generate long-term economic prosperity because this requires extra-group linkages (Woolcock 1998).

Harrison (1992) argued that it was through specific relationships between local partners based on repeated interaction and experience that trust-building evolved in the industrial districts. However, this is a very partial explanation. He largely ignored the fact that trust-based relationships between partners built on experience are generally accompanied by high sunk costs and thus a risk of lock-in (Maskell 1999). Hence, a source of social capital that exists at community level may be a more efficient and flexible solution. Trust-building at community level in the Third Italy takes place at the industrial district level. In order to be effective as an asset, the social structure at the district

level should be characterised by norms and values that exclude those that do not submit to these rules. Norms can only become effective when sanctions actually constrain the actions of actors that conducted deviant behaviour. This is true at the district level where misbehaviour soon becomes known to others. As a result, malfeasance by firms in such closely interwoven networks is almost ruled out because of the severe consequences.

However, this is not at the expense of flexibility. On the contrary, firms in communities blessed with high stocks of social capital tend to have a minimal amount of relation-specific investments. As compared to the other means of building trust described above, social capital at district level is economically superior because it tends to lower investment costs and enhances flexibility. Breaking relations with partners when economic or other circumstances require such does not incur a heavy loss of sunk costs. Those communities are likely to accept this kind of behaviour "... as long as any decisions to discontinue old partnerships are carried out in a proper manner and in accordance with the community's beliefs of good behaviour. The risk of becoming a victim of a lock-in is thus greater for firms relying on built trust in network-arrangements only than for firms able to attain and utilise social capital through membership of a community" (Maskell 1999, p. 6).

In the case of the Third Italy, there is another source of social capital that extends beyond the district level. As described earlier, there is an abundance of industrial districts in the Third Italy, in contrast to the South of Italy. This is related to strong cultural norms of mutual trust and good governance institutions that are available in this part of Italy. Trigilia (1989), among others, has mentioned the existence of deeply rooted, cohesive 'political subcultures' that cut across social cleavages, regulate potential social conflicts and achieve political and social cohesion. More particularly, the Third Italy area was characterised, at least until recently, by two distinctive political subcultures, that is a red Communist-oriented one in the central regions such as Emilia Romagna and Tuscany and a white Catholic/Christian Democratic one in the north-east.

Despite their diverse political backgrounds, both movements were very active at the local level, establishing an intricate web of social relationships between organisations like unions, associations, co-operatives and local governments (Trigilia 1989). Dei Ottati (1994) emphasises the importance of these local institutions for social control in an industrial district that has a far more complex environment than a small, homogenous community. In this respect, local political subcultures reflect a fine balance between the state (at the local and regional level) and civil society that boosted, among other

things, the effectiveness and credibility of institutions of governance (Amin 1999). This shows a strong resemblance with ideas about policy models based on functional, participative and associative principles (see e.g. Schobben and Boschma 2000).

The above makes clear that social capital is unequally distributed between entities at various spatial levels. There is good reason to believe that these regional differences are likely to persist over time: social capital is essentially immobile. Due to its intangible and complex nature, social capital is - in contrast to other forms of capital -not a commodity that can be bought on the market. Moreover, although social capital may be rapidly destroyed, it cannot be easily created. It is almost impossible to imitate, replicate or substitute social capital due to its complexity (it consists of a complex web of linkages and relationships) and its time-consuming accumulation (in which asset mass efficiency plays a role) (Maskell 1999).

Social capital and regional development of the Third Italy

Above, we briefly introduced the notion of social capital. We have largely set out the social part of the notion referring to structures of social relations between people that may exist at different levels (e.g. the family, the community or the regional level). Moreover, we made clear that the availability of social capital is unequally distributed between regions, a statement that has been further illustrated by the case of Italy. By doing so, we have touched upon the capital dimension of these social structures, that is, the asset function of social capital. We will now elaborate on this topic.

As shown in Figure 7.3, structures of social relations enable people to trust one another. This, in turn, allows their members to solve collective action problems that arise because of market failures. We made clear above that there must be different sources of social capital present at various levels (e.g. trust among non-kin) before it generates economic development. Below, we explain four ways of linking social capital through trust to economic performance. We restrict our attention by linking social capital explicitly to the particular form of industrialisation in the Third Italy described earlier.

First of all, social capital reduces the costs that are involved in a transactional activity, such as search and information costs, bargaining and decision costs and policing and enforcement costs (Nooteboom 1999). When there is high trust, there is less need to specify all the details of a transaction in formal written contracts in order to reduce uncertainty and opportunism. There is also less need to put a lot of effort into controlling and monitoring the execution of the transaction. This higher efficiency of economic exchange

is essential for the functioning of industrial districts that are characterised by large numbers of transactions due to an extreme division of labour between the many specialised firms. Hence, trust lowers the costs of co-ordination between small firms and facilitates the exchange of commodities that may result in more deepening of the division of labour. In this way, social capital enables the small firms to reap the benefits of increasing specialisation, such as high productivity (Camagni and Capello 1999). In other words, social networks based on shared norms make co-ordination of transactions between local actors more efficient and, thus, less costly than explicit contracting and monitoring and makes them more effective than formal enforcement by the state.

Second, local relations of trust encourage the co-ordination and co-operation mechanisms that are so vital for the competitiveness of small firms. Generally speaking, small firms lack the resources to be successful on export markets, to do their own research, to negotiate with large banks for loans at favourable terms etc. The importance of relations of trust here is that they provide them the means to realise this (Dei Ottati 1994). As Harrison (1992) puts it, "firms are said to co-operate on getting new work into the district, in forming consortia to obtain cheap credit, in jointly purchasing raw materials, in bidding on large projects and in conducting joint research" (p. 478).

Third, trust among local actors favours the transmission and exchange of knowledge at district level. This is essential for small firms to learn and innovate. When firms can fall back on mutual trust, communication proceeds relatively smoothly (Lambooy 1997). This is especially important for the transmission of non-codified or tacit knowledge which is, by nature, much more difficult to communicate (Malmberg and Maskell 1997; Storper 1997). The notion of 'innovative milieu' has been introduced to explain the clustering of vertically disintegrated firms specialised in a particular techno-industrial field in terms of collective learning embedded in a regional context (Camagni 1991). Collective learning in industrial districts is achieved through the intra-regional mobility of human capital (as main carrier of tacit knowledge), the transfer of information via informal local networks and a common local culture of trust based on shared practices and rules (Boschma 2004). Hence, a large stock of social capital facilitates interactive learning and therefore innovation, which allow the many low-tech firms in districts to survive and prosper in relatively high-cost regions like the Third Italy (Morgan 1997; Asheim 1999). Empirical research tends indeed to show a high innovation rate in this area (Paci and Usai 1999; Evangelista et al. 2002).

Fourth, the existence of political sub-cultures explained earlier contributed to the particular form of industrialisation in the Third Italy in various

ways (Trigilia 1989). On the one hand, it boosted the flexibility of the labour market because it regulated potential social conflicts. The dynamic functioning of industrial districts demanded from labour a flexible attitude, which was enhanced in the Third Italy by a lack of labour militancy and limited class polarisation (high rate of social mobility). Social networks guaranteed a rapid flow of information about new job opportunities, while a social compromise between local interest groups (government, entrepreneurs, unions) often guaranteed a flexible work force. On the other hand, these political sub-cultures were based on civic norms which may have stimulated the effectiveness and responsiveness of regional governments in the Third Italy. An empirical study of Putnam (1993) indeed demonstrated a strong difference in institutional performance between the more civic-minded northern and central part of Italy and the less civic (more clientelistic) South of Italy. When institutional performance increases, positive economic effects are likely to emerge (Hillman and Swank 2000). Regional governments that are more reliable and trustworthy make it less risky for firms to engage in long-term investments and provide better and more efficient services (for which one does not have to pay individually) that match the particular needs of the SMEs in the districts (Brusco 1991).

7.4 The importance of social capital for the industrial rise of the Third Italy

Above we have clarified the role social capital may have played in the particular form of industrialisation in the Third Italy. We will now attempt to measure social capital at macro-regional level and empirically assess its importance for the rise of this type of industrialisation in Italy. This study is based on an extensive set of regional data. We will first explain how we measured social capital. Then, we will test whether the Third Italy is an unique socio-cultural area, as compared to other Italian regions. Finally, we will assess whether social capital has contributed to this type of industrial development across the Italian regions during the post-war period.

How can social capital be measured?

As set out in the introduction, few studies have been carried out to provide empirical support for theoretical statements concerning the importance of social capital for regional development. As mentioned earlier, it is difficult to determine what is actually meant by social capital. This is even more so when

measuring the stock of social capital (Bolton 1998). Maskell (1999) takes a rather pessimistic standpoint in this respect: the dimensions of social capital (he talks about its 'labyrinthine qualities') would be too complex to measure and would depend too much on the specific local context.

Nevertheless, a few efforts have been made. These empirical studies differ with respect to definitions of social capital, units of analysis, control variables, etc. (Jackman and Miller 1996; Schneider et al. 2000). A study done by Knack and Keefer (1997), based on the World Values Survey concluded that social capital has had a strong and significant impact on economic growth in 29 market economies over the 1980-1992 period, especially in poorer countries. Another study by Helliwell and Putnam (1995) showed that, while holding initial income constant, Italian regions with a more developed 'civic community' had higher economic growth rates in the 1950-1990 period.

But how was social capital measured in these studies? Knack and Keefer (1997) measured trust using the question of whether 'most people can be trusted', while 'civic norms' were assessed by the trustworthiness of the respondents. They were asked whether it is justified 'to claim government benefits which you are not entitled to, to avoid a fare on public transport, to cheat on taxes if you have the chance, to keep the money you have found and to fail to report damage you have caused accidentally to a parked vehicle'. Another study (Granato et al. 1996) made use of two cultural indexes capturing motivational factors: achievement motivation and postmaterialist values. However, these kind of studies suffer from several drawbacks. In short, the indicators taken from the World Values Survey are rather vague (Moore 1999), the presumed link with economic development is often hard to imagine (especially the mechanisms through which social capital influences growth remain unspecified), while the unit of analysis (countries instead of regions) is largely left unexplained.

In an empirical study of Italy, Putnam (1993) and Helliwell and Putnam (1995) constructed a composite index of 'civic community' at regional level. This index consisted of three dimensions. The first one is 'civic engagement', which has been associated with newspaper readership and turnout in referenda. The second refers to horizontal association or group membership, which is gauged by the density of sports and cultural associations. The third one is based on the incidence of preference voting at national elections which is regarded as a surrogate for clientelism and thus for the absence of civic community. Following Katz and Bardi (1980), they regarded preference voting as a measure of clientelism, in which political relations are based on securing self-interest and assuring individual benefits rather than expressing a policy preference.

However, the empirical work of Putnam may be criticised for several reasons (see e.g. Bagnasco 1994). First, preferential voting may be regarded as a positive element in civic involvement rather than the opposite (Tarrow 1996). Piattoni (1997) claimed that some clientelistic systems may even be beneficial to growth, as the Abruzzo region shows. Moreover, it remains unclear how the indicators of 'civic engagement' may be meaningfully linked to growth. Another weak point is that Putnam associates social capital with regional growth in general. As explained earlier, we believe social capital gets a different and more direct meaning when linked to the Third Italy type of industrial development.

We have selected three variables of social capital that can be meaningfully linked to the Third Italy experience. The main restriction we had to cope with was that we needed reliable data per Italian region during the initial stage of development of the Third Italy, that is, in the early 1950s (Zamagni 1993). The three variables chosen (i.e., co-operatives, associations and political subcultures) refer to different, but interwoven structures of social relations that are likely to reflect a culture of mutual trust at the regional level.

The first (economic) indicator concerns the number of economic co-operatives (consumer-oriented as well as producer-based). This type of economic organisation is often regarded as a form of 'organised but voluntary social solidarity' (Putnam 1993). The intensity of co-operative associations is likely to reflect a culture of mutual trust, because members have shown a willingness to collaborate in order to achieve mutually beneficial ends (Fornasari and Zamagni forthcoming). As a proxy for the co-operative form of economic organisation, we constructed the variable ECONCOOP, measured as the number of economic co-operatives per 10,000 inhabitants by region in 1951. We made sure that this indicator did not mix up cause and consequence of social capital: the overall majority of the 14,331 co-operatives in Italy in 1951 was found in activities, such as construction and agriculture, that had no relation whatsoever with the traditional, craft-based sectors associated with the Third Italy (SVIMEZ 1961).

The second (social) measure we use is the density of associations that include religious organisations, cultural activities, sport clubs, etc. Following Putnam (1993), this indicator is used as a proxy for civic sociability. A high intensity of associational activity reflects a high rate of social interaction that builds trust and co-operative habits between its members. The variable ASSOCIAT measures the number of recreational and cultural associations per 100,000 inhabitants by region in 1982 founded before 1960. Naturally, we would have preferred to measure this in the early 1950s, like the other

variables. We were unable to due to a lack of data. Making use of the 1982 Associational Census (Mortara 1985), this measure excludes associations that existed in the 1950s but which had disappeared in 1982. Despite this shortcoming, we believe it is an advantage that we have only included the durable and long-lasting associations in our analysis.

The third (political) indicator of social capital we use is the predominance of a red or white political sub-culture in a region. As explained above, this facilitated industrial development in the Third Italy for two main reasons. It not only achieved socio-political cohesion, it also enhanced institutional performance. At least till the 1990s, their existence could be illustrated by the enduring dominance of a political movement that was very active in local community life since the end of the nineteenth century (Coppola 2000). We make use of the variable POLCULT as a proxy for the predominance of either a white Catholic or red political sub-culture. This has been measured as the number of either white votes (for the Christian Democratic Party) or red votes (for the left-wing parties of PCI, PSI and PSDI) per 100 votes by region during the national elections of 1953.

Is the Third Italy unique with respect to social capital?

Previously, we concluded that the Third Italy was to a considerable degree a distinct area with respect to the form of industrialisation that emerged in the post-war period. We argued that social capital may have played a role. Now, we will ascertain whether the Third Italy was indeed an unique area during its initial stage of development with respect to the three social capital indicators described above.

Our objective is to examine whether it makes sense to split Italy into three main areas (that is, the First, Second and Third Italy) with respect to social capital. The literature often states that we should draw a sharp socio-cultural and political line between the Second and Third Italy. Others suggest there is a lot of diversity within both areas (Bianchi 1994; Piattoni 1997). It is also rather unclear whether the First Italy (the industrial heartland) should be treated as a homogenous and separate area in this respect. As demonstrated earlier, to some extent it developed a number of industrial districts. This may suggest it shares similar socio-cultural features with the Third Italy.

As described above, the pattern of industrialisation in the Third Italy was a rather localised phenomenon. Therefore, we would have preferred to measure social capital on the more disaggregated level of industrial districts (meaning areas smaller than the Italian provinces). However, a lack of necessary data

	ECONCOOP	ASSOCIAT	POLCULT	INDSOC
First Italy	2.60	3.63	45.32	1.16
Piedmonte	1.50	1.97	41.58	0.77
Lombardy	2.76	2.42	45.86	1.01
Liguria	3.53	6.51	48.53	1.70
Third Italy	3.12	2.41	51.40	1.09
Trentino Alto-Adige	0.92	2.20	45.16	0.76
Veneto/Friuli-Venezia-Giulia	2.28	2.12	52.80	0.96
Emilia Romagna	7.39	2.37	57.87	1.64
Tuscany	3.46	3.29	54.31	1.28
Umbria	1.80	2.24	54.41	0.94
Marche	2.84	2.27	43.84	0.99
Second Italy	2.65	1.85	39.30	0.87
Lazio	7.36	8.29	37.04	2.32
Abruzzi/Molise	1.53	1.25	42.54	0.68
Campania	2.37	0.71	36.13	0.65
Puglia	2.26	0.65	38.47	0.65
Basilicata	2.15	0.96	41.32	0.70
Calabria	0.94	0.59	40.69	0.50
Sicily	1.72	0.94	36.46	0.61
Sardinia	2.83	1.41	41.71	0.85
Italy	2.80	2.36	44.63	1.00

Sources: SVIMEZ 1961, table 382; ISTAT 1954, table 137; Galli 1968, tables 3, 4, 5 and 7; Mortara 1985, table 6.

Table 7.3 Social capital in the Italian regions in the early 1950s

at this level made this impossible. Nevertheless, as demonstrated earlier, a majority of the industrial districts are located in the Third Italy area. This suggests that the impact of social capital extends well beyond the level of the district. In fact, as mentioned before, it might indicate that other sources of social capital, such as cultural norms of mutual trust (embodied in political sub-cultures) operate on a more aggregated spatial level covering the whole area of the Third Italy. We have taken the 20 standard administrative regions of Italy shown in Map 7.1 as units of analysis. Due to missing values, we have restricted our analysis to 17 regions. The small number of cases means we were, unfortunately, unable to use classification techniques such as

discriminate analysis to assign each region to distinctive groups concerning their scores on the three social capital variables.

Therefore, we will simply present the scores of all 17 regions concerning the three indicators of social capital in Table 7.3. We also constructed an index of social capital, INDSOC, in which the weight of each of the three indicators is treated equally. The outcomes suggest considerable differences between the three Italies in the early 1950s. The Third Italy, as expected, scores above average for all three social capital variables: it even shows the highest scores for two of them (i.e. ECONCOOP and POLCULT). As expected, it is also clear that the Second Italy has the lowest rate of social capital for all three variables in the early 1950s. By and large, the First Italy occupies an intermediate position at that time but shows the highest scores on INDSOC and ASSOCIAT (which is entirely due to Liguria).

The question is, to what extent these three macro-regions can be considered homogenous areas? The Second Italy was quite a distinct area with respect to social capital in the early 1950s, with one major exception: the Lazio region, with the capital city Rome, which is a markedly different and unique area. Is this also true for the Third Italy? Table 7.3 suggests it is (i.e. the major part of the Third Italy shows a high score for social capital) but still there are considerable internal differences with the regions of Trentino Alto-Adige and Emilia Romagna being the two extreme cases. The outcomes demonstrate that there is no justification whatsoever for treating the First Italy as a separate area. The Liguria region shows, quite surprisingly, a high score on all three indicators, the opposite is true for the Piedmonte region, while the Lombardy region occupies an intermediate position.

The importance of social capital for the industrial rise of the Third Italy

In the remaining part of this chapter, we will make an attempt to assess empirically whether social capital (measured in the early 1950s) has contributed to this Third Italy-type of industrial development across the Italian regions during the post-war period (1951-1981). In other words, we will analyse whether this form of industrialisation may have been rooted in regional stocks of social capital. By doing so, we will examine whether social capital has indeed constituted a basis for the industrial rise of the Third Italy during its initial stage of development. One should recall that, due to the small number of cases, we have not been able to employ regression techniques and check for other variables that may have influenced cross-regional variation in economic development over such a long period.

We will use the variable INDGROW that measures the annual growth rate in employment in firms with less than 500 people employed in traditional-artisanal sectors by region in Italy during the period 1951-1981. In doing so, we will cover two main features of this type of industrial development described earlier. The typical small-scale industrialisation has been accounted for by excluding firms that employ more than 500 people. The craft-based nature of this type of industrialisation was grasped by selecting manufacturing industries that could be considered traditional-artisanal: textiles, footwear and clothing, leather goods, wood and furniture, non-metallic mineral products (including ceramics, marble, jewellery) and metallic engineering. A shortcoming of this indicator is, however, that it does not account for the organisational dimension of industrial districts. Due to a lack of data, our indicator ignores the linkages that may have developed between the small and medium-sized firms involved. It was, therefore, impossible to separate SMEs that operated independently (which we would like to have excluded from our analysis) from SMEs that were part of a local dynamic network.

Due to the small number of cases, it is impossible to apply multiple regression techniques in order to assess the impact of social capital on the cross-regional variation in growth of employment in SMEs in traditional-artisanal sectors in Italy during the period 1951-1981. Therefore, in Table 7.4, we have simply put together two variables that measure the stock of social capital in each region in the early 1950s (INDSOC) and the economic growth rate with regard to the Third-Italy-type of industrial development for the period 1951-1981 (INDGROW). By comparing the regional scores of these two standardised variables we can carefully assess the economic contribution of social capital in each region as far as the Third-Italy type of industrial development is concerned. Unfortunately, we are not able to describe the regional evolution of social capital during this period, due to data shortcomings.

The outcomes presented in Table 7.4 seem to suggest some relationship between social capital and regional growth in employment in small-scale, traditional-artisanal sectors during the period 1951-1981. The Pearson correlation coefficient shows, however, a positive (0.198) but insignificant relationship between the two variables. Nevertheless, the empirical results provide some evidence of why the Third Italy, which is well endowed with a favourable socio-cultural structure, did much better than the South of Italy to develop the Third Italy type of industrial development. Although we have to be cautious, the low stock of social capital in the south in the early 1950s seems not to have provided a stimulus for this particular form of

industrialisation. This may well explain why small and medium-sized firms in the Second Italy often operate independently, whereas SMEs in the Third Italy co-operate and form dynamic networks (Fukuyama 1995). In the First Italy, the reverse situation is almost true: relatively good scores on social capital go along with very low scores on industrial development.

	INDSOC	*INDGROW*
First Italy	*1.16*	*0.54*
Piedmonte	*0.77*	*0.45*
Lombardy	*1.01*	*0.61*
Liguria	*1.70*	*0.08*
Third Italy	*1.09*	*1.94*
Trentino Alto-Adige	*0.76*	*0.78*
Veneto/Friuli-Venezia-Giulia	*0.96*	*1.89*
Emilia Romagna	*1.64*	*2.14*
Tuscany	*1.28*	*1.67*
Umbria	*0.94*	*2.11*
Marche	*0.99*	*3.16*
Second Italy	*0.87*	*0.75*
Lazio	*2.32*	*1.03*
Abruzzi/Molise	*0.68*	*1.07*
Campania	*0.65*	*0.67*
Puglia	*0.65*	*1.37*
Basilicata	*0.70*	*0.26*
Calabria	*0.50*	*-0.02*
Sicily	*0.61*	*0.42*
Sardinia	*0.85*	*0.77*
Italy	*1.00*	*1.00*

Sources: see Figure 7.1 and Table 7.2

Table 7.4 Social capital and industrial growth by region in Italy, 1951-1981

Taking a more detailed look at Table 7.4, we observe a slightly more complex picture. Table 4 reveals that the regions of Puglia and Abruzzi/Molise occupy a rather exceptional position in the south: they show a satisfactory score on INDGROW while doing quite poorly on the social capital index. With respect to the Third Italy, we witness three exceptional regions (i.e. Veneto/

Friuli-Venezia-Giulia, Umbria and Marche) where a relative modest score on social capital in the early 1950s is accompanied by a high rate of industrial growth for the period 1951-1981. As far as the First Italy is concerned, we can conclude that the observed values of INDGROW in the regions of Liguria and Lombardy are much lower than might be expected from their scores on social capital.

7.5 Concluding remarks

Although the rise and development of local networks of SMEs in the Third Italy has been widely documented, it is remarkable how few empirical studies have been conducted to provide an explanation for this. A large body of literature has mentioned a particular socio-cultural environment that may have provided a basis on which this form of industrial development could emerge. However, much theorising in this field has not been accompanied by studies that provided systematic empirical support for these theoretical statements. This certainly has something to do with the sheer complexity of this research field. There are several topics that deserve more particular attention in this respect.

To begin with, we need better dependent variables that make it meaningful to link explicitly social capital to economic performance at different spatial levels. Our dependent variable accounted for the Third Italy-type of industrialisation in which this socio-cultural factor was believed to play a crucial role. However, one shortcoming is that this dependent variable does not account for its organisational dimension (i.e., its local network form). For instance, Camagni and Capello (1999) observed that the Third Italy consisted of two parts (the north-eastern versus the central regions) with different degrees of co-operation between firms in the early 1990s, resulting in varying regional innovation paths. Moreover, it is more useful to analyse various sources of social capital at different spatial levels in order to provide a more comprehensive explanation for regional differences in growth. In our Italian study, we made use of regional data, for good reason. However, an empirical study on the more disaggregated level of industrial districts would lead to a more complete assessment of the economic impact of social capital.

Second, it remains hard to develop indicators to measure social capital. Our study drew only limited empirical attention to the actual mechanisms through which social capital may determine economic performance. In common with other studies (like Putnam's) the explanations for observed

correlations are "... argued by analogy, inference, and theoretical realm rather than on empirical analysis of causal mechanisms" (Bebbington and Perreault 1999, p. 400). This is an epistemological issue that is, to some extent, a consequence of what Crevoisier (1999) called a 'homogenising' (instead of a 'particularising') approach. Nevertheless, it is true that we need more progress in specifying mechanisms underlying relationships between the state, civil society and economic performance that account for complexity in different spatial contexts, and which go beyond simple and broad classifications of low and high stocks of social capital.

Third, our study emphasised a rather static, positive relationship between social capital and economic performance. However, we have to be careful when treating social capital in such a static way (Trigilia 1995; Tarrow 1996). A reciprocal relationship is likely to exist between social capital and economic growth (Granato et al. 1996). Moreover, some point out that, in addition to too little social capital, too much social capital may have adverse impacts on economic performance (Boschma and Lambooy 2002). For instance, there is much debate on the impact of associational activity on economic growth. In contrast to Putnam, Olson (1982) claimed that economic self-interest of rent-seeking associations may exist at the expense of society's welfare at large, while Grabher (1993) argued that a rather conservative culture of co-operative relations between large corporations, public authorities and labour unions may actively oppose change in the event that the vested interests of the main associations are threatened (Boschma and Lambooy 1999).

Finally, a consensus seems to exist on the issue that social capital is hard to copy or imitate from successful places. However, this is less true for questions like how social capital may be created and what role the (local) government may play in this respect (Cooke and Wills 1999). For example, Fukyama (1995) claims that a trade-off exists between social capital and government, whereas others claim that the efficiency and effectiveness of government policy depends on the available stock of social capital. In this respect, the challenge for policy makers is how to invest in social capital formation and how to account for different pathways through which social capital may be built.

There is no doubt that these, as yet unsettled, issues will continue to be at the centre of debate for the next few years.

Notes

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8 Regional Innovation Systems, Varieties of Capitalism and Non-local Relations: Challenges from the Globalising Economy

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8.1 Introduction: the global challenges

For more than twenty years, a strong case has been made that territorial agglomerations are growing in importance as a competitive location for economic activities (Asheim and Isaksen, 2002, Cooke, 2001a). The main argument for this is that territorial agglomeration (or clustering) provides the best context for the promotion of localised learning and endogenous economic development. An important empirical background for this position has been the rapid economic growth of territorial agglomerated and networked small and medium-sized enterprises (SMEs) in industrial districts in the 'Third Italy' (Asheim, 2000), in which firms are embedded in spatial structures of social relations. Theoretically, in the definition of post-Fordist societies as "learning economies", innovation is seen as basically a socially and territorially embedded, interactive or reflexive process (Storper, 1997), which cannot be understood independent of the institutional and cultural contexts surrounding it (Lundvall, 1992). The purpose of this chapter is to explore the relationship between, on the one hand, such territorial agglomerations and their local or national institutional foundations and, on the other, their connections to non-local learning interfaces and non-local institutional incentives and constraints represented by international user-producer networks, research collaborations and not least foreign direct investments. A main aim of this chapter is to raise questions, both general questions relating to the tension between local learning and globalisation and more specifically to how this interplay should be theoretically conceptualised and thus applied in empirical research.

Arguments have been presented that cast doubts on the sustainability or importance of clustering and localised learning (Boschma and Kloosterman, this volume). Some of these raise conceptual issues (ibid) and point to the possible importance of mechanisms other than geographical proximity per se, such as cognitive proximity, institutional coherentness (ibid, Herstad 2003) or conventional-relational assets (Storper 1997), both in producing

R.A. Boschma and R.C. Kloosterman (eds.), Learning from Clusters: A Critical Assessment, 169–201.

and reproducing clusters and e.g. within non-clustered production networks producing those same competitive advantages allegedly exclusive to clustered firms. Furthermore, the model is seen as static (Boschma and Kloosterman, this volume) and thus unable to produce insights into the long-term evolution (Herstad 2003) of clusters, as well as generic both in the sense of lacking ability to distinguish between different *organisational* forms of clusters (i.e. from industrial districts to regional innovation systems) but in particular in the sense of lacking ability to distinguish between different *functional* forms of clusters (i.e. from diversified quality production in Third Italy to radical innovations in Silicon Valley) (Herstad, 2003). These arguments become particularly relevant when the process of economic globalisation is taken into consideration. As a starting point for our discussion we argue that at least five different processes could be identified which challenge the role of localised learning and endogenous growth in regional economic development. These five processes are the following:

1. Industrial districts in the Third Italy, which has been the paradigmatic example of localised learning and endogenous growth, used to be characterised by the whole value chain being carried out locally in the districts. This is no longer the normal case, as specific phases of the value chain, typically the most labour intensive or/and the most polluting phases, are increasingly being located outside the districts in former East-European countries and/or countries in the Third World, as a result of an industrial restructuring caused by increased global competition as well as stricter environmental regulations. This is resulting in a transformation of the industrial structure in the districts as well as a fragmentation of the previous local value chain. The outsourcing either goes to locally owned and existing factories in the eastern and southern countries, or to subsidiaries of the outsourcing firms. An example of the latter is the construction of brand new factories in Albania by SMEs in Emilia-Romagna to take care of labour intensive phases of the production, previously carried out in Emilia-Romagna. This has resulted in a concentration of only the most knowledge and/or capital-intensive phases of the industrial activity (R&D, design, product development, marketing etc.) in the original industrial districts. Another important development tendency which speeds up the fragmentation of the local system is the transition from an internal knowledge base in specific industries (i.e. high tech sectors) or agglomerations (e.g. sector specialised industrial districts) to a globally distributed knowledge base of firms or production systems,

caused by the generally increased knowledge intensity. This implies that the relevant perspective on the knowledge base of firms is neither the individual firm, nor always the local system of firms but often extra-local production or learning systems.

2. Many studies of regional innovation systems have shown that even if regional resources and knowledge bases are very important for the innovativeness and competitiveness of local firms, linkages to regional innovation systems alone are insufficient to remain competitive in a globalising economy. This applies in particular as individual firms initially linked to the system, through specialisation, deepen their cognitive focuses and hence finds themselves in need of specialised external knowledge - thus collectively creating divergences in the system as a whole. Local firms must have access to national and supra national innovation systems, as well as to corporate innovation systems for the local firms that have been bought up by multinational corporations or transnational corporations. This requires a multi-level approach to innovation systems (Asheim and Isaksen, 2002).
3. Furthermore, and related to the argument above, it has been argued that as a result of globalisation and codification processes, knowledge becomes increasingly ubiquitous, which implies that the competitive advantage of high-cost regions and nations are steadily being undermined as local, tacit knowledge is destroyed by the ubiquitification process (Maskell, 1999). This creates pressure on actors in those regions to be in a state of continuous learning and knowledge creation, which often implies a stronger focus on the core competencies of firms and an increase in the importance of social and institutional structures promoting learning (i.e. knowledge exploration as opposite to exploitation of existing knowledge with varying degrees of tacitness and local embeddedness).
4. Questions have been raised lately as to whether spatial embeddedness of learning and knowledge creation might be challenged by alternative organisational forms (i.e. temporary organizations), which are said to become more prevalent in the globalising economy (Asheim 2002; Grabher 2002). According to Alderman (forthcoming) "there are ... important a priori or theoretical reasons why a project-based model does not fit comfortably with ideas about clustering, localized learning and local innovation networks". The distributed knowledge base of firms also allows for the increasing importance of temporary forms of organisations as a mode of knowledge governance on an intra- and inter-firm level in order for firms to meet the challenges of the globalising economy. As a result of intensified innovation based international competition and

the consequent need for continual innovation and learning in order to keep up with rapid product changes, firms have to mobilise the relevant knowledge bases for the relevant part of the value chain in the innovation and production processes of more and more knowledge intensive products. However, Wenger (1998) and Nooteboom (2001, 2002) may be regarded as highlighting the fact that the difficulties in establishing deep learning interfaces in the form of temporary organisations are related to the advantage paradox that exists because the cognitive variety initially representing the rationale behind the establishment of a project team also creates difficulties in achieving the deep levels of interactive learning necessary to realize it. Furthermore, Lam (1998b), in opposition to the argument by Alderman, explicitly argues that the dilemma of knowledge accumulation represented by temporary organisations, as well as the dilemma of identifying the best participants of such organisations, is best solved when these are formed among firms clustered in a common social and thus spatial "containing structure" (Lam 1998a).

5. As mentioned above, there is clearly a larger number of foreign direct investments (FDIs) in industrial districts types of clusters and, typically, the most innovative and competitive middle-sized firms are the ones being bought up. As a consequence of this, there may be a potential conflict between the innovation network or system in the districts and the incoming corporations due to the integration of the acquired district firms into the innovation and business systems of the corporations. As will be argued below, incoming FDIs carry "foreign" institutional incentives and constraints (e.g. corporate governance system characteristics) through their internal capital allocation and monitoring system (Porter, 1998)) which are not necessarily compatible with or complementary to the regional innovation and business systems it interacts with. This poses the question of the extent to which foreign direct investments are value creating or value extracting when they interact with the cluster.

These processes could be looked upon either as negative developmental processes caused by globalisation processes, representing a threat to local learning and thus the "embeddedness" of competitive advantages, consequently eroding the basis for regional endogenous development, or they could be considered as being necessary adjustments and adaptations to globalisation process in order to avoid 'lock-in' tendencies in the regional economy, enabling regions to stay innovative and competitive in the future as well. In any event, these processes will have consequences for the relative

importance of local vs. non-local conditions and relations for future regional development (Bathelt et al., 2003, MacKinnon et al., 2002). In what follows we shall examine these tendencies in more detail (especially the tendencies described in points 2-5), which undoubtedly will be reinforced by the globalising economy and especially the consequences for the role of regional innovation systems with regard to the capacity for upgrading the knowledge bases of firms in regional clusters.

8.2 Regional innovation systems and localised learning

In the perspective on innovation as culturally and institutionally contextualised, strategic parts of learning processes by necessity emerge as highly localised, as opposed to placeless. Thus, local contexts can represent important structural and cultural prerequisites for the continuing development of the knowledge bases and knowledge infrastructures of firms and regions, underscoring the role of historical trajectories. Governments and agencies at all spatial levels have increasingly become involved in seeking to stimulate innovation and, consequently, innovation policy is being placed at the centre of policies for promoting regional and national economic development. At the regional level, regional innovation systems and learning regions have been looked upon as policy frameworks or models for the implementation of long-term, development strategies initiating learning-based processes of innovation, change and improvement (Cooke et al., 2000, Asheim, 2001, Asheim and Isaksen, 2002). A regional innovation system involves co-operation in innovation activity between firms and knowledge creating and diffusing organisations, such as universities, colleges, training organisations, R&D-institutes, technology transfer agencies, business associations and finance institutions. These organisations hold important competence, train labour, provide necessary finance, etc. to support regional innovation[1]. This implies that structures of coordination (i.e. incentives, constraints, expectations and experiences concerning collective action under uncertainty) between different spheres of actors necessarily are vital for the emergence and characteristics of regional innovation systems.

The concept of a regional innovation system is a relatively new one, which first appeared in the early 1990s (Cooke, 1992, 1998, 2001a), a few years after Chris Freeman first used the innovation system concept in his analysis of Japan's economy (Freeman, 1987) and approximately at the same time that the idea of the national innovation system was becoming more

widespread, thanks to the books by Lundvall (1992) and Nelson (1993). To a large extent the 'system' dimension was inspired by the same literature as was the rationale of different territorially based innovation systems (national and regional), i.e. that there are historical technological trajectories based on 'sticky' knowledge, localised learning and coherent institutional structures that are continuously competitive by promoting systemic relationships between the production structure and knowledge infrastructure. In addition, the idea of regional innovation systems was inspired by agglomeration theories within regional science and economic geography (e.g. growth pole theory etc.) as well as the observed success of regional clusters and industrial districts (Asheim, 2000, Asheim and Isaksen, 1997).

However, it is important, analytically as well as in policy formulation, to distinguish between different types of regional innovation systems. On the one hand, we find innovation systems that could be called *regionalised national innovation systems*, i.e. parts of the production structure and the institutional infrastructure located in a region, but functionally integrated into, or equivalent to, national (or international) innovation systems which are more or less based on a top-down, linear model of innovation (e.g. science parks and technopolis). On the other hand, we can either identify *networked innovation systems* constituted by the parts of the production structure and institutional set-up that is territorially integrated in a particular region, and built up by a bottom-up, interactive innovation model, or *innovation networks*, which are embedded in the socio-cultural structures of a region, characterised by a "fusion" of the economy with society (Piore and Sabel 1984), and based on bottom-up, interactive learning. To be able to talk about territorially integrated, regional innovation systems, the national, functionally integrated, techno-economic and political-institutional structures must be "contextualised" through interaction with the territorially embedded, socio-cultural and socio-economic structures (Asheim and Isaksen, 1997).

The networked regional innovation system is different from the embedded innovation network due to the systemic dimension of the former, which requires that the relationships between the elements of the system must involve a degree of long-term, stable interdependence. This implies that it is based on system integration and not on *social* integration. A further consequence of this is that a networked regional innovation system cannot be embedded in the community, as embeddedness builds on social integration (Granovetter, 1985). However, it is still an example of a bottom-up, interactive innovation model and, thus, represents an alternative to regionalised national innovation systems. The systemic, networked approach to regional innovation systems

brings together regional governance mechanisms, universities, research institutes, technology transfer and training agencies, consultants and other firms acting in concert on innovation matters as well as promoting a socially interactive culture of cooperation (Asheim and Cooke, 1999). As such, it could be said to represent a step towards a 'learning region' understood as a *development coalition* (Asheim, 1996; 2001).

The networked regional innovation systems represent a planned interactive enterprise-support approach to innovation policy relying on close university-industry cooperation. Large and smaller firms establish network relationships with other firms, universities, research institutes, and government agencies. Examples of such networked innovation systems can either be found in regions in Germany, Austria, and the Nordic countries, where this model has been the more typical to implement (Asheim and Cooke, 1999), or in later stages in the evolution of industrial districts, which were previously characterised by territorially embedded, innovation networks (e.g. industrial districts Mark II in Emilia-Romagna).

Earlier research on regional innovation systems (Isaksen, 1999) has, on the one hand, demonstrated that the innovative activity of firms is to a large degree based on localised resources such as a specialised labour market and labour force, subcontractor and supplier systems, a unique combination of different types of knowledge, local learning processes and spillover effects, local traditions for co-operation and entrepreneurial attitude, supporting agencies and organisations and the presence of important customers and users. On the other hand, the research revealed that the regional level is neither always nor even normally sufficient for firms to remain innovative and competitive, and pointed to the additional importance of innovation systems at the national and international level for firms in regional clusters.

The importance of the regional level is confirmed by results from the European comparative cluster survey (Isaksen, forthcoming), which shows that regional resources and collaboration are of major importance in stimulating economic activity in the clusters. In this study it was found that in many clusters, firms increasingly find relevant research activities and other supporting services inside the cluster boundaries (Isaksen, forthcoming). Isaksen found that this was supported by formal organisations and social institutions, which helped to co-ordinate activities and manage transactions in the clusters. However, the survey found an increased presence of MNCs in many clusters and also that firms in the clusters increasingly source major components and perform assembly manufacturing outside of the clusters (Isaksen, forthcoming). Moreover, Tödtling et al. (forthcoming) found

support for clustering, because of the importance of social interaction, trust and local institutions. Yet they also note that both local and distant networks are often needed for successful cooperative projects, in particular for projects of innovation and product development when it is usually necessary to combine both local and non-local skills and competences in order to go beyond the limits of the region (Tödtling et al., forthcoming). Interactions and connections with non-local innovation systems thus serve to prevent the path-dependency of the local industry and the local network from culminating in 'lock-in' situations demonstrating the 'weakness of strong ties'. This risk is built into an innovation system strategy, as the key rationale is precisely to support the positive effects of economic path-dependency and industrial specialisation.

Thus, in spite of the important role of place-specific, local resources and regional innovation systems, firms in regional clusters are in need of innovative co-operation and interaction with world-class, national and international competence centres and innovation systems in order to stay competitive. Firms' innovation activity relies both on place-specific experience based, tacit knowledge and competence, artisan skills and R&D-based knowledge. In order for non R&D-intensive firms to be able to acquire formally codified knowledge available from national and international innovation systems, the operation of such systems must be stimulated to become more interactive. In this way, these innovation systems, originally organised according to the linear model, would become more accessible as well as responsive to the individual and collective needs of international competitive non R&D-intensive firms in regional clusters.

8.3 Institutional structures and product market compatibility

The above discussion points to the need for access to innovation support at different functional and territorial levels, which requires a multi-level approach to innovation systems, i.e. that different forms of knowledge must be accessed from different parts of the knowledge infrastructure (i.e. functional levels) and at different spatial scales (i.e. territorial levels) (Cooke et al., 2000, Freeman, 2002). This will have consequences for the relevant types and scales of innovation systems in order to accommodate the changes from globalisation processes and adapt and modify the systems and especially in order to challenge the future role of regional innovation systems (Asheim and Isaksen, 2002). One approach to an alternative framework for innovation

support in a context "where global value chains are integrating with regional clusters" (Cooke, 2001b, 7) could be what Cooke calls an 'Industrial Innovation and Learning System' building on "both the national and regional innovation systems, thus integrating the multi-level governance concept, and [...which...] integrates the important 'learning system' dimension" (Cooke, 2001b, p. 7).

Alternatively, Cooke talks, on the basis of studies of the biotech industry in the UK and USA, about the differences between the traditional regional innovation system (RIS) and the new economy innovation system (NEIS) (Cooke, 2001a). While RIS is based on the idea of the positive effects of systemic relationships between the production structure and the knowledge infrastructure, the NEIS lacks these strong systemic elements (and therefore does not perhaps fully merit the system concept) and instead gets its dynamism from local venture capital, market demand and incubators. Thus, when Cooke calls this a 'venture capital driven' system, it is implicitly short-term and focused on creative destruction - or knowledge exploration in the Nooteboom terminology (2002) - at the expense of path dependent interactive learning and knowledge exploitation. Such a system will, of course, be more flexible and adjustable and will therefore not run the same risk of ending up in 'lock-in' situations, be it positive or negative. Hence, whereas NEIS in some contexts may have institutional support, it does not have the ability to support the consolidation of and value exploitation within stable technological trajectories, which so far in the history of regional as well as national development have represented the most important growth factor.

Importantly, and as already indicated, the concept of innovation systems itself highlights how the structure of coordination within a multiple equilibrium game is a key explanatory variable behind the emergence and characteristics of such systems, be it on a regional, national, international or/and sectoral level. The ability of actors to coordinate, and the structure of this coordination is, in turn, linked to both institutional incentives, constraints and "societal" or culturally embedded expectations concerning collective action, as well as within such contexts developed conventional-relational assets (Storper, 1997)[2]. Thus, the discussion about the efficiency of various types of innovation systems with respect to their ability and capacity to promote innovativeness and competitiveness in regions needs to be undertaken in a broader societal context. Soskice (1999) and others[3] convincingly argue that different national institutional frameworks support different forms of economic activity, i.e. that coordinated market economies have their competitive advantage in diversified quality production, while liberal

market economies[4] are most competitive in industries characterised by radical innovative activities. Following Soskice, the Nordic and (continental) West-European welfare states can be referred to as coordinated market economies, and a main determinant is the degree of non market coordination and cooperation which exists inside the business sphere and between private and public actors, as well as the degree to which labour remains 'incorporated' and the financial system is able to supply long-term finance (Soskice, 1999) based on in-depth rather than proxy-based allocation, monitoring and evaluation[5] (Porter, 1998). In a comparison between coordinated market economies such as Sweden, Germany and Switzerland on the one hand, and liberal ones such as the US and UK on the other, he found that the coordinated economies performed best in the production of "relatively complex products, involving complex production processes and after sales-service in well-established industries" (e.g. the machine tool industry), and that the US performed best in industries producing complex systemic products such as IT and defence technology and advanced financial and producer services, where the importance of scientific based knowledge is significant (Soskice, 1999, 113-114).

Thus, what Soskice basically argues is that competitive strength in certain markets - e.g. production characterised as 'diversified quality production' (Streeck, 1992) - is based on problem solving knowledge developed through interactive learning and accumulated collectively in the workforce (Soskice, 1999) which, in turn, represents a situation in direct conflict with unilateral control over work processes (a preference generated by certain finance and governance systems and supported by weak unionisation and judicial protection of workers); while competitive strength in other markets - e.g. markets characterised by a high rate of change through radical innovations and stand alone investment projects (Porter 1992), and thus most efficiently served by "new economy innovation systems" - is based on the institutional freedom as well as financial incentives to restructure production systems continuously in the light, or in search, of new market opportunities (Gilpin, 1996). While coordinated market economies at the macro level support co-operative, long-term and consensus-based relations between private as well as public actors, liberal market economies inhibit the development of these relations but instead offer both the opportunity to quickly adjust the formal structure to new requirements and create strong incentives towards such strategies. Such institutional specificities both contribute to the formation of divergent 'business systems' and provide the context within which different organisational forms with different logics of collective action and

thus mechanisms for learning, knowledge accumulation and knowledge appropriation have evolved (Asheim and Herstad, 2002).

Placed in this context, the traditional regional innovation system is typically accompanied by the institutional framework of a coordinated market economy, notably long-term and stable structures of insider ownership and finance, cooperative inter-firm relations and a dedicated workforce (the latter dedicated to individual firms in the organisational community labour market model, or to the broader cluster in the occupational community labour market model (Lam, 1998b)), while the new economy innovation system carries the features of the institutional framework of an liberal market economy, notably fluid, professionalised or bureaucratised labour markets and a shareholder value-oriented system of corporate control. A key distinction is thus the degree of relational monitoring (i.e. in the system of corporate control) and peer group recognition (i.e. in labour markets) versus the degree of faceless and/or short-term market interaction based on transparent qualities (with respect to both capital and labour) and their respective market prices.

8.4 Local 'sticky' and global 'ubiquitous' knowledge

In an ongoing discourse on knowledge and globalisation some authors argue that, as a result of globalisation and codification processes, knowledge becomes increasingly ubiquitous. This implies that the competitive advantage of high-cost regions and nations are steadily being undermined (Maskell et al., 1998). Others authors maintain that a lot of strategic knowledge is disembodied and, thus, remains "sticky" and that important parts of the learning process continue to be localised as a result of the enabling role of geographical proximity and local institutions in stimulating interactive learning (Asheim, 1999a). In this perspective, some competitive advantages remain geographically embedded as they are tied to the social and institutional systems by which their related learning processes are structured, and as knowledge is never transferred but at best only duplicated and interpreted by different actors within various social and institutional systems (Brown and Duguid, 1996).

Thus, localised learning is not only based on tacit knowledge, because contextual knowledge also consists of disembodied codified knowledge and also because structural prerequisites for the efficiency of certain processes of learning can be highly localised. Disembodied knowledge, referring to knowledge and know-how which are not embodied in machinery but which are the result of positive externalities of the innovation process (de Castro

and Jensen-Butler, 1993), is often created by geographically immobile combinations of place-specific experience based, tacit knowledge and competence, artisan skills and R&D-based knowledge (Asheim, 1999b). It is generally based on a high level of individual skill and experience, collective technical culture and a well-developed framework for collective action. Storper (1997) defines such contexts as "territorialization", understood as a distinctive subset of territorial agglomerations, where "economic viability is rooted in assets (including institutions and conventional-relational assets) that are not available in many other places and cannot easily or rapidly be created or imitated in places that lack them" (Storper, 1997, 170). This view is supported by Porter, who argues that "competitive advantage is created and sustained through a highly localised process" (Porter, 1990, 19).

Similarly, and highlighting the importance of experiences and interpretations in processes of knowledge exploration, duplication and/or exploitation, Lundvall (1996) maintains that "the increasing emergence of knowledge-based networks of firms, research groups and experts may be regarded as an expression of the growing importance of knowledge which is codified in local rather than universal codes. ... The skills necessary to understand and use these codes will often be developed by those allowed to join the network and to take part in a process of interactive learning" (Lundvall, 1996, 10-11). Lam (1998a, 1998b) points out that the skills required for knowledge interfacing within and between collective learning processes tend to be highly time-space specific. Interactive, collective learning is based both on institutional incentives and constraints regulating collective action, but also on intra- or inter-organisational routines, tacit norms and conventions and tacit mechanisms for the absorption of codified knowledge. The latter in particular requires the actors in question to have close connections with the "local codes", on which collective tacit and disembodied codified knowledge is based. Thus, depending on the actual architecture of a productive knowledge base, the ability to interpret local codes will be critical for the integration of the operations of a firm within an inter-firm network.

Following this line of reasoning, it could be argued that the combination of contextual disembodied knowledge and "untraded interdependencies"[6] (e.g. linked to occupational community labour markets or inter-firm relations) can provide the material basis for localised learning in a globalising learning economy and, thus, can represent important context conditions of regional clusters with a potentially favourable impact on their innovativeness and competitiveness. This would represent an important modification of the argument that "ubiquitification" (i.e. the global availability of new

production technologies and organisational designs at more or less the same cost (Malmberg and Maskell, 1999), as an outcome of globalisation and codification processes, in general tends to "undermine the competitiveness of firms in the high-cost areas of the world" (Malmberg and Maskell, 1999, 6).

8.5 Learning economies, temporary organisations and distributed knowledge bases

Stable development paths sooner or later necessitate creative destruction and local learning alone cannot be expected in itself to be sufficient for the long-term endogenous development of firms and regions. The current interest in the potential of temporary organisations in the form of projects and development coalitions to promote knowledge creation and radical innovations is an expression of a search for alternative modes of knowledge governance to overcome the limitations of learning-based and spatially embedded organisations such as industrial districts and other types of regional clusters, which are situated in a context of interactive learning and supported by long-term, stable organisational networks and institutional frameworks. Projects, understood as 'temporary systems' with 'institutionalised termination' (Lundin and Söderholm, 1995), are not a new phenomenon that has developed as part of the so-called 'new economy'. On the contrary, project organisation has always been present in certain industries such as construction, engineering and the aviation and space sector. If a tendency towards increased importance of project organisation is to be found, is this only taking place in what are popularly called the new economy sectors (IT, bio-tech, media) (Grabher, 2001), or is it related to the more general transformation of the economy from Fordism to post-Fordism? Some studies suggest that firms are becoming increasingly dependent on projects to organise the production of knowledge-intensive and complex products and systems (Gann and Salter, 2000). Thus, if this is the case, it is important to consider - from a research as well as from a policy point of view - whether there is a potential connection between temporary forms of organisations and spatial disembeddedness of learning and innovation, or conversely, whether the use of temporary organisations that span geographical space is a prerequisite for sustained localized learning or is even itself based on this (Asheim, 2002).

According to Alderman (forthcoming), "from a theoretical perspective, [...], it is hypothesized that low volume project-based production will be predicated on networks that span geographic space rather than being locally

focused and that proximity will not be of great importance in learning and knowledge creation". Thus, according to Alderman's (forthcoming) study, "local embeddedness is not a normal outcome". In a study of such traditional project organisations he found that "project networks, however, were in all cases predominately non-local, especially in relation to core technologies and key areas of knowledge. Basic support and supply services, however, could more easily be procured within the local area" (Alderman, forthcoming). This contrasts with the traditional view found in studies of forms of quasi-integration, that oblique quasi-integration of specialised suppliers often benefit from co-location with clients, while capacity subcontractors in a vertically disintegrated supply chain are increasingly sourced globally. Based on this reasoning, Isaksen (forthcoming) argues that specialised suppliers involved in production and other activities that depend on tacit knowledge, face-to-face interaction and trustful relations normally remain in the clusters.

Alderman's cases show that even if access to and acquisition of knowledge is of strategic importance to complex projects, which often would benefit from face to face communications and the transfer of tacit knowledge between actors in projects, proximity is not brought about through a process of spatial embedding, but through the embedding of knowledge in projects, where resources are mobilised on a temporary basis at the project site. However, he concludes that much of this knowledge is not geographically mobile due to its tacit nature and is, therefore, not effectively transferred from project to project. "The socially embedded nature of knowledge limits its mobility" (Alderman, forthcoming). Based on these findings, Alderman argues that "local learning is diminished as learning by doing [...] or making has to be acquired at a distance. Indeed, this is a major area of concern in that the loss of the manufacturing function may ultimately undermine the very sources of the firm's competitiveness" (Alderman, forthcoming). This is consistent with the traditional view that "inter-organisational co-operation is frequently cheaper and faster when it takes place at the local level than at a great distance and when their tacitness make the results less prone to be imitated" (Maskell, 1999, 50).

Grabher is "convinced that projects under the current conditions of increasing demands for customised 'packages' of products and services and a deepening division of labour between firms due to outsourcing and concentration on 'core competencies' have become an increasingly influential organisational practice" (Grabher, 2002, 206). The outsourcing to subcontractors and suppliers as a result of the development from

vertical integration to disintegration in the organisation of production is accompanied by a transition from an internal knowledge base in specific industries or agglomerations to a distributed knowledge base of firms in (global) production systems. In order to acquire a better understanding of the complex interactions and relationships which characterise the innovation processes of firms in different industries within vertically disintegrated (global) learning systems, it would be more theoretically adequate and empirically relevant to apply the perspective of a distributed knowledge base of firms, where the whole value system of a firm or value chain of a product is taken into consideration when the knowledge intensity of a product is determined, or the relevant knowledge infrastructure in support of firms' innovative activities is analysed.

Much of this knowledge intensity enters as embodied knowledge incorporated into machinery and equipment, or as intermediate inputs (components and materials) into production processes of other firms and industries. This demonstrates that "the relevant knowledge base for many industries is not internal to the industry, but is distributed across a range of technologies, actors and industries" (Smith, 2000, 19). The concept of a 'distributed knowledge base' is understood to be "a systemically coherent set of knowledges, maintained across an economically and/or socially integrated set of agents and institutions" (Smith, 2000, 19). By way of an illustration, let us, for example, take a look at the knowledge base of the food processing industry. The core knowledge areas of this industry are food science, including food related chemistry, biology and physics, and food technology, including biotechnology, electronics, instrumentation and engineering. Thus, it might be argued that this is one of the most knowledge-intensive sectors of the entire economy, despite the fact that the industry is classified as having relatively low levels of internal R&D. To make sense of this seemingly paradoxical picture, we have to apply a value chain perspective on knowledge intensity, which shows that many of the sub-sectors of the industry are research intensive industries, such as the advanced materials sector, the chemicals sector, or the ICT sector (Smith 2000).

8.6 Drawing the threads together: FDI, learning interfaces and the transformation of a regional cluster

One way to integrate or link up regional clusters with global value chains is through FDIs. However, the impact and consequences of FDIs should be

analysed within a framework of varieties of capitalism and business systems reflecting differences among national political economies. This analytical framework is applied in the following analysis of FDIs at Jæren, located south of Stavanger in the south-western part of Norway which, although much smaller than industrial districts in the Third Italy, is one of the best examples of an industrial district type development in Norway. Jæren is a regional cluster of specialised production with a traditionally high degree of inter-firm co-operation. This co-operation was until recently institutionalised through TESA (technical co-operation), a competence network that was established by local firms in 1957, based on the presence of social capital, with the aim of promoting technological development among member firms, which were mostly small and medium sized, export-oriented firms producing mainly farm-machinery. This has, among other things, resulted in the district today being the centre of industrial robot technology in Norway with skills in industrial electronics and microelectronics far above the general level in Norway. Main characteristics of the original cluster include a high degree of local ownership and thus local strategic control and relational monitoring, a labour market characterised by high union density, low external mobility and cooperative industrial relations and, of course, a high degree of inter-firm cooperation. Thus, this cluster has traditionally represented a local institutional structure characterised by positive complementarities (i.e. incentives towards long-term strategies arising out of ownership, industrial relations and intercompany relations), and thus distinct and coherent incentives and constraints concerning collective action and strategy.

The regional cluster, which is still very competitive and export oriented, has undergone considerable changes during the last ten to fifteen years due to the globalisation of the world economy. During this period, companies were bought up and transformed into subsidiaries of multinational corporations, thus creating information gaps between strategic decision makers and local firms and linking the latter to foreign systems of corporate governance, while others have grown to be multinational corporations themselves and at least partly attempted to build corporate innovation systems, integrating subsidiaries located world wide. All of the companies in TESA are, thus, more or less affected by the constant drive towards globalisation and "corporatisation" into multinational corporations controlled by external forces with a) potentially minimal focus on regional or local issues, and not least b) potentially a minimal ability to understand and/or take account of how those same issues relate to the competitiveness of their subsidiary.[7] The "corporatisation" was a challenge for the TESA network as an arena for local

inter-firm cooperation. As the member companies become less independent and focus was turned to the multinational corporations, the centrifugal forces in the network become stronger.

ABB's acquisition of Trallfa Robot in 1988, now called ABB Flexible Automation and Europe's leading producer of painting robots for the car industry, was the first major example of FDIs, while Kverneland, one of the world's largest producers of agricultural equipment, is the main example of a local firm becoming a MNC. Today, the company has production facilities in 14 countries and, during the past 10-15 years, bought firms in Italy, Denmark, Germany, the Netherlands, France and Australia. Other examples of FDIs are the Swedish Monark take-over of Øglænd DBS in 1989 and subsequent integration into Grimaldis' Cycleurope in 1995, and the 1998 buy-up of a Jaeren-based industrial group by a British MNC, hereafter referred to as Alltronics Plc.[8] The first and last cases, i.e. ABB and Alltronics, will serve as the main empirical illustrations in the following as they both represent complete opposite cases and as they illustrate differences in TNC structure and strategy representative for a larger survey sample of FDI in Norwegian manufacturing.[9]

The globalisation and corporatisation processes have had considerable consequences for TESA. As a result of the potential tensions between the corporations and their local subsidiaries with respect to control and loyalty, all the firms belonging to, or in alliances with, large corporations which are independent of national or foreign ownership are no longer members of TESA. This means that the TESA network is in danger of being closed down, with potentially negative consequences for economic development in and of the region. The individual firms belonging to national and international corporations have substituted - or at least attempted to substitute - the regional innovation system with corporate systems of innovation as well as with national innovation systems in other countries and international sectoral innovation systems.

Corporatisation might not be a totally problematic development. On the contrary, both the local firms as well as their (often) global markets are undergoing development processes that may necessitate some sort of corporate integration. As noted, the individual firms are experiencing an increased need to focus their activities and thus renew the specialised capabilities which are the only basis for their continuing existence, while a global presence - and consequently the availability of often scale-sensitive, pedestrian resources such as logistics, sales and marketing - increasingly seems to be a prerequisite for continued localised competitive strength.

Furthermore, the TNCs may act as a connection between the individual firm and other knowledge sources - for instance corporate innovation systems or foreign national/regional innovation systems - supplying critical knowledge to increasingly specialised learning processes which neither the national innovation system nor the regional innovation system at Jæren are capable of supporting. However, as learning and innovation to a large extent is based on the interactive innovation model, our theoretical perspectives indicate that the governance structures - and possibly new organisational structures - which are implemented by the TNCs in question will be of critical importance and thus the behavioural characteristics of the business systems which enter the region through FDIs. Consequently, in addition to duress caused by deepening and diverging specialisation paths resulting in functional outgrowth, business system interfaces may cause substantial duress on both individual firms and the regional industrial structure as a whole to the extent that they carry institutional incentives and constraints incompatible with local industrial and intercompany relations.

The most internationally well-known firm at Jæren is ABB Flexible Automation. At the time the locally owned Trallfa Robot was bought by ABB, it supplied around 50% of the European market for painting robots for use in the car industry. If ABB had applied their normal restructuring strategy, the robot production at Jæren should have been closed down and moved to Västerås in Sweden, where the production of handling robots was taking place on a much larger scale. Instead, Trallfa was assisted technologically in the transition from hydraulic to electrical robots, the production capacity at Jæren has been increased considerably and markets expanded to include both the US and Asia. This means that ABB Flexible Automation currently supplies 70% of the demand for painting robots in the European car industry and 30% in the USA. Generally, it is described as the most profitable ABB unit in Norway. The factory at Jæren has been upgraded to a so-called "supplying unit" in the ABB system and the production of other types of painting robots has, in part, been transferred from ABB factories in Germany to Jæren.

Knowledge of robot technology contained within the TESA network initially represented strong region specific 'untraded interdependencies' recognised by ABB as being extremely important (Asheim 1999b), thus explaining the decision not to relocate. The complex synthetical nature (Laestadius 1998) of the activities of ABB Flexible Automation requires the integration of knowledge from such different sources as mechanics, information technology, chemistry and physics. Furthermore, the degree of market pressure with respect to improving the product in a cost-efficient way is high which, in turn,

implies that generating and mobilising knowledge held collectively by the workforce is extremely important. Evidence from the company suggests that its knowledge base now has strong elements of tacit knowledge accumulated collectively and on a broad basis within the workforce. The development of these organisational characteristics, to a large extent based on the existence of a well-functioning organisational community model of the local labour market and high levels of decentralisation and informal coordination among highly skilled workers, seem critical to the competitive strength of the company, and can be seen as highly embedded in a) the regional institutional framework, notably regional industrial relations and b) the capital allocation and evaluation system traditionally applied within ABB (i.e. with less focus on transparency and control of investment decisions)[10]. The company itself regards multi-functionality, cross-disciplinarily and company-specific training in a context of patient capital and long-term employment as being a prerequisite for its competitive strength, strategies for which institutional support is of vital importance (Soskice 1999).

As well as representing the most highly localised or "sticky" form of knowledge and learning - collective and tacit - ABB Flexible Automation illustrates the important interplay between tacit and codified knowledge. Although its sticky knowledge base effectively inhibits the establishment of deep learning interfaces in interaction with other organisations - cooperation with ABB Västerås as well as a few local spin-offs, high-precision/low volume component producers being among the few exceptions - the firm is, however, connected to corporate based networks providing advanced codified and R&D-based knowledge related to different component areas, such as chemistry and physics. Mechanisms that seek to secure the effective absorption of this largely *embrained* knowledge have been implemented and are being continuously improved. However, the interfacing between ABBs knowledge base and external sources is extremely difficult and reflects a general limitation of project-based organisations[11]. Apart from this, sources in the organisation maintain that product development is normally maintained within the existing organisation - without the establishment of internal project teams - thus highlighting the innovative dynamic of embedded firms and the problems of creating interfaces with external knowledge sources which are not part of its 'social community'[12].

The interesting point to note here is, therefore, that in addition to supplying critical pedestrian resources - logistics, sales and so forth - the stickiness of ABB Flexible Automations knowledge base means that ABBs corporate R&D-system only supports - and only can support - the learning processes of

ABB Flexible Automation through superficial although critical and corrective interfacing. Thus, asymmetry exists in that ABB Flexible Automation is able to absorb external and often codified knowledge and diffuse it within its own organisation, while experiencing great difficulties in the communication of its own knowledge outwards[13]. This again has important implications with regard to project based organisations, as both ABB Flexible Automation itself and its potential external project partners face problems of knowledge transfer and interactive learning created by the nature of the knowledge base of the former. Thus, knowledge held in embedded firms is extremely sticky in that 'learners need to become insiders of the social community in order to acquire its particular viewpoint' (Brown and Duguid 1991 in Lam 1998a, 33), implying a need for stability that is in direct conflict with the logic of fluid temporary organisations. Hence, as long as the knowledge produced remains specialised and non-substitutable, the organisation will endogenously resist relocation and represent highly place-specific learning.

The relations between the local ABB unit and its corporate headquarters demonstrate the importance of strategic integration and how this is achieved in an embedded firm, implying that knowledge and learning processes are difficult to communicate to a non-functionally integrated corporate headquarter. As long as the local unit can show satisfactory long-term results, it operates under few operational restrictions with a high degree of responsibility decentralised to local management, thus reducing the information gap between strategic decision makers and the learning processes they allocate resource to. This in turn implies that strategic decision-making is based on first-hand knowledge of the organisation and its learning processes, rather than the latter being structured by a need for transparency represented by the former and its external ownership structure and sources of finance. All in all, ABB's origin in the Swedish and Swiss institutional frameworks seems to have shaped the behavioural characteristics of the business system which is well-suited for handling embedded firm structures such as ABB Flexible Automation.[14]

Our contrasting case, a subsidiary of Alltronics Plc, is a high-volume producer of a relatively non-complex and standardised products which, through extensive automation projects in the late 1980s and early 1990s, managed to attain scale-dependent cost advantages superior to competitors in low-cost countries. In this process the willingness of the original owner to allocate resources continuously to learning and high fixed-cost technological upgrading, as well as the competence in the TESA network, played an important role, which resulted in a vital accumulation of specialised, sticky knowledge concerning process development and automation. As the product

in question is durable and replacement demand therefore low, broad market access and deep market penetration was needed to exploit these economies of scale. In the beginning, this was achieved with success through cooperation with external distributors in Europe, Asia and the Middle East. The producer was involved at an early stage in a limited 'outgoing' process by being owned by a holding company that expanded with similar or complementary activities to other places in Norway as well as to the rest of Scandinavia. However, during the 1990s, its distribution system was increasingly integrated with those of its competitors, resulting in escalating transaction costs and reduced market penetration. Thus, the company had to look for a corporate partner that eventually resulted in it being bought by a global corporation which was highly embedded in a liberal market economy framework and shareholder value-oriented system of corporate governance.

In this case, international restructuring necessitated defensive corporate integration, as the problem was one of the availability of pedestrian, scale-sensitive resources. However, the implications for the future development of the company remain unclear, as there seem to be substantial tensions in the interface between the two distinct business systems of the home country and the host cluster. Our data shows that the local company after the take-over has no financial nor administrative leverage to develop processes and new products endogenously and, therefore, that the future development of the firm will be determined exogenously (to this may also be added that the company has no linkages to external sources of knowledge within the corporate system). This indicates a hierarchical governance structure, illustrating what Lazonick and O'Sullivan (1994) call 'value extracting strategies' through prohibiting investments in further endogenous process innovations and hierarchically implementing solutions characterised by our respondent as far below sub-optimal. The TNC in question has moved substantial production volumes to Jæren, but this is motivated solely by a need for efficient utilisation of existing localisation fixed capital through economies of scale and no strategy for renewal of such capital and future value creation at the Jæren plant. The basis of the corporation in an outsider model system of corporate control might, to a large extent, explain why their main goal is expressed as that of maintaining a progressive dividend policy and meeting their obligations towards shareholders and thus why it applies a capital allocation and monitoring system that favour short-term profits and cash-flows at the expense of strategic learning, process innovations and long-term investments in capital equipment. This interface between two quite distinct business systems - one shaped by the Norwegian coordinated

market economy framework in general and the Jæren industrial culture in particular, and one shaped by a liberal market economy framework of the UK - explain why key personnel chose to leave the company after the take-over citing 'cultural differences' as their main reason. Differences in management styles and strategic preferences, profit horizons and industrial relations have isolated this firm from the regional innovation system and created organisational duress which, if left unresolved, may lead to the disintegration of the specialised knowledge held locally and thus reduce the future potential for long-term endogenous development.

Considering this regional cluster in general, several critical developments can be identified. In many cases internationalisation and 'corporatisation' can be seen as a means to increase the companies' global presence through the supply of increasingly critical pedestrian resources such as logistics and sales services, hence strengthening the still locally embedded knowledge-based competitive advantage of firms, rather than as a result of reduced local embeddedness. The outcome is to a large extent determined by the actual strategic and organisational preferences of the corporations in question and thus the characteristics of the business system they represent as well as the characteristics of the governance structure they are integrated into. This affects the ability of individual firms to renew their specialised capabilities. Examples of 'corporatisation' - implying increased competitive strength - include the above-mentioned ABB Flexible Automation, which refers to pedestrian resources such as sales and logistics as the main advantages of corporate expansion, but also the potential for inter-organisational innovative synergies and increased R&D strength. This fact might be concealed by the reduced dependence of the companies on local supplier networks, caused by increasing dependence on economies of scale in component production and the need to utilise specialised capabilities located outside the Jæren cluster. ABB has developed an extensive European based network of long-term relations with component producers, but this does not in itself mean that the local knowledge in the Jæren cluster is 'ubiquitous' or substituted by specialised knowledge bases elsewhere. On the contrary, these restructuring processes must be seen as a pre-requisite for the future development and utilisation of more specialised and sticky knowledge bases by increasing the economic viability of the local learning processes, thereby contributing to the realisation of its actual value. Thus, the inability of the local production system to supply the specialised or pedestrian external resources needed to meet the increasingly global competitive environment faced by the larger and mostly internationally oriented firms in the cluster, implies a change in the

focus of regional cooperation and networking. However, this does not in itself mean that the organisations in question are becoming less embedded in the territorial system and the institutional competitive advantages of the region or nation.

At the level of individual firms and their corporate integration or corporate expansion, the above points towards three critical observations. First, that the duress created by incoming FDIs is, to a large extent, determined by the behavioural characteristics of the corporate governance and general business systems that FDIs serve as carriers thereof, and therefore that our analytical focus should move towards studying FDIs as business system interfaces with a distinct focus on the complementarities between institutional systems and local learning in the host region and financial characteristics and corporate governance at the home region of the parent company. Secondly, the business system perspective should be used to enrich the study of how these multinationals function as knowledge infrastructures constituting learning interfaces between potentially divergent knowledge architectures of different foreign and domestic companies (Lam 1998a), i.e. differences in the how, where and by whom of organisational knowledge creation and accumulation that can be linked to societal differences in industrial relations, finance and education. This perspective highlights both learning and knowledge as institutionally contextualised processes and outcomes and therefore focuses on how institutional divergences (i.e. divergences in incentives and constraints defining knowledge actors and constructing legitimacy, participation and non-participation (von Krogh and Grand 2000, Wenger 1998)), in particular with regard to the structure of industrial relations and education systems, create structural barriers to knowledge transfer that cannot be overcome by formal structures of ownership or cooperation (see Lam 1998a).

Last but not least, and set against the background of a changing global competitive environment, analyses based on the learning economy approach should not focus narrowly on the dynamics of specialised knowledge bases alone. We need to address issues relating to how the productive potential of different knowledge bases are fully realised, i.e. how certain pedestrian resources are critical in this respect and how global, corporate integration or expansion can prove the only way of achieving this. We therefore need to think in terms of both processes of substitution and disembeddedness and in terms of complementarities, synergies and functional support.

8.7 Conclusion

Hence, non-local linkages exist in the form of a) linkages to sources of knowledge (namely projects, strategic alliances and user-producer relations) and support for "ubiquitous" functions and b) linkages to sources of incentives and constraints concerning collective action, organisation and strategy that both originate outside the cluster (again in particular related to foreign corporate governance systems and their implications for corporate strategy), while still having to interact with and complement incentives and constraints within it. When understood in the context of our theoretical framework, what can the experiences of the original TESA firms tell us about the importance and limitations of such linkages?

The first question concerns the relationship between, on the one hand, local learning and thus endogenous development and the place-specificity of competitive advantage and, on the other, potential forces of fragmentation acting upon this structure, notably the establishment of international project teams, raising the question of where its resulting knowledge is accumulated and appropriated and how and where the formation of international strategic alliances and international user-producer relationships takes place. The question we need to ask is whether such development tendencies are a necessary prerequisite for local learning, or whether they contribute to disembeddedness or ubiquitification of the specialised knowledge of firms in the region?

Our data clearly indicates that specialised knowledge and related learning processes remain locally embedded, while representing a change in the embeddedness from local system embeddedness to local organisational embeddedness (i.e. from the TESA structure to individual firms). We have identified a process of divergent specialisations among the cluster firms, which has resulted in their knowledge becoming increasingly organisationally embedded and thus embedded in their respective labour forces, as opposed to being regionally embedded within inter-organisational cooperative arrangements. This increasing organisational embeddedness of knowledge, illustrated in particular by ABB Flexible Automation, in turn results in asymmetries in temporary organisations and other attempts to link organisational knowledge bases to outside sources of knowledge. According to ABB, and as highlighted theoretically by Wenger (1998), the organisation may very well learn from individual "visitors", but the scope for communicating knowledge outwards is limited as a result of the properties of their knowledge base which, in turn, limits the scope for interactive learning. This

is not to belittle the role of linkages to outside sources of knowledge, but simply to highlight that the relative importance of local versus non-local learning is a question of core learning processes versus complementary or corrective learning interfaces, not a question of non-local learning substituting local learning and definitely not a question of non-local accumulation of knowledge and thus control of core competencies, substituting local accumulation. Core competencies remain - to the extent that systems of corporate governance allow such - embedded in the experiences and competencies of the dedicated workforces of these firms.

This brings us to the next issue, namely linkages or interfaces between different "business systems" created in particular by the presence of foreign ownership in the region. The evidence from Jæren clearly indicates how foreign ownership per se is less problematic than foreign strategic control, as the latter imply both a large information gap and a potential tension between host and home institutional incentives and constraints (e.g. in the case of Alltronics Plc a tension between shareholder value-oriented corporate governance and local industrial relations) concerning strategy and the definition of legitimate participation and legitimate interests. To sustain local learning processes, a certain degree of local strategic control is critical, as the information gap between decision makers and their subsidiaries otherwise easily translate into local learning processes becoming subordinate to corporate demands for transparency and - depending on the external governance system of the parent company - short-term profitability. Thus, since "outsider system" corporate governance easily creates internal systems of monitoring and capital allocation which are heavily influenced by its business system and since these systems carry strong incentives towards transparency and constraints as to local financial autonomy, FDIs originating in such external systems of corporate governance represent potentially stronger destructive forces with respect to sustained local learning compared to FDIs originating in systems of corporate governance with less focus on transparent resources and values. The contrast between the subsidiaries of ABB and Alltronics Plc clearly illustrate this dynamic. Hence, there are two dimensions since local strategic control emerges as a prerequisite for sustained endogenous learning, not least because the willingness and ability of foreign owners to allow for local strategic control is restricted and permitted by their own business system's national embeddedness.[15]

When foreign ownership creates abundant supplies of patient capital and the actual use of this capital is determined by local strategic management, as in the case of ABB, foreign ownership can vastly improve the competitiveness

of local firms by enhancing and supporting local learning. This also applies to other resources than capital. The experiences of all foreign-owned firms in this region illustrate how the availability of pedestrian resources such as logistics, sales and marketing, etc. are of vital importance to their development. In this perspective, foreign ownership emerges as a catalyst of *sustained* localised learning.

Again, with regard to both our two main issues, we need to think in terms of complementarities, "synergies" or interplays rather than oppositions. Local learning processes can be complemented by foreign ownership to the extent that this ownership allows for investments that by their interplay with the local institutional context and industrial structure emerge as 'value creating' - i.e. supporting or correcting the logic of knowledge exploration and exploitation in which they initially invested. Similarly, non-local learning interfaces are essential as firms increasingly find themselves in need of specialised high-end knowledge. However, these learning interfaces complement and reinforce rather than substitute whatever goes on locally - such as inter-firm learning or in-house organisational learning embedded in the labour force. Temporary organisations - both local and transcending geographical space - are part of this picture, but in attempting to understand their role it is important to remember how they - by their temporary character - are unable to accumulate knowledge and also how they primarily link individual knowledge for a certain amount of time, rather than link collective knowledge and thus create organisational idiosyncrasies. Whereas both these barriers may be overcome when temporary organisations are locally embedded and linked to an occupational community labour market that serves as a unit of accumulation, as Lam (1998b) argues, temporary organisations that span social spaces will easily be characterised as superficial interfaces between individual specialists removed from their home communities in which their knowledge is developed. ABB Flexible Automation might perhaps be a good illustration of this, as there is a perfect 'formal' logic for their establishment of learning interfaces towards a broad range of scientific and industrial communities. However, in relation to their use of external specialists, they still maintain that "...people have to be here for a long time, they have to sit on top of each other in order to contribute". When they contribute, they do so but at high transaction costs and mainly as individual experts, not as carriers of organisational knowledge and this contribution is highly asymmetrical as the organisation in which they are visitors - or "legitimate peripheral participant" to use the terminology of Brown and Duguid (1996) - clearly gains more in terms of knowledge than does the home community of the experts.

Leaving firm level implications aside, there is however no doubt that there are negative implications for the regional cluster. Established local inter-firm networks are broken as firms substitute them with non-local ones, reducing the ability of the region to accumulate externalities related to transactions within the network. Moreover, the general process of specialisation and deepening cognitive focuses within the individual firms that necessarily result from international competition further reduces the ability of the local network itself to generate and accumulate knowledge externalities and "untraded interdependencies" resulting from cluster firm activities and use them as inputs in a continuing process of industrial renewal and innovation. Thus, as regional cognitive focuses increasingly diverge, as a consequence of firm specialisation and thus as an inevitable result of the natural development paths of firms exposed to international competition, the scope for local inter-firm interactive learning is reduced dramatically. This in turn reduces the general level of system integration at the regional level and thus the ability of this system to contribute to new firm formation. Firms, however, may very well remain tied to their location through their dependence on collective knowledge held by the workforce. Hence, they are dependent not on the functional resources of the region (i.e. user-producer interaction) but on the institutional foundations that enable a certain capital-labour relationship and the resulting specialised knowledge held internally within the firm.

Notes

1 This conceptualisation of regional innovation systems corresponds with the one found in Cooke et. al (2000). In their words any functioning regional innovation system consists of two sub-systems: (i) the knowledge application and exploitation sub-system, principally occupied by firms with vertical supply-chain networks; and (ii) the knowledge generation and diffusion sub-system, consisting mainly of public organisations.

2 According to Amable (1999) it is important to distinguish analytically between different mechanisms for coordinating and regulating collective action, i.e. notably institutions and conventions. As argued in Grønning et al (2003), institutions can be seen as structural incentives and constraints, independent of actual actors holding positions within the structure, whereas conventions can be seen as developed and carried by such specific actors.

3 Numerous authors have presented research emphasising both the importance and enduring geographical divergences of incentives and constraints regulating collective action. These include Richard Whitley and his concept of business systems, as well as Robert Boyer and Bruno Amable with the concept of 'social systems of innovation and production' (Amable 1999). The central common characteristic is a focus on complementary mechanisms of

coordination, i.e. the structure of collective action in general - for instance between individual companies, capital and labour - and to what extent different sub-systems of coordination counteract or complement each other.

4 While Soskice (1999) distinguishes between coordinated and un-coordinated market economies, Hall and Soskice (2001) distinguish between coordinated and liberal market economies, thus accepting that market coordination (liberal systems) should not be equated with a lack of coordination (un-coordinated economies). Hence, this must be understood as a distinction between degrees of relational versus market coordination, not a distinction between coordination and non-coordination as the market - from a conceptual viewpoint - is a coordination mechanism equal to others.

5 A distinction that could be framed as "insider" versus "outsider" systems of corporate control (Herstad 2004), thus highlighting both differences in revealed commitment of owners, how strategic influence is exercised and the knowledge this influence is exercised on the basis of (i.e. insider information and related accumulated experiences versus public information made available in markets for corporate control)

6 Dosi defines "untraded interdependencies" as "a structured set of technological externalities which can be a collective asset of groups of firms/industries within countries/regions» and which represent country- or region-specific «context conditions» of fundamental importance to the innovative process (Dosi, 1988, 226).

7 I.e. monitoring and evaluation systems based on transparent value proxies rather than personal networks, reputational effects and a general understanding of the local industrial dynamic imply standardised governance structures and strategies insensitive to the local social specificities on which the knowledge and learning processes of the subsidiary initially rested.

8 This is a fictitious name. Respondents of this firm have been promised that no direct reference to names of parent company, subsidiary or themselves will be made.

9 Herstad (forthc.) is based on interviews with 14 foreign-owned manufacturing firms, covering 17 TNC owner firms.

10 I.e. the lack of exposure to pressures to move towards short-termism, liquidity and transparency generated by market-coordinated systems of corporate control that has traditionally characterised ABB by its embeddedness in the Swedish and Swiss systems of corporate control and its conscious strategy, maintained until recently, of seeking to avoid such influences (Ruigrok and van Tulder 1995).

11 Our respondent indicates that it is extremely difficult to establish and manage well-functioning project teams when individuals outside the organisation are meant to contribute substantially, see next note.

12 As argued by Wenger (1998) and illustrated by ABB Flexible Automation, the problem of creating interfaces between learning communities must be understood both as a problem of creating social structures of legitimacy and thus access, as a problem of creating mutual understandings based on divergent experiences and thus reference frames and as problem caused by at least one of the knowledge actors necessarily being removed from the community within which its knowledge is embedded and learning processes structured.

13 These findings correspond perfectly with the findings in Lams (1998a) intensive analysis of a high-technology corporate venture between a British and a Japanese firm. Inter-organisational learning proved extremely difficult due to divergent approaches to learning and divergent knowledge accumulation and, while the Japanese team seemed able to absorb

some knowledge from the British team, the British team proved incapable of absorbing knowledge from the Japanese team.

14 For instance, the corporation has until quite recently consciously avoided exposure to international equity markets (Ruigrok and van Tulder 1995) and an interesting future research agenda would be to trace how ABB's financial structure has influenced its international behaviour.

15 I.e. this is not to say that local strategic control, or the lack of such control, necessarily emerge as a result of incentives and constraints pulling in either one direction, put simply to highlight the structural constraints actors, in this case parent companies, face in defining strategy and structure.

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9 Delirious Rotterdam: The Formation of an Innovative Cluster of Architectural Firms

Robert C. Kloosterman and Eva Stegmeijer

9.1 The creation of a cluster[1]

In April 2000, Rem Koolhaas became the first Dutchman to win the prestigious Pritzker Architecture Prize. Although the award was, of course, primarily for his fascinating oeuvre, Koolhaas was also explicitly honoured for his influence on an entirely new generation of Dutch architects who emerged onto the national and international scene after 1985 (Lootsma, 2000). According to the chairman of the jury of the Pritzker Prize, J. Carter Brown, Koolhaas is "The leader of a spectacularly irreverent generation of Dutch architects" (*Architecture Week*, 2000; see also Lampugnani, 1989: 245). A large number of those revolutionary architects had worked at Koolhaas' *Office for Metropolitan Architecture* (OMA) in Rotterdam. The 'OMA reference' turned out to be extremely important for architects such as Kees Christiaanse, Winy Maas, Jacob van Rijs, Christiaan Rapp and Willem Jan Neutelings. In the meantime, they have themselves acquired international fame (Colenbrander, 1995). The home base of a lot of the OMA *Nachwuchs* is still Rotterdam and it seems that we are witnessing the emergence of a spatial concentration of internationally renowned architectural firms there.

Cultural industries, to which architectural firms belong, generally display a notable tendency towards spatial clustering (Scott, 2000; 2004). In the cultural industries, we typically find relatively small companies which rely on specific high-quality knowledge and which, in addition, have to deal with rapidly fluctuating demand. They are, therefore, dependent on a localised labour pool that enables them to find the specific labour they need at the right time. In cultural industries, we also find the other two Marshallian forces of economies of agglomeration at work (cf. Phelps and Ozawa, 2003): the development of dedicated suppliers and the creation of an "atmosphere" conducive to particular economic activities. This latter driver of spatial clustering is especially important when dynamic economies of agglomeration, which are geared towards continuous innovation and aimed at competing on

R.A. Boschma and R.C. Kloosterman (eds.), Learning from Clusters: A Critical Assessment, 203–224.

unique qualities of products, are more important than static economies of agglomeration which are aimed at cost reduction to get the edge in markets dominated by price competition (cf. Capello, 2001).

The creation of the specific but rather elusive local atmosphere ("it's in the air") is contingent on the development of locally-rooted institutions which, for example, contribute to the reproduction of high-quality work, stimulate knowledge transfer or spillover, or help to refine and articulate a critical demand as in the case of competitions or specialist journals. The development of such a set of interdependent dedicated and localised institutions can be understood as a *path-dependent process* whereby the competitive position of a certain local cultural industry is continuously being reproduced, sometimes for a very long time. The centuries-long dominance of *haute couture* from Paris is one example (Storper, 1997).

The question is whether we are now witnessing, in a similar way, the creation of a cluster of (internationally renowned) architectural firms in Rotterdam? Below, we offer a tentative and positive answer to this question. Our analysis consists of the following components. First, we will examine the importance of Rotterdam as a site for architectural firms. We start with an indication of the quantitative importance of architectural services in Rotterdam in terms of employment based on national data. We then try to ascertain empirically whether the surprisingly strong position that Rotterdam has in the Netherlands with regard to employment in architectural services is also linked to innovative capacity (section 9.2). After all, from an economic point of view, it is crucial that local cultural industries are able to innovate in order to cope with the competition. As we cannot rely on patents as an indicator for innovativeness in architectural services, we try to assess the innovative nature of individual firms by looking at the amount of attention they get in (top) architectural journals. Thirdly, we provide a very brief analysis of the (local) trajectory of institutional embedding from the theoretical perspective of path-dependency in section 9.3. (Pierson, Mahoney, 2000). This part is based on literature and on interviews with key persons.[2] We conclude (section 9.4) by hypothesising that a contingent combination of, on the one hand, the development of strategic local institutions and, on the other, the appearance of a crucial actor, namely Rem Koolhaas, has lain the foundation for a cluster of trend-setting architectural firms in Rotterdam.

9.2 Rotterdam as a centre of architectural firms

Measuring the economic importance of cultural industries-certainly at a lower spatial scale-can be difficult. Cultural industries are hard to define and even harder to distil from standard classifications used in socio-economic statistics, as these are not sufficiently geared to this new approach. In a first exploration, we selected eight separate industries which were evidently focused on producing goods and services with a high symbolic or aesthetic content (Kloosterman, 2004). These eight industries are: publishers; architectural services; advertising; movie and video production; radio and television programme production; performing arts; news agencies and journalists; and libraries, museums and nature protection.

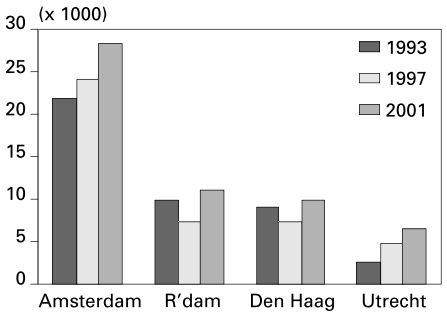


Figure 9.1 Number of jobs (x 1000) in selected cultural industries in the G4 in 1993, 1997 and 2001

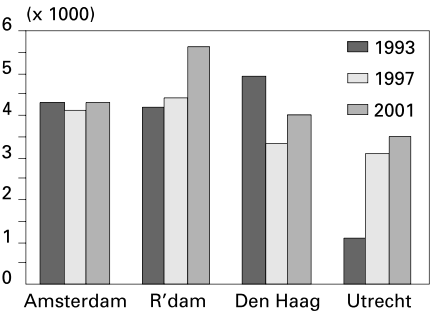


Figure 9.2 Number of jobs (x 1000) in the architectural services in the G4 in 1993, 1997 and 2001

Source: Kloosterman, 2004.

Figure 9.1 shows the extent of the total combined number of jobs in these industries in each of the four largest cities in the Netherlands (G4). Amsterdam is without any doubt the cultural capital of the Netherlands. In 2001, fewer people (27,100) were employed in the selected industries in the three other cities together than in the capital Amsterdam (28,200). If the numbers are divided according to the individual industries, we see that this applies to almost all industries (Kloosterman, 2004). This pattern, whereby one city dominates the national cultural landscape can also be found in the United Kingdom (Pratt, 1997). This dominance by one city seems to point towards interlocking mechanisms between several cultural industries. These mechanisms might consist of being part of the same value chain, dependent on the same set of customers,

looking for the same sort of *milieu* where highly skilled creative labour wants to work (Zukin, 1995; Florida, 2001), and thriving on the same institutions (educational, informational, and socio-cultural). Having one dominant cultural capital, however, does not stand in the way of the possibility that other places may excel in one particular cultural industry. In the Netherlands, the glaring proof of this point is architectural services in Rotterdam (see Figure 9.2). In this cultural industry, Rotterdam is clearly the frontrunner with no less than 5,600 employees in 2001 or 1.6 percent of the total Rotterdam working population (nearly twice as much as the share in Amsterdam).

However, the economic significance of a cultural industry cannot be specified purely in terms of employment. The importance of a specific industry, cultural industries included, is determined to a considerable degree by its innovative capacity. This certainly applies to a sector such as architectural services where innovative concepts play a crucial role in creating a competitive profile. The competitiveness of firms can be achieved in basically two ways (Porter, 2001). The first way is by being efficient in terms of the unit output per man-hour or unit of capital employed. The second way refers to adding to the value of the product by increasing its qualities (uniqueness, features, gadgets, image).[3] This latter strategy of increasing competitiveness is much more relevant to high-end cultural industries as these are not geared towards churning out standard products with more efficiency but instead aim to create temporary quasi monopolies by coming up with unique (or apparently unique) products. Continuous product innovation then becomes a sine qua non for cultural industries in advanced economies.

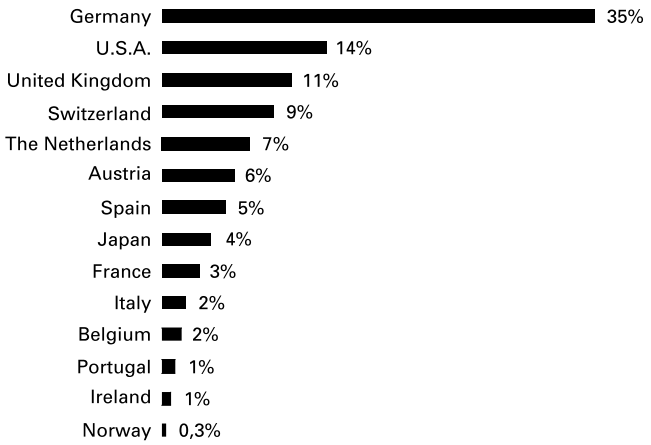
In manufacturing, innovativeness is frequently measured by looking at the number of patents. This kind of measurement has a strong technological bias (apart from underestimating the intricate social processes of how patents are issued which may differ from country to country and from sector to sector). According to den Hertog et al. (2003), a narrow focus on "new technologies embedded in renewable vintages of machinery" does not capture impact of innovation in services where non-technological innovations in organisations, marketing and products play a key role in boosting competitiveness (cf. van der Aa and Elfring, 2002). They call this the "soft side of innovation". Kloosterman (2004) reaches the same conclusion for cultural industries (which are for the most part services) labelling these breakthroughs as conceptual innovations. This approach is much more in line with the broader, original concept as developed by Joseph Schumpeter (see also Drucker, 1993). The lingering emphasis on machinery and patents in innovation research and policies is perhaps still a legacy of the industrial era.

The soft side or conceptual form of innovations in services in general is much less liable to be patented because of its more intangible nature. Neither can forms of product innovation in cultural industries, in terms of colour palettes, styles, imagery and plot lines be easily claimed as intellectual property. Patents are hence not very useful as indicators of innovativeness in cultural industries.

This also holds true for architecture whereby (stylistic) innovations are only very rarely translated into patents. Fortunately, architectural services constitute an economic activity in which those involved are rather preoccupied with presentation (including self-presentation). They are part and parcel of a wider *milieu*, which includes a wide range of architectural critics and experts, where continuous discussion on the latest architectural designs is highly institutionalised. This institutionalised (and - thankfully - widely publicised) capacity for self-reflexivity helps us to identify innovative architectural firms. Specialist architecture magazines can, therefore, give us a peer-review opinion on which firms are innovative. This indicator is, of course, not without its shortcomings. Other selection mechanisms than sheer innovativeness also determine which firms will be discussed and which not. Certain styles tend to be largely ignored by critics and journalists. An oft-heard criticism of architecture magazines is levelled against their exclusive focus on modern(ist) architecture, while neglecting other styles such as retro[4]. Furthermore, a journalist might also be influenced by proximity: if a new building is constructed within his or her own city it is much more likely to get attention. Lastly, we also expect that the Matthew effect will come into play and this will benefit already famous architects instead of newcomers.

Notwithstanding these shortcomings, we do think that the fact that a certain architectural firm is referred to in these architecture journals gives some indication of its innovative capacities. First, it would be difficult for all journals to ignore persistently an innovative style that is making waves in the architectural world. Moreover we made use of a number of (international) journals so that some of the biases of individual journals (and journalists), with their own orientations and tastes, are cancelled out. Looking at which architectural firms are written about in leading publications therefore allows us to gain an insight into the innovative power of the various architectural firms. Some of the work has already been done in the form of rankings of architectural firms which are already published on a regular basis.

Strategic rankings of international architectural firms can be found on the (German) website of *BauNetz* (2004). These are based on references to architectural firms in a number of important international journals in the



Source: Calculated by the authors on the basis of BauNetz, 2004

Figure 9.3 International distribution of architectural firms in BauNetz Top100 January up to and including June 2004

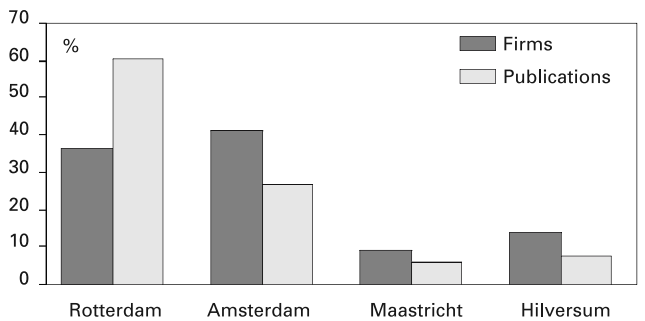
field of architecture and design. Our assumption is that these references can be read as an indicator of innovativeness since they refer to novel or path-breaking designs. Several German journals have been used to construct these rankings (*Bauwelt*, *Baumeister*, *DBZ*, *DB*, *Detail*, *Wettbewerbe Aktuell*), as well as some important foreign ones (*Architecture*, *Architectural Review*, *A+U*, *Werk Bauen und Wohnen*, *Domus*). The rankings are subject to specific rules applied by *BauNetz*. First, only architectural designs less than ten years old are taken into account. Secondly, the score of points of firms is related to the number of pages devoted to those firms. More pages mean a higher score but this score is calculated in a way that resembles the law of diminishing returns: the higher the number of pages, the less they contribute to the score. Thirdly, the final number of point is also related to the "information thickness" or status of the journals: a multiplication factor 1 is awarded to publications in *Wettbewerbe Aktuell*, a factor 2 to publications in *Bauwelt*, *Baumeister*, *DBZ*, *DB*, *Detail* and finally a factor 3 to references in *Architecture*, *Architectural Review*, *A+U*, *Domus* and *Werk Bauen und Wohnen*.[5]

Most of the rankings constructed by *BauNetz* are focused on German architectural firms. The most useful ranking for our purpose, however, is the so-called *International Top 100* and we use this as the basis for our innovation indicator. In Figure 9.3 we have calculated the average shares of countries of origin of the architectural firms in the total number of references in the successive BauNetz Top 100s for January - June 2004.

Figure 9.3 shows, first of all, the remarkably large share of German firms. This reflects to a considerable extent the German origin of *BauNetz*. Six of the eleven journals of which the ranking is constituted are of German origin. Chauvinistic as well as practical reasons might clarify Germany's relatively large share. Secondly, the Netherlands are ranked fifth, a relatively high position given the size of the country-though even here we should be aware of a proximity (this time cross-border) bias as other neighbours of Germany (Switzerland and Austria) also show high rankings. Still, being a neighbour of Germany is apparently not sufficient in itself as the ranking of Belgium and the absence of Denmark attest. We conclude, therefore, that the *BauNetz* rankings further underpin the notion that Dutch architectural firms are significant players in the international arena.

Here, we are mainly interested in architects from Rotterdam. Using the *BauNetz* ranking as a point of departure, we have mapped the location pattern of the architectural firms within the Netherlands (see Figure 9.4). In the period January - June 2004, nine different Dutch firms can be found in the Top 100. The ranking of January/February contains seven Dutch firms. In March/April the number of Dutch architectural firms has grown to eight, to be reduced to seven again in May/June. For the period as a whole, Amsterdam makes the largest contribution with nine firms, closely followed by Rotterdam with eight firms. Hilversum and Maastricht have lower scores with respectively three and two firms, enumerated for the different months.

We have also, on the basis of the *BauNetz* ranking, created a weighted distribution of the importance of the locations within the Netherlands. This weighting takes the importance of the firms cited into account by using the



Source: Calculated by the authors on the basis of BauNetz, 2004

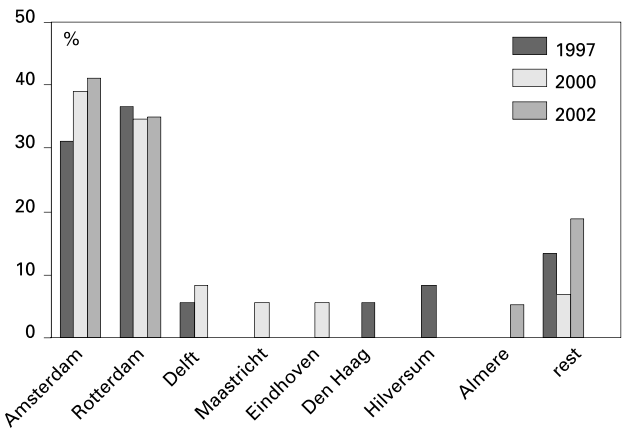
Figure 9.4 Distribution (of number of firms and publication thereon) of Dutch architectural firms in BauNetz Top100 January - June 2004

number of pages per publication devoted to an architectural firm. By taking the number of pages into account, instead of just the position in the ranking, a more accurate indicator of the innovativeness of these firms results as the number of pages reflects the attention of the journals.[6]

Figure 9.4 shows the share of locations of Dutch architectural firms in the total amount of points awarded to Dutch firms. Judging by the *relative importance* of the firms, Rotterdam clearly stands out in the *BauNetz* ranking. Firms located in Rotterdam generate no less than, on average, sixty percent of the total points awarded to Dutch firms in the *BauNetz* rankings. The other cities are less relevant in the weighted distribution and Amsterdam comes second with 29 percent on average. Therefore, the *BauNetz* Top100 rankings not only show the international significance of Dutch architectural firms in general but of those in Rotterdam in particular.

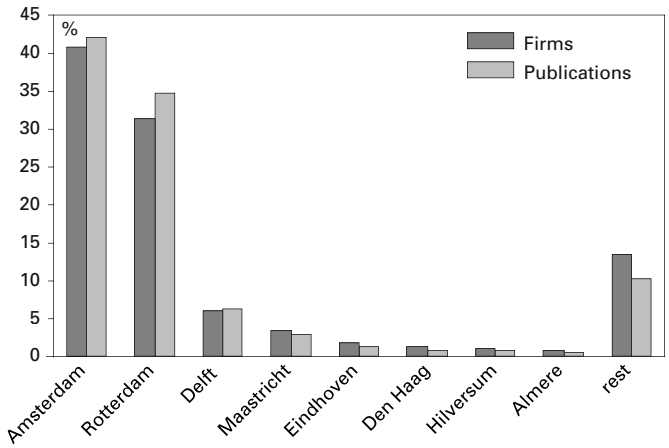
We also possess Dutch rankings that are highly similar to the *BauNetz* rankings. The website *Architectenwerk* has, since 1997, published a Top 40 of the (firms of) architects that are referred to most frequently in the magazines *Archis*, *De Architect*, *Bouw* and *Detail in Architectuur.*

We have ascertained the place of business (in so far as this is located in the Netherlands) of each of the chosen architectural firms in order to determine the relative innovative power of the various locations. The distribution over the 'place of business' variable in the different years is shown as a percentage of the



Source: Calculated by the authors on the basis of Architectenwerk *Top 40, 1997, 2000 and 2002*

Figure 9.5 Distribution of architectural firms (Architectenwerk Top 40: years 1997, 2000 and 2002) across 8 selected cities (2 or more firms) and the rest of the Netherlands



Source: Calculated by the authors on the basis of Architectenwerk *Top 40, 1997, 2000 and 2004*

Figure 9.6 Weighted distribution (Architectenwerk Top 40: years 1997 - 2002) across eight selected cities and the rest of the Netherlands of architectural firms and publications thereon

total number of references. Towns with two or more firms are then processed separately in the graph, together with a residual category (see Figure 9.5).

Amsterdam and Rotterdam are head and shoulders above the other cities as the locations of innovative (firms) of architects. Despite the smaller number of employees in architectural services in Amsterdam, the capital is apparently just as innovative as Rotterdam. Another striking aspect is that the two other G4 cities - Utrecht and The Hague (Den Haag) - barely feature. Den Haag is very well represented as regards employment (see Figure 9.2), but not when it comes to innovative capacity. The extremely strong spatial concentration is also remarkable. In the period 1997-2002 there were a minimum of three and a maximum of five cities with two or more selected architectural firms in the Top 40.

The distribution over the different locations was also analysed for an average of six years. The number of firms per location was divided by the total number of firms that year, aggregated for the various years and then divided by the number of years. This reveals the share per location (in percentages of the total number of firms referred to in the Top 40) of the architectural firms established there during all years (see Figure 9.6). A similar analysis can be made of the number of times that the firm in question is quoted in the magazines referred to. Here a weighting has been applied as a correction for

the number of pages on which a certain architect is referred to per article. The total number of weighted points due to publications on firms in a certain city is then expressed as a proportion of the total number of (points due to) publications on firms in the Top 40.

In addition, if one looks in this manner at the importance of the places of business, Amsterdam and Rotterdam appear to be very dominant with three-quarters of the total number of publications. Given the close proximity and

Source: Architectenwerk, *2004 (edited by the authors)*

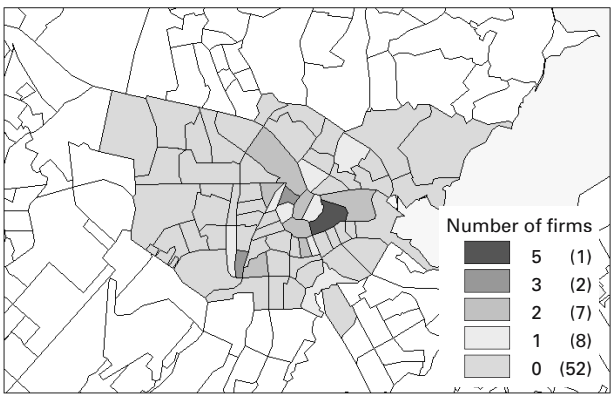
Map 9.1 Distribution (Architectenwerk Top 100: years 1997 - 2002) of architectural firms in the Netherlands

the strong links between the Faculty of Architecture at Delft University of Technology and the Rotterdam architects, one could make a case for including Delft in the Rotterdam data. Doing so would put the two cities more or less on an equal footing. Map 9.1 shows the dominance of Amsterdam and Rotterdam architectural firms in the rankings of the *Architectenwerk* Top 40.

The almost equal importance of both Amsterdam and Rotterdam according to this Dutch ranking (Architectenwerk) seems somewhat remarkable, in view of the obvious dominance of Rotterdam in the German BauNetz ranking. This divergence may be related to the much more international orientation of Rotterdam firms thus qualifying for the much stricter selection BauNetz criteria. Despite employing fewer people in the architectural services than Rotterdam, Amsterdam still manages to hold its own in the field of innovative, controversial architecture. It may be the case that the general climate in the Dutch cultural capital contributes to the innovative power of the architects located there. Rotterdam misses this broad cultural embedding but this isolation also turns out to have a rather splendid side. In the wake of Rem Koolhaas, an ambitious generation of architects has emerged. The other cities-with the exception of modest roles for Delft (Mecanoo) and Maastricht (Wiel Arets)-do not amount to much. The considerable level of employment in the architectural services in The Hague and Utrecht is apparently not, or scarcely, being translated into eye-catching, innovative designs.

9.3 The architectural firms cluster

The above elaboration of rankings makes clear that Rotterdam is not only the most important centre for architecture as regards employment, but also that this port city can be regarded, alongside Amsterdam, as an international centre for innovative architecture in the Netherlands. However, more is required to create a real cluster than just the spatial concentration of innovative employment. A spatial cluster also means that the different companies are linked with each other and other actors by specific functional relationships, which constitute the basis of agglomeration benefits. Those benefits may relate to the possibility of creating a very sophisticated division of labour which leads to increased productivity, a local employment pool of highly-skilled specialised work, a continual exchange of high-quality knowledge which facilitates innovation (spillover) and the presence of a specific set of local institutions which reinforce the matching between supply and demand on sales and purchasing markets and which also contribute to



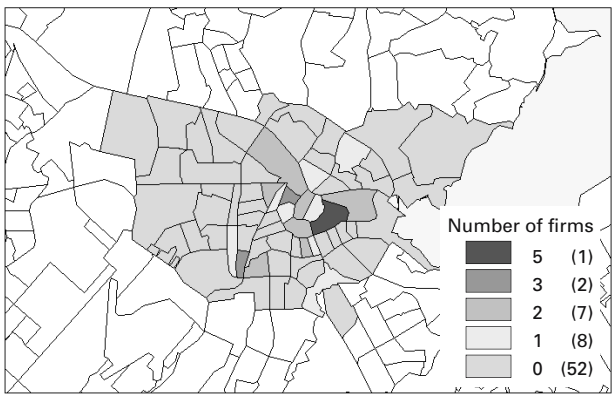
Source: Architectenwerk, *2004 (edited by the authors)*

Map 9.2 Distribution (Architectenwerk Top 100: years 1997 - 2002) of architectural firms in Amsterdam, zip code level

the reproduction and exchange of knowledge and conventions relating to, in this case, innovative architecture (Storper, 1997; Simmie, 2001; Bathelt et al., 2004). The current research focuses on exposing these interdependencies and their dynamism in Rotterdam (and Amsterdam) by interviewing the key actors, i.e. the architects themselves.

Here, we limit ourselves to showing that spatial concentration is not just an inter-urban phenomenon, but also highly salient on an intra-urban level. The intra-urban distribution of innovative architectural firms (those that have been mentioned in the Top 40 of *Architectenwerk*) in Amsterdam and Rotterdam are shown respectively in Map 9.2 and Map 9.3. In both cities, the significant architectural firms are clearly concentrated in a small number of neighbourhoods, especially centrally located ones. In Rotterdam, this pattern is even more pronounced than in Amsterdam. Although we do not yet have any clear view of the implications of this proximity, it is clear that these patterns at least allow meaningful interactions and (un)intended meetings on a frequent base.

From the interviews that we have carried out so far, we already have some inkling of how proximity may help to boost competitiveness of the architectural firms in the Rotterdam cluster. First, there is a localised labour pool of specialised, experienced workers. This pool is partly created by the firms themselves as they recruit young architects from nearby and abroad, who are willing to work long hours for low wages because of the skills



Source: Architectenwerk, *2004 (edited by the authors)*

Map 9.3 Distribution (Architectenwerk Top 100: years 1997 - 2002) of architectural firms in Rotterdam, zip code level

and experience they can acquire. These novices emerge spontaneously-they can visit a large number of famous architectural firms in Rotterdam and show their drawings in the span of just a few days-or they are recruited through connections with Dutch (notably Rotterdam and Delft) and foreign educational institutions at which (as in the case of Koolhaas who is based at Harvard) many already established Rotterdam architects teach. The firms themselves thus transform this partly local partly global source into a localised labour pool, thereby cutting search costs for employers. Most of these young architects are temporary workers who boost the flexibility of the architectural firms in markets where the difference between success and failure in winning a contract can have considerable consequences for the level of employment.

The architectural firms also employ internees on a permanent basis. They tend to switch quite frequently between firms and thereby contribute to a flexible and cheap labour force. The exchange of internees, moreover, also helps to spread all kinds of tacit knowledge throughout the Rotterdam architectural cluster as well as strengthen conventions that contribute to interactive learning, which underpins innovation (Bathelt and Boggs, 2003).

Another significant channel of dissemination of knowledge is partly related to this. Given the localisation of the labour pool and the sharing of a broader *habitus* (educational history, interests, and, ostensibly, dress codes), it comes as no surprise that many of the architects in Rotterdam are not just

close friends but also partners. According to one interviewee, if a Rotterdam architectural firm has been successful in its bidding for an assignment, other firms are very quickly in the know as employees of the winner proudly phone their partners working with other Rotterdam firms to rub the news in.[7] Other types of contextualised knowledge will, of course, also be exchanged between the Rotterdam firms as partners discuss their day at the office at the dinner table. These relationships not only support interactive learning but also help to blur boundaries of firms regarding competencies (Grabher, 2001; Bathelt and Boggs, 2003).

We already have more concrete indications of the institutional embeddedness of these architectural firms. In the first place, one can refer to the presence in Rotterdam of three national institutions dedicated to architecture. The Nederlands Architectuurinstituut [Netherlands Architecture Institute] NAi (established in 1989), the Stimuleringsfonds voor Architectuur [Architecture Promotion Fund] (established in 1992) and the Berlage Institute (first established in Amsterdam, but located in Rotterdam since 2000) form an important triad of institutions that primarily ensure the reproduction of knowledge (archive- and institutional memory function, as well as Master's courses), the exchange of knowledge (exhibitions, lectures, competitions, publishers of books and magazines such as 010 Publishers and the NAi Publishers, promotion abroad) and fundraising (Stimuleringsfonds voor Architectuur). Local clustering of these institutes may facilitate and reinforce networks within architecture because, after all, proximity significantly increases the chance of face-to-face contacts.

This wave of institutional innovation is, incidentally, the direct effect of central government policy. At the end of the Eighties, the central government attempted to boost Dutch architecture (see the policy documents entitled Ruimte voor Architectuur, Nota voor Architectuurbeleid [Space for Architecture, policy document on architectural policy] 1991 and the Architectuur van de Ruimte [Architecture of Space] 1997). Instrumental contributors to this new policy were national architecture institutes (Lootsma, 2000). A decision was taken at that time to establish the above-mentioned institutes in the city because of the earlier initiatives in Rotterdam in the field of architecture, in combination with a strong focus on Rotterdam by the governments of the period (under the then prime minister Lubbers who also hailed from Rotterdam).

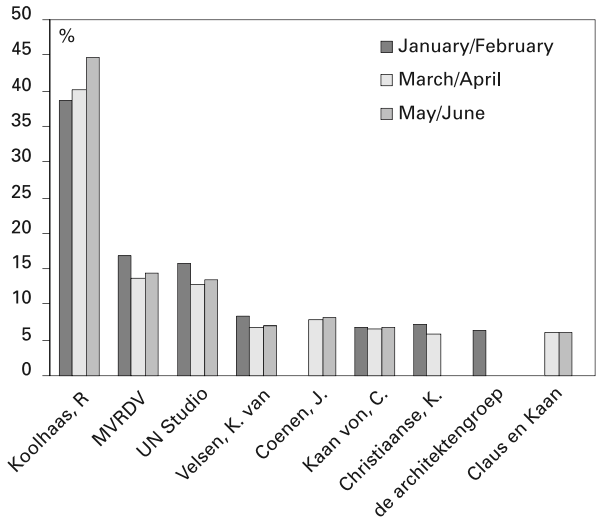
The local desire in Rotterdam for architectural innovation was the result of sheer physical emptiness (due to the war-time bombardment), but also a deeper-rooted positive attitude to experimenting. The predilection for daring

architecture goes back further into history, further even than the Second World War and the bombardment. In 1929, Rotterdam was referred to as "the most American city on the Continent" due to such eye-catching, daring examples of architecture as the café De Unie (1924) by J.J.P. Oud and the world-famous Van Nelle factory (1925-1931) by the Rotterdam firm of architects Brinkman & Van der Vlugt (Halbertsma and Van Ulzen, 2001, 17). Even then, and in contrast to the situation in many other cities, people in Rotterdam dared to provide space for modern-looking constructions. There were certainly opportunities for progressive architects after the Second World War when the centre of Rotterdam was a desolate space dramatically devoid of buildings. The Lijnbaan (1951-1953) by the Rotterdam firm Van den Broek & Bakema is just one example.

Nevertheless, this continuity should not be overestimated. From an international perspective, fewer 'milestones' were realised in the Netherlands and also in Rotterdam in the period 1945-1980 than in the period between the wars (Ibelings, 1995: 92). It was only in the Eighties of the previous century that this situation changed. This break also had a more internal aesthetic reason, namely the dissatisfaction with the movement that prevailed at the time whereby the human dimension was central (with the focal figures being Herman Hertzberger and Aldo van Eyck). No one put the criticism of this into words more succinctly than Rem Koolhaas, who really came from outside the Dutch world of architecture and was even ignored in the Netherlands for quite some time.[8] Originally he built up a mainly verbal and pictorial vocabulary in the field of architecture (for example Delirious New York from 1978), but in the Eighties he succeeded in acquiring assignments (albeit primarily outside the Netherlands in the beginning) and therefore in building up his own vocabulary of realised buildings as well. The standing of Rem Koolhaas can also be gauged from the BauNetz Top 100. The amount of attention that he is able to generate literally towers over that of his Dutch competitors (See Figure 9.7).

His role as initiator and innovator is crucial to an understanding of the creation of an architecture cluster in Rotterdam. The fact that Koolhaas was able to play that role not only has to do with his innovativeness but also with the organisation of his firm. OMA has more of the open structure of a laboratory with which young architects are associated for varying periods of time before seeking employment elsewhere and/or setting up their own firms (often in Rotterdam).[9]

To show the spatial impact of OMA as an incubator for architects and its contribution to the formation of the cluster of architectural firms, we have



Source: Calculated by the authors on the basis of BauNetz, 2004

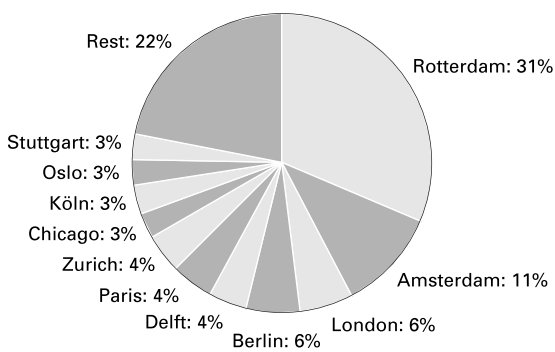
Figure 9.7 Share of firms in the total amount of points awarded to publications on Dutch firms in BauNetz Top100, January/February, March/April, and May/June 2004

looked at the places of work of OMA offspring. Again the predilection of architects for reflexivity in general and that of Rem Koolhaas in particular, helps us out as researchers. In the book *Small, Medium, Large, Extralarge* by Rem Koolhaas and Bruce Mau (1995: xxx - xxxi) a list is given of (former) employees of OMA. Furthermore, we found additional information in the book *Referentie OMA* by Bernard Colenbrander (1995). This allowed us to compile a list of 158 names of former employees of OMA. Surfing the World Wide Web, we have tried to trace their current workplaces. We were able to trace the workplaces of 70 former OMA employees[10]. It turned out that not all of them are still working with architectural firms. Some architects are, for example, teaching at educational institutes. For those persons the location of that institute is listed as the current workplace. Figure 9.8 shows the distribution of the workplaces of these former OMA employees.

The former employees of OMA are now working in 28 different cities, of which 11 cities are home to two or more architects. The *international* character of OMA is evident: less than half of the former employees (48 percent) has a workplace in the Netherlands. The *local* importance of OMA, however, becomes apparent when one looks at the share of Rotterdam: almost a third (31 percent) of the total number of former OMA employees has found

a workplace in Rotterdam. Amsterdam is second in terms of importance as a workplace for former OMA employees (11 percent), followed by Delft (four percent). If we confine ourselves to the former employees who stayed in the Netherlands, more than two third of them are located in the Rotterdam-Delft area. Again, the absence of other large cities in the Netherlands such as The Hague and Utrecht is striking. Foreign cities with a relatively large share are London and Berlin (both six percent), followed by Zürich and Paris (both four percent). With only a few exceptions, the former OMA architects found a job within Europe and, to be more precise, mostly in globally well-connected cities such as London, Paris, Berlin, and Zürich.

The above underlines the crucial role of Koolhaas' OMA. Partly through its open structure and incubator function, OMA has generated a significant spin-off and thus made a real contribution to creating and distributing a very specific habitus for relatively large numbers of architects. Many of them stuck to Rotterdam as the place of work. According to architecture expert Hans Ibelings (1995: 162) it is partly as a result of this that Rem Koolhaas "...developed into a mouthpiece and point of reference of Dutch architecture". To quote Bart Lootsma (2000), Koolhaas' presence signalled 'The Second Modernity' of Dutch architecture with which the Netherlands, and Rotterdam in particular, have created distinct profiles of themselves since the beginning of the 1990s of the last century (see also Lauwen, 2003).



Source: Koolhaas & Mau, 1995; Colenbrander, 1995 (edited by the authors)

Figure 9.8 Distribution of present employers of former OMA employees

9.4 Path creation and path reproduction

The emergence of an architecture cluster in Rotterdam is partly an unintentional consequence of a central government policy that was aimed primarily at improving the aesthetic quality of the structural environment not just in Rotterdam, but also in the Netherlands as a whole. This policy was partly prompted by local aldermen, mostly from the Social-Democratic party, who were looking for new challenges after the first phase of urban renewal had run its course. In an era of city marketing, these challenges were sought in iconic buildings. To this end, institutions were established which were focused specifically on architecture and these were established in Rotterdam. Such initiatives by the government-in cooperation with the Faculty of Architecture at the Delft University of Technology-considerably enlarged the web of possible relationships via which innovative knowledge can be created and transferred. In addition, it is via those social relationships that both partnerships and competitiveness can be deepened and broadened. This has increased the extent to which innovative architecture puts down roots in the Rotterdam environment and also enhanced its viability in the long term.

However, it is certainly not just a question of a lucky and partly unintentional intervention by the national government that has caused the emergence in Rotterdam of a group of innovative architects. The formation of the cluster cannot properly be understood without referring to one highly contingent factor, namely Rem Koolhaas. In this, the Rotterdam architecture cluster strongly resembles the rise of the fashion cluster in New York where people such as Donna Karan and Ralph Lauren were instrumental in perceiving, seizing and creating the opportunities (Rantisi, 2004).

Path-dependent processes tend to move along trajectories where structures-"sunk costs"-are very strong forces as Boschma and Lambooy (1999) have observed. Before a sufficient critical mass is reached and a path-dependent process is set in motion, there is a relatively open window that allows for contingent factors and, hence, also for significant actors who are able to initiate such a process and determine, at least partly, its course in the formative stage. After this window of path creation, dedicated institutions are formed and path reproduction becomes possible (Mahoney, 2000). The creation of a cluster of famous architectural firms in Rotterdam is inherently linked to Rem Koolhaas who directly - and above all indirectly through publications, the setting up of the OMA as a training institute, and his thorough international orientation right from the start-gave form to and distributed innovative architecture.

Our research focuses on analysing the economic importance of cultural industries for urban economies. For Dutch cities in particular it is a source of prosperity and employment. Innovations are not only related to nanotechnology, software or biotechnology. Conceptual innovations in the cultural industries are certainly just as important and, to date, little is known about them. The Rotterdam case offers an insight into the strategic moment of creation of a cluster within the cultural industries. We would like to unravel this moment of *path creation* and the role of the public and private actors further. In addition, we would like to ascertain to what extent *path reproduction* is still taking place. In other words, does this promising cluster in Rotterdam have sufficient critical mass in the sense of numbers of designers and supportive institutions to remain an international trend setting activity in the long term, just as the fashion industry in Paris or the film industry in Los Angeles? This question far transcends the borders of architecture and those of Rotterdam. One reason for optimism is the continued demand for flagship or iconic buildings that are able to put cities on the map in a global era (Le Galès, 2002, Rykwert, 2002). We think that the architectural firms in Rotterdam, supported by dedicated institutions, will also be able to design these buildings in the near future.

Notes

1 This chapter is an updated and extended version of an article that appeared in *Petermanns Geografische Mitteilungen*, 2004:4. Our research is still in progress and a book on the architectural cluster in Rotterdam is planned for 2006. This study is part of larger research project entitled *Spatial Footprints of Path Creation and Path Reproduction; Mapping Processes of Globalisation and Localisation in Cultural Industries in the Dutch Delta Metropolis* undertaken by the Theme Group Economy and Space, AMIDSt, University of Amsterdam. This involves also other cultural industries (such as television, advertising, graphic design).
We would like to thank our colleagues Bart Lambregts and Merijn van der Werff for their help and comments.

2 We have so far interviewed 10 key persons, including spokespersons of architectural associations and journals, and architects.

3 Cf. Michael Porter (2001, 142): "Rising per capita income comes as much or more from driving up the value of products (and the prices they can command) as it does from increasing the efficiency with which generic or standard products are produced"

4 One editor warded off these 'attacks' by pointing at a number of articles on retro architecture for example, interview with Harm Tilman, chief editor Dutch specialist architecture journal *The Architect*.

5 These multiplication factors are determined by the experts of the BauNetz website.

6 The difference between the number of pages devoted to firms at two successive positions in the Top 100 can vary within the ranking, depending on the range and distribution of (sometimes corresponding) scores of the firms. Our weighting corrects for these underlying differences.
7 Interview with Floris Alkemade, project director at OMA
8 At first, Koolhaas was not very successful in getting contracts, especially in The Netherlands. According to Jan Benthem, an influential Dutch architect: "Rem Koolhaas is definitely the best, biggest, and most influential Dutch architect, but he doesn't get the biggest jobs. Why isn't he asked to build a large government building, or an airport or a railway station? It's part of the tradition. The Dutch like things level, to keep the country flat, to keep the landscape flat, to keep the cultural landscape flat. We don't like high peaks." (cited in Winner, 2000, p.82)
9 Interview with Janny Rodermond, (*Stimuleringsfonds voor Architectuur*).
10 Two architects have died and are, hence, excluded from our list of workplaces.

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10 Competitiveness in Regional Clusters. The Case of Océ's 'Knowledge Industry Clustering' Project

Roel Rutten and Frans Boekema

This work is a contribution to the growing body of literature on learning, innovation, networks, knowledge and space. The main argument of this literature is that today's economy can best be characterised as a knowledge-based economy. The argument goes that knowledge and learning are the key to innovation and competitiveness. Furthermore, firms depend on collaboration in networks to access knowledge beyond their control. These networks are argued to have an important spatial dimension.

An oft-heard criticism of this body of literature is that it may present some very interesting theoretical views, but that the empirical support for these views is generally poor. This work answers that criticism by presenting a case study of inter-firm collaboration on innovation in a regional manufacturing network. However, due to its focus on the empirical side, the theoretical part of this study is not very elaborate. Instead, this work assumes that most readers will be familiar with what can be referred to as the mainstream literature (see below) and only touches on this literature briefly. In view of the theme of this chapter, the above approach seems justifiable. Moreover, Jan Lambooy himself has published extensively in this particular field, i.e., Lambooy (2000), Lambooy and Boekema (1998), and Lambooy et al. (2002). This work focuses on the presentation of a case study in order to let the empirical information speak for itself. The empirical information will then be interpreted in the light of the mainstream literature in order both to support and criticise this literature.

10.1 Introduction to the mainstream literature

In the growing body of literature on the knowledge-based economy, five basic elements can be identified: knowledge, innovation, learning, networks and space. As argued, this work will not discuss the mainstream literature. The reader can find such a discussion in many recent publications (e.g., Boekema *et al.* 2000, Grabher 1993, Maskell *et al.* 1998, Morgan 1997, Nonaka and

R.A. Boschma and R.C. Kloosterman (eds.), Learning from Clusters: A Critical Assessment, 225–245.

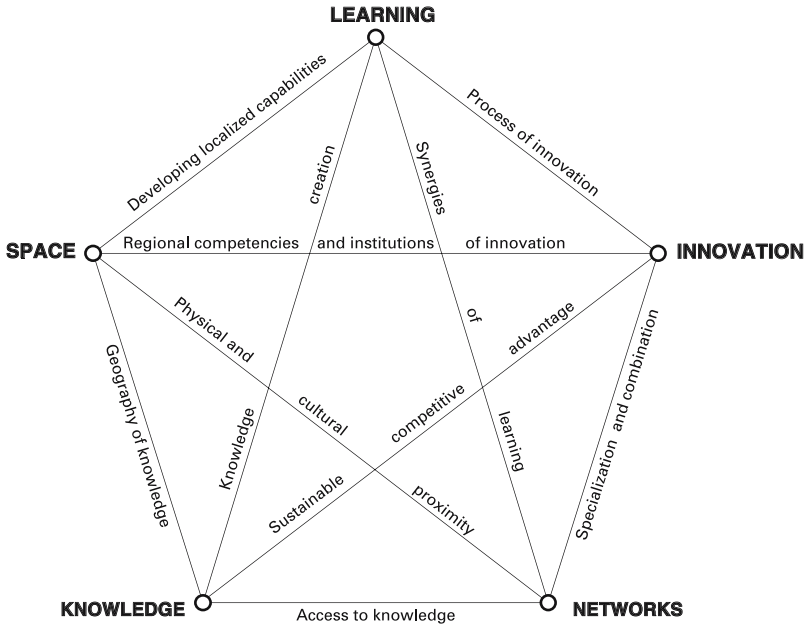

Figure 10.1 LINKS pentagram: Web of relations

Takeuchi 1995, Rutten 2002, Storper 1997, Uzzi 1997, etc.) and, of course, in the present volume. What matters here is a general picture, a birds eye view of the mainstream literature on the basis of the above-mentioned five elements. These elements are presented in Figure 10.1, the LINKS pentagram. The word LINKS is an acronym of the first letters of each of the pentagram's five elements and it indicates that these elements are linked to each other.

Knowledge is at the core of the knowledge-based economy. Economic development is explained in terms of the ability of firms, networks and regions to create, exchange and use knowledge to their advantage. Knowledge, through a process of *learning*, leads to *innovations*. Innovations create competitive advantage. In the knowledge-based economy, innovations are most durable when they are based on knowledge, in particular on tacit knowledge, as it does not easily slip away to competitors. Consequently, (interactive) learning is a crucial process in the knowledge-based economy since it transforms (tacit) knowledge into innovations. The mainstream literature also argues that the knowledge-based economy is a network economy. *Networks* are important for a variety of reasons. Firstly, they are a means for firms to access knowledge that is beyond their control. Secondly, they allow firms to specialise

and thus develop a competitive advantage in selected fields of knowledge as, through networks, firms can access complementary knowledge. In other words, through networks, firms can make new combinations of knowledge from various firms thus making innovation truly a network effort. The third reason, which is closely connected to the previous two reasons, is that networks are helpful for learning as firms are exposed to more and richer flows of information. The final element of the knowledge-based economy is *space*. Space, too, is connected to all other elements. It is connected to knowledge through a phenomenon that is known as the geography of knowledge. This phenomenon says that, in order to exchange tacit knowledge, it is necessary for actors to establish face-to-face communication. In other words, people actually have to meet each other to exchange tacit knowledge. Consequently, distance between them may be a handicap. The more tacit the knowledge, the more proximity becomes an advantage with regard to knowledge creation. Moreover, knowledge creation in networks very often works better when the firms in the network are located close to each other and share a common background. In other words, physical and cultural proximity facilitates the exchange of knowledge. Firms are also more likely to produce innovations in regions where regional competencies and institutions have been developed that support innovation. Finally, learning can result in the development of localised capabilities, the merits of which will benefit firms in regional networks.

The above can be considered, more or less, a synopsis of the mainstream literature. Within the space allowed, this work does two things. First, it discusses the process of knowledge creation and, second, it considers the role of space in this process. In other words, this work highlights some of the relations in the LINKS pentagram, i.e., the relations between knowledge, networks, and space.

10.2 Case Study: The KIC Project

The object of this study is the KIC (Knowledge Industry Clustering) project of Océ, one of the leading firms in the Dutch manufacturing industry. In 1993, Océ initiated the KIC project in order to involve suppliers more closely in the product development process. The objective of Océ was to put more emphasis on the 'front side' of the product development process, i.e., research and development, as that is where it creates its added value compared to, for example, Canon and Xerox. The 'back side' of the product development

process, i.e., the engineering, could then be outsourced to suppliers. On the basis of the above-mentioned specialisation argument, this would allow Océ to make better use of the manufacturing knowledge of its suppliers and thus develop better products. As a consequence, the KIC project placed substantially heavier demands on suppliers as they were now being asked to solve engineering problems for Océ whereas, in the past, they had merely been asked to manufacture as efficiently as possible. The benefits for the suppliers in the KIC project lay in the fact that they could upgrade from 'jobber' to 'co-developer,' or even 'main supplier.' They would learn how to engineer, that is, to compete on knowledge rather than costs. In sum, the KIC network was a big step away from the traditional arm's-length buyer-supplier relations as it required the companies involved to work intimately with each other for several years - the time it took to complete an engineering project. This also changed dependency relations as Océ became more dependent on the knowledge of its suppliers. The KIC project therefore seems to be an example of the knowledge-based economy at work.

The KIC project involved some 40 suppliers organised into 20 clusters. On average, a cluster was composed of two to three suppliers and a representative from Océ. Each cluster worked on a specific engineering project for Océ. The clusters were operative from 1994 to 1998, when the KIC project ended. On average, clusters worked on their projects for two years, meaning that the first clusters had already been dissolved by the time the last clusters were formed. For this study, 14 suppliers in 10 different clusters were interviewed. In addition, 10 representatives of the Océ R&D department who were involved in the clusters were interviewed, as well as four representatives of the Océ management and purchasing departments. For each of the 10 clusters involved in this study, the Océ representative and at least one supplier were interviewed.

Inter-firm knowledge creation in the KIC project

The KIC project focuses on the engineering phase of the product development process. The engineering phase starts when the functional specifications of a product or module have been determined. For example, the stapler inside the copier has to be able to apply a certain number of staples per minute and must be easily accessible for users in case they need to put a new supply of staples in the machine when the old supply has been used up. These conditions determine a number of functions and design specifications, which are the input for the engineering process. In the KIC project, the engineering was carried out by teams (or clusters) of suppliers who would work on the

engineering of a complete module whereas, formerly, Océ engineers would do most of the engineering themselves and then have individual suppliers work on the final engineering of separate parts. Thus, the KIC approach involved the suppliers in the engineering process to a far greater extent and called on their skills and expertise to design something new, rather than on their ability to manufacture a given part as efficiently as possible. The idea behind the KIC project was to involve suppliers in that part of the product development process in which they can offer the greatest added value because of their specialisation. The resulting dependency of Océ on the suppliers is considered a price worth paying if the overall quality of the product development process improves. Although Océ used to be in charge of the KIC network, it left most of the operational management to the suppliers in their various clusters. The objective was to let the suppliers take the initiative so as to challenge them to use their skills and expertise in the engineering process. In practice, however, the Océ engineers played a much more prominent role as, in many cases, Océ had overestimated the suppliers' engineering capabilities. The collaboration between Océ and the suppliers was based on a contract that reflected Océ's position in the KIC network as a central and dominant but not dominating actor. The contract was only a few pages long and allowed for considerable discretion on the part of the suppliers.

The technical aspects of the clusters illustrate how the engineering - and therefore the knowledge creation - took place. For reasons of confidentiality, it is not possible to go into detail about the engineering process, but a brief description of the technical objectives of two of the clusters gives an impression of what the KIC project set out to do. The aim of the discussion is to show the (technical) complexities of the engineering, as this had implications for the process of knowledge creation between the companies involved.

- *Cluster C: TOSUP (toner dosage system).* The objective of this project was the functional development of a new toner dosage system for a new generation of colour copiers. The new colour copier has seven picture-forming units that each have to be supplied with its specific toner. The units hold a small supply of toner and must, therefore, be constantly re-supplied during copying. The dosage mechanism is the heart of the system. The purpose of this mechanism is to supply the picture-forming units with a stable amount of toner from the reservoirs. During this dosing, the toner must not be thermally or mechanically disturbed, as this will change the structure of the toner which, in turn, could cause malfunctions in the picture-forming units.

- *Cluster F: glass transfer cylinder.* The glass transfer cylinder is applied in the warm process functions of the copier. Flanged bearings attach the cylinder to a frame in the copier. Inside the glass cylinder, two halogen radiators are placed as a heating device that can produce various temperatures when the machine is turned on. When the machine is operative, rollers are pressed onto the cylinder and the complete toner image is subsequently transferred to the receiving material (i.e., a sheet of paper). The objective of this cluster was to develop a new, cheaper and more reliable production technology for glass transfer cylinders with improved specifications for the new generation of colour copiers.

From the above discussion it is clear that each cluster involved several 'disciplines.' In the manufacturing industry, a discipline is not understood in terms of a scientific line of inquiry and teaching but as a set of related activities in the field of R&D, engineering and production. Examples of disciplines are sheet metalworking, electronic engineering, glass technology and, increasingly, ICT. Whereas suppliers were used to working with a mono-disciplinary approach - i.e. to carry out a limited amount of re-engineering of an individual part that Océ had designed for them - they now had to adopt a multi-disciplinary approach in order to engineer a complete module based on functional specifications. This involved a substantial degree of knowledge creation between the suppliers, as they had to develop some sort of understanding of each other's disciplines. Otherwise the suppliers would not be able to develop a joint solution to the engineering problem presented to them. In order to achieve this, each cluster had a lead supplier who was responsible for the management of his cluster. Among other things, lead suppliers had to ensure that knowledge creation took place between the engineers involved in their cluster. In addition, every cluster made some sort of distinction between the management and the engineering levels. Basically, the management level was responsible for the formal, contractual side of the projects while the engineers focused on the technical contents. It is important to keep in mind, though, that informal communication often bypassed the formal communication channels. Although the second-tier supplier, i.e., those who were not lead suppliers, were not supposed to communicate frequently with the Océ engineer of their cluster, Océ engineers often found themselves heavily involved in the engineering process.

From a knowledge perspective, a company's ability to master a discipline is at the heart of its competitive advantage. The more a company knows about its discipline and the better it is able to translate that knowledge into

concrete solutions and products, the stronger the competitive position of that company will be. Mastering a discipline therefore involves creating a substantial body of tacit knowledge. As one supplier observed, "induction is a specialisation that cannot be acquired from reading books" (Derix 1998: 44). The difficulty is clear: working together on engineering requires companies to exchange parts of their respective tacit knowledge. The question is, how did they do so? Formal meetings, according to Nonaka and Takeuchi (1995) are hardly the place for exchanging tacit knowledge. In any case, most knowledge was exchanged on the 'work floor,' that is in the interaction between the engineers while they were working on the project and in the informal day-to-day communication between team members. The engineers used various mechanisms to interact with each other, ranging from telephone conversations and electronic data exchange (such as e-mail and facsimile messages) to face-to-face communication. In the latter situation they would often sit around a prototype of their module to experiment with it and to demonstrate what it could and could not do. The fact that engineers could bypass the formal communication channels and directly communicate with each other resulted from the shortening of communication lines in the KIC project. This, the respondents argued, stimulated the creativity that the engineers needed when they have to solve technical difficulties. The ease with which the engineers could discuss matters with one another outside the formal communication channels indicates that the boundaries between the organisations in the various clusters were not an obstacle to knowledge creation. This led respondents to argue that, in the KIC project, more knowledge was exchanged than in earlier innovation projects.

Finally, it is important to notice that many companies acknowledged the need for face-to-face communication with regard to knowledge creation. They argued that electronic communication is ideal to exchange "most of the technical information," but in order to exchange "knowledge and ideas it is necessary to meet face to face."[1] Respondents were not familiar with the terminology of this study, such as tacit and codified knowledge. Nevertheless, their answers speak for themselves. Océ engineers argued that engineering is "a creative process, you have to have your nose on the machine," and that "you cannot put everything in writing." Clearly, Océ engineers considered tacit knowledge essential for the success of their projects. Evidence of tacit knowledge being exchanged in the KIC project can be found in the suppliers' answers, too. One supplier, for example, argued that "a physical confrontation with the product you are working on is important to understand it, to demonstrate how it works." The respondents realised that

codified knowledge (the technical information) requires different exchange mechanisms to tacit knowledge (the ideas). The suppliers in this study often referred to the latter as "looking in each other's kitchen." This shows that engineering is about exchanging and creating tacit knowledge. As much as possible, the companies in the KIC project tried to eliminate barriers that hinder the free flow of knowledge between organisations. They did so by first separating engineers from managers in order to allow the engineers to concentrate on the technical side of the projects without having managers look over their shoulders. Secondly, the model of communication ensured that the exchange of (tacit) knowledge between organisations could take place without organisational structure being a problem.

Results of the KIC project

It is beyond the scope of this study to assess the (technical) qualities of the modules engineered in the KIC clusters and compare them to modules in which no suppliers were involved. Therefore, the analysis will have to be based on opinions of the respondents. A little more than half of them (15, or 54 percent) argued that involving suppliers leads to better engineering. A further 11 respondents (or 39 percent) argued that, in the case of the KIC project, this may not have been the case but it is certainly possible in future projects. The suppliers, they argued, just needed more time to upgrade their skills. Only two respondents (or seven percent) said that Océ might just as well do the engineering without the suppliers and reach the same (or even better) results. In general, this supports the specialisation-and-combination argument as discussed in the above. Looking at the categories of respondents, however, there are some important differences. The Océ engineers were relatively sceptical about the role of suppliers in the engineering process. Their sceptical attitude may, of course, be due to the engineering outcomes actually not being better than if Océ had not involved the suppliers. On the other hand, this was a new experience for the Océ engineers as the suppliers now entered into what, till then, had been their exclusive domain. The suppliers, of course, take a different approach to engineering than the Océ engineers. This is why they were invited to participate in the KIC project in the first place. Whereas the Océ engineers look at engineering from a conceptual point of view, i.e., finding the optimal solution, the suppliers look at it from a production perspective. They are used to thinking in terms of how to manufacture something as efficiently as possible and that is not necessarily the same as looking for the optimal solution from a technical point of view. In other words, the Océ engineers' scepticism may also have been caused by a

different perception of the engineering process. The suppliers overwhelmingly believed in Océ's new approach to engineering: 71 percent (10 respondents) said that engineering in the KIC project had led to better outcomes while the remaining 29 percent (four respondents) believed it could lead to better results in the future. This outcome, too, is not really surprising since the suppliers were asked to assess their own performance. Still, from their perspective, the KIC project did produce better results because now they had the chance to voice their views from an early stage on. Océ engineers, for example, had never considered the possibilities, limitations, tolerances, etc. of a supplier's machinery when designing a part. However, it is this machinery that has to manufacture the parts and the re-engineering that resulted from Océ engineers ignoring the machinery could now be avoided.

Relations with other companies

Knowledge creation in networks largely depends on how well companies work together. This boils down to the issue of trust. In the literature, trust is often associated with long-term relationships (cf. Granovetter 1985, 1992, and Williamson 1993, 1999). However, the relations in the KIC project are peculiarly not long-term. In 50 percent of the cases, for example, no previous relationship existed between the suppliers and the Océ engineer and in only 14 percent of the cases had the suppliers ever worked with each other before (Rutten 2002). Considering the risky and uncertain nature of the KIC project, one would expect Océ to collaborate with established partners and to select suppliers who, also among themselves, have a history of favourable relations. Williamsonian theory, at least, suggests this (Williamson 1993, 1999). Given the absence of long-term relationships, other mechanisms must have provided for the certainties that companies need to collaborate trustfully. Doing a bad job in KIC, for example, would certainly have compromised a supplier's position in the wider context of the sector and regional networks it is embedded in. Moreover, even though the KIC contract did not force the suppliers to perform well, as it did not provide for sanctions, the suppliers were committed, due to their strategies, to making KIC a success. In other words, similar strategies mean similar interests. To pursue their similar interests the companies involved had no other choice than to work trustfully with each other. In other words, the fact that companies depended on each other and needed each other's knowledge to make their projects a success (see the discussion on engineering) seems to have ensured their trustful working together. Ultimately, however, the behaviour of companies in a network is largely determined by the way they perceive their relationships. Perceptions

have to be used with caution in scientific analyses. Nevertheless, they do provide valuable background information and colouring. Océ respondents, for example, argued that they tried to make the relations with the suppliers "as open as possible" and that lines of communication where short. Moreover, they said that, on the engineering level, there was absolutely no patron/subordinate-like relation between Océ and the suppliers. Formally, such a relationship did exist, but in practice there was little sign of it, according to the Océ engineers. The suppliers' perception in this respect corresponded with the Océ view. One supplier argued, for example, that "in the clusters, they had the freedom to do what was necessary to achieve the best possible technical result." This supplier actually says two things: firstly, that he more or less had carte blanche in technical matters, i.e., the engineering part of the KIC project but, secondly, that Océ had a big say in non-technical matters. The supplier in this case appreciated this situation as he was commending the way he did business with Océ on "equal terms." Other suppliers also argued that "we had a lot of freedom," and that "to a large degree, we could make our own decisions." The answers show that both Océ and supplier respondents perceived the relations in the KIC network as favourable. They also show that both sides appreciated these favourable relations and acted trustfully. The construction of the clusters with their short lines of communication and the absence of rival firms supported the development of trust in the relations. Conditions for knowledge creation were, therefore, favourable.

Regional orientation

For Océ, working with regional suppliers on engineering is a strategic choice; it makes communication easier. Remember that the KIC project was intended to upgrade regional suppliers in order to become competent partners for future engineering projects. In other words, Océ focuses strongly on regional-based knowledge in the engineering process. Data from Océ's purchasing department confirms this strategic focus. The total purchasing value of Océ increased from 77 million euro in 1988 to 235 million euro in 1996. This confirms the trend towards involving suppliers more heavily in Océ's operations. Of the purchasing value, 34 percent (or 26 million euro) was allocated to suppliers in the south-eastern Netherlands in 1988. This regional share increased to 45 percent (or 105 million euro) in 1996. At the same time, Océ's purchasing value in the rest of the Netherlands remained fairly constant: almost 21 million euro in 1988 versus 23 million euro in 1996. However, in relative terms, the share of the rest of the Netherlands dropped from 27 percent in 1988 to 10 percent in 1996. The relative shares

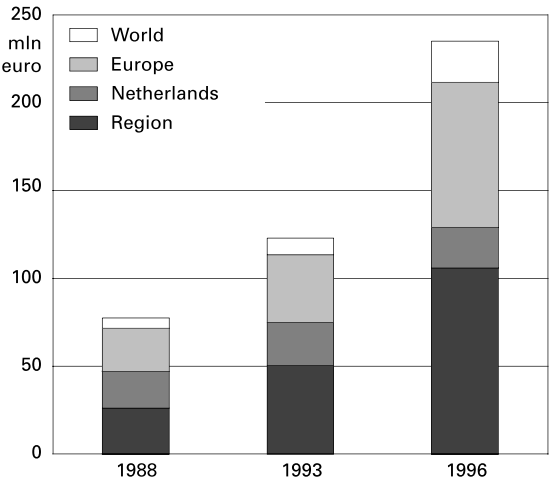

Figure 10.2 Allocation of purchasing per region

of Europe and the rest of the world remained constant. In 1988, Europe accounted for 32 percent of Océ's purchasing value against 35 percent in 1996. The figures for the rest of the world were seven percent in 1988 and 10 percent in 1996 (see Figure 10.2). These figures show that suppliers in the region (i.e., the south-eastern Netherlands) have become significantly more important in recent years, mainly at the expense of suppliers in the rest of the Netherlands.

This shows, firstly, that purchasing became more important for Océ and, secondly, that Océ is focusing more strongly on its home region. The share of regional suppliers is the only one to show a significant increase (in relative terms). The suppliers, too, predominantly have a regional focus. For the majority of them, the south-eastern Netherlands is (one of) the favoured areas to look for buyers, suppliers, and engineering partners. Nine out of 14 suppliers (or 64 percent) have a high regional orientation, which means that they have few buyers, suppliers, or engineering partners outside the south-eastern Netherlands. A further two of the KIC suppliers (or 14 percent) have a moderate regional orientation. This means that, in all, 78 percent of the KIC suppliers involved in this study consider their home region the focal point of their business activities. In short, the available empirical data clearly shows that the companies involved in this study have a regional orientation with respect to engineering.

Knowledge creation and spatial proximity

The literature argues that spatial proximity facilitates the exchange of embedded knowledge through a mechanism that was referred to as 'the geography of knowledge.' In order to establish whether or not this mechanism played a role in the KIC project, it must be determined whether the respondents found that spatial proximity facilitated the communication between them. The longest distance between any of the companies involved in the KIC project (not just those involved in this study) was 70 - 75 kilometres (44 - 46 miles), which corresponds to about one hour's driving time. Therefore, it is justified to say that the relations in the KIC network were proximate relations. One would therefore expect to find some evidence in support of the geography-of-knowledge theory. This supporting evidence is demonstrated in Table 10.1, in which the perspectives of the respondents in this study regarding spatial proximity and face-to-face communication are presented. Spatial proximity is an advantage with respect to knowledge creation when actors experience that the communication between them is easier when they are located close to each other. Table 10.1, for example, shows that all of the 14 Océ respondents found that spatial proximity facilitated communication in the KIC project. Of the suppliers involved in this study, nine out of 14 (or 64 percent) found that spatial proximity facilitated communication. Only one supplier (or seven percent) did not agree. In the case of four suppliers (or 29 percent) it could not be established how they thought spatial proximity affected communication in the KIC clusters. Taken together, this means that 23 out of 28 respondents in this study (or 82 percent) found that spatial proximity facilitated communication. Important as they may have found spatial proximity for the communication between them, respondents did not think it was necessary. Only two out of 28 respondents (or seven percent) found that spatial proximity was necessary in engineering projects like KIC, whereas the majority (22 respondents or 79 percent) felt that, if necessary, communication could also be achieved over long distances. Finally, the respondents were asked whether they felt that face-to-face communication was important. Considering that the knowledge that was exchanged in the KIC project contained a significant portion of tacit knowledge, one would expect to find that respondents attached importance to face-to-face communication. This proved to be the case, as 25 out of 28 respondents (or 89 percent) found face-to-face communication to be important in the KIC project. The opinion of three respondents (or 21 percent) on this issue could not be established.

	Spatial proximity facilitates communication			Spatial proximity is necessary			Face-to-face communication is important		
	yes	*no*	*n.a.*	*yes*	*no*	*n.a.*	*yes*	*no*	*n.a.*
Océ									
N	14	0	0	1	13	0	14	0	0
percent	100	0	0	7	93	0	100	0	0
Suppliers									
N	9	1	4	1	9	4	11	0	3
percent	64	7	29	7	64	29	79	0	21
Total									
N	23	1	4	2	22	4	25	0	3
percent	82	4	14	7	79	14	89	0	11

n.a. *not available*

Table 10.1 Perspectives on spatial proximity and face-to-face communication

This data shows that, first of all, the respondents found that face-to-face communication was important in the KIC project. This is a significant outcome because, if they had held any other opinion, there would be no case to support the geography-of-knowledge argument. Moreover, the fact that respondents found face-to-face communication important indicates that they did indeed exchange tacit knowledge. Secondly, the data in Table 10.1 shows that the respondents found that spatial proximity facilitates knowledge creation, confirming the geography-of-knowledge argument for the KIC project. However, they did not find that spatial proximity was necessary. This supports the assumption that the geography-of-knowledge argument does not dictate that actors must be located close to each other but that, though preferring regional partners, actors look for competent partners in the first place. A look at the answers from the respondents during the interviews provides some more in-depth information to this data. Respondents associate spatial proximity with short lines of communication and easier meeting opportunities. However, as the data shows, they do not put spatial proximity first. One of the suppliers, for example, argued that "you have to find a like-minded partner, in which case proximity is of secondary importance." With

regard to face-to-face communication, the respondents argued that modern electronic communication could never replace it because "you have to look each other in the eye," and "you have to 'taste' a relationship." In other words, the suppliers valued the short distances as it made the 'social aspects' of the communication easier. It is precisely these social aspects that are crucial to the exchange of tacit knowledge.

10.3 Implications for theory

This section discusses the theoretical implications of the KIC project. The idea is to interpret and explain the phenomena observed in the KIC project on the basis of what was referred to as the mainstream literature. Given the limited space, the following discussion will not go into detail with regard to the mainstream literature. Instead, it will highlight relevant issues that can explain the facts and data presented in the previous section.

Knowledge creation and competitiveness
Firm competitiveness depends on the combination of internally and externally tacit knowledge in unique (network) competencies, so the literature argues. The previous section showed that the companies involved in the various KIC clusters exchanged their respective tacit knowledge in order to develop new modules. The purpose of the collaboration effort was to create something (the modules) that was beyond the capabilities of the individual firms. Furthermore, it was demonstrated that other teams of suppliers could not easily copy the work of the clusters precisely because it depends heavily on the tacit knowledge of the companies involved. In other words, the suppliers in the respective clusters have developed competencies that are highly specific to their clusters, which were used to create unique modules. The KIC case thus supports the assumption in the literature that companies collaborate in networks in order to develop unique, network-specific competencies. Whether they actually lead to a competitive advantage cannot be established within the context of this case study, since it focuses on the collaboration effort itself and not on its consequences.

Trust and knowledge creation
Trust is a key element in inter-firm relations and can be defined as the confidence that actors will work for mutual benefit (Rutten 2002). Obviously, corresponding strategies indicate that the partners involved are committed to

the same objectives. Another important factor in the KIC network was that the companies depended on each other to get the job done. In other words, inter-firm dependency was very strong. In addition, the companies in the various clusters all had complementary skills and knowledge, i.e., they were not competitors. Thus, the companies involved, at least, acted as if they trusted each other. They assumed that their network partners could be trusted because of the above-mentioned corresponding strategies, common objectives, and complementary skills. What is relevant, then, is that companies are willing to trust each other if certain conditions are met and that these conditions do not involve a history of working together. Whereas, traditionally, theories (e.g., the Williamsonian and Granovetterian approaches) have looked at the past to explain trust, this work argues that the focus should be on the future.

Knowledge creation with regional partners

Finally, the KIC project is an interesting case to demonstrate the relationship between knowledge creation and spatial proximity, as the literature suggests there is. The findings of the KIC project give strong support for the argument of the 'geography of knowledge.' The value of the present study, therefore, is that it clearly demonstrates that space matters for companies that are collaborating on innovation. For many years, science has argued that this is the case but it rarely supported its claims with empirical data on knowledge creation between companies. The present study shows that companies favour collaboration with regional partners in the engineering phase of the innovation process. In other phases of the innovation process, however, they may come to a different conclusion. It is here that the relevance of the present study for innovation and regional economic theory becomes clear, as it demonstrates that the focus must be on knowledge, not on proximity or space. Proximity is the outcome of a trade-off; companies ask themselves whether or not it is desirable and possible to involve regional partners in their knowledge-creation effort. In the engineering process, relevant knowledge is company specific but not necessarily unique, meaning that several companies may have this knowledge. Moreover, the knowledge is advanced but not necessarily high-tech. This, too, implies that the number of potential partners is substantial - though not abundant. In other words, it is likely that competent partners be found nearby. Furthermore, engineering requires face-to-face communication between network partners for a prolonged period of time, which makes collaboration with regional partners desirable from an efficiency perspective. These characteristics - regional availability of relevant knowledge, and the advantages of proximate relations - enable companies to choose regional

partners for collaboration in engineering projects. Consequently, the answer to the number one question in regional economics, i.e., does space matter, depends on a trade-off between the regional availability of knowledge on the one hand and the benefits associated with collaboration with proximate partners on the other. As argued, the present study demonstrates that, in the engineering phase, this trade-off is made in favour of proximate relations. Furthering an understanding of the relationship between innovation and space requires this trade-off to be explored for other phases in the innovation process as well, as it may lead to a different outcome in terms of geography in different phases of the engineering process.

Explaining knowledge creation in networks

In the mainstream literature it is argued that the intangible side of the innovation process is the key to firm competitiveness. The present study is no exception given its focus on tacit knowledge. Recognising that tacit knowledge is at the heart of the explanation, however, requires a fundamental reconsideration of the nature of knowledge, innovation (i.e., knowledge creation), and space. The concept of tacit knowledge holds that some forms of knowledge have no meaning and cannot exist outside a personal or organisational context. In other words, such knowledge is always embedded in a social context. This, in turn, implies that tacit knowledge is socially constructed knowledge and that, to understand the process of knowledge creation, the focus must be on the social context in which knowledge is created. It is perhaps better to speak of embedded knowledge rather than tacit knowledge. In the present study, this context was the inter-firm teams, or clusters, at the heart of the KIC project. In 'The knowledge-creating company,' Nonaka and Takeuchi (1995) argue that the creation of new knowledge takes place in project teams. They do not elaborate on this, but von Krogh *et al.* (2000) argue that the creation of tacit knowledge takes place in productive work communities that are based on social processes. These work communities, or "micro communities of knowledge," are small groups of five to seven people[2] who maintain a "dense network of relationships" (von Krogh *et al.* 2000: 14). The creation of tacit knowledge in these micro communities takes place through face-to-face interactions, which are facilitated as the team members gradually get to know more about each other's personalities. These micro communities develop an identity of their own as well as a shared base of tacit knowledge. It takes little imagination to see the KIC clusters as examples of these micro communities. The present study demonstrated that tacit, or embedded, knowledge was actually created in these clusters and it highlighted some of the social issues

related to collaboration in small teams. In other words, this is where theory and practice meet. Support for the small-teams approach also comes from other authors such as Johannessen et al. (2001) who argue that the creation of tacit knowledge takes place in 'apprenticeship teams,' and Judge *et al.* (1997) who speak of 'goal-directed communities.'[3]

Where does this leave the present debate? As far as knowledge creation is concerned, the theories of, for example, Nonaka and Takeuchi (1995) and Von Krogh *et al.* (2000) go a long way towards explaining what takes place when individuals in teams create embedded knowledge. The problem, however, is that these theories discuss knowledge creation in intra-firm teams whereas the present study focuses on inter-firm teams. This has few consequences for the process of knowledge creation but it does require one to take a closer look at governance structures. That is, it means we need to look at the organisational structures, e.g., markets or hierarchies, within which knowledge creation takes place. In this light, it is useful to refer to the work of Nooteboom (2000) who argues that, in spite of its shortcomings, some elements of transaction cost economics (Williamson 1993, 1999) are useful as they can be fruitfully employed in a wider theory of coordination in innovation systems. In his view, "one piece of salvage is the notion of specific investments as a cause of dependence" (Nooteboom 2000: 920). Superficially, this appears to be the case in the KIC network as specific investments have arguably been made and the companies were mutually dependent on each other. On closer examination, though, the specific investments made in the KIC project were the *result* of the companies being dependent on each other, not, as Nooteboom argues, the cause. Because the companies in the KIC network followed an innovation strategy, they had to engage in mutual knowledge creation in order to engineer the desired modules. In other words, their dependence followed from strategic considerations, not from transactions. This 'piece of salvage,' is therefore a dead end from the perspective of the present study.

With regard to forms of coordination, Nooteboom (2000) argues that transaction cost economics is valuable because it looks into the "redistribution of the ownership of specific investments." This could be applied to knowledge in so far as the companies in the KIC network made specific investments in knowledge and Océ became the owner of the fruits of the knowledge-creation effort. It should be clear, however, that embedded knowledge cannot be owned because it is socially constructed. Embedded knowledge is, as the concept says, embedded in social relations and no single actor can own embedded knowledge. Neither can an actor own codified

knowledge as anyone who has access to codified knowledge can acquire that knowledge at (virtually) no cost. What Océ owns after the KIC project is not a body of knowledge but the right to use that knowledge. The participants in each cluster 'own' the same body of knowledge since this knowledge was constructed in a process of interaction between them.

In sum, the conceptual framework of transaction cost economics is inadequate to explain the process of inter-firm knowledge creation. Though this is not the place for a lengthy discussion of governance structures, the case study of the KIC project suggests that the emphasis in theory must be on knowledge and on the process of knowledge creation, i.e. learning. This process is far more socially constructed than, for example, transaction cost economics is willing to admit. Given the dependency relations between the companies in the KIC project, the Granovetterian embeddedness approach (Granovetter 1985, 1992) may constitute a more fruitful way of explaining why and how companies collaborate on knowledge creation.

The role of space

How, then, is space important in this respect? The previous sections have already shown that, in the engineering phase, proximity is the outcome of a trade off between, on the one hand, the fact that knowledge creation benefits from face-to-face communication and, on the other hand, the question of whether or not a company is able to actually involve proximate partners in this process of knowledge creation. If involving proximate partners in the engineering phase is possible, this certainly seems to be the wisest choice. However, it does not go without saying that this choice will always be made. This certainly puts in perspective the 'received wisdom' (Oinas 2000) considering the relation between proximity and learning. It is not as straightforward as some authors have suggested (cf. Angel 2002, Maskell *et al.* 1998, and Morgan 1997). The focus of scientific inquiry, therefore, should be on knowledge rather than on space or proximity. Contrary to what economic geography has subscribed to for many years, space and proximity are not the starting point of the analysis. Instead they are the outcome. Explaining the spatial dimensions of a network, therefore, requires regional economists to look at the spatial dynamics of the processes and activities of that network. Obvious as this may seem, it does shift the level of analysis from 'space' to 'network activities,' i.e. a lower level of analysis.

This also explains why, for example, the learning-region perspective is absent from this work. It belongs to a different level of analysis. The learning region looks for answers on the regional level, such as the role of

regional innovation policy and the regional innovation system with regard to regional economic development (cf. Hassink 2001 and Morgan 1997). The present work, in contrast, looks at inter-firm relations first and their spatial dimensions second. In general, this issue of levels of analysis requires more attention in regional economics (cf. Lambooy 2004).

10.4 Conclusion

The objective of the present study is to contribute to the literature on learning, innovation, networks, knowledge and space by discussing a case study and by interpreting its findings in the light of the 'mainstream literature.' Inevitably, this approach yields more questions than answers. However, we regard this as a favourable outcome as it places some question marks with regard to the received wisdom from the mainstream literature. As for competitiveness in regional clusters, this work shows that close collaboration on engineering does lead to better results. Whether or not this actually resulted in firm competitiveness cannot be established within the context of the present study. What is important, however, is that this study points out that there is no simple, straightforward relationship between learning, competitiveness and space. Moreover, there are two different questions involved here. In the first place, it is the question of how inter-firm learning can contribute to competitiveness or innovation. This, we argue, depends largely on the phase of the innovation process. We feel that, thus far, the different phases of the innovation process have not been sufficiently accounted for in the literature on knowledge creation. The second question is how spatial proximity can facilitate innovation. This, we argue, is the outcome of a trade off between the desirability to involve external partners and the possibilities that a company has to actually do so. In other words, the focus is not on space but on the content of the inter-firm relationship, in this case, knowledge creation. This idea, too, we believe, has not been focused on sufficiently in the regional economic literature.

Of course, our presentation of the KIC case in this work has its limitations. We argue, however, that the strength of this work lies in the empirical support it offers for some theoretical considerations, such as the geography of knowledge, and the questions it raises with regard to other considerations. The knowledge-based economy still presents a challenge to the science of regional economics.

Notes

1 Answers from respondents are placed between double quotation marks. However, these are not their exact answers. As the interviews were in Dutch, the original answers have been translated and stylised in order to maintain a readable and academic text.
2 The number of people in these small groups is irrelevant. What matters is that the emphasis is on small groups, as this is an important parallel with the KIC project.
3 The definition of apprenticeship teams and goal-directed communities is irrelevant for the present discussion. It suffices to say that they are very similar to the micro communities of von Krogh *et al.* (2000).

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Part II The impacts of ICT and externalities on urban development

11 Urban Milieux: from Theory to Empirical Findings

Roberto Camagni and Roberta Capello

11.1. Introduction[1]

The aim of this chapter is to present a theoretical reflection on the relationships between the concept of Innovative Milieu (I.M.) and that of the city interpreted in economic and spatial terms, and to provide empirical evidence on the existence of urban milieus.

The concept of the innovative milieu was developed extensively during the 1980s among regional scholars[2]: it interprets phenomena of spatial development as the effect of innovative processes and synergies which occur over limited territories. The Innovative Milieu is comprised of a set of relations which unite a local production system, a set of actors and representations and an industrial culture. Together, these generate a localized dynamic process of collective learning. Space, assumed as mere geographic distance, is replaced by territory (or relational space), defined through economic and social interaction. Time, usually understood as a mere sequence of intervals on which to measure quantitative variations of smooth variables, is conceived here as the pace of learning and innovation/creation processes (Camagni, 1995). The *milieu innovateur* functions like a microcosm in which all those elements which are traditionally considered as the genetic sources of development and economic change operate as if they were *in vitro*, highlighted and enhanced by spatial proximity and by those economic and cultural homogeneities which allow the *milieu* itself to exist. There are Smithian processes of division of labour among units belonging to the same productive cycle, processes of learning-by-doing and learning-by-using *à la* Arrow, amplified beyond each enterprise by the high mobility of the specialized labour force inside the local area. Then there are Marshallian or Allyn Young-type externalities, generated by a common industrial culture and intense input-output interactions, the formation of Schumpeterian entrepreneurship, facilitated by specific historical competences, sectoral specialization and ample possibilities of imitation and cross-fertilization processes *à la* Freeman, which generate systems of integrated and incremental innovations. All these are essential components of the *milieu innovateur.*

R.A. Boschma and R.C. Kloosterman (eds.), Learning from Clusters: A Critical Assessment, 249–274.

At first glance, the concept of the milieu innovateur as defined above does not seem to share many characteristics with the city: the only similarity, in theoretical terms, resides in the agglomeration and proximity element[3]. However, if one proceeds to a more accurate consideration, and in particular if one abstracts from the consideration of the physical element which is more easily attached to the common image of the 'city', presenting it as a built environment, more similarities emerge. In fact, taking up a theoretical perspective in terms of *relational capital, spatial interaction and learning processes*, one could easily find that the genetic elements of the City and the Milieu are not so distant. They are in fact at least commensurable, comparable, although they have a different level of complexity.

Under the generic conceptual umbrella of the agglomeration principle, which we consider as a common genetic principle of both phenomena, lies a wide spectrum of different elements/ processes/effects, which span from the development of a common identity and sense of belonging to the 'socialized' production of human capital and know-how. These elements and processes - which are not deterministically, but only probabilistically linked to the pure agglomeration fact - prove, when empirically established, to be at the heart of both the innovative nature of the Milieu and the 'progressive' role of the City.

Our thesis is that:

a) under certain conditions, the comparison of the two concepts, I.M. and City, is legitimate;
b) the two concepts, or theoretical archetypes, share many characteristics; the City is a more complex form of Milieu, as it intrinsically encompasses economic differentiation (vs. the natural specialisation of the Milieu) and the entire sphere of residential and life activities of the population (which are only considered by the Milieu concept when they generate synergy and learning effects directly useful for the innovation process);
c) from a conceptual perspective, the relationships between City and Milieu can take place in two distinct forms:
   - Urban Innovative Milieus: I.M. located in cities and exploiting the urban atmosphere;
   - City as Innovative Milieu: the entire city behaving as a Milieu.

The aims of the chapters are twofold:

- to develop a conceptual comparison of the two concepts in order to underline common features and mutual theoretical relationships (Section 11.2);
- to provide quantitative empirical evidence on the existence of 'urban milieus'. The empirical evidence is based on a database of firms located

in five European cities, namely London, Paris, Amsterdam, Stuttgart and Milan (Section 11.3 and 11.4).

11.2 Cities as milieus

11.2.1 The conditions for a comparison

A word of caution and prudence is necessary from the very beginning when dealing with such a multifaceted realm as the city. In fact:

a) the city is a complex phenomenon, probably the most complex product of mankind. It is "*un territoire particulier,…, le dispositif topographique et social qui donne leur meilleure efficacité à la rencontre et à l'échange entre les hommes*" (Roncayolo, 1990). Therefore it can be analyzed under different perspectives: "*comme structure materielle, comme système d'organisation sociale, comme ensemble d'attitudes et d'idées, comme costellation de personnes s'impliquant dans des formes types de comportement collectif*" (Wirth, 1938);
b) cities have evolved in history, performing different functions and even nowadays they are undergoing fast structural changes. In particular, the form of the city is rapidly evolving and its boundaries with respect to the non-city are blurring (Remy and Voye, 1992): forms of low density peri-urbanization, processes of 'metropolisation', edge-city developments on one side; evolution of the countryside in terms of infrastructure, social equipment, lifestyles on the other (Camagni, Gibelli, 1996);
c) there are different kinds of cities: of different size (therefore performing different functions within the spatial division of labour), different specialization, different location (ports, ...);
d) cities are linked together differently within wider regional spaces (urban systems, hierarchies, city-networks) and therefore their role and functions cannot be fully interpreted through the consideration of the isolated, standalone city;
e) cities are indicated by great historians (Braudel, Pirenne) and sociologists (Weber, Sombart) as the birthplace of innovation (economic, political, cultural), although other functions are characteristically performed by the city, giving rise to an economic advantage: defence (once), control and power, cultural interchange.

As a consequence of the theoretical complexity and the empirical diversity of the object of this reflection, the limits and the characteristics of the approach

have to be made clear:

i) we limit ourselves in a first approximation to economic aspects: the city as a particular and efficient form of organisation of economic relationships (though by the term 'economic relationship' we mean a much wider set of factors and interactions than the mainstream economic textbooks do). The interpretation we are going to give of the city's role and performance is therefore partial, though not trivial;
ii) the main dimensions under which the city is analysed are:
   - a relational one (the city as a set of territorial and social relationships),
   - a dynamic one: the city as a learning system;
iii) we assume, at least initially, an abstract and archetypal approach to the city - the City with a capital 'c', abstracting from geographical or historical differentiation, theorizing the characteristics of the urban environment which:
   - have an impact on economic phenomena and economic performance, and
   - explain the genesis of the city as an efficient form of organization of economic relationships. As already mentioned, these economic functions are not the sole functions performed efficiently by the city, but are nevertheless (very) important;
   - explain its innovative character, a character that historians and economists usually assign to it.
iv) we do not consider different, non-economic aspects, which have strong feed-back effects on the economic performance of the city: city size, form, environmental quality ...

11.2.2 *The economic role of the city and a taxonomy of urban agglomeration advantages*

An economist looks at the city as a self-organising system (Camagni, 1996), whose competitive advantage resides in i) agglomeration (the city as a 'place'), ii) accessibility (the city as a 'node' in global networks), iii) interaction (the city as 'relational capital'), focused on the achievement of collective goals such as economic efficiency, welfare (at least for ruling classes), territorial power and control.

In history, the success of this form of social organisation was striking and it allowed the achievement of further general goals like cultural development, quality of life, individual freedom and more generally democracy, progress, modernisation of the society and innovation in the economy.

In a sense, we can affirm that the I.M. realizes a short-circuit between the general characteristics it shares with the City (agglomeration, accessibility, interaction) and the specific outcome, namely innovation, reducing the complexity of the full process of urban development and its high degree of roudaboutness, and forgetting about the other possible outcomes.

It is important to note that the characteristics of innovativeness that in the abstract scheme is directly attributed to the City or the M.I. may well be absent in many (or most) empirical circumstances. In fact, the existence of a City or of a Milieu is only a relevant precondition for innovativeness, although its actual manifestation depends on finer local specificities and, on average, is subject to stochastic processes.

Starting with the agglomeration element which characterises the urban environment and which in some respects may also encompass the other two elements - external accessibility and networking goes hand in hand with urban size and the same happens to internal interaction potential, a direct function of size and differentiation of urban activities - we can devise a taxonomy of the single sub-elements on which agglomeration advantages reside.

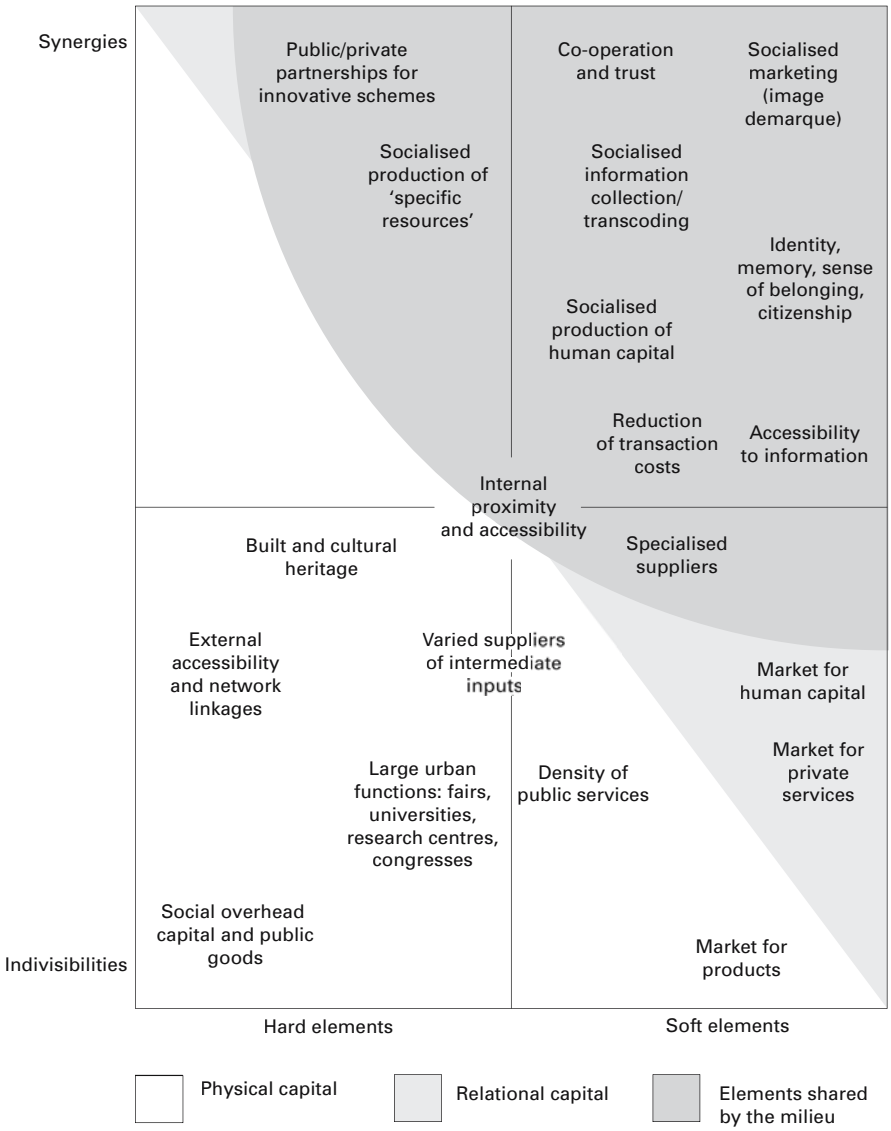
On the one hand, a distinction can be made, in a quite traditional way, between 'hard' and 'soft' elements of agglomeration advantage and, on the other hand, less traditionally, between the two main sources of the same advantage, namely *indivisibilities*, stemming from city size and *synergy*, facilitated by more subjective elements like interaction, cooperation, synergetic processes (Fig. 11.1).

In the lower left side of the table, we find the advantages which are derived from the provision and concentration of public goods such as infrastructure and overhead capital, public services, large urban functions like fairs, congress facilities, universities and the cultural heritage. On the other hand, on the lower right side, we find advantages connected with the nature of big market of the city:

- market for products, market for human capital, market for private services on the demand side,
- market for a diversified supply of intermediate inputs, on the supply side.

On the upper right side of the picture we find the elements which are, in my opinion, more interesting and which were pointed out in the recent past: elements connected with the synergetic action performed by the city. In fact we find (Camagni, 1991, 1995):

- accessibility to information - which is inherently a cooperative good - through informal, face-to-face and inter-personal contacts,



Source: Camagni, 1999

Figure 11.1 Sources of urban agglomeration advantages

- explicit cooperation among actors, stemming from trust, a common sense of belonging to a community sharing the same values,
- implicit cooperation among actors, in the form of socialized production of:

- skilled labour,
- human capital for high-level managerial functions,
- marketing ('*image de marque*')
- information transcoding.

Some of these functions may be embodied in the provision of physical or 'hard' elements like dedicated infrastructure or important urban projects realized through private/public partnership. Therefore we find in the upper left part of the graph the socialized provision of 'specific resources', used typically by urban productions or functions.

The lower triangle of the table encompasses what could be labelled as the 'functional capital' of the city, which is of a mainly physical nature. The upper right triangle on the other hand may be seen as representing the 'relational capital' of the city.

In our opinion, it is on the theorisation of the relevance of the relational capital of territorial systems that the contribution of this kind of reflection brought the most advanced results. In fact, the Innovative Milieu shares with the city many of the abovementioned characteristics, stemming from proximity (the grey area in Fig. 11.1) and may provide a lot of theoretical and analytical tools which can be used to interpret the city. In fact, territorial relational capital resides in different elements:

a) the synergy and cooperation element, embedded in the local 'milieu effect' and in territorial cooperation networks (Aydalot, 1986; Maillat and Perrin, 1992; Maillat et al, 1993). These elements were subsequently theorized by the French proximity school[4] and by Storper with the concept of 'untraded interdependencies' (Storper, 1995);
b) the socialized nature of the production of specific resources, as skilled labour and human capital, or the socialized production of market signals (Gordon, 1989; Camagni, 1991);
c) the reduction of dynamic uncertainty, inherent in processes of technological innovation and economic transformation, through:
   - socialised management/transcoding of information,
   - ex-ante coordination and control over competitors' moves (Camagni, 1991).

One important element that differentiates the I.M. from the City resides in the relevance of size, which is crucial in the urban environment, as was shown earlier through the indivisibility element. The nature of the City being a big market for products and for production factors, and particularly for

labour, was stressed by Veltz (1993) as representing an important locational advantage of the City over the I.M., another way of achieving the reduction of uncertainty ('*ville-assurance tout risque*').

11.2.3 The theoretical relationships between the milieu and the city

On the basis of arguments developed so far, the theoretical similarity between the City and the Milieu emerges with relative clarity. They share the elements of proximity, strong internal integration, synergy and psychological and cultural identity. Furthermore, they share the functions of collective and socialized production of specific resources, human capital and market signalling and of supplying the substrate for collective learning processes.

Their special characteristics may be described as follows:

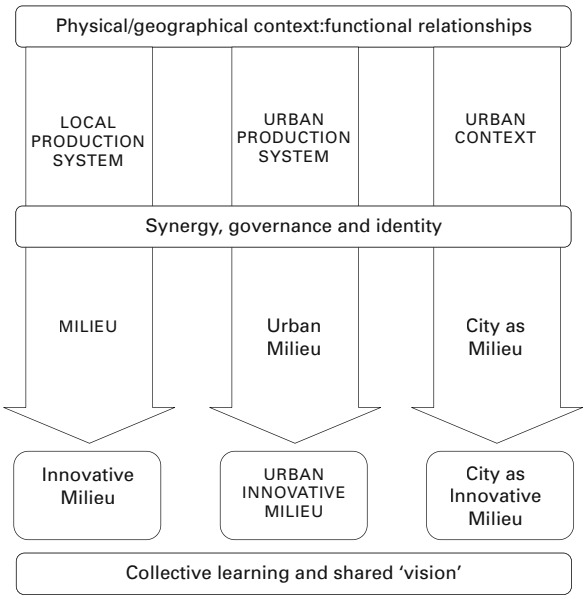
Cities	*Milieus*
mostly de-specialized	*mostly specialized*
important physical agglomeration	*important proximity, even without agglomeration*
general-purpose infrastructures	*oriented infrastructures*
private services with intersectoral market	*private services integrated in filières*
social heterogeneity	*social homogeneity*
identity defines productive 'vocation'	*productive 'vocation' defines identity*

As stated above, the City is a much more complex system, focusing on major social goals which are not relevant to the Milieu and which have a physical dimension (built environment, size, built and cultural heritage) which is alien to the Milieu.

Another logical path that can be traced in the case of both concepts regards how to pass from the functional aspects of the territory to the innovative milieu aspects.

In the same way as the Milieu represents the relational capital of local territorial systems, adding the elements of synergy, governance and identity, so the City like the Milieu represents the relational capital of the Urban Context (Figure 11.2). The innovative element of both the Milieu and the City derives from the existence of collective learning processes and the development of a common 'vision' for the evolution of the local milieu.

However, in the case of the City, another relevant situation may emerge (represented by the central column in Figure 11.2), namely the presence of an



Source: Camagni, 1999

Figure 11.2 The Urban Milieu and the City as a Milieu

Urban Milieu, a network of informal or selected linkages developed around a specialisation sector or filière and growing inside the Urban Context or the Urban Production System. Empirical evidence suggests that many cases exist of such Milieus or Innovative Milieus which characteristically exploit an urban atmosphere (and therefore an urban location), without implying that the entire city behaves like a Milieu. The cases of the financial milieu in cities like Zürich, Geneva, Frankfurt, the innovative milieus developing around the fashion creation filière in Milan or Paris and the media or the communication milieus in Hamburg and Milan are important examples.

While still adopting a dynamic approach and the aim of interpreting innovation processes, existing literature attributes to the City some characteristics that may assign to it a dynamic comparative advantage. In fact, urban competitiveness and its continuous recreation in time may be linked to the following elements:

a) the city is the natural location site of *production services* (to an extent which is proportional to their quality and rarity), a sector which is responsible for the level (and growth rate) of the efficiency of the local (urban, regional) industrial sector. According to Thompson (1968): "the

economic base of the larger metropolitan area is the creativity of its universities and research parks, the sophistication of its engineering firms and financial institutions, the persuasiveness of its public relations and advertising agencies, the flexibility of its transportation networks and utility systems, and all the other dimensions of infrastructure that facilitate the quick and orderly transfer from old dying bases to new growing ones"[5]. In the empirical analysis, we will refer to these kinds of advantages, which are typical of urban areas and which support innovative activity in cities, using the label 'dynamic urbanisation economies';

b) the city is the natural location site of small and medium-sized businesses (incubator hypothesis) which are, by definition, the schumpeterian innovation agents;
c) the city is the natural location site of industries and products in the early, pioneering phases of their lifecycle[6];
d) similarly to c) another hypothesis is that metropolitan areas play a mayor role in the phases of radical renewal and rejuvenation of products, when strict interaction is required among different functions of the firm, usually spatially dispersed such as engineering (mastering of technologies), R&D (mastering of products) and marketing (mastering of demand) (Camagni, 1988): a large city supplies a barycentric location for all these functions.

All these reflections were developed in the context of location theory; they may be easily utilised in an evolutionary context characterised by synergetics and learning processes.

11.3 Empirical evidence: milieu behaviours in metropolitan cities

The relationship between the two concepts presented above acquires greater emphasis if it is tested at an empirical level. For this reason, the present work aims to provide empirical evidence which tests:

- the existence of any milieu behaviour in firms located in metropolitan regions and whether it is reasonable to speak of an urban milieu or an urban production milieu (the present section);
- whether milieu economies (i.e. the advantages stemming from milieu behaviours) are more conducive to innovative behaviours than dynamic ur-banisation economies, which are typical externalities of urban areas (Section 11.4)

The first theoretical hypothesis to be tested is therefore the existence of a 'milieu' behaviour in firms located in metropolitan regions.

The empirical analysis is based on a database which contains 159 observations, more or less equally distributed among five cities, namely London, Amsterdam, Milan, Stuttgart and Paris[7]. The firms interviewed belong to both high-tech and low-tech sectors, with a higher share for the low-tech sector. The size of firms interviewed differs greatly from small to medium and large firms, with an equal distribution of firm size among the cities. Both private and public sectors are involved in the analysis, although there is a higher representation from the private sector (88.7% of the total sample firms belong to the private sector). All the cities have a high share of firms developing product innovation, while one third of the sample firms are involved in process innovation.

A common questionnaire was submitted to firms, with the intention being to collect information on:

- the innovation developed;
- the geographical location of customers, suppliers and competitors;
- the forms of cooperation developed for the innovation activity;
- the sources of information used for the innovation activity;
- the sources of knowledge for their innovation activity;
- the importance of localisation factors in their innovation activities.

Most questions provided discrete information on the degree of appreciation of the different sources of information, knowledge, cooperation and locational advantages of each firm. The methodology used to transform them into continuous variables and to reduce their high number is factor analysis[8].

The first hypothesis, i.e. whether milieu behaviours exist among firms located in urban areas and support their innovative activities, is tested through a descriptive statistical exercise, called cluster analysis, which allows for the identification of groups of firms with similar structural characteristics in terms of innovation behaviour, being run with variables characterising innovative behaviours such as the type of innovation, sources of information, of knowledge, of cooperation for the innovation activity and the locational advantages which are valuable for the innovation activity.

Table 11.1 shows the results obtained; four different typologies of innovative behaviours emerge, which are characterised by the size of the firm and by the relative sectoral specialisation of each firm.

a) small firms in specialised sectors

A first cluster depicts the behaviour of *small firms in specialised sectors*, characterised by 94 observations, nearly 60% of the firms sample. In this cluster a typical milieu economy and networking behaviour prevails,

	Small firms (<99 employees)		**Large firms** (>99 employees)	
Specialised sectors (ql > sample mean)	*Small firms in specialised (94 observations =5 9.1% of the sample)*		*Large firms in specialised sectors (45 observations = 28.3% of the sample)*	
	Market size:		*Market size:*	
	• National	0.11	• Non-European	-0.44
	• European	0.16	• Non-international	-0.24
	• International	0.03		
	Innovation:		*Innovation:*	
	• imitative	0.05	• breakthrough	0.53
	Sources of knowledge:		*Sources of knowledge:*	
	• local innovative suppliers	0.05	• external suppliers	0.32
	• consultancy services	0.004	• ex-colleagues	0.26
			• scientific research centres	0.06
	Sources of cooperation:		*Sources of cooperation:*	
	• cooperation with innovative local customers	0.06	• cooperation with external suppliers	0.1
	• cooperation with innovative local suppliers	0.22	• cooperation with innovative local suppliers	0.22
	• cooperation with other firms	0.05	• cooperation with innovative R&D centres	0.4
			• cooperation with other firms	0.74
	Sources of information:		*Sources of information:*	
	• information from scientific journals	0.59	• internal information	0.38
			• information from R&D centres	0.4
			• technological information	0.59
			• information from scientific journals	0.99
	Locational advantages:		*Locational advantages:*	
	• presence of ex-colleagues and friends	0.03	• presence of ex-colleagues and friends	0.49
	• proximity to infrastructure	0.03	• proximity to supp. and customers	0.45
	• proximity to services to firms	0.06	• proximity to information	0.02
	• proximity to suppliers and customers	0.01	• proximity to high-quality public services	0.21
			• proximity to R&D centres	2.8
Non-specialised sectors (ql < sample mean)	*Small firms in non-specialised sectors (14 observations = 8.8% of the sample)*		*Large firms in non-specialised sectors (6 observations = 3.8% of the sample)*	
	Market size:		*Market size:*	
	• local and regional	0.23	• local and regional	0.015
	Innovation:		*Innovation:*	
	• breakthrough	0.26	• no particular innovation	
	Sources of knowledge:		*Sources of knowledge:*	
	• external customers	0.29	• external customers	0.28
	• consultancy services	0.17	• ex-colleagues	0.07
			• scientific research centres	0.05
			• qualified labour market	0.09
	Sources of cooperation:		*Sources of cooperation:*	
	• cooperation with external suppliers	0.08	• cooperation with R&D centres	0.007
	• cooperation with other firms of the group suppliers	0.18	• cooperation with other firms of the group	0.4
			• cooperation with innovative R&D centres	0.4
			• cooperation with other firms	0.74
	Sources of information:		*Sources of information:*	
	• information from ex-colleagues	0.07	• information from ex-colleagues	0.01
			• internal information	0.03
			• information from R&D centres	0.07
	Locational advantages:		*Locational advantages:*	
	• proximity to R&D centres	1.65	• proximity to competitors	0.15
	• proximity to customers and suppliers	0.18	• high life quality standard	0.14
	• proximity to infrastructure	0.11		
	• proximity to services to firms	0.14		

Values = deviance from the sample mean

Source: Capello, 2001a

Table 11.1 Results of the cluster analysis

witnessed by:
- local innovative suppliers, a channel through which collective learning takes place is one of the sources of knowledge for innovative activity;
- innovative local customers and suppliers are the main sources of cooperation, together with cooperation with other firms, comprising the importance of local economic interactions and networking mechanisms in innovation processes at small firms.
- an industrial atmosphere, suggested by the presence of ex-colleagues and friends, and by the proximity of suppliers and customers, describes the locational preferences of these firms. This suggests that even the most appreciated locational advantages of these firms reflect a 'milieu' approach. However, these firms also appreciate proximity to infrastructure and to services to firms, more related to their urban location.

b) small firms in non-specialised sectors

A second cluster depicts the behaviour of *small firms in non-specialised sectors*, characterised by 14 observations (8.8% of the sample): interestingly enough, this group of firms behaves in a completely different way to the previous one. These firms seem to represent small branches of large firms, choosing an urban location for different purposes:
- to control the final market (proximity to customers);
- to control specific suppliers (proximity to suppliers);
- to take advantage of a large urban location (proximity to services to firms, to consultancy firms);
- to take advantage of an advanced scientific environment (proximity to R&D centres).

The interaction of this group of firms with local actors and local institutions is so weak that it is hard to envisage any territorial embeddedness, any kind of spatial interaction among local economic actors:
- customers external to the area are envisaged as being the main sources of knowledge;
- the most appreciated channels for cooperation are external customers and suppliers, or with other firms of the same group;
- the locational advantages are envisaged in traditional urbanisation economies.

c) large firms in specialised sectors

A third group depicts the behaviour of *large firms in specialised sectors*, which represent nearly 9% of the firms sample (14 observations). These

firms exhibit a third sort of behaviour which is also rather peculiar in that they behave as large firms, generally appreciating their urban location and taking advantage of the scientific environment of the large metropolises. However, they also seem to appreciate 'milieu economies', determined by the high specialisation and concentration of the sector in which they operate. The sources of knowledge and the strategic information sources for their innovative activity are typical of large firms:

- external suppliers and scientific research centres are the main sources of knowledge;
- internal information is the primary source of information;
- the scientific environment in which firms operate plays a key role in their innovative activity. One of the most appreciated sources of knowledge are R&D research centres, which are also appreciated as locational advantages;
- the presence of highly qualified public services (schools, hospitals and public facilities), already envisaged by previous studies as one of the main reasons for a metropolitan location of multinationals.

The importance of 'milieu economies' for large specialised firms emerges from some elements like:

- the appreciation of proximity to customers and suppliers as important locational advantages;
- cooperation with innovative local suppliers (a traditional collective learning channel) is a way through which firms feed their innovative activity.

d) large firms in non-specialised sectors

The fourth cluster is characterised by six *large firms in non-specialised sectors* (3.8% of the firms sample). These firms reflect the typical behaviour of a large firm which appreciates the central location through:

- information from scientific research centres;
- knowledge from cooperation with scientific research centres;
- a highly qualified labour market.

The sources of development and creative activity of these firms do not stem from the local environment but:

- either from knowledge internal to the firm;
- or from external resources: external customers, external suppliers, cooperation with other firms of the group.

The reasons for the choice of a metropolitan location of these firms seem to be related to:

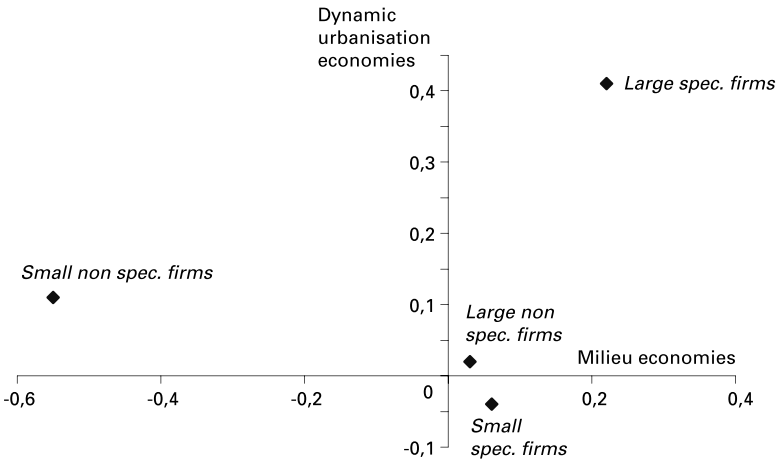
- a high standard of living, as also applies to large specialised firms as mentioned above;
- a control on the competitors and on market shares.

The definition of these four different behaviours provides two important results for our analysis. The first important element achieved via this descriptive analysis is that a milieu behaviour can also exist in urban areas; some firms appreciate and take advantage of the interaction with local economic actors and of cooperation with suppliers and customers which stimulate their innovative activity. One can easily argue that these firms appreciate the existence of mechanisms of socialised knowledge which feed their innovative capability and push them towards innovative behaviour[9].

The second rather interesting result of our analysis is that firms appreciating this kind of spatial economies can be defined according to:
- on the one hand, their size;
- on the other hand, the degree of specialisation of the sector in which they operate.

As far as the size of the firm is concerned, small firms generally appreciate milieu economies more than large firms do. The latter, on the contrary, benefit more from dynamic urbanisation economies (cooperation with research centres, a highly qualified labour market). However, when the specialisation of the sector in which firms operate is also taken into consideration, another perspective emerges: large specialised firms tend to feed their innovative activity with local specialised knowledge and seem to appreciate not only urbanisation economies but also milieu economies which stem from the high degree of specialisation of the sector in which they operate. In contrast, small firms operating in non-specialised sectors do not seem to appreciate milieu economies and tend rather to benefit from their central location.

The interaction of the two above-mentioned elements explains the behaviour of firms. Figure 11.3 summarises this important result by showing the importance of the interplay of the two above-mentioned elements depicting the behaviour of firms in the different spatial economies. Two indices are calculated, namely the cooperation with research centres and the cooperation with innovative suppliers, as proxies for dynamic urbanisation economies and milieu economies (i.e. collective learning) respectively and giving rise to the following results:
- both non-specialised and specialised large firms take advantage of dynamic urbanisation economies;



Source: Capello, 2001a

Figure 11.3 Dynamic urbanisation economies vs. milieu economies for the four clusters

- milieu economies are appreciated by both large and small firms operating in more specialised sectors;
- small firms, which by definition operate in non-specialised sectors, do not take advantage of milieu economies, but instead tend to appreciate dynamic urbanisation economies in their innovative activity.

The cluster analysis presented above shows that small specialised firms located in metropolitan cities appreciate milieu economies for developing their innovative activity. Another interesting suggestion put forward by the milieu innovateur theory is that within the milieu, two kinds of co-operation processes are at work (Camagni, 1991):

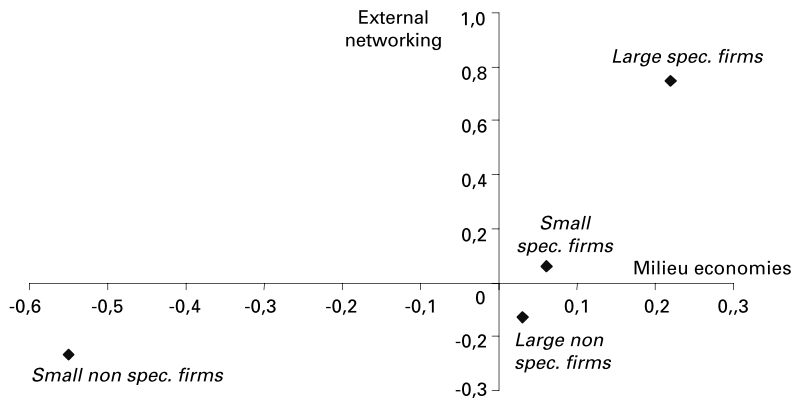
- a set of mainly informal, 'non-traded' relationships - between customers and suppliers, private and public actors - and a set of tacit transfers of knowledge taking place through the individual chains of professional mobility and inter-firm imitation processes;
- more formalised, mainly trans-territorial co-operation agreements - among firms, collective agents and public institutions - in the field of technological development, vocational and on-the-job training, infrastructure and service provision[10], which represent an organisational model between pure market and hierarchy.

The former kind of relationship is in fact the 'glue' that creates a milieu effect. It is complemented by the latter, more formalised kind of relationship called 'network relationships'. Both sets of relationship may be regarded as tools or 'operators' that help the (small) firm in its competitive struggle, enhancing its creativeness and reducing the dynamic uncertainty intrinsically embedded in innovation processes.

In particular, the second kind of cooperation, networking behaviour, seems to be an efficient way for small firms to overcome extremely turbulent and innovative economic phases, representing a way to obtain information and knowledge outside the area.

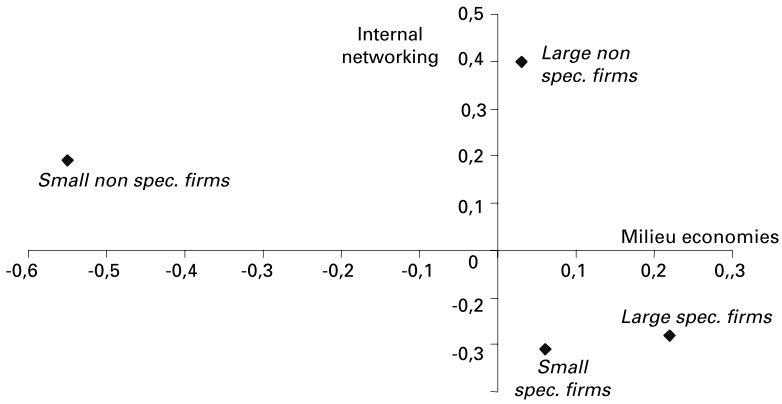
We have attempted to test this hypothesis in the case of our metropolitan firms as well. Two proxies have been constructed, one for the existence of the milieu relationship (cooperation with innovative suppliers), the other for the network (cooperation with other firms), and presented in Figure 11.4.

The results are quite interesting. Specialised firms take advantage of both milieu economies and external networking, reflecting a typical behaviour of innovative firms in milieu areas. By contrast, non-specialised firms, despite their size, do not develop any kind of inter-firm innovative cooperation activity. The latter, on the contrary, seem to rely on internal networking, measured through the degree of cooperation with other firms of the same group (Figure 11.5).



Source: Capello, 2001a

Figure 11.4 External networking and milieu economies for the four clusters



Source: Capello, 2001a

Figure 11.5 Milieu economies and internal networking for the four clusters

11.4 Empirical evidence: Dynamic urbanisation economies vs. milieu economies in innovative activity

One of the main results of the previous analysis is that both milieu economies and dynamic urbanisation economies play a role in the innovative activity of firms, the latter being the traditional externalities that support innovation in urban areas. However, the previous analysis also shows that the size of the firm and the sectoral specialisation help to explain the choice of firms for 'milieu economies' rather than 'dynamic urbanisation economies'. Small specialised firms are more inclined to exploit milieu economies while large firms are more in favour of dynamic urbanisation economies. In this part of the analysis our aim is to measure:

- on the one hand, the impact of milieu economies and dynamic urbanisation economies on firms' innovative capacity;
- on the other hand, how this impact changes according to the size of firms and the sectoral specialisation in which firms operate.

For this purpose, we estimate the following two models:

$$I = \alpha_1 + \beta_1 \ln ql + \upsilon_1 \ln S + \varepsilon_1 due + \phi_1 me + \eta_1 (me{*}ql) + \lambda_1 (me{*}S) \quad (1)$$

and

$$I = \alpha_2 + \beta_2 \ln ql + \upsilon_2 \ln S + \varepsilon_2 due + \phi_2 me + \eta_2 (due{*}ql) + \lambda_2 (due{*}S) \quad (2)$$

where:

I = the innovation capacity of a firm,
ql = the location quotient of the sector in which the firm operates,
due = dynamic urbanisation economies,
me = milieu economies,
S = size of the firm.

The two models differ as regards the terms of interaction between dynamic urbanisation economies or milieu economies and the firms' size or location quotient. In this case, with the estimate of the first model (equation 1), one can capture the role of milieu economies as regards innovation activities of firms and the way in which this role changes according to different firm size and degree of sectoral specialisation. The second model, in turn, captures the same effect for dynamic urbanisation economies since it relates the impact of dynamic urbanisation economies to the innovation capacity of firms of different sizes and degrees of sectoral specialisation (equation 2). Measuring such a role simply required a calculation to be made of the first derivative of innovation activities for respectively dynamic urbanisation economies and milieu economies, namely:

$$\frac{\delta I}{\delta me} = \phi_1 + \eta_1 ql + \lambda_1 S \qquad (3)$$

and

$$\frac{\delta I}{\delta due} = \varepsilon_2 + \eta_2 ql + \lambda_2 S \qquad (4)$$

and a calculation of the way in which this varies according to the different size or location quotient of firms. The models are estimated by using the following proxies:

- as regards size we used the turnover of firms (in euro) (expressed in logarithmic terms). Turnover was available only for 126 firms, limiting this part of the analysis to these 126 observations;
- for the specialisation index we used the share of employment in one sector in a city compared with the same share of employment at the national level (location quotient, expressed in logarithmic terms);
- for the dynamic urbanisation economies we used the cooperation with scientific research centres and universities strategically for the innovation activity (factor 5 of factor analysis b);

- for the milieu economies we used the cooperation with local innovative suppliers for the innovation (factor 3 of factor analysis b).

Independent variables	*Model 1*	*Model 2*
Constant	*1.65*	*-0.24*
	(3.63)	*(-1.95)*
Location quotient (ln)	*0.38*	*0.31*
	(3.22)	*(2.38)*
Turnover (ln)	*-0.09*	*-0.06*
	(-3.63)	*(-2.40)*
Milieu economies	*0.97*	*0.21*
	(2.12)	*(2.47)*
Dynamic urbanisation economies	*-0.17*	*-0.60*
	(-2.20)	*(-1.70)*
Service firms	*-0.47*	
(1=service firm)	*(-2.53)*	
*Milieu economies * turnover (ln)*	*-0.04*	
	(1.70)	
*Milieu economies * location quotient (ln)*	*0.21*	
	(1.79)	
*Dynamic urbanisation economies * turnover (ln)*		*0.03*
		(1.26)
*Dynamic urbanisation economies * location quotient (ln)*	*-0.24*	
		(-1.95)
Goodness of fit (R-square)	*0.24*	*0.20*
Number of observations	*126*	*126*

T-student in brackets

Dependent variable: Imitative innovation (factor 2 of factor analysis a)

Milieu economies = Cooperation with local innovative suppliers for the innovation (factor 3 of factor analysis b)

Dynamic urbanisation economies = Cooperation with scientific research centres and universities (factor 5 of factor analysis b)

Table 11.2 Innovation, milieu economies and dynamic urbanisation economies (Linear regression models)

The results of the estimates of equations (1) and (2) are presented in Table 11.2, while the results of equations (3) and (4) are presented in Figure 11.6. The estimated models underline that:

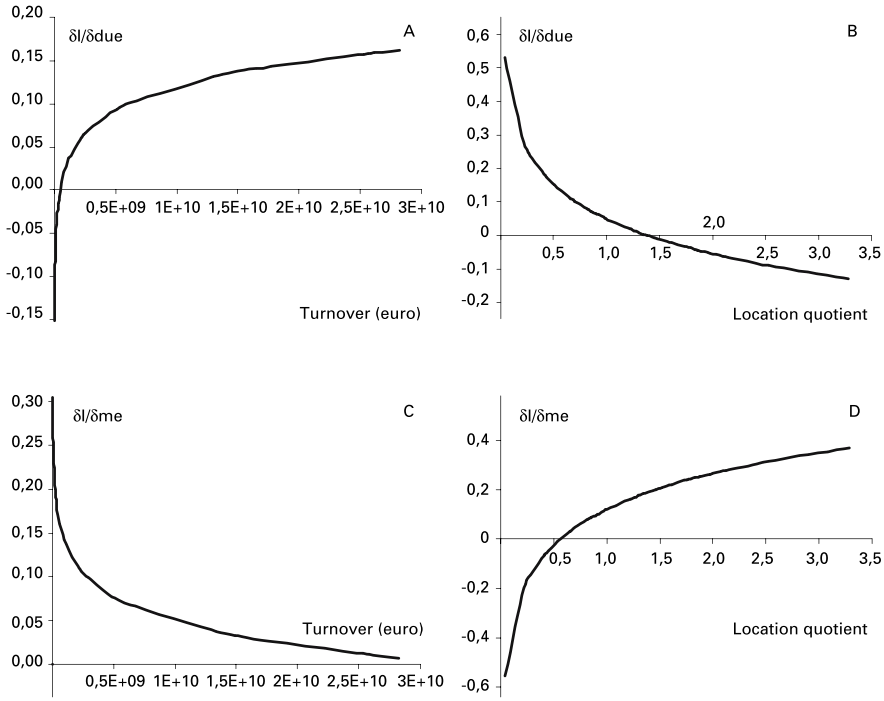
- imitative innovation activity (measured as the capacity of firms to introduce a new innovation) is developed by small specialised firms, operating in the industry sector, taking advantage of milieu economies and, in particular, of collective learning mechanisms (model 1, Table 11.2). Dynamic urbanisation economies do not provide any sort of help and are even negatively correlated;
- interestingly enough, the interaction terms between size, specialisation and agglomeration economies are statistically significant, with opposite indications; milieu economies are related negatively to the size of firms and positively to the degree of sectoral specialisation (model 1), while dynamic urbanisation economies are positively linked to the size of the firm and negatively to the location quotient (model 2).

In Figure 11.6 we present the results of equation (3). Interesting results emerge:

- the impact of dynamic urbanisation economies on firms' innovative activities increases with firm size, i.e. larger firms appreciate dynamic urbanisation economies more than small firms (Figure 11.6.a);
- on the other hand, the impact of dynamic urbanisation economies on firms' innovative capacity decreases when the degree of specialisation of the sector in which the firms operate increases. Highly specialised firms tend to get quite a low externality from an urban environment (Figure 11.6.b).

As far as equation (4) is concerned, the following results were established:

- the impact of milieu economies on firms innovative capacity decreases with the firm size. This, once again, shows that milieu economies are appreciated more by small firms (Figure 11.6.c);
- more interestingly, the impact of milieu economies on firms innovative capacity increases when the location quotient increases. This shows, once again, that in cities milieu economies take place only in specialised sectors and give rise to what has been labelled as an 'urban production milieu'. They are in fact confined to specialised sectors, where firms recreate the sort of industrial specialised territorial atmosphere typical of a milieu (Figure 11.6.d).



Source: Capello, 2001a

Figure 11.6 Impact of dynamic agglomeration economies on firms' innovation activities according to firms' size and sectoral specialisation

11.5 Conclusions

The most important conclusion that can be drawn from this chapter is related to the proof of the relevance of the milieu approach for a modern and renewed interpretation of the City as a spatial archetype. Cities and Milieus share many characteristics, not really in their geographical form but in their intrinsic role in shaping the spatial economy. This role is related, according to the milieu innovateur's theory, to the reduction of dynamic uncertainty and the supply of the durable substrate for learning processes and for the tacit transfer of know-how and non-codified non-material assets among territorial actors.

This conclusion is proven by quantitative empirical evidence. The old debate on urbanisation versus localisation economies and on urban productivity is, in this case, reinterpreted in terms of milieu economies (expressed

in the capacity of the city to produce knowledge in a socialised way, through a strong and innovative interaction among economic actors) versus dynamic urbanisation economies (i.e. channels of knowledge acquisition typical of the large city, like innovative interaction with universities and research centres).

Thanks to the existence of a database on firms innovative behaviour in five European cities, some results have been achieved which suggest that:

- in the metropolitan cities analysed, urban production milieus exist, in that in these cities some firms take advantage of milieu economies, in the form of collective learning. For these firms, in fact, innovative cooperation with local suppliers and customers is one of the main determinants for their innovation activities. This is verified by the importance attributed to sectoral specialisation in the definition of both the innovative behaviour of firms and the determinants of innovation activities;
- according to these results, the reply to the question of whether dynamic urbanisation economies or milieu economies are more conducive to innovative behaviour is misleading. From the results acquired, it seems that the reply very much depends on the size of the firm and on the sectoral specialisation in which it operates. Small specialised firms, probably part of an industrial filière, take advantage of the traditional dynamic synergies typical of a milieu behaviour while large firms, by contrast, seem to prefer dynamic urbanisation economies, oriented towards the acquisition of knowledge stemming from their urban location. These results are witnessed by a quantitative analysis on the impact of dynamic urbanisation economies and milieu economies and on the way this impact changes according to the different size of firms and degree of sectoral specialisation.

Notes

1 Though the chapter is the result of a common research effort, R. Camagni wrote sec. 1 and 2, while R. Capello wrote sec. 3, 4 and 5.

2 On the "milieu innovateur" theory see, among others, Aydalot, 1986; Aydalot and Keeble, 1988; Camagni, 1991; Maillat and Perrin, 1992; Maillat et al., 1993; Ratti et al., 1997; Camagni, 1999; Crevoisier and Camagni, 2000. The concept has recently been inserted into textbooks on Regional Economics (Capello, 2004), witnessing the scientific strength of the theory. Lambooy participated actively in the first rounds of the GREMI analyses. See Lambooy, 1986.

3 Lambooy has largely provided contributions to the debate on agglomeration economies. For some of his works on the subject, see Lambooy, 1997.
4 See, among others, Bellet et al., 1993; Dupuy and Gilly, 1995; Rallet, 1993; Rallet and Torre, 1995; Gilly and Torre, 2000.
5 Please note the dynamic element constituted by the term 'transfer', meaning the continuous shift of local specialization and the re-launching of the local competitiveness through it.
6 This idea was first developed by Vernon with reference to a spatial setting in 1957, long before his well-known 1966 article referring to industrial evolution.
7 The empirical analysis on the above theoretical reflections is based on a database built within an ESRC research project led by Oxford Brookes University and carried out by a research group composed of national subcontractors, one for each case study city, namely Amsterdam, London, Milan, Paris and Stuttgart. In each 'metropolitan city' (NUTS 3 level), firms of different sectors were interviewed with a common questionnaire related to their innovation activity. The results for each city are contained in Simmie, 2001. For Amsterdam, Jan Lambooy has directly participated in the work, providing useful, thorough and stilulating ideas, contained in his paper written with Manshanden and Endendijk. See Manshanden et al., 2001.
8 Factor analysis is in fact a statistical technique used to identify a relatively small number of factors that can be used to represent relationships among sets of many interrelated variables. The basic assumption of factor analysis is that underlying dimensions, or factors, can be used to explain complex phenomena. The goal of factor analysis is thus to identify the non-directly-observable factors based on a set of observable variables, reducing their number without losing too much of their explanatory power. The results of the factor analysis are contained in Capello, 2001a.
9 A similar result has been found for the innovative behaviour of firms in the metropolitan area of Milan (see Capello, 2001b).
10 "Regional milieux provide collective learning processes essential to innovation, but increasingly these informal mechanisms are insufficient either to initiate or to sustain creative activity as technical-economic complementarities force production chains to incorporate extra-regional sources of innovation". (...) Far from constituting an alternative to spatial dispersion, localized agglomeration becomes the principal basis for participation in a global network of regional economies" (Gordon, 1993).

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12 The Spatial Clustering of Knowledge-intensive Services: Computing Services in the Netherlands

Anet Weterings

12.1 Introduction

Between 1994 and 2002, the number of computing services firms in the Netherlands increased by more than 150%, while the average growth in number of firms was about 30% (Statistics Netherlands 2003). The widespread adoption of the personal computer and the rise of the Internet stimulated the demand for computing services and, consequently, the sector grew very rapidly. The question is which regions have benefited from the quick growth in this relatively young industry? In theory, computing services firms can locate almost anywhere in the Netherlands. Entry barriers are low because entrepreneurs only need a computer and some programming skills to start a computing services firm (Haug 1991). Moreover, most firms are small and, consequently, they hardly need any start-up capital or office space (Sivitanidou 1999).

Nevertheless, empirical studies in the U.S. (Haug 1991; Sivitanidou 1999), Great-Britain (Coe 1999; Fingleton et al. 2004) and the Netherlands (Van Oort & Atzema 2004) all show that computing services firms tend to concentrate in space, contradicting the assumptions of a footloose industry. Agglomeration economies, which are the benefits of being located at the same place as other firms, are often suggested as an explanation for the clustering of industries. Firms operating in close proximity to other firms might have lower production costs because they can share the costs of infrastructure or specific services and have lower transportation costs and higher productivity because they can benefit from a large and specialised labour market. Since the 1990s, the literature on agglomeration economies has mainly emphasised the benefits of knowledge spillovers that are more likely to occur within a spatial concentration of firms (see Feldman & Audretsch 1999). While the more traditional agglomeration economies are called static externalities, knowledge spillovers are assumed to be dynamic externalities, because they stimulate learning dynamics (Glaeser et al. 1992). Firms that are co-located

R.A. Boschma and R.C. Kloosterman (eds.), Learning from Clusters: A Critical Assessment, 275–301.

are assumed to be more innovative because the spatial proximity facilitates knowledge spillovers and the firms obtain more external knowledge.

Most literature on agglomeration economies has been preoccupied with the spatial concentration of *manufacturing* industries, while services have been relatively neglected (Drejer & Vinding 2003). This is quite surprising, not only because services form a major part of the current economy, but also because both static and dynamic agglomeration economies are likely to affect the spatial pattern of services. In contrast to manufacturing firms, knowledge-intensive services do not develop material goods but instead provide customised and often innovative information, expertise and knowledge to other firms, generally with a view to solving customers' firm-specific problems (Keeble & Nachum 2004). Knowledge-intensive services deal with complex and often non-standardised knowledge that is embodied in highly skilled employees. Exchanging such knowledge requires regular face-to-face interactions and these firms in particular are assumed to benefit from co-location (Storper & Venables 2004). In order to understand the spatial pattern of knowledge-intensive activities, both static externalities such as a location near a lot of potential customers and a highly educated labour market and dynamic externalities should be taken into account.

In this chapter, the spatial concentration of the computing services industry in the Netherlands will be empirically explored over time. The central question is: to what extent has the computing services industry in the Netherlands concentrated in specific regions between 1981 and 2001 and what characterises the regions where the industry has primarily developed? In other words, can we find empirical evidence that agglomeration economies affect the spatial pattern of computing services industry in the Netherlands? To answer this question, we will use an analysis comparable to Glaeser et al. (1992) and Henderson et al. (1995) in which the regional conditions of previous years are used to explain the employment growth in following years. Contrary to their studies, however, we will include both static and dynamic externalities because we assume that these factors can contribute to the employment growth in the computing services.

The chapter is organised as follows. Section 12.2 discusses the theoretical explanations for the clustering of knowledge-intensive services. Three factors are assumed to affect the employment growth in this industry: the demand for services, the availability of highly educated employees and knowledge spillovers between industries. Section 12.3 provides a detailed description of the dataset of this study. Using that data we will answer the first research question and describe the spatial dynamics of the computing services

employment in the Netherlands between 1981 and 2001. In section 12.4 the second research question will be answered. Using two regression analyses we will analyse which regional conditions affect the employment growth in the computing services industry. Finally, section 12.5 comprises a short discussion of our results and some recommendations for future empirical studies.

12.2 Spatial clustering of knowledge-intensive services: the attractiveness of cities

Traditionally, the incubation hypothesis (Hoover & Vernon 1959; Leone & Struyck 1976) has been used to explain the concentration of new industries in urban areas. Although the rise of the 'new industrial spaces' such as Silicon Valley during the 1970s and 1980s (Scott 1988) seemed to contradict this assumption, most economic growth and employment is still concentrated in cities (Glaeser 1998). Knowledge-intensive services contribute to the continuing growth of cities, as these firms tend to concentrate in urban regions (Isaksen 2004). Services are typically non-standardised activities that are accompanied by high levels of uncertainty. According to the incubation hypothesis, these activities in particular benefit from the urbanisation economies that result from the high densities and wide diversity of economic activities in cities.

Cities are attractive locations for knowledge-intensive services for three reasons. The first two reasons, proximity to customers and the availability of highly educated employees are the result of the specific activities of services. Services are typically 'products' that are developed at the same time as they are consumed (Gallouj 1998). Such activities require regular face-to-face contacts with customers and highly educated employees to execute the activities. Both factors are static agglomeration economies from which firms can benefit simply by being located near other firms and organisations (Glaeser et al. 1992). The third reason, knowledge spillovers, are a *dynamic* externality that stimulates learning dynamics between co-located firms. Therefore, firms located in an agglomeration are assumed to be more innovative and competitive. In this section, we will discuss all three factors and explain how they might affect regional differences in the employment growth of knowledge-intensive services.

The first reason why knowledge-intensive services tend to concentrate in urban regions is the necessity of proximity to customers (Isaksen 2004). The literature on regional clusters hardly pays any attention to the role of

demand-side factors. However, empirical studies on knowledge-intensive services indicate that access to a large market is key to understanding spatial clustering (Keeble & Nachum 2002). The rationale of these firms lies in the provision of customised and often innovative information, expertise and knowledge to other firms and organisations. Often knowledge-intensive services aim to solve problems or enhance customer efficiency. In order to integrate the necessary new knowledge successfully into the user's firm, absorptive capacity is required (Drejer & Vinding 2003). The providers have to obtain a lot of firm-specific knowledge about the activities and networks of the user and spatial proximity between the provider and the user can contribute to this in two ways. First, exchanging non-codified knowledge defies easy articulation and interaction and, therefore, is best shared through face-to-face interactions (Gertler 2003). Spatial proximity to customers lowers the high transaction costs of the regular meetings both in terms of money and time (Illeris 1996). Second, firms located near one another are more likely to have a similar background and therefore share the same conventions and customs which would enhance the efficiency of the interactions (Gertler 2003). Grabher (2002) has added to this discussion that the growing importance of project-based organisation of knowledge-intensive services might lead to clustering as well. Several firms only co-operate temporarily on projects and, if necessary, co-operate with another partner in a subsequent project. Spatial proximity between partners lowers the diverse transaction costs, but also facilitates monitoring the pool of resources and potential collaborators.

The second and related reason for the concentration of knowledge-intensive services in urban areas is the need for highly educated employees (Illeris 1996). Employees determine the competitiveness of knowledge-intensive services because they consult customers in order to reveal the problem. Although services can be standardised by formulating manuals or developing software packages, many services remain as uncodified information (Gallouj 1998). Consequently, the experience, skills and knowledge of services are often "embodied" in employees (Keeble & Nachum 2002). A location near a large labour market and near similar or related firms is, therefore, beneficial for these firms (Haug 1991). A relatively large number of highly educated employers are located in urban areas because most people stay where they have studied or prefer to live in residential environments which offer a large diversity of quality-of-life aspects (Florida 2002).

The third reason is the importance of access to external information and the benefits of knowledge spillovers (Illeris 1996). Knowledge spillovers

occur if an innovation or improvement implemented by a certain enterprise increases the performance of another enterprise without the latter benefiting firms having to pay (full) compensation (Van Stel & Nieuwenhuijsen 2004). Especially during the 1990s, the benefits of knowledge spillovers in spatial clusters of industries have been widely debated in the literature on the new growth theory. The traditional view was that co-located firms exchange more knowledge because they are involved in local linkages with proximate firms. However, empirical studies could not unambiguously show that having many local relationships improves the innovative behaviour of firms. Moreover, highly educated employees and entrepreneurs of knowledge-intensive services will not only be involved in local contacts, but will visit conferences and fairs all over the world to gather information about future developments (Bathelt et al. 2002).

Nevertheless, *local buzz* would still stimulate the clustering of firms (Storper & Venables 2004). Local relationships or collaboration alone cannot explain the clustering of firms. The need to obtain information on both market and technological developments in general is very important. Certainly, firms that deal with complex and non-standardised information will benefit from a location near other firms, organisations, media and research institutes (Isaksen 2004). Mechanisms such as labour market dynamics, spin-offs and informal meetings between professionals will lead to the exchange of information and knowledge. Firms located near similar or related firms might also benefit from rivalry. Firms can learn from each other by observing and monitoring the activities and improvements of nearby firms without having any direct contacts (Malmberg & Maskell 2002). Young firms would be stimulated to learn mainly by rivalry, while more mature and established firms benefit more from network linkages that have developed over time.

In the new growth literature, two different types of knowledge spillovers have been singled out, localisation and urbanisation externalities (Feldman & Audretsch 1999). Localisation externalities are knowledge spillovers that occur in a co-location of similar or related firms. According to this view, spillovers are more likely to occur in such a cluster because knowledge is often industry specific (Glaeser et al. 1992). Urbanisation externalities, on the other hand, follow from a concentration of a diversity of economic activities (Jacobs 1969). Knowledge is assumed to be more likely to spill over between different economic activities, because ideas in one industry can often be fruitfully applied in other industries (Van Oort 2002). Several empirical studies have attempted to measure which type of knowledge spillovers contribute more to economic growth in different industries, but

often found different results. While Feldman & Audretsch (1999) find that employment growth and innovation is enhanced by a diversity of economic activities, Henderson et al. (1995) and Beardsell & Henderson (1999) find faster employment growth when a single sector is concentrated. However, we assume that knowledge-intensive services are more likely to benefit from urbanisation externalities. Innovations in knowledge-intensive services often result from new or changing customer demands (Drejer & Vinding 2003).

In sum, knowledge-intensive services are more likely to benefit from urbanisation economies, that is, a location in a larger city. The high densities and concentration of a diversity of economic activities in urban areas are likely to be beneficial for these firms in two ways. First, firms can more easily find enough highly educated employees and the high densities facilitate the necessary interactions with customers and lower the transaction costs. Second, firms located near a lot of other firms, organisations and research institutions have better access to external information and knowledge. Firms located outside such areas have to rely on either internal efforts or face higher opportunity costs when acquiring external knowledge (Feldman 1994). Cities offer beneficial static and dynamic externalities which stimulate the employment growth in knowledge-intensive services in these regions.

However, the product life cycle theory states that the positive effects of urbanisation economies will reduce when the industry further standardises. In the first phases of the product life cycle, young firms have to deal with many changes in the technology and products and, therefore, require a lot of information and know-how from external players. When the product and production process standardises, relations with suppliers and customers will require less interaction and highly educated employees become less important. The traditional spatial variant of the product life cycle assumed that, from this moment on, the industry would shift to regions with lower production costs (Vernon 1966). However, Myrdal (1957) and also more recent views on the spatial clustering of industries assume that the industry will remain concentrated in the region where it initially developed. When a sector is concentrated in a region, over time, a specialised labour force, suppliers and institutions may develop that might lead to a continuing spatial concentration (Isaksen 2004). Such localisation economies will stimulate the further spatial concentration of the industry and only more standardised activities will move to peripheral areas to lower costs. However, the specific nature of services, which are in general less standardised than products, makes it unlikely that localisation economies will overtake the effect of urbanisation economies in this industry. Regular interactions with

customers and highly educated labour will continue to be important factors that attract these activities to cities.

Following on from this theoretical background, three hypotheses have been formulated that will be tested for the computing services industry in the Netherlands. The first hypothesis is that high demand stimulates the growth of computing services employment. Firms located near many potential customers will perform better, because the small distances eases the necessary regular interactions. Second, employment growth in the computing services industry is stimulated by the availability of highly educated employees. These firms are highly dependent on highly educated employees to perform their activities. The final hypothesis assumes that the computing services industry grows faster in regions with a wide diversity of economic activities, because especially knowledge from customers stimulates the innovation in this industry.

12.3 Regional differences in employment growth of the computing services industry

In this section, we turn to the empirical part of this chapter and answer the first research question. To what extent was the computing services industry in the Netherlands concentrated in specific regions between 1981 and 2001? We will describe the changes in the spatial distribution of employment in the computing services industry. However, before we will describe the spatial distribution and employment growth in the computing services, the dataset of this study is first described in detail.

12.3.1 Dataset: computing services employment between 1981-2001

The computing services industry is defined by the existing industrial classification code 72, which is the standard European code for computing services (see Table 12.1). The computing services industry in the Netherlands forms a large part of the Dutch ICT industry. Almost 70% of all ICT employees work in the computing services, while only 6.5% are employed in the ICT manufacturing (Statistics Netherlands 2002). As Table 12.1 shows, the computing services industry actually consists of several types of activities. Although the distinction in different classes seems to indicate that all firms are specialised in one of these activities, a large number of the computing services firms combine several activities. Moreover, the quick changes in Information and Communication Technology (ICT) have led to many

different specialisations within computing services that are not all captured in the current industrial classification. For instance, the adoption of the Internet stimulated the growth of internet-related services (Christensen et al. 2003). Although most of these new firms have registered at code 72, they are not distinguished by a specific code, because they have developed after 1993 when the latest update of the industrial classification took place.

7210.1	*System developers (provide 'total solution' for automation based on clients possibilities and wishes)*
7210.2	*Firms of consultants concerning automation*
7220	*Services for system development, system analysis and programming*
7230	*Computing centres, data-entry and punching*
7240	*Data banks*
7250	*Maintenance and repair of computers and office equipment*
7260	*Other services concerning automation*

Source: OECD 1998

Table 12.1 Definition of the computing services industries in the Netherlands[1]

An ideal analysis of the spatial evolution of an industry requires data on the location of new entrants, exits per region and firms that move from one region to another. However, as is the case for many other industries, such data is not available for the computing services industry in the Netherlands. Therefore, the data of this study has been taken from two different data sources which when combined provide a dataset of employment data in the years 1981, 1991 and 2001.

To describe the spatial pattern in 1981, we use data from the empirical study by Koerhuis & Cnossen (1982), which was the first empirical exploration of regional differences in the Dutch computing services industry. The study mentions both firm and employment data, drawn from the Register of the Chambers of Commerce as of 1 May 1981. The research population of this study has been selected with the old industrial classification of 1972, however, the population is restricted to firms that have computing services as their main economic activity. The data for 1991 and 2001 has been taken from the National Information System on Employment (LISA) dataset that contains employment data of all sectors in the Netherlands on the firm level. Since the LISA dataset only covers the whole Netherlands since 1996, the

data for 1991 has been constructed by combining LISA data with other datasets mainly obtained from Statistics Netherlands (for details see Van Oort 2002). All the data has been verified with data from Statistics Netherlands (Netherlands Institute for Spatial Research 2003).

In this study, only firms with 1 or more employees have been included. Both Koerhuis & Cnossen (1982) and the LISA dataset distinguishes between firms with zero employees and firms with one or more employees. Firms with zero employees are often only administrative registrations, which are not economically active (Bleichrodt et al. 1992). Therefore, we have decided to leave these firms out of the analysis. Koerhuis & Cnossen (1982) have estimated the number of employees of the firms that were registered with an unknown number of employees. They estimated the average number of employees of these firms at 11, because that was the average of all firms from which they had employment data. According to Drenth (1990), this number is probably too high because, in general, small firms especially are registered incorrectly. Therefore, we decided only to include the employment data of firms with a known number of employees to avoid an overestimation of employment rates in 1981.

The regional level of this study is the COROP level that corresponds to the international NUTS 3 classification of regions (see appendix I). The COROP division was constructed in 1971 and consists of 40 regions which cover the whole Netherlands. The aim of the division was to construct regions that consist of a central city and its surrounding market area. Therefore, the regional level describes functional regions where contacts and networks are more likely to occur within regions than between regions (Van Stel & Nieuwenhuijsen 2004). Between 1981 and 2001, several municipality boundaries were adjusted in the Netherlands and some of those changes have affected the COROP division. The LISA data has been corrected for these changes, but such a correction was not possible for the data by Koerhuis & Cnossen because their data is only available at COROP level. In 1986, the Northeast Polder, that used to be a part of the region Southwest Overijssel, and the Southern IJsselmeerpolders merged to form the newest province in the Netherlands, namely Flevoland. Consequently, employment in this region grew very quickly during the 1980s. Due to the low numbers of employment in the computing services in this region, the employment growth in the industry is not extreme. However, we have corrected the total employment growth in Flevoland during the 1980s to avoid an overestimation.

12.3.2 *Spatial dynamics in the computing services*

Between 1981 and 2001, the computing services sector in the Netherlands grew very rapidly in terms of employment. Table 12.2 shows a slightly more than eight-fold increase in employment in absolute numbers between 1981 and 2001. Moreover the contribution by the computing services industry to the total employment in the Netherlands has clearly increased within those 20 years.

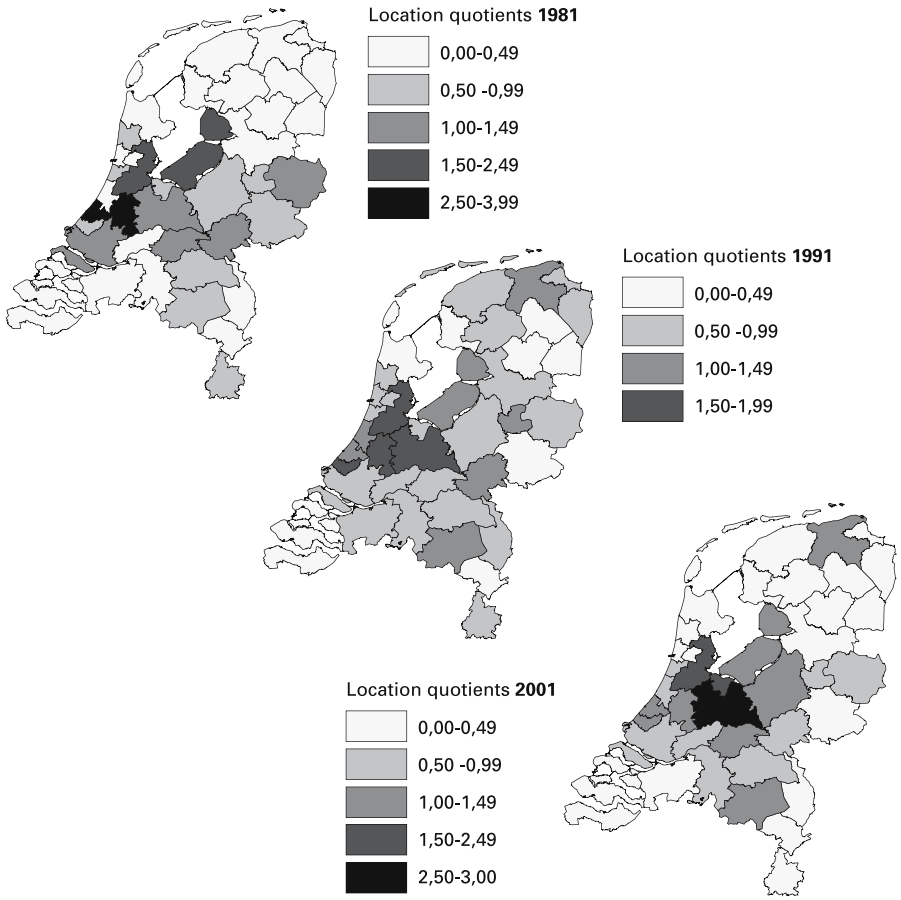
A Gini coefficient[2] describes the level of concentration of the computing services industry over the 40 regions compared to the spread of the total employment in the Netherlands. A Gini with value 0 indicates an equal spread of the sector over the country, while a value of 1 indicates complete concentration in one region. As Table 12.2 shows, the spatial diffusion of the computing service sector is not similar to the spread of total employment in the Netherlands. During the entire 20 years, the computing services industry remained relatively more concentrated. However, a Gini provides no information on whether the industry remained concentrated in the same regions as where most employment could be found in 1981.

In order to acquire an initial indication of the stability of the spatial distribution of the computing services employment over those 20 years, we have calculated the correlation coefficients between the employment in absolute numbers per region in 1981, 1991 and 2001 (table 2). We find a strong positive and significant relationship between the spread of the

	N	*% of total employment*	*Gini*	*Correlation of spatial distribution of employment*	
				1981	*1991*
1981	*12,739*	*0.31*	*0.30*		
1991	*56,775*	*1.06*	*0.20*	*0.878****	
2001	*123,828*	*1.84*	*0.27*	*0.865****	*0.931****

Source: Koerhuis & Cnossen 1982; Netherlands Institute for Spatial Research 2003

Table 12.2 Employment dynamics in the computing services industry in the Netherlands in 1981, 1991 and 2001



Source: Koerhuis & Cnossen 1982; Netherlands Institute for Spatial Research 2003

Map 12.1 Location quotients of employment in the computing services industry in 40 COROP regions, 1981, 1991 and 2001

employment over the 40 COROP regions during those 3 years. The industry seems to have further concentrated in specific regions.

Using location quotients[3], we have compared the regional differences in the share of employment in the computing services industry to the national average to see in which regions the industry is relatively overrepresented or underrepresented (see Map 12.1). In general, the computing services industry is concentrated in the Randstad, the economic core area of the Netherlands in the western and middle part of the country where the four largest cities Amsterdam, Rotterdam, the Hague and Utrecht are located. However,

during the last 20 years, the concentration of the industry has clearly shifted within the Randstad. At the beginning of the 1980s, most employment in the computing service sector was concentrated in Amsterdam and the province of South-Holland. During the 1990s, however, the industry concentrated in Utrecht, a smaller city in the middle of the Netherlands.

Until 1981, the computing services sector developed mainly in the two most urbanised provinces of the Netherlands, North- and South Holland (Koerhuis & Cnossen 1982). Slightly more than 18% of all computing services employment in the Netherlands were concentrated in the regions Amsterdam and the Hague. At that time, only 9.4% of all employment in the computing services sector was located in the fourth largest city of the Netherlands, Utrecht. While the industry had already developed relatively well in the south of the Netherlands, hardly any employment in computing services existed in the north of the country. Employment in computing services totalled a little more than 1% in the three northern provinces of Groningen, Friesland and Drenthe. Three regions in these provinces (Delfzijl, Northeast and Southeast Drenthe) did not develop any activities in this industry in 1981.

During the 1980s, the computing services industry were clearly spread over the Netherlands. The highest relative employment growth took place in the national periphery and especially in the north of the Netherlands where the industry also started to develop (Drenth 1990). As the map of 1991 shows, several regions outside the Randstad developed a relatively large share of employment in the computing services industry, while the initial employment in 1981 was very low. Most of these regions are urban areas outside the Randstad such as Eindhoven, Groningen and Arnhem-Nijmegen. The pattern seems to illustrate a filtering down process as described by Thompson (1968) in which an industry slowly diffuses from the urban areas in the economic core of the Netherlands to cities in more peripheral regions. Nevertheless, the industry was still concentrated in the Randstad in 1991 (Drenth 1990). Within the Randstad, the relative share in computing services employment of the Hague dropped to 8%, while Utrecht had improved its position to 15% which is the same percentage as Amsterdam in 1991.

The period between 1991 and 2001 is mainly characterised by a further concentration of the computing services sector in Utrecht and some regions adjacent to this region. The difference in the relative share of employment between Utrecht and Greater Amsterdam became much larger during the 1990s (see Table 12.3). In 2001, 23.2% of all jobs in this sector were located in Utrecht, while Amsterdam only had 16.8%. In absolute numbers, that difference

1981		1991		2001	
Corop	Lq	Corop	Lq	Corop	Lq
East South-Holland	3.61	Delft & Westland	1.98	Utrecht	2.83
The Hague	2.96	Utrecht	1.97	Greater-Amsterdam	1.66
Flevoland	1.99	East South-Holland	1.80	Gooi & Vechtstreek	1.58
Greater-Amsterdam	1.78	Greater-Amsterdam	1.53	Groningen	1.48
Utrecht	1.37	Flevoland	1.42	East South-Holland	1.43
Arnhem/Nijmegen	1.23	Groningen	1.35	Southwest Gelderland	1.43
Southwest Gelderland	1.15	Southeast		Southeast	
		North-Brabant	1.34	North-Brabant	1.20

Table 12.3 The Top 7 of regions with relative concentration of employment in the computer service industry in 1981, 1991, and 2001

is almost 8,000 jobs. In all other COROP regions, the employment in computing services increased or decreased with only 1% between 1991 and 2001.

One can summarise by saying that the spatial pattern of the computing services industry in the Netherlands has changed a lot during the last 20 years. However, a clear spatial concentration in the middle of the country occurred during this period. Although the cities of Amsterdam and The Hague used to have the highest relative share in computing services employment in 1981, Utrecht now has the largest share in computing services. The rapid growth in Utrecht might have been stimulated by the relocation of several large computing services firms during the 1980s. Cap Gemini, Volmac and BSO have all relocated from other cities in the Randstad to Utrecht and continued to grow during the 1990s (Van Geenhuizen 1993). Entrepreneurs in this industry state that the central location of Utrecht in the country is very attractive because it means customers spread over the country are easily accessible (Atzema 2001).

12.4 The effect of agglomeration economies on employment growth

In this section, we will test the three hypotheses formulated in Section 12.2. We hypothesise that employment growth in the computing services is the highest in COROP regions characterised by a high demand, the availability of highly educated employees and/or urbanisation externalities. Similar to Glaeser et al. (1992) and Henderson et al. (1995), we use a base year

method and estimate the effect of regional conditions ten years ago on the employment growth during the following ten years[4]. Changes in the number of employees generally occur in an incremental fashion and, therefore, the effect of different regional conditions on the spatial pattern of an industry will become clear over time. We will estimate the effect of both the static externalities high demand and a highly educated labour market and dynamic externalities (compare Fingleton et al. 2004).

With ordinary least squares (OLS) regression, we estimate which regional conditions have affected the regional differences in employment growth. The descriptive analysis in the previous section has shown that the spatial dynamics of the computing services industry in the Netherlands were quite different during the 1980s and the 1990s. To capture these differences, we will estimate two separate models for both periods and use two base years: 1981 and 1991. Although several empirical studies have revealed the relevance of using spatial autocorrelation (Van Oort 2002, Fingleton et al. 2004), we will not use this method. The regional level of this study is higher than in both other studies. The COROP regions that are analysed are constructed to form functional areas (see Section 12.3). Therefore, we assume that spillovers are more likely to occur within the COROP regions than between regions.

The dependent variable of this study is the employment growth in the computing services industry per COROP region. This variable is measured by an index that divides the employment per region in 1991 or 2001 by the employment in respectively 1981 and 1991. The three regions in the north where no employment in the computing services industry had developed in 1981 are left out of the analysis for the first time period.

In order to identify the regional conditions that have affected regional differences in the employment growth in computing services during the last 20 years, six independent variables have been constructed. The first regional condition is the availability of demand. According to Fingleton et al. (2004) the growth of total employment per region over the study period reflects the effect of growth in regional demand and supply conditions. We have included the total employment growth for each time period in both models (EMPLGR) in order to measure the effect of regional differences in the demand for computing services. In both cases, the employment growth in the computing services industry is excluded from the variable. As stated in Section 12.3, we have corrected the high employment growth in the new region of Flevoland. The data are drawn from Statistics Netherlands (1982; 1992).

The availability of human capital is likely to be another important source of employment growth in the computing services industry. We have therefore

added the HEDU variable that describes the percentage of adults with a university or higher vocational education degree within the total population above 25 years old for each COROP region in 1981 and 1991. This variable has also been constructed with data from Statistics Netherlands.

To measure the potential effect of knowledge spillovers, we have included three different independent variables which all have been used in previous empirical studies (Glaeser et al. 1992, Henderson et al. 1995, Feldman & Audretsch 1999). The first variable measures the potential effect of localisation externalities, which are knowledge spillovers within an industry. These knowledge spillovers are measured with location quotients that indicate the spatial concentration of the computing services industry per region (CONC). This variable measures the relative overrepresentation or underrepresentation of ICT employment per COROP region compared to the national average in 1981 and 1991 and has been constructed with data drawn from Koerhuis & Cnossen (1982) for 1981 and the LISA dataset for 1991.

Knowledge spillovers that occur due to the co-location of a diversity of economic activities are measured with a Gini coefficient that is calculated over regions instead of sectors to get location specific values. This variable DIVERSITY indicates how evenly employment in a COROP region is spread across economic sectors. Commonly, Gini is used to measure the sectoral degree of diversification (as we did in Section 12.3). However, summation over sectors instead of locations and calculating absolute differences of sectoral employment shares in locations with those in the whole Netherlands results in location specific values of Gini (see Van Oort 2002). A value of 0 indicates that the employment in the region is spread in a manner which is identical to that of total employment in the reference region, while a value of 1 indicates concentration in one sector. In other words, lower values of Gini indicate higher diversity and, consequently, a negative relation between employment growth and DIVERSITY indicates that inter-industry knowledge spillovers matter. The Gini coefficients have been computed with employment data for 47 sectors with 2-digit NACE codes on the COROP level. This data has been drawn from the LISA dataset. We have no employment data on all sectors for the year 1981, but in order to capture the potential effect of industrial activity in the first period, we will add the Gini data of 1991 in the model for the 1980s.

The third indicator for the effect of knowledge spillovers is competition. According to Porter (1990), growth in clusters is mainly enhanced by local competition and not by agglomeration economies, because a higher degree of competition might stimulate higher productivity. Following Glaeser et al. (1992), we measure competition by the number of establishments per worker in the

industry per COROP region (COMP). The variable COMP indicates whether the average firm size is larger or smaller in that COROP region compared to the national average. The interpretation of this variable of establishment size as a measure of local competition has been called into question by Combes (2000), who contends that it may measure internal diseconomies of scale, and Rosenthal and Strange (2000), who view it as a broader measure of local industrial organisation. Furthermore, relative establishment size may be a poor indicator of competitive pressure in cases in which there is competition from outside the local area. Fingleton et al. (2004) argued that the variable can be included as an indicator of the market structure of the industry per region. In order to compare our results with previous studies, we keep this measurement in the analysis. This variable is only included in the model for the second time period because the correlation with the degree of spatial concentration was too high (above 0.75, see appendix III).

Finally, we have added the control variable population density that generally accounts for the level of urbanisation in each region. This variable accounts for the general static benefits of a location in a more urbanised region such as the higher quality of infrastructure. Computing services might, for instance, benefit from a fast Internet connection. Most models also include the initial employment in the industry as a control variable. However, the initial employment and the concentration of the industry have a high positive correlation and both variables therefore seem to measure the same effect. We have decided to leave initial employment out of both models. Both the dependent variables for the first and second period and the independent variables of concentration, competition and population density have been log transformed to improve the normal distribution of the variables.

The results of both regression analyses are summarised in Table 12.4. The employment growth in the 1980s is closely related to the availability of human capital, the spatial concentration of the industry and the population density per region. The positive sign of the percentage of highly educated employment per region confirms the second hypothesis that computing services employment has grown faster in regions where more human capital is available. However, the two other hypotheses have to be rejected for the time period 1981-1991. Both the indicators of a high demand per region and the availability of knowledge spillovers between industries are not significantly linked to the regional differences in employment growth in the 1980s. The degree of spatial concentration of the industry in 1981 has a negative effect on the later employment growth in the computing services during the 1980s. In other words, knowledge spillovers between similar or

related firms did not seem to have stimulated the employment growth in these regions. In fact, this result clearly reflects the diffusion process of the 1980s, which we have described in the previous section (see Map 12.1). In 1981, the industry was still concentrated in Amsterdam and parts of the province of South-Holland. However, these regions did not grow very fast during this period and they slowly lost their strong positions. In the 1980s, the highest relative employment growth in computing services took place in regions in the national periphery in the north (Friesland and Groningen) and south-west of the Netherlands (Zeeland). The continuing adoption of the personal computer seems to have stimulated the demand for computing services in the national periphery, thereby increasing the growth of the industry in those regions. Therefore, the highest relative growth in employment took place outside the regions with the highest urban density and where the industry was concentrated in 1991.

The main outcome of the second model, which estimates the effect of regional conditions on the employment growth in the 1990s, is that only static externalities appear to affect the employment growth in the computing services. Confirming our first two hypotheses, total employment growth and

	Growth 1981-1991			*Growth 1991-2001*		
	B	*S.E*	*St. Coef.*	*B*	*S.E*	*St. Coef.*
Constant	*0.56*[1]	*0.28*		*-0.31*	*0.33*	
Log (CONC)	*-0.80*[3]	*0.05*	*-0.98*	*-0.48*	*0.27*	*-0.43*
Log (COMP)	-	-	-	*-0.31*	*0.22*	*-0.29*
GINI	*-0.01*	*0.85*	*-0.00*	*-0.33*	*0.91*	*-0.05*
EMPLGR	*-0.01*	*0.24*	*-0.01*	*0.82*[3]	*0.29*	*0.44*
HEDU	*4.34*[3]	*1.22*	*0.26*	*3.10*[2]	*1.22*	*0.52*
POP. DENSITY	*-0.23*[1]	*0.12*	*-0.17*	*-0.01*	*0.15*	*-0.07*
N		*37*			*40*	
F		*69.15*[3]			*3.92*[3]	
Adjusted R square		*0.91*			*0.31*	

[1] $p < 0.10$; [2] $p < 0.05$; [3] $p < 0.01$

Table 12.4 Estimation results of the effect of regional conditions on the employment growth in computing services per COROP region between 1981-1991 and 1991-2001

the percentage of highly educated employees have a significant and positive effect on the employment growth in the 1990s. In other words, high demand and the availability of human capital indeed seem to be important factors that influence the regional differences in employment growth.

Although the variable GINI, which indicates the effect of knowledge spillovers between industries, has the expected negative sign, this variable is not significantly related to employment growth in both time periods. Consequently, we have to reject our third hypothesis that the growth in computing services employment is stimulated by urbanisation externalities. However, the relatively high spatial scale used in this analysis might cause the lack of any effect of urbanisation externalities. COROP regions have only small differences in the diversity of economic activity since the relatively large size of these regions averages high or low specialisations. Studies on lower spatial scales have found evidence of the role of economic diversity (Van Oort & Atzema 2004). Therefore, a similar analysis on a lower spatial scale might indicate that computing services firms do benefit from a location with many different other types of firms.

In the second model, none of the three indicators for knowledge spillovers has a significant effect. The regional differences in employment growth in computing services during the 1990s does not seem to be dependent on knowledge spillovers whether these come from within the industry, from other industries or are stimulated by higher competition. Although the spatial concentration of the industry (CONC) is not significant in the second model, this indicator again has a negative sign. The negative effect in this time period is caused by the exceptional growth in three regions. During the 1990s, computing services employment grew very fast in three regions in the middle of the Netherlands (Southwest Gelderland, Gooi and Vechtstreek, and the Veluwe), which had a relatively low share of employment in 1991. The growth of these three regions and the high growth in the region Utrecht have further strengthened the spatial concentration of the industry in the middle of the Netherlands.

To summarise our results, the regional differences in the employment growth in the computing services industry seem to be mainly affected by static externalities. In particular, the availability of highly educated employees appears to be very important. Not only can incumbent firms find new employees more easily when they are located in a region with a high percentage of highly educated employees, but highly educated people are also more likely to start their own computing services firm. Future empirical studies should distinguish between the effect of employment growth within

incumbents and employment growth caused by new establishments (compare Van Oort & Stam 2004). During the last 20 years, many new firms have entered the computing services industry (Statistics Netherlands 2003) and, therefore, mainly new entrants might have caused the regional employment growth in this industry.

The results of the model suggest that the demand for computing services only affected employment growth during the 1990s. Our findings for the 1980s seem to contradict the findings of Isaksen (2004) who stated that "... the need to be where the market is" (p. 1171) is the most straightforward reason for clustering in computing services. However, the spatial diffusion process that took place during the 1980s probably causes this result. Finally, the fact that we did not find any effect of knowledge spillovers might be caused by the indirect way of measuring that we have adopted in this analysis. We will further discuss this issue below.

12.5 Discussion

This chapter has investigated the spatial dynamics in the computing services employment in the Netherlands during the last 20 years. During this period, employment in the computing services industry grew very fast and started to concentrate in the middle of the Netherlands. Our econometric model has shown that these spatial dynamics appear to be related mainly to regional differences in demand for the services and the availability of highly educated employees. Other variables which indicate the effect of knowledge spillovers in three different ways, and urbanisation economies in general, had an opposite effect than expected, or the effect turned out to be insignificant. Furthermore, we found quite different patterns for the 1980s and the 1990s. The regional differences in employment growth during the 1980s clearly illustrate the spatial diffusion of the industry. In the 1990s, the industry has diffused over the whole Netherlands and the industry further concentrates in the middle of the country.

The lack of effect of knowledge spillovers in our study seems to contradict previous studies, although many comparable studies also often found quite contradictory results. We may find an effect of knowledge spillovers if we use spatial autocorrelation methods. Fingleton et al. (2004) used a comparable method to the one we adopted in this chapter by which they estimated the effect of both static and dynamic externalities on the employment growth of small and medium-sized enterprises (SMEs) in computing services in Great

Britain. They estimated an OLS regression and a model that accounts for spatial autocorrelation. The simple regression indeed showed that demand and supply conditions are important factors governing the employment growth in computing services. However, the models that include spatial autocorrelation showed a positive effect of knowledge spillovers between regions.

Another explanation for the differentiating results between this study and other studies might be differences in spatial scales. According to Van Oort & Stam (2004), the diversity of spatial levels that are adopted in empirical studies which attempt to explain what type of spatial circumstances induce dynamic and innovative externalities might be a major cause of the often differentiating research results. In their study, they find that knowledge spillovers in the Dutch ICT industry mainly occur in the agglomerated region and are not limited to the larger urban areas.

Finally, it is important to note that we have used a method in this chapter that can only provide indirect proof of the effect of regional conditions on the employment growth in the computing services industry in the Netherlands. Similarly to previous studies (e.g., Glaeser et al. 1992; Feldman & Audretsch 1999), we have measured the relation between employment growth and agglomeration economies on the regional level. However, such a study provides no direct information on how the co-location of firms might contribute to the performance of firms (Martin & Sunley 2003).

To acquire a better understanding of why industries tend to concentrate in specific regions and whether firms really benefit from a co-location near other firms, empirical studies should focus on the firm level. Firms that are located next to each other do not necessarily also have contacts with one another or institutions located nearby. Empirical studies should explore the nature and strength of linkages between firms, firms and institutions, or among employees, in order to really understand how knowledge is transferred and whether geographical proximity also facilitates knowledge spillovers. Moreover, recent empirical studies even suggest that the spatial concentration of industries can also occur without any benefits for the co-located firms. According to Sorenson (2003), employees of existing firms are more likely to start their own firm because they have better access to resources such as start-up capital, potential employees and customers and they have more information on market niches. Spin-offs of incumbent firms often locate near their parent and, therefore, further strengthen the spatial concentration. In a similar way, Zhang (2003) has suggested that imitation behaviour can lead to spatial clusters, because successful entrepreneurs may act as role models, inspiring new entrepreneurs in the region. Future empirical research should

test the effect of agglomeration economies on the firm level and control for other potentially relevant factors such as strong network relations and spin-off dynamics which might overtake the effect of agglomeration economies (see Boschma & Weterings forthcoming).

Notes

1 The Dutch industrial classification code 72 is slightly different from the European standard NACE. The standard defines 72.1 as hardware consultancy, while in the Netherlands code 72.1 includes system developers and consultants concerning automation (OECD 1998).

2 $$\text{GINI} = \frac{1}{2}\sum_{i=1}^{n}\sum_{j=1}^{n}\left|s_{i,g} - s_{j,g}\right|$$

$s_{j,g}$ = share of total employment in location j

$s_{i,g}$ = share of employment in sector g in location i

n = number of regions

3 $$LQ = \frac{E_{i,j} / \sum_{j} E_{i,j}}{\sum_{i} E_{i,j} / \sum_{i,j} E_{i,j}}$$

E = Employment in industry

i = Region

j = Sector

4 Henderson (1997) finds that effects of agglomeration economies on employment growth peak after about 5 years and die out after 6-7 years. Thus, for the data used in this chapter, the time interval over which employment growth was measured appears to be long enough to allow measurable change to emerge. See also Combes (2000).

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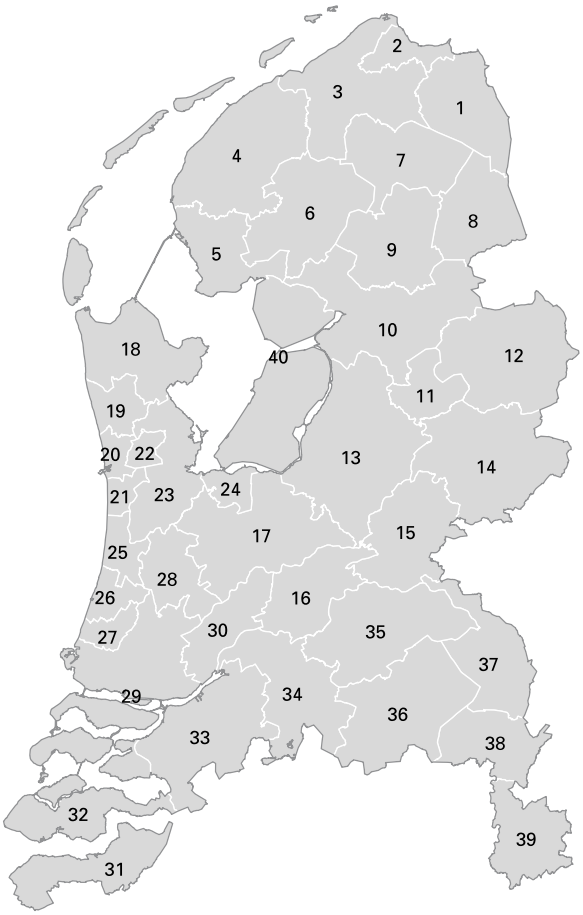
Appendix I. Division into COROP regions



1. East-Groningen
2. Delfzijl
3. Rest of Groningen
4. North-Friesland
5. Southwest Friesland
6. Southeast Friesland
7. North-Drenthe
8. Southeast Drenthe
9. Southwest Drenthe
10. North Overijssel
11. Southeast Overijssel
12. Twente
13. Veluwe
14. Achterhoek
15. Aggl. Arnhem-Nijmegen
16. Southwest Gelderland
17. Utrecht
18. Kop van North Holland
19. Alkmaar
20. IJmond
21. Aggl. Haarlem
22. Zaanstreek
23. Greater Amsterdam
24. Gooi and Vechtstreek
25. Aggl. Leiden
26. Aggl. The Hague
27. Delft and Westland
28. East-South Holland
29. Greater Rijnmond
30. Southeast South-Holland
31. Zeeuws-Vlaanderen
32. Rest of Zeeland
33. Western North-Brabant
34. Middle of North-Brabant
35. Northeast North-Brabant
36. Southeast North-Brabant
37. Northern Limburg
38. Middle of Limburg
39. Southern Limburg
40. Flevoland

Appendix II. Descriptive statistics

	N	*Mean*	*Std.*	*Minimum*	*Maximum*
GRICT 1981-1991	*37*	*27.02*	*60.92*	*1.72*	*269.19*
GRICT 1991-2001	*40*	*1.80*	*1.12*	*0.30*	*6.33*
CONCENTRATION 1981	*37*	*0.73*	*0.80*	*0.01*	*3.61*
CONCENTRATION 1991	*40*	*0.83*	*0.45*	*0.21*	*1.98*
CONCENTRATION 2001	*40*	*0.70*	*0.57*	*0.13*	*2.83*
INITIAL EMPL. 1981	*37*	*344.30*	*577.77*	*0.57*	*2323.45*
INITIAL EMPL. 1991	*40*	*1419.38*	*1950.84*	*130.00*	*8517.00*
EMPL. GROWTH 1980-1991	*40*	*0.30*	*0.14*	*0.03*	*0.67*
EMPL. GROWTH 1991-2001	*40*	*0.23*	*0.14*	*-0.08*	*0.68*
COMPETITION 1981	*37*	*2.86*	*3.48*	*0.43*	*17.60*
COMPETITION 1991	*40*	*1.47*	*1.11*	*0.57*	*6.97*
GINI 1991	*40*	*0.16*	*0.04*	*0.10*	*0.25*
HIGH EDUCATED 1981	*40*	*0.13*	*0.03*	*0.09*	*0.20*
HIGH EDUCATED 1991	*40*	*0.14*	*0.04*	*0.00*	*0.22*
POP. DENSITY 1981	*40*	*239.77*	*248.65*	*32.15*	*1277.21*
POP. DENSITY 1982	*40*	*298.80*	*290.20*	*62.44*	*1452.93*

Appendix III. Correlation matrix

Correlation matrix 1981-1991

		1	2	3	4	5	6	7
1	*Log GRICT 8191*							
2	*Log INEMPL 81*	-0.90[3]						
3	*Log CONC 80*	-0.94[3]	0.95[3]					
4	*GINI 91*	0.02	-0.12	-0.04				
5	*EMPLGR 81-91*	0.05	-0.08	-0.00	-0.29[1]			
6	*Log COMP 81*	0.84[3]	-0.88[3]	-0.89[3]	0.12	0.08		
7	*HEDU 81*	-0.33[2]	0.52[3]	0.49[3]	-0.00	-0.03	-0.36[2]	
8	*Log POPDENS 81*	-0.51[3]	0.61[3]	0.53[3]	0.12	-0.41[3]	-0.38[2]	0.61[3]

Correlation matrix 1991-2001

		1	2	3	4	5	6	7
1	*Log GRICT 9101*							
2	*Log INEMPL 91*	0.43[3]						
3	*Log CONC 91*	0.17	0.75[3]					
4	*GINI 91*	-0.22	-0.34[2]	-0.06				
5	*EMPLGR 91-01*	0.48[3]	0.33[2]	0.36[2]	-0.28[1]			
6	*Log COMP 91*	-0.17	-0.57[3]	-0.73[3]	-0.07	-0.22		
7	*HEDU 91*	0.43[3]	0.66[3]	0.50[3]	-0.16	0.22	-0.24	
8	*Log POPDENS 91*	0.15	0.64[3]	0.52[3]	0.08	-0.04	-0.34[2]	0.70[3]

13 Dynamic Information Externalities and Employment Growth in the Netherlands[1]

Frank G. van Oort, Daan P. van Soest and Shelby D. Gerking

13.1. Introduction

Beginning with Romer (1986) and Lucas (1988), the theory of endogenous growth emphasised the role in the growth process of both the stock of knowledge and the (planned or unplanned) transfer of knowledge between economic agents. For example, knowledge spills over between firms via informal contacts between employees, or because employees switch jobs and take their knowledge with them. Indeed, the most important type of knowledge that plays a role in the growth process is not necessarily path-breaking innovations, but may be learning opportunities for everyday people (Glaeser 1999). Empirical tests of this theory have often looked at cities to identify settings in which these external factors most effectively foster growth. Results, however, have been sharply divided. On the one hand, Glaeser *et al.* (1992) and Feldman and Audretsch (1999) find that employment growth is enhanced by diversity of activity across a broad range of sectors. Henderson *et al.* (1995), Black and Henderson (1999a). Beardsell and Henderson (1999), on the other hand, find faster growth when more activity is concentrated in a single sector. While endogenous growth theory is among the most powerful advances in economics in the past quarter-century, the fact that no clear view has emerged regarding situations to which it best applies represents a barrier to its further development and application. In growth models, for example, it is appropriate to treat urban areas as completely specialised as in Black and Henderson (1999b) or to assume that knowledge spills over predominantly between employees within the same industry as Glaeser (1999) does? Or, is industrial diversity such a fundamental component of the growth process that it must be captured in models such as those outlined in Fujita, Krugman, and Venables (1999)? Moreover, the lack of agreement on the relative importance of industrial concentration and diversity sends an ambiguous message regarding policy choices to promote or manage growth in urban areas.

This chapter includes three steps toward a better understanding of the relationship between knowledge spillovers and economic growth using data for the Netherlands. First, we provide insight into potential explanations for

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differences in results of two highly influential papers, Glaeser *et al.* (1992) and Henderson *et al.* (1995), using data from outside the United States. Like Combes (2000), who analysed data from France, we draw attention to the importance of differences in the sectoral composition of the two data sets and also focus on the differences in methodologies used. Second, we address several long-standing issues using data at the municipality level from the entire country, as well as data from individual postal zip codes in one of the 12 Dutch provinces, *Zuid-Holland* (South-Holland). This province, which is about the size of the Dallas-Ft. Worth metropolitan area, covers a substantial part of the country's core economic area, the Randstad. Because zip codes average less than 6 km^2 in size, we can analyse employment growth in relatively small (urban) areas within an already small heavily urbanised region. As explained more fully below, this affords better controls for spatial aggregation error and unobserved location attributes than can be found in prior studies (Wallsten 2001). Third, we identify growth determinants among establishments that have remained at one location for a period of years and develop an alternative measure of local competition. Previous studies have not been able to distinguish between employment growth in existing establishments and employment growth attributable to establishment births, deaths, and relocations. We find that local competition may retard employment growth among existing establishments, a result that sets our work apart from earlier studies.

The remainder of the chapter is divided into five sections. Section 13.2 reviews the approaches taken in two prior studies in order to motivate the analysis presented later on. Section 13.3 describes the data. Section 13.4 examines determinants of employment growth in 234 Dutch municipalities. Section 13.5 looks at employment growth in 416 zip (postal) code areas in South- Holland. Section 13.6 concludes.

13.2. Background

Knowledge-based theories of endogenous growth can be tested at the city level. The density of economic activity in cities facilitates face-to-face contact as well as other forms of communication (Lucas 1993). Several hypotheses have been proposed concerning conditions under which knowledge spillovers affect growth. One hypothesis, originally developed by Marshall (1890) and later formalised by Arrow (1962) and Romer (1986) (MAR), contends that knowledge is predominantly sector-specific and hence that regional

specialisation will foster growth. Furthermore, (local) market power is also thought to stimulate growth as it allows the innovating firm to internalise a substantial part of the rents. A second hypothesis, proposed by Porter (1990), also states that knowledge is predominantly sector-specific, but argues that its effect on growth is enhanced by local competition rather than market power as firms need to be innovative in order to survive. A third hypothesis, proposed by Jacobs (1969), agrees with Porter that competition fosters growth, but contends that regional diversity in economic activity will result in higher growth rates as many ideas developed by one sector can also be fruitfully applied in others. A fourth hypothesis, of course, could be developed by combining aspects of the other three to emphasise the role of industrial diversity in a non-competitive environment.

Two important papers that empirically test these hypotheses are by Glaeser *et al.* (1992) and Henderson *et al.* (1995). These papers both use employment data to measure growth[2] but, as indicated above, reach different conclusions, particularly regarding effects of local industrial concentration versus local industrial diversity. The former study finds evidence supporting the Jacobs hypothesis, whereas the latter finds evidence consistent with both the MAR and Jacobs view, depending on whether mature capital goods or high-tech industries are considered. One key difference between these studies rests on whether data from all cities in a given industry are analysed (Henderson *et al.* 1995) or whether only the largest industries in each city are included in the sample (Glaeser *et al.* 1992). Consequently, Glaeser (1998, p.148) suggests that "[a] possible reconciliation of results [on this point] is that scale and concentration may have value for smaller firms; however, diversity has more value for long term growth." Beardsell and Henderson (1999) argue that another important difference lies in the treatment of time invariant firm and/or location attributes. In particular, they state (p.449) that "...rather than the link between the present and the past representing mostly dynamic externalities, an alternative explanation is that there is a location fixed/random effect in estimation that gives rise to the role of history." Glaeser *et al.* (1992, p.1148) counter this view by distinguishing between the role of historical factors, such as natural resource and transport advantages, in location versus the role of these factors in growth. Kim (1999) and Ellison and Glaeser (1999) provide a more complete discussion of issues related to natural advantage and location.

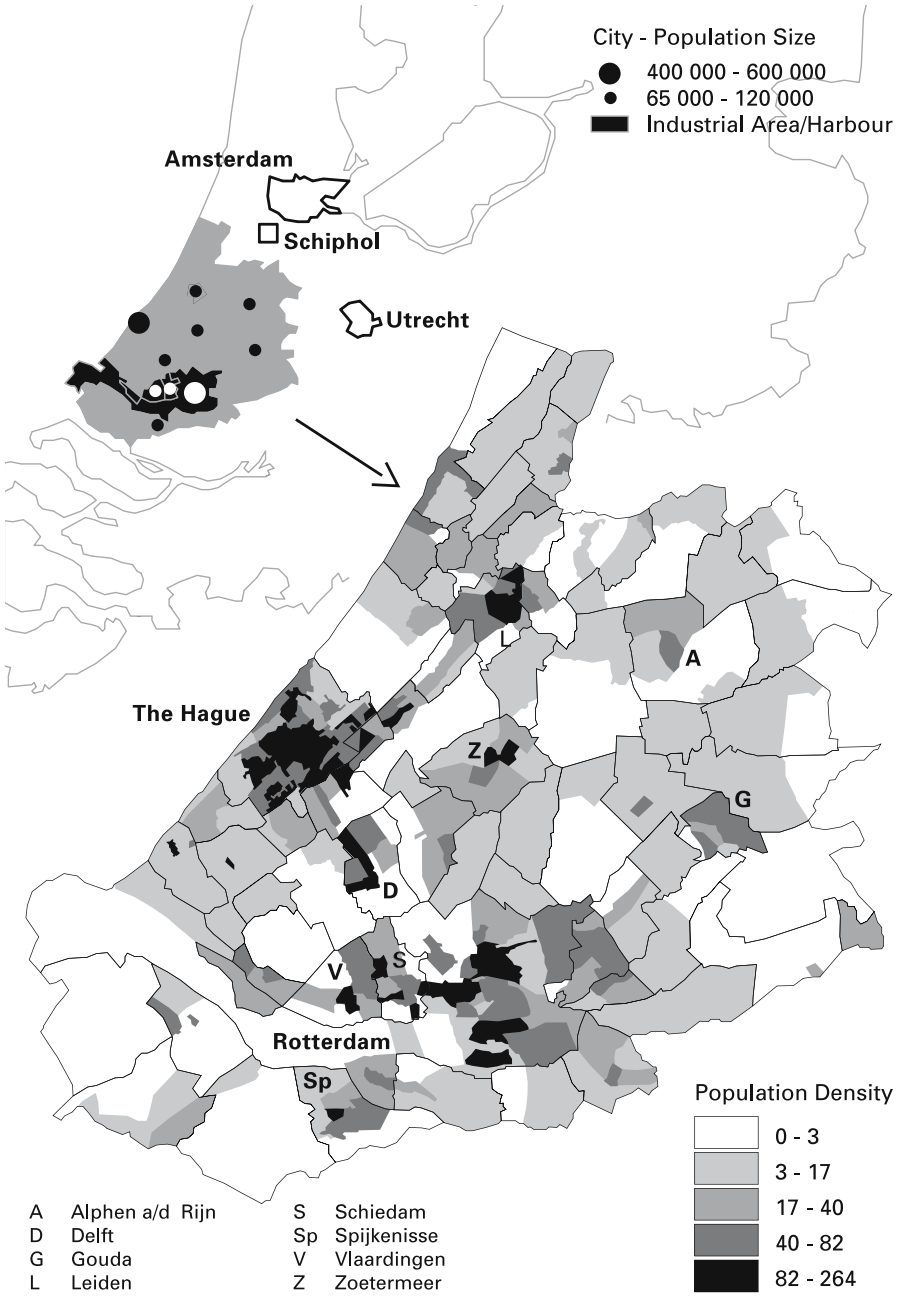
Other explanations for the differences in results from these studies are also possible. For example, in the Henderson *et al.* (1995) study, the strategy of analysing all cities in a given industry turned out to be problematic. Because of disclosure rules, employment data for as many as 30% of cities

was censored. This problem led to estimating a Tobit model in which the log of the end-of-period (1987) employment level was regressed on the log of beginning-of-period (1970) employment level. This approach is natural given the circumstances faced. However, controlling for the fixed/random effects of history becomes difficult with only one cross-section of data for each industry. A number of explanatory variables were tried that might be components of a fixed effect, but they performed unevenly.

Glaeser *et al.* (1992), on the other hand, estimated equations to explain growth in, rather than the level of, employment for city industries. As the existing growth models imply that the knowledge externalities are sources of *permanent* growth, they focus on the largest (and hence often mature) industries. Therefore, data was drawn from the six largest industries in each of the U.S. cities studied, and hence censoring did not appear to be as serious as in the Henderson *et al.* (1995) study. Also, they drew a substantial proportion of their observations from non-manufacturing industries (about one-third came from wholesale trade, construction and auto dealers and service stations), whereas Henderson *et al.* (1995) looked only at manufacturing industries. Recent evidence for France shows that indeed the composition of the data set may at least partially explain the difference in findings: Combes (2000) finds that diversity tends to enhance employment growth in services, whereas it tends to retard growth in manufacturing industries. However, specialisation does not seem to foster growth in either type of activity. Finally, in addition to variables measuring agglomeration economies, Glaeser *et al.* (1992) included a control variable in their regressions measuring the national employment growth rate of the industry outside the city.[3] This variable was included to account for national demand shifts and to capture general (industry-wide) technological progress (see Blanchard and Katz 1992).

13.3. Data

Data for this study was drawn from Dutch municipalities and from postal zip code areas in the Province of South-Holland. The Netherlands is a small country with land area of about 41,000 km^2 and population density of 457 persons per km^2. The province of South-Holland is about $1/12^{th}$ of the country and is heavily urbanised with a population density of 1200 inhabitants per km^2. This province covers a substantial part of the core economic region of the Netherlands, the Randstad and includes the country's second and third largest cities (Rotterdam and The Hague) as well as numerous



Map 13.1 The South-Holland Research Area (416 ZIP Codes)

medium-sized cities such as Leiden, Delft, and Schiedam. Figure 13.1 shows the South-Holland research area and its population build-up. Both the regional (South-Holland) and national (Netherlands) data sets are of particular interest because (i) they include virtually all establishments present in the Netherlands for the period 1991-1997 and in South-Holland for the period 1988-1997, and (ii) the data is available on a fine spatial and industrial scale (see Appendix A). The time intervals are the longest over which employment growth can be measured using this detailed data in both the Netherlands and South-Holland.[4] Establishments were enumerated based on information furnished by the Chamber of Commerce, insurance companies and industrial sector associations, and an annual questionnaire was sent to each. The average response rate to the questionnaire was 96%. Questionnaire results identify each establishment's 6-digit zip code (a small area containing about 100 different mailing addresses) and 5-digit activity code. The Dutch and South-Holland data sets, however, are not identical (Van Oort 2004). Whereas, for the entire Netherlands, only employment *totals* are available by industry and zip code, the South-Holland data set contains information on individual establishments. Thus, in one respect, the South-Holland data resembles the Longitudinal Research Data made available by the U.S. Census Bureau, but contains information on all establishments located there, not just those engaged in manufacturing. A disadvantage of the Dutch and South-Holland data sets, however, is that they do not contain measures of outputs, inputs other than labour, or plant characteristics. Consequently, they are not appropriate for estimating establishment-level production functions, as in Beardsell and Henderson (1999).

Spatial and industrial detail is an obvious advantage. However, the level of detail in both the Dutch and South-Holland data is actually too great for the purposes of this study. When the data is organised into a location-by-activity matrix, most of the cells contain no information. Many of the 6-digit zip code areas, for example, have only residences and individual 5-digit industries are present in only comparatively few 6-digit zip codes. Consequently, the data was first aggregated up to the 4-digit zip code, 2-digit activity code level (roughly the equivalent of 2 digit industries in the U.S. SIC system). In South-Holland, for example, the average size of a 4-digit zip code is about 5.65 km^2, although they tend to be smaller in urban centres where the density of addresses is high and larger in areas that have more open space. In any case, a zip code is quite small, particularly in comparison to U.S. counties or cities.

The South-Holland data was left at the 4 digit zip code level, whereas the data for the Netherlands was further aggregated into 548 municipalities

(69 of which are in South-Holland) in order to conduct analyses similar to those in earlier studies. These municipalities ranged in size from international cities such as Amsterdam to small villages. Because of their relative size to other municipalities, Amsterdam, Rotterdam, Utrecht, and The Hague were further subdivided into 3-digit zip code areas, roughly corresponding to economic areas in the core and periphery, containing 50,000 to 100,000 persons each. This led to a total of 580 geographic units (still referred to as municipalities).

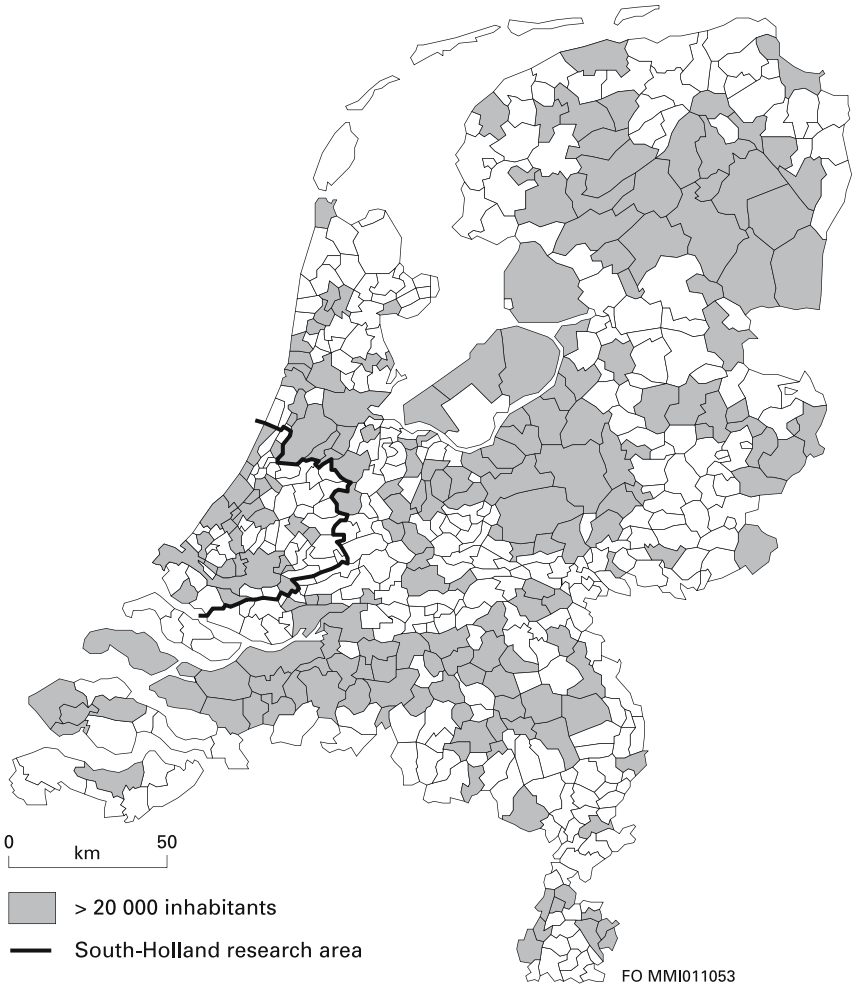


Figure 13.2 Municipalities with more than 20,000 inhabitants (1991)

	Netherlands			South-Holland	
Sectors	*Representation (1991)*	*Employment (1991)*	*Sectors*	*Representation (1988)*	*Employment (1988)*
Health care	*206*	*545,343*	*Building and construction*	*289*	*67,500*
Building and construction	*195*	*244,735*	*Remaining Business services*[1]	*263*	*78,610*
Retail trade	*179*	*344,665*	*Retail trade*	*232*	*70,929*
Remaining business services[1]	*156*	*370,842*	*Education*	*221*	*45,116*
Wholesale trade	*109*	*239,908*	*Health care*	*202*	*103,656*
Education	*100*	*154,444*	*Wholesale trade*	*181*	*67,114*
Agriculture and fishery	*90*	*88,620*	*Agriculture and fishery*	*132*	*32,406*
Government and social insurance	*73*	*143,011*			
Distribution by land	*105*	*23,156*	*Distribution by land*	*33*	*30,848*
Government and social insurance	*99*	*52,475*			
Food and beverage processing industry	*27*	*33,419*	*Consumer services (non-retail)*	*71*	*1,918*

[1]*Remaining business services: juridical, taxes, public relations, consultancy.*

Table 13.1 Largest Sectors Represented in the Netherlands and South-Holland Data

Because previous research dealt with cities, we focus our analysis on employment growth in urbanised areas. For the Netherlands we include in the analysis the 234 municipalities that have 20,000 or more of inhabitants (see Map 13.2). The province of South-Holland is heavily urbanised and hence all zip code areas are included in the data set. However, not all areas in South-Holland have equal population densities. Hence we include an indicator of the degree of urbanisation. This indicator is based on a criterion that distinguishes between the most heavily urbanised and other areas, based on (i) the density of addresses, population and employment (which includes addresses in the own zip code and those in neighbouring zip codes corrected for geographical distance), and (ii) the presence of urban services (such as,

for example, the number of hospitals, sports facilities, social-cultural services, public transport, etc. per household). For a more detailed description, see WMD (1999). Applying these criteria, 62% of the zip code areas in South-Holland are classified as urbanised.

Table 13.1 shows the ten sectors that turned up most often among the six largest sectors in either the 234 Dutch municipalities and the 416 zip code areas in South-Holland, and the number of employees in each. The most well-represented sectors in each of the two samples are building and construction, retail trade, financial institutions and services, health care, education, and wholesale trade. It should be noted that manufacturing industries appear less often in these samples than do non-manufacturing industries. Table 13.2 shows the number of times individual manufacturing industries are among the largest six sectors present in Dutch municipalities. The table also shows total employment in the Netherlands data set for each of these ten industries. In the Dutch municipality data, food and beverages is the most frequently occurring manufacturing sector, but the chemical industry is the largest in terms of employment. Other manufacturing sectors, such as electronics, glass and ceramics, transportation equipment and medical instruments, are also re represented in the province, but in most cases there are too few establishments to permit a meaningful sector-specific analyses.

The Netherlands and South-Holland data sets were used to construct indicators of various types of agglomeration economies that are similar to those used in prior studies (see especially Glaeser *et al.* 1992 and Henderson

Sector	*Representation (1991)*	*Employment (1991)*
Food and beverage processing industry	*27*	*33,419*
Furniture industry	*25*	*26,593*
Metal products industry	*24*	*12,511*
Publishing and reproduction	*17*	*21,177*
Chemical industry	*17*	*41,912*
Machinery industry	*16*	*16,911*
Electrical machinery and instruments	*7*	*16,614*
Metal industry (primary)	*7*	*15,089*
Glass and ceramic industry	*7*	*8,864*

Table 13.2 Largest Manufacturing Industries Represented in the Dutch Municipality Data

	Definition	South-Holland Average	Netherlands Average
EMPLOYMENT GROWTH	Change in the natural log of employment	-0.263	-0.170
CONCENTRATION	Share of the sector's employment in total employment in the zip code or municipality, divided by the sector's employment share in total employment in South-Holland or the Netherlands	4.823	4.959
COMPETITION	Number of establishments per worker in a zip code or municipality divided by the South-Holland or Netherlands ratio of establishments to workers	1.129	0.788
TURNOVER	Zip code-specific or municipality-specific sum of establishment births, relocations and deaths over the estimation period divided by the initial stock of establishments	1.105	-
SHARE	Employment share of the other 5 largest sectors in total regional employment (i.e., excluding the employment of the sector under consideration)	0.590	0.484
GINI	Gini coefficient for the distribution of employment by sector in the zip code or municipality under observation	0.477	0.292
HHI	Hirschman-Herfindahl coefficient for the distribution of employment by sector in the zip code or municipality under observation	-	0.076
URBAN AREA	Dummy indicating whether the zip code is heavily urbanised	0.620	-
GROWTH	Change in the natural log of total (South-Holland or Dutch) employment excluding the zip-code/ municipality under consideration	0.082	0.004
INITIAL WAGE	Natural log of sectoral wage rates, which are national averages in the Netherlands and regional averages in the South-Holland data sets	3.881	3.818
WAGE	Change in natural log of (regional) sectoral wage rates	0.278	0.301
INITIAL EMPLOYMENT	Natural log of initial zip code (1988) or municipality (1991) employment	5.448	6.820
EMPLOYMENT 1997	Natural log of end-of-period zip code or municipality employment	5.177	6.584

WORKAREA	*Dummy variable equals 1 if zip code or municipality has more than 500 employees per 100 households*	*0.263*	*8.850*
INDUSTRIAL ZONES	*Dummy variable indicating more than South-Holland or Netherlands average of opening up of acres new industrial site relative to total stock of acres industrial site present in base year*	*0.151*	*0.459*
DISTANCE ROTTERDAM	*Distance from the zip code's centre to Rotterdam Harbour*	*21465.48*	-
LACK OF ACCESSIBILITY	*Distance from zip code's or municipality's centre to nearest highway exit or railway station*	*6.597*	*0.639*
POPULATION GROWTH	*Change in natural log of the zip code's or municipality's population size*	*0.094*	*0.066*
RANDSTAD	*Dummy indicating location within the country's core economic region, the Randstad*	-	*0.317*
INTERM. ZONE	*Dummy indicating location in area between core and periphery in the Netherlands*	-	*0.379*

Table 13.3 Definition of the variables used and their average values for South-Holland and the Netherlands

et al. 1995). These indicators and other variables are constructed using data from the base year (1988 and 1991 for respectively South-Holland and the Netherlands) to reduce simultaneity problems. Also, this approach, unlike the one adopted by Feser (2001), facilitates testing as to whether effects of different types of agglomeration economies on growth persist over time. The variable definitions and sample means of the Netherlands and South-Holland data sets are summarised in table 13.3. It should be noted that to economise on notation, the same names are used for certain variables that appear both in the Dutch municipality and South-Holland zip code analyses. For each of the two data sets these variables are defined somewhat differently as emphasised in the paragraphs below.

Concentration is defined as a location quotient showing the percentage of employment accounted for by an industry in a municipality (or zip code) relative to the percentage of employment accounted for by that industry in the Netherlands (or South-Holland). This variable measures whether an industry is over- or underrepresented in a location compared with its average representation in a larger area. *Competition*, measured as establishments per worker in a municipality (or zip code) industry divided by establishments per worker in that industry in the Netherlands (or South-Holland), indicates whether establishments tend to be larger or smaller in a municipality (zip

code) compared to the country (province) as a whole. An alternative measure of local competition was developed for use in the South-Holland analysis and is discussed more fully in Section 13.5.[5] Two variables are used as a measure of industrial diversity to indicate how evenly employment in a municipality is spread across economic sectors. *GINI*, the Gini coefficient for the distribution of employment by sector in a municipality (or zip code), measures the absence of diversity and is similar to the Hirschman-Herfindahl index used by Henderson *et al.* (1995). As Glaeser *et al.* (1992) focus on changes in employment among the six largest sectors in each city, the employment share of the other five largest sectors in total employment in a municipality or zip code can be used as an alternative measure of (the lack of) diversity. Whereas *GINI* varies only across municipalities or zip codes, this index (referred to as *SHARE*) varies across both locations and industries at a particular location. A positive coefficient of *CONCENTRATION* and a negative coefficient of *COMPETITION* support the MAR hypothesis. A positive coefficient of *CONCENTRATION* and a positive coefficient of *COMPETITION* support the Porter hypothesis. A negative coefficient of *GINI* or *SHARE* and a positive coefficient of *COMPETITION* support the Jacobs hypothesis.

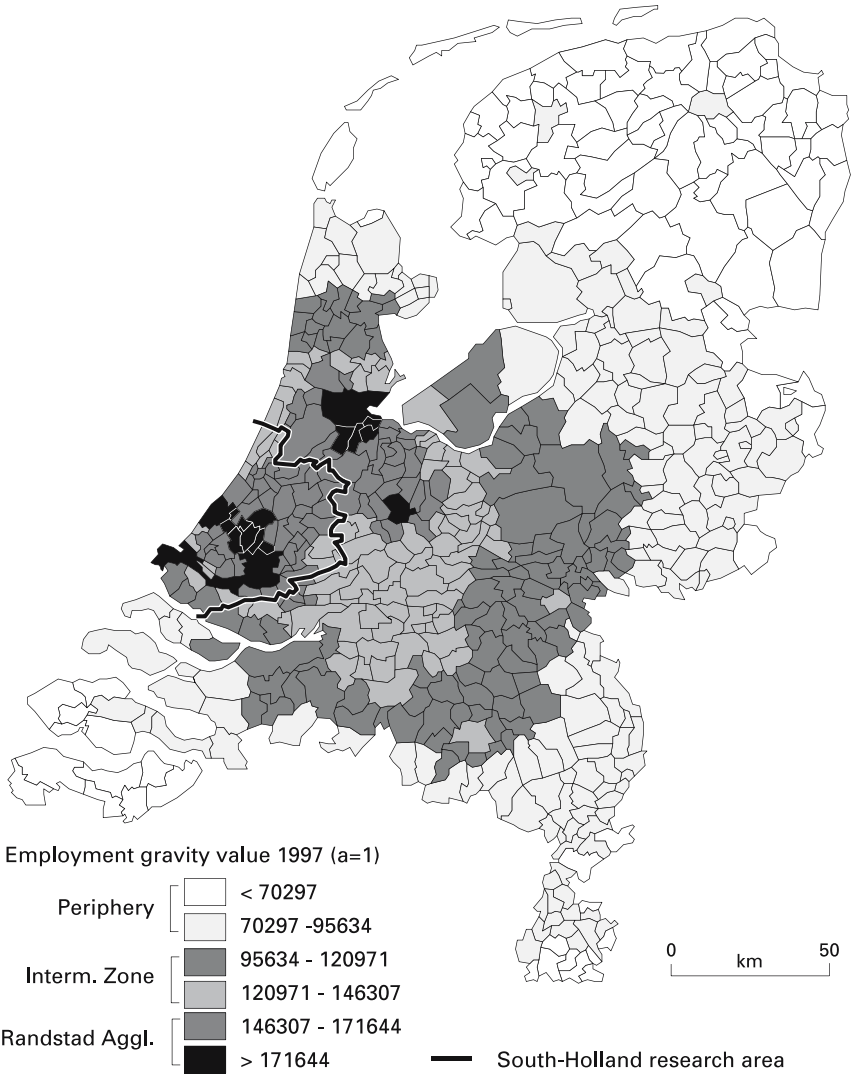
13.4 Analysis of the Dutch municipality data

As previously indicated, the Dutch municipality data is used in this section to compare results from the city-industry (here, municipality-industry) approach applied by Glaeser *et al.* (1992) and the individual-industry approach applied by Henderson *et al.* (1995). The aim here is not to attempt a reconciliation of their results. Rather, this starting point is adopted simply because it is useful to have some idea of how results from the Netherlands compare to those from the U.S. before looking at the South-Holland data.

The individual-industry approach was implemented by running the seven regressions presented in table 13.4 in which the dependent variable was the natural logarithm of 1997 employment (*EMPLOYMENT* 1997).[6] Industries selected represent both traditional manufacturing as well as industries that are more technologically oriented. Three of the explanatory variables (*COMPETITION*, *CONCENTRATION*, and *GINI*) have already been discussed. Control variables measuring initial employment in a municipality-industry and region of the country were also included. *RANDSTAD* indicates a location in the core economic region of the country and *INTERM.ZONE* indicates a location in the intermediate zone between the country's core economic region

	Primary metal and metal products	Machinery industry	Electrical machinery and instruments	Transportation equipment	Computers	Audio, video and telecommunications equipment	Medical instruments
CONSTANT	0.596 (1.622)	0.838 (1.804)	-0.196 (-0.283)	1.646 (4.004)	-1.739 (-1.243)	-1.319 (-1.191)	1.774 (3.939)
INITIAL EMPLOYMENT	0.937 (20.456)	0.920 (15.124)	0.874 (9.953)	0.762 (15.514)	0.795 (3.525)	0.810 (5.891)	0.652 (9.574)
COMPETITION	-0.005 (-0.194)	0.009 (0.499)	-0.001 (-0.196)	0.002 (0.310)	0.001 (0.005)	0.013 (1.631)	0.002 (0.114)
CONCENTRATION	-0.059 (-3.168)	-0.092 (-1.663)	-0.158 (-1.840)	0.026 (1.002)	-0.255 (-1.569)	0.025 (0.222)	0.068 (1.144)
GINI	-0.672 (-1.120)	-0.642 (-0.695)	-0.179 (-0.093)	-3.100 (-2.744)	-5.165 (-1.252)	-4.684 (-1.478)	-2.40 (-2.164)
RANDSTAD	-0.189 (-2.003)	-0.542 (-3.532)	0.423 (1.289)	-0.031 (-0.168)	1.695 (2.580)	0.559 (1.083)	0.327 (1.649)
INTERM. ZONE	-0.033 (-0.361)	-0.077 (-0.518)	0.526 (1.680)	0.091 (0.500)	0.506 (0.808)	0.390 (0.814)	-0.166 (-0.886)
Summary Statistics							
Log Likelihood	-190.430	-298.283	-412.078	-336.139	-264.570	-325.118	-351.006
No. of Iterations	1	4	5	4	8	7	3
No. of Observations	234	234	234	234	234	234	234
No. of Zero Employment	0	7	48	23	154	122	10

Table 13.4 Explanation of Employment 1997 Levels in 7 Selected Industries (t-values in parenthesis)



Map 13.3 Randstad, Intermediate Zone and National Periphery Spatial Regimes in the Netherlands

and its periphery. The three national zoning regimes used in our analysis are distinguished in Map 13.3 by means of a gravity model of total employment in 1997. In the analysis of urbanisation in the Netherlands, economic activity spreads from the Randstad region towards this so-called Intermediate zone, especially comprising the provinces of Gelderland and Noord-Brabant. This

shift of economic activity is explained by increased congestion and increasing land scarcity in the Randstad (Lambooy 1998, Van Oort 2004). The specification shown in Table 13.4 is not as full as that used by Henderson *et al.* (1995) because we have no data on local labour market conditions for Dutch municipalities, such as wage payments or educational attainment. However, we have also included *COMPETITION* as an explanatory variable to achieve consistency with Glaeser *et al.* (1992). Tobit is used as an estimation method for all seven equations. However, this method is equivalent to least squares in the primary metals/metal products sector in which observations on the dependent variable are always positive (Greene 1997, p.965). Estimates converged in eight or fewer iterations.

Similar to findings by Henderson *et al.* (1995), coefficients of *INITIAL EMPLOYMENT*, included to capture persistence of industry employment levels, are positive and highly significant in all seven regressions. In most respects, however, similarities stop there. Findings of Henderson *et al.* (1995) strongly support the idea that the degree of past concentration of an industry positively affects later employment levels (the MAR view) in both traditional capital goods and newer high-tech manufacturing sectors. Furthermore, they report that historical industrial diversity in an area positively affects later employment levels only in high-technology manufacturing. In the results presented in Table 13.4, however, *CONCENTRATION* has either a negative effect or no significant effect on *EMPLOYMENT* 1997 in the seven sectors considered. *GINI* has a negative and significant coefficient with a t-statistic exceeding 2.0 in absolute value in just two sectors, one of which is a newer, technology-oriented manufacturing sector (medical instruments). Coefficients of *COMPETITION*, a variable not used by Henderson *et al.* (1995), have relatively small t-statistics.[7] Additionally, coefficients of dummy variables for location perform unevenly, showing that some industries appear to grow faster inside the Randstad, while others grow more slowly in that region. In any case, results presented in Table 13.4 provide no consistent support for MAR, Porter, or the Jacobs hypotheses.

Reasons why results in table 4 differ from corresponding estimates for the U.S. are not obvious. It is possible to speculate, however, that possible explanations rest on the short time interval (1991-97) for the Dutch municipality data, censoring of the U.S. data and the role of unmeasured establishment and/or municipality characteristics. The issue of unmeasured characteristics is discussed more fully in the next section.

Next, an analysis of municipality-industries (similar to Glaeser *et al.* (1992)) was performed using data from the 234 Dutch municipalities. Results

	EMPLOYMENT GROWTH (All sectors)	EMPLOYMENT GROWTH (Manufacturing sectors)
CONSTANT	-0.260	-3.433
	(-0.585)	(-1.661)
CONCENTRATION	-0.020	-0.016
	(-10.227)	(-4.680)
COMPETITION	0.159	0.363
	(5.490)	(3.801)
GINI	0.018[1]	-1.344[2]
	(0.093)	(-2.223)
GROWTH	0.765	0.244
	(5.160)	(0.555)
INITIAL WAGE	-0.059	0.574
	(-0.666)	(1.150)
INITIAL EMPLOYMENT	0.034	-0.010
	(1.886)	(-0.181)
WAGE	0.223	4.314
	(0.627)	(1.883)
RANDSTAD	-0.023	-0.029
	(-0.639)	(-0.275)
INTERM. ZONE	0.059	0.053
	(1.723)	(0.551)
N	1404	370
R^2	0.173	0.194

[1] The SHARE indicator yields similar results.

[2] The SHARE indicator turns out to be insignificant.

Table 13.5 Determinants of Employment Growth per Municipality (t-values are presented in parenthesis)

from two regressions are presented in Table 13.5. Column (1) shows the outcome from using data on the six industries with largest employment in each municipality and column (2) shows the outcome from using data on just the manufacturing sectors among the six largest sectors in each municipality. In each regression, the dependent variable is the change in the natural logarithm

of municipality-industry employment over the period 1991-97. Explanatory variables included *Concentration* and *Competition* (defined above) but used two alternative indicators for industrial diversity. Although Glaeser et al. (1992) used *Share* as an indicator of the absence of diversity, we use the Gini coefficient in both regressions as it was found to perform best. However, in the footnotes to the table we also indicate the results when *Share* was used.

Six control variables were also included in each of the Table 13.5 regressions. *Initial Employment* measures the number of employees in a municipality-industry at the beginning of the sample period. *Growth* is the change in the natural logarithm of employment in an industry outside the municipality. *Wage* measures the difference in the natural logarithm of wages between industries at the national level (in the Netherlands) in 1991 and (*Wage* measures the change in the natural logarithm of wages for each industry at the national level over the sample period.[8] *Randstad* and *Interm. zone* were defined previously in the context of the Table 13.3 regressions.

In table 5, both equations are estimated by least squares. Values of R^2 are 0.173 for the all sectors regression and 0.194 for the manufacturing regression. Thus, the explanatory power of both equations is rather low. The small size of many of the municipality industries may be partly responsible for this outcome. In situations where employment is comparatively low in the base year, relatively small absolute employment changes over the sample period can produce relatively large changes in growth rates. Correspondingly, with a small number of establishments operating in some municipalities, there is more room for growth rates to be affected by firm-specific factors (discussed momentarily) that are not controlled.

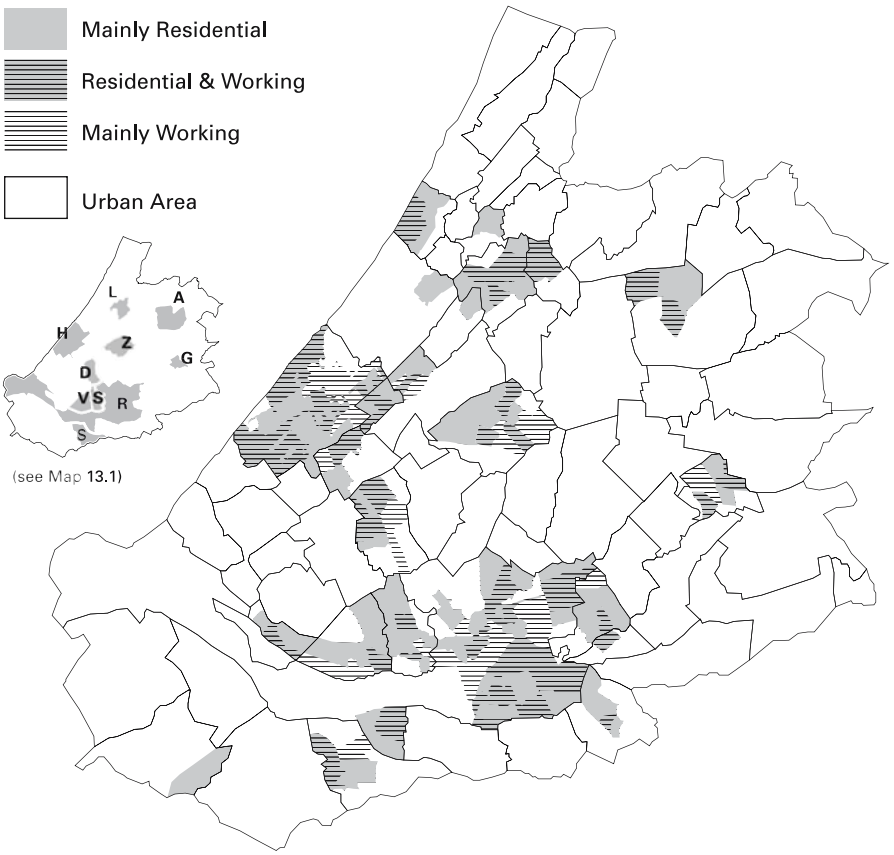
Results for the agglomeration indicators *Concentration*, *Competition*, and *Gini* are at least broadly consistent with those obtained in the Glaeser et al. (1992) study. In both regressions, the coefficient of *Concentration* is negative and significantly different from zero at conventional levels; results that do not support the MAR and Porter hypotheses. The coefficient of *Competition* also goes against MAR as more competition is found to increase growth in both manufacturing and non-manufacturing industries. The various measures of sectoral diversity do not appear to play a role in explaining employment growth for all sectors presented in the first column of Table 13.5. However, there is evidence that industrial diversity matters in determining growth in manufacturing sectors as the coefficient of the *Gini* index is negative and significant with a t-statistic exceeding 2.0 in absolute value (see the second column of Table 13.5). This outcome stands in contrast to the individual-industry analysis presented earlier and supports

the notion that the Jacobs hypothesis has greater applicability to sectors in which employment has already reached some minimum threshold size. But if *SHARE* is substituted for *GINI*, its coefficient is not significantly different from zero at conventional levels, thus weakening the conclusion about the role of industrial diversity. Coefficients of control variables performed unevenly. For example, the coefficient of *GROWTH* is positive and highly significant in the column (1) regression, but is not significant at conventional levels in the column (2) regression.

13.5 Analysis of the South-Holland data

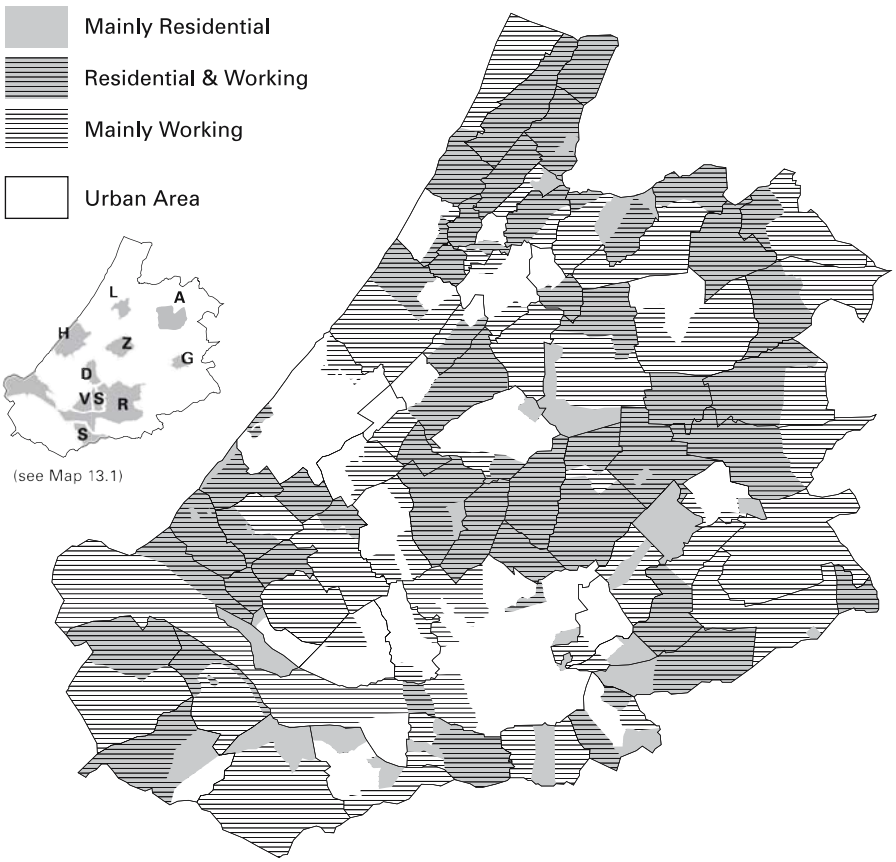
Results presented in the previous section are of interest because they highlight the role of agglomeration economies in the Netherlands in analyses similar to those conducted for the U.S. and France. Yet, they can be questioned from at least four perspectives. First, does the Dutch data offer adequate controls for unmeasured municipality and/or establishment specific effects? Second, does *COMPETITION* measure the degree to which establishments in a sector actually are confronted with competition, or does it just measure the relative size of establishments in a sector? Third, do the municipality-industry results apply to establishments present in the base year, or do they merely reflect a tendency for new establishments to start up or move into areas where their sector is underrepresented? Fourth, are the Dutch municipality-industry results misleading because of biases arising from spatial aggregation? These questions, which equally apply to prior empirical studies on the role of knowledge spillovers and agglomeration economies in urban growth, can be addressed more easily with the South-Holland data and are taken up in turn below.

South-Holland's small size and high degree of economic integration offers an important natural control for location-specific attributes. Between locations in South-Holland, there are few differences in resource endowments, political institutions, taxes, culture, environmental amenities (including climate), and environmental regulations. Additionally, the province is small enough for the labour market to be tightly integrated. Workers can live in one zip code and commute to work in any other using either public or private transport modes (and in fact they do!). Thus, wage rates within a sector show little variation between locations[9] and there is no need to control labour force characteristics such as level of education, percentage of workers with particular skills, or percentage of workers who are union members. Moreover, the role of



Map 13. 4 Residential-, Working- and Mixed Spatial Regimes in Urban Areas in South-Holland

history in determining the spatial economic layout of the province can be at least partially controlled using variables measuring distance of a zip code from intercity railway stations or major highway entries or exits (*LACK OF ACCESSIBILITY)*, the harbour in Rotterdam (*DISTANCE ROTTERDAM*), and whether the zip code is in an urbanised area (*URBAN AREA*). Controls for land use patterns can be obtained using variables showing whether a zip code is classified as predominately a work area (*WORKAREA*) and whether it has new industrial sites that can be developed (*INDUSTRIAL ZONES*). Maps 13.4 and 13.5 illustrate the typologies of living work and mixed areas within urban (Map 13.4) and non-urban (Map 13.5) zip codes in South-Holland (see for the selection criteria Section 13.3). Additional control variables include



Map 13. 5 Residential-, Working- and Mixed Spatial Regimes in Non-Urban Areas in South-Holland

region-specific and sector-specific wage rates (both *INITIAL WAGE* and (*WAGE*, defined in the previous section) and zip code *POPULATION GROWTH*.

Unmeasured establishment-specific effects are difficult to control using the South-Holland data set. Because establishments are aggregated into zip code-industries, some of these effects will average out, but other sources of these effects (e.g. clustering of high quality entrepreneurial talent, clustering of older and/or newer plants, and clustering of firms using particular specialised inputs) may remain. This problem can be treated using establishment-level data in a fixed effects framework. However, this approach involves sacrificing information by restricting the sample to establishments that appear in the South-Holland Firm Register in consecutive years. In fact, in their attempt

to develop a panel of plants, Black and Henderson (1999a) ended up with sample sizes averaging only 8% of plants in an industry. Using the South-Holland data, an estimation of establishment-specific effects is not a realistic option in any case because employment is the only establishment-specific variable available. In consequence, the South-Holland zip code data is aggregated to zip code totals and analysed as a cross-section for 1988-97.

On the other hand, an advantage of the establishment-level South-Holland data is that it can be used to develop an alternative measure of competition that may be superior to those used in prior studies. More specifically, the relative establishment size variable (*COMPETITION*) used in the previous section and by Glaeser *et al.* (1992) may not be appropriate for two reasons. First, as is also noted by Combes (2000) and Rosenthal and Strange (2003), it is not clear whether this variable measures the extent of competition, internal diseconomies of scale, or broader aspects of industrial organisation. Second, this indicator may be inappropriate in cases where competition is faced from outside the local area and is particularly questionable when the "local area" is as small as a South-Holland zip code. Thus, for South-Holland the individual establishment data is used to develop an alternative measure of competition, *TURNOVER*, defined for each sector in each zip code as the sum of establishment births plus relocations plus deaths over the period 1988-97 divided by the number of establishments in the base year. *TURNOVER* may be a better measure than *COMPETITION* because it is based on establishment dynamics in a zip code (Dumais et al. 2002)..

Additionally, spatial aggregation in the Dutch municipality (and U.S. city) data is a potentially serious problem. Imagine an urban area that can be divided into a number of zones, each of which has the same number of employees and is completely specialised in the output of goods produced by a single (different) industry. Thus, each zone would have a high concentration index and no industrial diversity. From the standpoint of the urban area as a whole, however, concentration in production by a particular industry may or may not exceed its counterpart on a broader geographic scale and a Gini index will reflect maximum possible industrial diversity. Of course, an urban area is unlikely to develop as described in this stylised example. Yet, it is important to recognise that an entirely different view of the contribution of knowledge spillovers to growth could emerge from analysing parts of cities as compared with analysing cities as a whole. In any case, as mentioned previously, the South-Holland data permits the province to be divided into very small spatial units, so possible spatial aggregation error can be better controlled.

A limitation of the South-Holland data is, however, that it is not well suited to individual-industry analyses along the lines of those presented by Henderson *et al.* (1995). Most industries are present only in a small number of zip codes. As a consequence, both beginning-of-period and end-of-period employment would be zero for most observations. This aspect would not be a problem if the aim of the study was to ask why particular industries chose to locate in particular zip codes. However, the primary focus here is on the closely related issue of mechanisms thought to be important to the growth process. This emphasis motivates the decision to look only at employment growth in firms that were present at the beginning of the sample period.

The results from the South-Holland zip code-industry regressions, using the 1988-1997 change in natural logarithms of employment (*EMPLOYMENT GROWTH*) as a dependent variable, are shown in Table 13.6. Explanatory variables have again been constructed using data from the base year (1988 in this case) to minimise simultaneity problems. Similar to the municipality-industry analysis reported in the previous section, attention is restricted to the six largest sectors in each zip code. Because the province contains 416 4-digit zip code areas, a total of 2408 observations were possible. However, in some zip code areas, fewer than six sectors are present and in other zip code areas some of the largest six sectors have little base year employment making growth rate calculations problematic. In consequence, zip code industries with fewer than 50 employees in 1988 were excluded. This yielded a data set with 1797 observations. To gain an insight into the potential differences in the growth process in more and less heavily urbanised areas, we have interacted key variables of interest with *URBAN AREA* (see Map 13.4) to create *URBAN COMPETITION*, *URBAN CONCENTRATION*, and *URBAN SHARE*.

Column (1) presents results from a regression specified similarly to those used in the analysis of the Dutch municipality-industries. The value of R2=0.166 is once again rather low. However most of the estimated coefficients have significant (at 5% under a one-tail test) with plausible signs. Additionally, coefficient estimates obtained are broadly consistent with results presented by Glaeser et al. (1992) and support the Jacobs hypothesis. *CONCENTRATION* and *SHARE* enter with negative and significant coefficients. The effect of *CONCENTRATION* is stronger in more heavily urbanised areas as indicated by the outcome for the variable *URBAN CONCENTRATION*. Furthermore, *COMPETITION* is positively correlated with employment growth at least in urban areas. Thus, these results give additional support for Section 13.4's conclusion (based on municipality data for the entire country) that Jacobs externalities are the dominant type of knowledge spillovers. The fact that

	EMPLOY-MENT GROWTH (All Establ.)	EMPLOY-MENT GROWTH (All Establ.)	EMPLOY-MENT GROWTH (Old Establ.)	EMPLOY-MENT GROWTH (Old Establ.)
CONSTANT	2.121	2.933	2.252	2.310
	(3.182)	(4.441)	(2.962)	(3.059)
URBAN AREA	-0.239	-0.129	-0.304	-0.237
	(-1.016)	(-0.538)	(-1.135)	(-0.861)
CONCENTRATION	-0.009	-0.010	-0.009	-0.009
	(-2.434)	(-2.596)	(-2.129)	(-2.141)
COMPETITION	0.080	-	0.086	0.069
	(1.727)		(1.618)	(1.299)
TURNOVER	-	0.058	-	-0.111
		(1.428)		(-2.421)
SHARE	-0.628	-0.728	-0.903	-0.915
	(-2.037)	(-2.339)	(-2.566)	(-2.618)
URBAN CONCENTRATION	-0.009	-0.011	-0.008	-0.009
	(-2.229)	(-2.614)	(-1.777)	(-1.988)
URBAN COMPETITION	0.148	-	0.123	0.143
	(2.698)		(1.964)	(2.289)
URBAN TURNOVER	-	0.011	-	-0.077
		(0.198)		(-1.258)
URBAN SHARE	-0.035	0.054	0.091	0.128
	(-0.096)	(0.147)	(0.217)	(0.306)
GROWTH	1.077	1.043	0.778	0.963
	(6.986)	(6.543)	(4.428)	(5.371)
INITIAL WAGE	-0.452	-0.521	-0.550	-0.499
	(-2.761)	(-3.135)	(-2.946)	(-2.675)
INITIAL EMPLOYMENT	-0.029	-0.106	-0.024	-0.029
	(-0.906)	(-3.551)	(-0.648)	(-0.795)
WAGE	-1.478	-1.590	-1.098	-1.442
	(-3.352)	(-3.546)	(-2.184)	(-2.858)
WORKAREA	0.128	0.085	0.104	0.117
	(2.105)	(1.387)	(1.503)	(1.702)
INDUSTRIAL ZONES	0.172	0.164	0.178	0.215
	(2.513)	(2.355)	(2.282)	(2.754)
DISTANCE ROTTERDAM	3.982E-06	4.015	5.182E-06	4.767E-06
	(1.712)	(1.706)	(1.953)	(1.806)
LACK OF ACCESSIBILITY	0.008	0.008	0.011	0.010
	(1.916)	(1.909)	(2.229)	(2.142)
POPULATION GROWTH	0.131	0.112	0.082	0.084
	(2.254)	(1.908)	(1.238)	(1.282)
N	1797	1797	1797	1797
R^2	0.166	0.148	0.121	0.134

Table 13.6 South-Holland Regression Results (t-values are presented in parenthesis)

the Jacobs hypothesis is supported in this study of very small areas within an urbanised region strengthens the interpretation of our results, suggesting that they are not driven merely by spatial aggregation. Regarding control variables, the coefficient of *Growth* suggests that a 10% increase in the growth rate of an industry in South-Holland is associated with an increase in the growth rate of that industry in a zip code by 10.8%. This outcome indicates a tendency for industries to grow at about the same rate in zip codes where they are among the largest employers. Moreover, results from column (1) indicate that industries with comparatively high wage levels and wage increases tend to grow more slowly than other industries. Furthermore, employment growth is faster (i) if over the estimation period industrial zones expanded by more than the South-Holland average (*Industrial Zones*), (ii) if the area is a work area rather than a residential area (*Workarea*), and (iii) the faster the zip code's population growth (*Population Growth*. Coefficients of *Urban Area*, *Distance Rotterdam* (which also measures proximity to Amsterdam and Utrecht), *Lack of Accessibility* and *Initial Employment* in a zip code-industry are not found to be significant at conventional levels.

The specification shown in column (2) of Table 13.6 is the same as for the regression in column (1) except that *Turnover* is substituted for *Competition*. The positive coefficients of *Turnover* and *Urban Turnover* do not differ significantly from zero at the 5% level under a one-tail test. Thus, the alternative measure of competition indicates that greater numbers of establishment births, deaths and relocations in a zip code-industry do not lead to higher growth rates. This outcome weakens support for the Jacobs hypothesis found in the column (1) regression. Other coefficient estimates in the column (2) regression are similar to those presented in column (1) as multicollinearity between the various explanatory variables is very low, the only exception being that initial employment now becomes significant.

Also, as previously described, an advantage of the South-Holland data is the ability to distinguish establishments present at the beginning of the sample period from others that either moved in or started up after that time. Consequently, a regression was estimated (see column (3)) to look at the growth of zip code-industry employment only by the original (old) establishments present in 1988. In 1997, these establishments accounted for 64% of all South-Holland establishments as well as 83% of total South-Holland employment. Results from this regression again support the Jacobs hypothesis. Coefficients of *Concentration* and *Share* are negative and significantly different from zero and effects are equally strong in more and in less heavily urbanised areas. *Competition* is found to be positively correlated

with employment growth only in more heavily urbanised areas. This outcome is important because it suggests that the results that focus exclusively on existing firms reflect more than just a tendency for new firms to move into an area where their line of business is underrepresented. With respect to the other explanatory variables, three differences are worth mentioning. First, when analysing growth in existing firms, proximity to Amsterdam and the region's hinterland (as measured by the distance to Rotterdam) is positively related to employment growth in zip codes. Second, the coefficient on local population growth is no longer significant. Thus, local population growth may be a factor for attracting new establishments, but not a factor in the growth of old ones. Third, the larger the distance to intercity railway stations and highway entries and exits, the faster the employment growth. Thus, a mildly surprising result is that congestion appears to hamper growth in existing firms in the province of South-Holland.

Because *Competition* and *Turnover* may not measure the same phenomenon, we ran a regression using employment growth in old establishments as the dependent variable with both indicators included as explanatory variables. Results are presented in the fourth column of Table 13.6. The coefficient of *Turnover* is lower (actually, it is negative and significant) than that reported in column (2) of Table 13.6. This outcome would be expected because in the all establishments regression, establishment births and relocations contribute to both *Turnover* and employment growth, whereas in the old establishments regression, births and relocations contribute only to *Turnover*. In contrast, *Competition* and *Urban Competition* have positive coefficients, although only the coefficient for *Urban Competition* is significantly different from zero. Hence, if the Combes (2000) and/or the Rosenthal and Strange (2003) interpretation of this variable is accepted (that is, the variable measures internal diseconomies of scale or broader aspects of industrial organisation), the conclusions concerning the dominant type of externalities are substantially altered. Whereas regional diversity and lack of specialisation still foster employment growth (as predicted by Jacobs), regional competition (as appropriately measured by *Turnover*) is found to hamper rather than to foster growth in existing firms. In other words, although Jacobs' ideas concerning the regional composition is found to be supported by the South-Holland data, the fact that lack of competition is found to foster growth gives partial support to the views of MAR and Porter. The negative and significant coefficient of *Turnover* also emerges when *Competition* and *Urban Competition* are excluded from the model.

13.6. Conclusions

The theory of endogenous growth emphasises the importance of knowledge and knowledge spillovers in the growth process. Considering the alternative hypotheses concerning the circumstances under which knowledge externalities are most likely to foster growth, the question arises as to whether knowledge spills over primarily between firms in the same sector, or whether growth is determined predominantly by knowledge spillovers between industries? In other words, is knowledge sector-specific or can ideas conceived in one sector be fruitfully applied in other sectors as well?

This chapter addresses this question, providing empirical evidence from the Netherlands. The regression results using data on Dutch municipalities give at least some support for Jane Jacobs (1969)'s hypothesis that knowledge spills over between sectors and that competition fosters growth because of the necessity to innovate. In this respect, the results are similar to Glaeser *et al.* (1992)'s analysis of employment growth in U.S. cities, and are in conflict with Henderson *et al.* (1995)'s findings that industrial concentration is more important than industrial diversity.

However, the data set for the province of South-Holland, which covers a substantial part of the core economic region of the country, enables us to correct several flaws in the analysis of Dutch municipalities. The most important of these is that it permits a sources-of-growth analysis in that changes in regional sectoral employment can be broken down to identify the separate contributions of growth by existing establishments as well as growth contributed by establishment births, deaths and relocations. As the theory of knowledge spillovers and growth focuses on dynamic externalities rather than at location choice, the appropriate dependent variable in the analysis is employment changes in existing firms. The results are markedly different from the results mentioned above. The results for regional composition still support Jacobs' theory that knowledge is not necessarily sector-specific and that ideas conceived in one sector can fruitfully be applied in others. However, the fact that lack of regional competition is found to foster growth gives support to the ideas of Marshall, Arrow, Romer and Porter that knowledge creation is stimulated by the possibility of rent capture. Hence, this outcome does not give full support to any of the existing hypotheses concerning the circumstances that foster growth.

Notes

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2 Because of the lack of data on sectoral output and the capital stock at the city level an appropriate measure of total factor productivity cannot be constructed. Glaeser *et al.* (1992) built a small model in which output is produced with only one input, labour, under conditions of decreasing returns to scale. Then, technological progress enhances the marginal value product of labour and hence the demand for labour increases. In that model, assuming constant prices for inputs and outputs, employment growth is an appropriate indicator of output growth.

3 Note that the variable measuring sectoral national growth rates outside the city would be virtually the same for each observation in the Henderson *et al.* (1995) analysis.

4 Henderson (1997) finds that effects of agglomeration economies on employment growth peak after about 5 years and die out after 6-7 years. Thus, for both data sets, the time interval over which employment growth was measured appears to be long enough to allow measurable data to emerge. See also Combes (2000).

5 Combes (2000) does not agree that the *COMPETITION* variable as constructed by Glaeser *et al.* (1992) is a proper measure of the degree of competition an industry faces. However, given that this variable measures the impact of relative firm size on employment growth, he argues that it can be used as a test for the importance of internal economies of scale; he proposes measuring competition by the inverse of a local Herfindahl index of productive concentration.

6 A related analysis was also performed using the 580 municipalities data set (i.e., after including the smallest municipalities) with similar results to those presented in table 3. These and all other results that are described, but not explicitly reported in the text, are available from the authors on request.

7 These results differ from those obtained by Combes (2000) in his analysis of (regional) employment growth in France. For manufacturing industries, he finds that (i) diversity slows down employment growth, (ii) specialisation hardly matters and (iii) smaller firms grow faster (where size is measured in terms of the number of employees per firm, which coincides with Glaeser *et al.*'s (1992) *COMPETITION* measure).

8 Note that the two wage variables could not be used in the individual industry analysis as they have no variation within a sector.

9 Although no zip code-specific sectoral wage data is available, the Dutch Central Bureau of Statistics distinguishes five regions in this province (so-called COROP regions) for which it calculates average sectoral wages. Pearson correlations of sectoral wages between regions range from 0.76 to 0.86.

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Appendix A: Description of the data

The data used in this paper is derived from various sources. The most important sources are the longitudinal datasets of the Firm Register South-Holland (BRZ) and the National Information System on Employment (LISA, the nationwide firm register in which the BZH is embedded). Registration is at the level of individual firms, including detailed information on location (6-digit zip-code) and activity (5-digit SBI93-code, completely consistent with NACE and ISIC industrial classifications). However, actual firm level data is only available for South-Holland; the Netherlands dataset only gives information on sectoral employment (i.e. aggregate employment of all firms in a specific sector) in each 6-digit zip code area. The variables *Employment Growth*, *Concentration*, *Competition*, *Share*, *Initial Employment*

and *TURNOVER* on location-industry level are calculated from these data (*TURNOVER* could only be calculated for the South-Holland analysis). The data concerning agricultural employment was derived from the Agricultural Statistics of the Dutch Central Bureau of Statistics (CBS) at municipality-level and localized to 4-digit zip codes on the basis of the Land Use Statistics (Bodemstatistiek CBS, function agriculture). Various other sources have been consulted to construct and verify the remaining variables, like data from the Chamber of Commerce in 1990 and CBS statistics on (aggregate) employment development. The Netherlands wage data were obtained from CBS Labour Statistics whereas the regional South-Holland wage rates were obtained from the CBS's Annual Regional Economic Dataset (various years). The variable measuring the distances to Rotterdam was constructed using an ArcGIS geographical information system. A detailed description of the data and the verifications applied can be found in Van Oort (2004).

14 New Regional Economics: about Virtual Agglomeration Effects

Luc Soete

14.1 Introduction

My closest interaction with Jan Lambooy, who I had known for many years, was actually just three years ago when he put forward my name to the chairman of the Board of the 'other' university - Utrecht University - he has been so closely involved with, to give one of the academic opening speeches in 1999. The two of us would, together with the other invited guest, the then Dutch Prime Minister Wim Kok, shed some light on the new knowledge economy. The timing was, as far as I was concerned, perfect. 1999 was by any token *the* year of the breakthrough of the concept of the new economy. Paul Krugman had, as the year passed by and ICT investments continued to soar in preparation of the millennium bug, withdrawn from his website his pamphlet *Requiem for the new economy*, in which he predicted the resignation of Alan Greenspan and the recession of the US economy, before the beginning of the new millennium. I had been asked in April of that year by the advisor to the Portuguese Prime Minister, Maria João Rodriguez, to help prepare the Portuguese presidency of the European Union in the next year and, in particular, to develop ideas for a special summit of heads of states which the Portuguese Prime Minister, Antonio Guterres wanted to organise in Lisbon in the spring of 2000. I had just finished a first draft of a paper and particularly welcomed the opportunity to develop these ideas further within the context of a university environment in search of an 'economics' identity.

So I sketched the contours of a radically new economics programme consisting of the four ingredients which Jan Lambooy had been instrumental in bringing together in Utrecht, namely economic geography, economic sociology, economic history and economic law, in which, so I argued, the new digital technologies would be challenging most dramatically traditional economic beliefs and insights. I did not know how Jan Lambooy would react. I did not know whether he was going to be an opponent or a fellow new economy believer. For me, it would be a pure, live, onstage discovery. However, when the day arrived, Jan had regretfully received some terrible news and I had to give my speech alone, unchallenged. And so the local

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media hype of the new economy was born ... which goes to show that global hypes do have their local version! The Dutch Prime Minister, the Vice-Chancellor of the University and the Dutch media all listened to my unchallenged story. Jan later wrote a newspaper article on his vision of the new economy but it was too late and the damage had already been done. So, it gives me great pleasure, after the hype, and now in honour of this Festschrift for Jan Lambooy, to be able to elaborate further on some of those eclectic new economy ideas a couple of years later and applied most explicitly to *the* area which owes so much to Jan Lambooy, that is regional economics. The subtitle of my contribution 'about virtual agglomeration effects' can then be understood alternatively as reflecting another attempt to express my confused, new economy views about regional economics, or as a remembrance of our failed real meeting back in 1999, accompanied though by strong virtual agglomeration effects.

Even today, after more than twenty years[1] of writing about the subject, it remains difficult to assess the social and economic impact of Information and Communication Technologies (ICT) on regional and local development. There is now a substantial amount of evidence on the potential impact of ICT on '*physical space*' based on the technical, 'engineering' characteristics of these technologies. As in the case of other technologies, the acknowledgement and recognition of such characteristics represent nothing more than a listing of various technical 'enabling' factors. By addressing them first in Section 14.2, I do not imply any kind of technological determinism, rather I want to emphasise that ICT do represent, from the perspective of the possible physical impact and despite the many, increasingly popular, claims to the contrary, a radical set of 'new' technologies. Contrary to other, previous radical technological breakthroughs, ICT appear, however, characterised by their flexibility in use. There is therefore much more 'malleability' in the impact of ICT on physical space. This malleability is extreme. It ranges from a relatively straightforward diffusion process of ICT as primarily a set of complementary technologies reinforcing existing regional and local developments trends including many forms of reorganisation of existing production and distribution activities, to a much more radical, 'creative destruction' diffusion process whereby ICT act in the first instance as substitution technologies challenging, and in some cases even replacing, existing regional development trends. It is these latter issues that are addressed in Section 14.3. In conclusion some general observations are drawn.

14.2 ICT a breakthrough technology?

The impact of ICT - it is customary in Europe to speak of information *and* communication technologies - on the economy and society in general, is founded on a number of technological breakthroughs that seem to be historically unique. It remains, of course, difficult to give a fair, historical estimation of 'new' technological breakthroughs. To many scientists and technologists, the breakthroughs in the area of nuclear know-how and technology in the 1940s and 1950s represented an almost inexhaustible new source of energy. Only a few of these promises eventually came true. Worse still, the cost of storing non-degradable nuclear waste draws heavily on citizen's future well-being. A substantial dose of scepticism seems to be justified when scientists and technologists refer to 'radical' new technologies and use them to distil future scenarios, whether these are put in a positive or in a negative light.

In a certain sense, it is the task of an economist to confront technologists with the numerous social, economic and societal factors that are related to the slow diffusion of any new technology, no matter how radical the technology may be perceived by the scientists and technologists, businessmen and women or policy makers. However, from the perspective of its social, economic and organisational implications and broader societal embedding, the current cluster of ICT represents a potentially radical technological and organisational transformation.[2] It might even be argued that the simple, single introduction of new ICT equipment into an organisation represents an innovation. The cluster of what is currently described as 'new ICT' is based on a broad range of continuous, sometimes radical, converging technological breakthroughs that, when viewed as a group, appear to be historically unique in terms of speed and world-wide impact.

First, there is the continuous, but nevertheless dramatic technological improvement in the capacity of semiconductors, which led to a gigantic increase in the capacities and speed of computers as regards storing and processing data. Using what became known as Moore's Law, these improvements were described in 1965 as a logarithmic increase in the processing capacity of computer chips. This law still seems to apply 35 years after its formulation. This trajectory of continuous technological improvement has been described in depth and analysed by a great many economists since the 1980s (see for example Katz & Phillips, 1982; Dosi, 1984), so in fact there is nothing much 'new' to it. The process of technological improvement in semiconductors in particular of course gained momentum with Intel's invention of the

microprocessor in 1971. Triplett (1996) mentions a price reduction by a factor of 3,000 during the 1974-1994 period. In other words, the continuous technological improvements over the past 25 years combined with the individualisation of computer use thanks to personal computers has led to the ever-increasing diffusion of *IT* (Information Technology) applications throughout the various sectors of the economy. Thus, IT - and the computer in particular - has made its entry into the numerous economic analyses as a 'general purpose' technology (Bresnahan & Trajenberg, 1995), the diffusion of which has been accompanied by a great many organisational mismatches and tensions (Freeman & Perez, 1988; David, 1991).[3]

Secondly, there is the intrinsic tendency to miniaturise IT. I put this forward as a clear, separate second trend, because the impact of IT miniaturisation has been essential to the physical integration of electronic functions in existing (and new) equipment and has made this equipment itself more handy and efficient in use. Previously it was impossible to apply a lot of the old IT equipment in both electromechanical capital and consumption goods, simply because it would have taken up too much space. Apart from the development of the miniaturisation of IT equipment, new, user-friendly products as illustrated in the case of the computer by the development of mainframe to mini-computer, PCs, laptops and palms, offer the possibility of including electronic intelligence in practically any existing mechanical apparatus. Thus, IT equipment further increases the efficiency of existing products, whether they be instruments, machines, or household appliances. Miniaturisation also leads to a lower use of energy.[4] Ultimately, the possibilities for ever-increasing miniaturisation open the avenue to nanotechnology, i.e., the production of electronic material at sub-micron level that can interact with tiny matter and cells, including live cells. As yet, the latter developments are in their early stages and subject to research in a lot of countries. Nevertheless, these mainly technologically-driven developments towards further miniaturisation are important because they show that the technological trajectory within the IT sector is far from completed and that the application areas of the technology are expanding further to other areas and sectors. In other words, IT is not just limited to the Internet.

Third, there are the almost equally radical technological improvements in the area of telecommunication. The developments in the field of optical fibres allow for the transmission of digital signals without any noticeable loss of energy. Combined with the trend towards miniaturising IT equipment described above - the 'routers' and networks stations - and the strong expansion of the bandwidth of communication channels, this allows for

the development of a communication network infrastructure in which information and communication goods can be supplied at minimal variable cost. Communicating with someone nearby or with someone on the far side of the globe will be virtually the same. Thus, the concept of 'death of distance' (Cairncross, 1998) is not as farfetched as it may seem. It is mainly from this perspective that the technological developments in the area of communication technology differ from other, previous breakthroughs in the area of network technology, such as electricity. Apart from being dependent on the much higher capital costs of the various 'network stations', an electricity network is also dependent on energy loss over its own network. In other words, distance continued to be an important cost factor in such previous networks. The way ICT is different from such a geographical impact is discussed in the next section.

Fourth, there are the specific developments in the area of mobile communication. In a certain sense, mobile communication represents the ultimate form of reachability. Physical access to the infrastructure of the network is no longer necessary, but can be effectively communicated from any place. Naturally, the antenna infrastructure continues to be a major cost factor, but once again this is not in proportion to the physical network costs of, for example, the distribution of electricity. As for the rest, the fixed network cost is formed by the property of a piece of 'space'. Hence, mobile communication implies more than the end of physical distance and it might be described as 'any place, any time, anywhere; information and communication is in the air'. It goes without saying that this additional dimension of communication, reachability, explains the originally unexpected boom in mobile telephone communication in the 1990s. This area, too, is still in its initial stages of further technological development.

Finally, there are the developments in the field of supporting technology, such as software and other communication standards, in particular the Internet protocols (for example WWW) and mobile communication standards (such as GSM, WAP and UMTS). Software development has appeared to be essential not only within the framework of the development of new information goods such as content but also because they have shown their particular importance with regard to improving the use of the physical communication infrastructure. ADSL, for example, allowed for the better and more efficient use of the old copper telephone lines. On the other hand, the different layers of open Internet protocols are crucial for the development of new information goods and the Internet trade in general. Thus, the possibilities of communication are expanding further and further and the

tradability of services is increasing strongly due to new software development and internationally accepted information and communication standards. The public availability of Internet standards is really at the basis of the 'new' Internet network advantages, such as B2B (business-to-business), which is the reason why these are far more important than the 'old' closed EDI standards. Thanks to these open international standards it is now possible to achieve network advantages worldwide, independent of close local interactions.

In brief, what is historically unique in terms of technological developments in the area of ICT is, in a certain sense, the historically long, unremitting technological improvement in various sub-areas, and on the other hand, the exceptional technological spillovers and convergence between the various ICT areas. As to what the implications are for regional development, ICT appears first and foremost to be a cluster of technologies which appear flexible in use. While the phenomenon of 'death of distance' might therefore lead to new possibilities for regional development in peripheral areas and for the decentralisation of economic activities to such areas, particularly those dealing with information handling and exchange, they might also lead to the opposite trend, namely a further concentration of activities in existing growth centres. This malleability in use of ICT therefore raises many questions about alternative uses of ICT and their regional impact. This is what I am going to discuss next.

14.3 The impact of ICT on physical space

At the outset, it seems useful to discuss the physical space impact of ICT from the perspective of the impact of ICT on production, distribution and consumption. The discussion with respect to the regional concentration of the production of ICT equipment and/or the impact of ICT on the concentration of industrial production activities has been well studied and is very much in line with traditional analyses of the spatial clustering of other production activities. It forms part of the 'old' bread and butter of regional studies, whereby the particular characteristics of ICT ultimately have little impact on the strengths of the production agglomeration effects, apart from the high-tech content of such production. Thus the concentration of ICT production in some regions and not in others has been a core variable in explaining differences between regional growth. It falls broadly speaking within the long Marshallian tradition of local agglomeration economics, leading to the further concentration of industrial and service activities as a

result of formal and informal network effects. Despite the 'death of distance' feature associated with ICT - with information being as it were 'in the air' - physical agglomeration effects are still likely to dominate because of the need of physical presence in one location. In this section, I do not wish to develop on this literature further; the focus here will instead be on the impact of ICT on distribution and consumption, the two areas which have received less attention and are, certainly when viewed from a regional and local urban planning perspective, important activities in which both economic agents and citizens are involved. I will first turn to ICT and distribution.

ICT and distribution

As already mentioned in Section 1, better monitoring with the help of ICT technologies will, in principle, lead to a better, faster, broader, more timely flow of goods and persons to their place of destination. ICT is, in this sense, first and foremost a complementary technology to existing distribution and transportation systems. While the term e-commerce seemed to imply a process of substitution of physical commerce, ICT appears more likely to increase the efficiency of the distribution and transport delivery systems through reduction in transaction costs and better usage of transport infrastructure whether by ship, plane. rail or truck. Substitution might occur but rather *between* different, alternative transport infrastructure systems.

Many authors have pointed to a trend towards the customisation of transportation and distribution of goods. Just like in the case of mass-customisation one might expect that ICT will here too ultimately lead to transport-customisation. Depending on the individual time pressures the client is confronted with, an alternative transport system will be selected. This holds not only for the transport of goods but also for the transport of persons.

However, the use of ICT to increase the efficiency and the rate of return of existing infrastructural space, as in the case of transport systems, is likely to generate decreasing returns once the physical and safety limits of the existing infrastructure have been reached. While ICT can push those limits further, one may think of 'smart' roads and electronically controlled rail and air-traffic control, there remain clear absolute physical limits beyond which the usage of infrastructure cannot be expanded and where safety limits linked to the human factor in complex systems will remain the fundamental barrier. One should remember in this context that the existing transport infrastructure, whether it be canals, railroads or roads is, of course, the result of centuries of investment. Much of the economic growth over the last centuries has been the

result of the continuous extension of the canals, railroad and road network infrastructure. They are also typical examples of path-dependent network infrastructures: the network advantages increased exponentially as more and more persons used the network until congestion and saturation started to set in, in the 80s and 90s.

It is important to realise that each of these transport systems contains a certain degree of flexibility which is essential from the perspective of transport customisation. The older the transportation system, the less flexible its features. Thus, the railroad transport system is in many ways a truly 'industrial age' transport system. The word 'railroad' is illustrative: roads of 'fixed' rails which determine the direction of movement and from which it is impossible to divert, except for rail switches at fixed places. The fast development of railroads in the 19th Century was strongly linked to the industrialisation process and the necessity to get raw materials and other goods from far removed places. It was much cheaper than the digging of canals, which had characterised the first phase of industrialisation. Mountainous places could be reached which where impossible to reach by canal. Many radical technological improvements took place over the last century in the railroad transport system: the replacement of steam power, the containerisation of freight transport, the electrification and automation of signalling, the creation of fast trains, the development of underground train transport, etc. In particular, the fact that stations where originally built in the centre of cities has emerged as one of the main advantages today for commuters using railroads as a transportation system. It has also been the basis for the further development of underground 'light rail' metro systems in most large cities across the world in the 20th Century. However, the major disadvantages of rail transport have not disappeared. On the contrary, those disadvantages have gradually become more and more visible. First of all, railroads are by their nature dramatically inflexible. Apart from rail switches at specific fixed places, there is no possibility for trains to avoid unforeseen obstructions. As a result, the whole railroad system is particularly sensitive to the smallest obstruction, which can in no time have implications for the performance of the whole network. Railroads suffer from practically all imaginable disadvantages of an inflexible network. It is not like the Internet where information packages can be sent through different 'routing' systems depending on congestion or even like aircraft transport, where possible alternative landing routes can be followed or planes can be diverted to other airports in case of unforeseen circumstances. As railroads are being used more intensively, the probability of delays therefore increases disproportionately.

A second factor relates to the simple physics behind rail transport. Pushing forward a massive amount of steel along fixed rails requires a lot of initial energy, while coming to a stop requires a substantial distance. This means that important safety limitations influence the intensity of the use of a railroad track. Weight and speed determine the required distance between trains: a high speed train requires more than ten miles to come from its maximum speed to a stop. A light metro train with a maximum speed of 60 km an hour will need a stopping length of less than a hundred yards. The intensity of use of an underground metro track is hence much higher than that of a high speed train track. The differences when compared to a telecom network are again huge. It is best illustrated by the success with which the telecom branch succeeded in developing new compression techniques (ISDN, ADSL) year after year in order to send larger and larger data volumes along existing 'upgraded' telephone lines and hence increase the use of the existing network in a dramatic fashion. From this perspective, railroads represent a typical old, network infrastructure, which is already near to its congestion capacity despite the very limited use of its large, physical infrastructure.

A similar question can be raised with respect to road infrastructure. The flexibility in the use of physical infrastructure is obviously much larger here. Thus, in first instance, the use of ICT - such as information on traffic use, board computers and alternative routing advice - will lead to a better and faster routing of transport over motorways. The increased use of ICT is therefore central to more efficient 'just-in time' stock management methods, whereby the road infrastructure is used more intensively. However, here too congestion limits will appear rather quickly. When distributed over the day and weekends, road use still offers plenty of opportunities for increased usage and at certain moments of the day the network will soon be overloaded and congestion will increasingly become translated into increased economic costs. In the case of road transport it is the human individual which plays a central role as an independent 'free' driver. The logical follow-up in automation, as in the case of 'clever' roads, whereby drivers are no longer 'free' in their driving decisions, will depend crucially on the social acceptance and integration of the technology by individual drivers. While on the commercial transport side (freight transport, bus transport and other commercial transport of persons) such further automation of driving is likely to be accepted and integrated in a relatively smooth fashion, it is in the consumption sphere, including the daily commuting from home to work that acceptance is likely to be much more difficult. Furthermore, the fact that both transport models combine the same

road infrastructure is likely to exacerbate the problem and slow down the diffusion of new road automation techniques.

These two examples illustrate the intrinsic limitations of the impact of ICT on an improved usage of existing transport infrastructures. And yet the impact of ICT is expected to increase given the new, global transparency of, and access to, markets and tradable activities. The search for better distribution methods and systems is therefore likely to continue to dominate the ICT agenda for a long time to come. Ultimately though, ICT also bring the limits of the physical transportation of goods and persons to the fore.

ICT and consumption

The consumption society as it developed in the US and Europe after the Second World War was strongly influenced by the industrialisation and automation of household tasks, which itself led to a large increase in the demand for household equipment and machines (from washing machines, dish washers, fridges, freezers, magnetrons, etc.). The time saving which resulted from the use of such equipment further opened up the way to the growth of double income families and the 'outsourcing' of other household tasks which could not be automated. As a result the individual choice possibilities of households with respect to consumption behaviour, living environment and in particular the distance to work, free time usage and the decision to carry out internally or outsource household activities, increased dramatically.

In terms of urban planning, these developments led to a large increase in the usage of physical space for consumption purposes. The emergence of shopping malls became a general trend with as essential condition easy access by car. Warehouses took advantage of the rapid growth in mass consumption thanks to their scale advantages, but also moved quickly to exploit some of the scope advantages through a continuous enlargement of the product range on offer, hence responding aptly to the growing individualisation trend of consumption behaviour. At the same time, the 'love of variety' of those consumers was cleverly used to realise through the notion of self-service a fundamental distribution chain reversal with consumers now themselves spending the time to select and carry the goods to the cashier. For most consumers those additional time costs were considered small compared to the cost advantages of such self-service systems. Very quickly shopping even became a social activity for which citizens were prepared to use large parts of their free time. Similarly, with respect to living conditions, physical space or distance to nature became a premium with, as a result, a rapidly growing differentiation in house prices depending on the physical location of the

object. In search of space people moved out of inner cities and this had major implications for the social fabric of inner cities which became empty office working spaces at night. As in the case of shopping, the increased time needed to get from home to work was made 'freely' available by the employee/consumer.

As a general trend it could be argued that the development over the last century of consumption patterns and behaviour was both *space* and *time* extensive. The limits of such a development pattern have clearly not been reached as yet, but the increase in price of prime locations and of time, as reflected in the opportunity costs, indicate that space and time saving is becoming increasingly valued. Here too ICT will, as a complementary technology, offer interesting opportunities. The very rapid diffusion of mobile phones and mobile equipment illustrates to some extent such underlying trends. As people put more and more time into commuting and as the uncertainty with respect to the necessary time involved grows (congestion delays, etc.), mobile communication becomes a basic need. The trend towards the further *mobilisation* of ICT equipment is undoubtedly also induced by the growing problems people are confronted with in terms of physical accessibility. The growing demand for mobile communication corresponds from this perspective to the same individual freedom of choice need, but this time more in terms of virtual contacts, as the motor car did in the previous century by bringing the freedom to bridge physical distance. However, as a complementary technology ICT offers though no solution to the increasing pressures on space and time. To do so one will have to look more in detail at the substitution possibilities of the new digital technologies.

With respect to *space*, it is the under-utilisation of space, both at home and at work, which is so striking. As Frances Cairncross noted: 'in half a century's time it may well seem extraordinary that millions of people once trooped from one building (their home) to another (their office) each morning, only to reverse the procedure each evening... Commuting wastes time and building capacity. One building - the home - stands empty all day; another - the office - stands empty all night. All this might strike our grandchildren as bizarre.' (Cairncross, 1998). Furthermore and particularly when viewed from a longer time perspective, the question can be raised as to whether the typical factory organisation system which first organised blue collar labour in order to commute within easy distance from the home to the factory and later on organised white collar work on a nine to five basis, with commuting time being part of the employee's own costs, is not likely to become increasingly eroded. New forms of household work have been growing rapidly and have

further reduced the time spent at the office (Lindbeck A. & Snower, D-J, 2000). In the emerging information society, the development of the household economy could well become a central societal trend contributing, in contrast to pre-industrial household production activities, directly to GDP and national income.

With respect to *time*, it is the change in the valuation of time by consumers which is most characteristic of recent trends. With the increase in household income, the 'money' valuation of time also increases. One is becoming more aware of the opportunity costs of the time spent in traffic jams while shopping. The time 'wasted' queuing at the cashier or in the parking lot will become associated with inferior service. Mass consumption itself in the sense of mass participation, mass tourism or mass congestion is undoubtedly driven by the greater transparency of information, but here too as a consequence of such greater transparency it can be expected that quality differentiation will emerge. With respect to the role of ICT, and Internet in particular, it can be expected that such technologies will increasingly become less used for simple price transparency than for the evaluation of products and services.

More generally the question can be raised as to whether the trend towards the externalisation of household tasks characteristic of the post-war period is not coming to an end thanks to a more efficient use of ICT time use. As Assar Lindbeck and Solveig Wikström put it: 'the new information and communication technology is likely to induce households to take over a number of production tasks earlier pursued by firms. In other words while, during the industrialisation period, 'outsourcing' was a main development, 'insourcing' is instead encouraged by ICT in a number of cases, a process sometimes facilitated by tools provided by firms and government service organisations.' (Lindbeck en Wikström, 2001, p.23). Examples might be financial services, health and tourism.

14.4 Conclusions

The developments described above give a rather complex, some might say confused picture of the possible impacts of ICT on physical space that certainly could not be summarised in a couple of sentences. I did not really discuss the impacts on local and urban development, addressed in many of Jan Lambooy's contributions. However, a lot of the questions raised with respect to the future function of e.g. cities depend crucially on the inflexibilities of the current, physical transportation and distribution infrastructures

with regard to dealing with congestion as opposed to the reliability and new opportunities offered by ICT.

After a century of continuous industrialisation, including of services, most of the basic needs of Western societies' consumers and citizens appear to have been fulfilled, their welfare has grown substantially and the amount of 'free time' significantly increased. The space and time extensive development path, which accompanied this industrialisation process, appears to run against natural limits. ICT can expand these limits. However it can also, partially at least, replace those limits. The first effect consisted of what was described here as the complementary effect of the use of ICT on space, the second effect as the substitution effect. The complementary effect of ICT can be considered a form of space and time augmenting technological change. Distance can, with the help of 'just in time' be made less relevant, the rate of return to the physical infrastructure increased. Mobile communication offers solutions to the time problem when access is becoming difficult because of congestion.

As for the knowledge sector which we did not discuss here, it can be expected that ICT will also augment the rate of return on knowledge investment. This holds for research and development, education and training, marketing, as well as information and communication more generally. In this sense the physical proximity to the access of codified knowledge and information no longer represents a limiting factor, but the distinction between knowledge in which physical proximity might be important, e.g. when based on informal and social contacts and codified knowledge remains essential. It is only this last form of knowledge, which appears no longer restricted by geographical frontiers but in Marshallian terms appears worldwide 'in the air', which can be bought or acquired and understood and maintained by communities.

From this perspective the relationship between ICT and space calls for a new concept of agglomeration in a world characterised by the 'death of distance'. As Jan Lambooy would probably emphasise, that such a world would still be heavily characterised by location and agglomeration effects is obvious from the continuous success of Wall Street or the City, which everybody can nevertheless bypass thanks to his mobile or PC anywhere and at any time.

The impact of the substitution effect is much more difficult to estimate. Here I have argued that, certainly from a long-term perspective, one should remain open to the possibility of changes in the organisational set-up of industrial production whereby household activities would (again) start to play a more important role. What the exact implications would be of such a

development trend for regional development and urban planning is difficult to predict. In one case there might be a clear need for new urban housing planning with a focus on up-to-date ICT connections, in other cases the opposite might be true with much more attention being required for social contact, independent of work.

The way in which ICT leads to complementary or substitution effects in consumption behaviour or labour organisation will in the end crucially depend on the way these developments are embedded in the social and societal environment. Both labour and consumption play an essential role in the need for social contact between humans. One cannot expect substitution effects ever to become totally dominant and replace the present mobile consumption society. Rather the question can be put whether the need for social contact will remain in the future a 'by product' of an increasingly time and space stressed work, family and consumption life or will become the 'core product' instead. This would mean that, for the greater part of the week, more content-based work is carried out near the home, with the formal working place being visited for complementary, more social activities. It would imply that for knowledge 'workers', such as Jan Lambooy there is no distinction between work and retirement except for income. Work remains the place for meaningful social contact, questioning at the same time the assumed disutility of work in most economic analyses. However, that is an entirely different topic.

Notes

1 My own first publication on ICT dates actually from 1983, see Soete and Dosi, 1983

2 See, among others, Freeman & Soete (1994) for an overview. Groot & De Grip (1991) and Autor, Levy & Murnane (2000) study the impact of ICT in two large banks in the Netherlands and the United States, respectively. They find that the introduction of ICT has led to a lot of organisational changes. Lindbeck & Snower (2000) give a theoretical explanation as to how the organisation of production has shifted from a Taylorist-based to a more 'holistic' production method in which teamwork, job rotation, the integration of tasks and learning through job rotation are essential ingredients.

3 Helpman (1998) provides a good overview of such technological changes. Harris (1998) studies the Internet as a 'general purpose' technology, focusing on the Internet as a communication network. His main findings are that the introduction of a communication network increases the 'virtual' mobility of both services and labour, resulting in an increase of the wage premium for high-skilled employees.

4 The intensive use and large-scale diffusion of their widespread presence, for example computers, can of course, undo this energy benefit per appliance. Undoubtedly, the share of energy use in the Netherlands will rise because of the increasing use of computers. According to calculations in the United States, the production and use of computers are responsible for 295 billion kilowatt hours, about 8% of the total American demand for electricity.

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15 'Old' and 'New' Economy and Services

Peter W. Daniels

15.1 Introduction

There are few social science disciplines that have not made reference since the mid-1990s to the 'new' economy (Weinstein, 1997, Beyers, 2002, 2003; Krugman, 1997; Woodrow, 2000; Visco, 2000; Pohjola, 2002, Gadrey, 2003, Bryson et al, 2004)[1]. There has been a 'vast outpouring of literature that uses the phrase 'New Economy' (Beyers, 2002, 1) and the media have also devoted many column inches to the topic (see for example, Zandi, 1998; Meyer, 2001, Coy, 2001, Madrick, 2001, *The Economist*, 2000).[2] There are almost as many 'takes' on the phenomenon and as a result the meanings attributed to the new economy remain fuzzy and imprecise (Gadrey, 2003). These include concerns about whether it is a reality or a fiction. If the new economy is a reality is it in some way distinctive from the old economy? Conversely, even if its existence is acknowledged, is it actually no different from the old economy (see for example Webber, 1993). The term 'new economy' has been used by business economists in the US since the 1970s with *Business Week* asserting in the mid-1980s that the US was undergoing the 'most revolutionary economic change in a century - the emergence of a new economy of services and high technology' (cited in Madrick, 2001, see also, Woodrow, 2000).

If content analysis is any guide, despite the much earlier use of the term, the notion of a new economy has only rapidly gained momentum since the mid-1990s. There were 1,000 references to the term in the US business press in 1996 alone, compared with some 775 references for the whole of the decade 1985-1995 (Madrick, 2001). In 1999 there were 3,000 references and there were more than 20,000 mentions of the new economy in the US business media during the year 2000. Its emergence as common currency coincided with strongly rising national and international stock markets, founded primarily on the valuations of high technology stocks and the rise of dot.com companies. Economic growth appeared unstoppable and the peaks and troughs characteristic of the business cycle during the 1930s or the second half of the 1980s, for example, would be smoothed out by inexorable improvements in productivity at rates not seen before.

R.A. Boschma and R.C. Kloosterman (eds.), Learning from Clusters: A Critical Assessment, 349–366.

From the perspective of geographers the need for more research on a variety of questions about the emerging new economy and its relationship with the declining old economy has, for example, been explored by Beyers (2002). After reviewing some of the key literature on the subject he constructs an empirically informed checklist of some of the key research issues posed by the emergence of a new economy. The list is based on spatial dimensions (the geography of production and consumption in the new economy) that are a high priority for research and it includes: the location of the key industries that perform a lead role in the new economy, the ways in which enterprises are organised, the changing nature of work (and of occupational structures) and how these affect the participation of different places (regions, cities, urban/rural communities)[3], or how to measure interregional and international trade as part of understanding the geography of consumption. There is much to commend the research agenda signalled by Beyers and elaborated in a response by Wood (2002), but it does assume that the new economy actually stands scrutiny as a concept. It is suggested in this chapter that perhaps economic geographers should stand back a little from the new economy bandwagon in order to establish whether getting on to it really serves any useful purpose. This is also important in relation to the theme of this volume i.e. the debate on the significance or otherwise for local and regional development of clustering, knowledge and agglomeration is taking place during a period of unprecedented technological and economic change. In terms of understanding what is going on and assessing future impacts it is surely important to form a view about whether the economy is working in much the same way as before (the old economy), but at a different pace and with more sophisticated factors of production, or whether, as the new economy advocates would have it, there has been a fundamental break with the past (the new economy) which means that we should be rethinking the outcome of economic processes in the future.

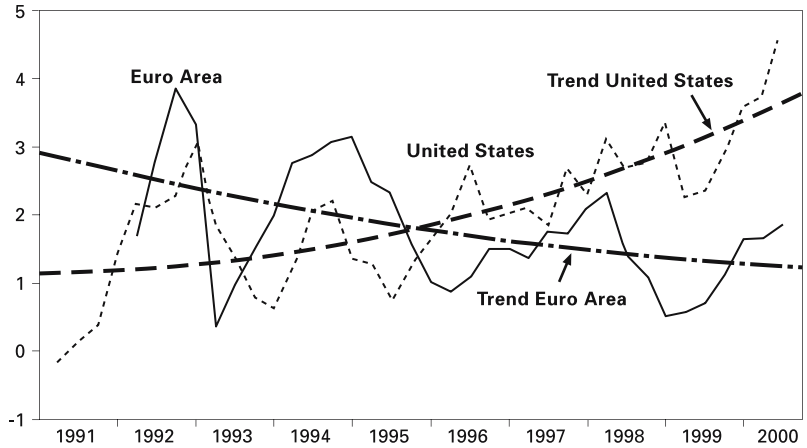
15.2 Nothing has changed?

The notion of a 'growth recession' provides a clue to the most widely used definition of the new economy, namely its association with dramatic improvements in productivity.[4] When these improvements begin to slow down, as they did during the second half of 2001, a growth recession will be taking place. Acceleration in productivity instigates an investment boom to take advantage of the new profit opportunities provided by technological

advances and a boom in consumption that is linked to higher growth of labour income and a sharp rise in the value of equities linked to an anticipated higher growth of earnings. It might be argued, in the context of this chapter at least, that many of these productivity-related effects are associated with the service industries in that many of the beneficiaries are firms in sectors such as finance, business, retailing, real estate, distribution, and transport services. Investment in information and communications technology (ICT) by these services has ballooned and has transformed their market coverage, inventory management, market research, client profiling and numerous other functions that streamline or in some way 'improve' the quality of the services that they provide.

Sustained improvements in productivity are central to the new economy mantra but historical evidence suggests that the recent round of improvements are simply a rerun of earlier 'new economies'. During the period 1889-2000 average annual labour productivity growth in the US was 2 per cent but there were periods of higher growth (1917-1927, 1948-1973; 1995-2000) interspersed with periods of lower growth between 1 per cent and 1.5 per cent (Meyer, 2001). While individual observers identify periods of different length, they tend to be labelled either as high or low growth. But Gordon (1999, 2000) has linked the rapid productivity growth between 1950 and 1972 (broadly the same period 1948-73 identified by Meyer) to the numerous technological and other innovations introduced during the last quarter of the 19th century and the early years of the 20th century. Amongst others, these include the telegraph, the telephone, the internal combustion engine, radio, television, plastics, and public transport systems. It has been suggested, however, that many of these innovations largely had an impact on standards of living rather than on productivity and economic growth. The electric motor (dynamo) and more recently ICT have, in contrast, largely stimulated improvements in production processes (including those of service industries) that were responsible primarily for significant improvements in productivity rather than in the standard of living (David, 1990).

Yet, even if this is the case, the effects are geographically inconsistent. While productivity has steadily improved in the US and is linked with the widespread adoption of ICT, it has yet to show up in the EU productivity figures. These reveal a downward trend (Figure 15.1) (European Commission, 2002). A possible explanation for the apparently divergent picture is that it is difficult to identify the impact of new technologies on productivity in Europe because they are being introduced or adopted at a time when labour markets are being deregulated. This has generated quite strong employment growth in some of the



Source: European Commission, 2002

Figure 15.1 Productivity (GDP per worker) in the Euro Area and the US (%, annual average)

Member States, lowered structural unemployment and encouraged the hiring of less productive workers. The net effect is a moderating effect on the productivity trend. Differences in the cyclical position of the US and EU economies may also be complicating the comparison, along with the fact that the share of ICT industries in total output is also lower in Europe than in the US.

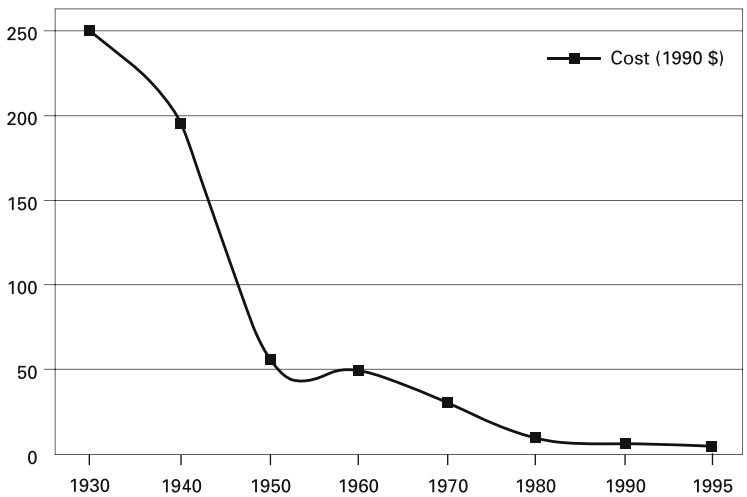
There does, however, seem to be a relationship between high productivity growth spurts and preceding periods when a significant number of innovations occurred together. Perhaps what marks out innovations in ICT as being different (rather than new?) is that they have, even if rather belatedly, triggered booms in the broader economy. Initially, just as was the case with earlier innovations, most of the productivity impacts have been experienced within the ICT sectors. One example is the high stock market valuations for the information technology sector during the late 1990s which were 'disconnected' from those for the economy as a whole. Earlier examples from the US include the initial development of the motor vehicle industry, the radio station industry during the 1920s, electric utilities companies and the airline industry. Seaboard Air Lines, for example, was actually a railway company that was one of many that tried to cash in on the rapid growth of airline stocks following Lindbergh's successful transatlantic flight in 1927. There are parallels with the addition of the dot-com suffix to company names in the second-half of the 1990s (Meyer, 2001). In this respect there is

nothing new about the economy. It is simply a re-run of what has happened in the old economy or as Visco (2000) puts it the '"new" in new economy should not be taken to mean that there have never been new economies in the past'.[5] Significant advances in technology are not the same as changes in the economy. Technology acts as a support or a service for those industries and activities that invest in and deploy it. It facilitates improvements in their operating efficiency which can range from improvements in sharing information and knowledge within firms to enhanced services to customers or clients.

Another example of 'the nothing has changed' argument, albeit based on manufacturing, is the reawakening of protectionism in the wake its decline as the creator of national wealth and jobs. This has happened earlier with reference to agriculture - every 1 per cent fall in agricultural employment/prices during the last century was matched by increases in agricultural subsidies and protection of at least 1 per cent and more (Drucker, 2001). Every developed country responded in this way, including the US. Although until recently protectionism in manufacturing tended to take the form of subsidies rather than tariffs, the balance has been changing as demonstrated by the US in 2003 its efforts to protect what is left of its steel industry by imposing heavy tariffs on imported steel. The EU has also been contemplating emergency quotas for steel to prevent it becoming a dumping ground for steel pushed out of the US. The rise of major regional trade blocs such as North Atlantic Free Trade Association (NAFTA) and the European Union (EU) has lowered internal tariffs for manufactured goods while simultaneously raising tariff barriers against producers outside them. Thus, most 'people continue to believe that when manufacturing jobs decline, the country's manufacturing base is threatened and has to be protected. They have great difficulty in accepting that, for the first time in history, society and economy are no longer dominated by manual work, and a country can feed, house an clothe itself with only a small minority of its population engaged in such work' (Drucker, 2001, 15). As far as service industries are concerned, the developing economies remain very cautious about opening up their domestic markets to imports or to foreign service providers seeking a direct presence (although they are becoming major destinations for outsourced services, see for example Zagler, 2004; Mattoo and Wunsch, 2004). All kinds of non-tariff barriers remain in place to protect domestic service producers, especially activities such as professional or business services that require a direct presence in a particular market in order to provide the level of quality of service that host country and any international firm clients located there expect.

ICTs: the bedrock of the new economy

There are also questions about whether recent advances in ICT mean that economies somehow now work in a new or different way. Is the reality that economies continue to work in the way that they always have? ICTs have simply amplified the scope for more frequent fluctuations in the business cycle or in stock market prices as the speed and reliability of data and voice transmission from one location (say a stock market) to another has been transformed. The friction of distance has become much more diluted than was the case when communications relied on the telephone or the telegraph, although not at the expense of geography![6] The sharp decline in the cost of transatlantic telephone calls is a simple example (Figure 15.2). The intensive deployment of technology in the dealing rooms of banks and securities firms provides a support service, albeit a much improved one, which enables firms to claim some competitive advantage or to specialise even more than was the case before. There is, however, nothing new about the services that they are providing. They are simply able to deliver them in ways that have evolved in line with advances in technology. Corporations continue, as in the past, to be subject to the same rules of the market and will succeed, fail, or be taken over in line with their performance and corporate ambitions.



Source: World Bank

Figure 15.2 Change in the cost of a three-minute telephone call from New York to London, 1930-1995

Nonetheless, ICTs are consistently regarded as the bedrock of the current new economy. They are seen as the key to economic performance and to understanding the dramatic improvements in productivity in countries like the US between 1995 and 2000. More investment in ICT is stimulated by a fall in component and equipment prices (therefore raising the capital intensity in the broader economy), by increasing the efficiency and volume of output from the IT sector in response to competition and market conditions, and via spill-over effects such as the growth of e-commerce or the expansion of the Internet. The latter are associated with significant organisational improvements and cost reductions for firms which are passed on to the larger economy as efficiency gains, especially faster expansion of multi-factor productivity growth.[7]

However, the introduction of a new technology such as ICTs, or indeed some of the earlier technologies such as the dynamo, causes productivity to slow and therefore a reduction in economic growth. This is because the introduction of new technology requires adopters to discover the best way to use and apply it to fulfil their business goals. The need for time and learning from experience results in the 'productivity paradox', first noted in the 1970s following the introduction of computers suitable for use in commerce, business and other sectors of the economy. It was fully expected that new technology would cause the demand for workers to decline while output and productivity would grow. In practice there was a restructuring of the labour force that required retraining and the appearance of occupations that had not existed previously, such as computer programmers and data processing specialists. Not only did firms need to invest in (relatively) expensive hardware and software, they also had to cover training and retraining costs, as well implementing organisational changes such as the establishment of new computer data processing centres (in banking and in insurance services, for example).

15.3 Are services the key distinction between the old and the new economy?

Importance of changing conception of services

In order to evaluate the relationship between services and the new economy it is necessary to recall the way in which they are viewed as part of the old economy? Historically, service industries were very much a residual category, anything that could not be classified as a manufacturing or primary activity was a service activity (see for example Delauney and Gadrey, 1992). This

position was also justified in terms of services as invisible and intangible inputs to other material products that were largely supplied on a standalone basis rather than in an integrated, horizontal, fashion. Services were largely produced and consumed simultaneously and most were not regarded as tradable, whether within or between national economies.

The way in which services are viewed in the new economy has evolved somewhat because ICTs, in particular, have had an impact on the ways in which they are, for example, produced, consumed, or traded across borders. The widespread adoption of ICTs has also influenced the cost structure and relative competitiveness of firms and entire industries (OECD, 2000). The rapid rise of e-commerce (both consumer-to-business and business-to-business) is changing the ways economies function by making technology, information and know-how more accessible than ever. The skills and expertise embodied in human resources can be sourced from many more places around the world, production can be integrated across many different time zone and borders and information on designs, distribution costs, markets, etc. can be shared widely and more or less instantly. The Internet, although it presents both opportunities and pitfalls, is pivotal to these developments and is the backbone for e-commerce, e-government and e-business (Berners-Lee, 2000, Tapscott et al, 2000). Service industries are prominent in a number of ways, leading Giarini (2001) to postulate the 'horizontalisation' of services whereby it becomes increasingly difficult to treat them as discrete activities but as part of a more integrated production system, often built around ICTs, spanning manufacturing, services and even the primary sector (Daniels and Bryson, 2002; Quinn, 1992). As a result, the boundaries between the old economy and the new economy, between goods and services, and between tradable and non-tradable goods and services are becoming more difficult to identify.

Job growth in the new economy is largely linked to service-producers

No matter how one chooses to measure it, there is no doubt that economies are undergoing change and shifts in occupational structure are often cited as a key indicator (Table 15.1).

But there is nothing new about such shifts in occupational structure.[8] In the twenty years between 1988 and 2008 the US Bureau of Labour Statistics anticipates that 'blue collar' occupations such as operators, fabricators and labourers will have declined from 14.2 per cent to 12.7 per cent of the labour force, while professional occupations will increase their share from 12.5 per cent in 1988 to 15.6 per cent in 2008 (or almost one in six of all occupations).

Occupation	Share of all occupations (%) 1988	2008	Change
Executive and managerial	10.3	10.7	+0.4
Professional	12.5	15.6	+3.1
Technicians	3.2	3.8	+0.4
Marketing/sales	10.3	11.0	+0.7
Administrative support	18.5	16.6	+1.9
Services	15.5	16.4	+0.9
Agriculture	3.5	2.8	-0.7
Production, craft and repair	11.9	10.5	-1.4
Operators, fabricators and labourers	14.2	12.7	-1.5

Source: US Bureau of Labour Statistics.

Table 15.1 Changing structure of occupations, United States, 1988-2008

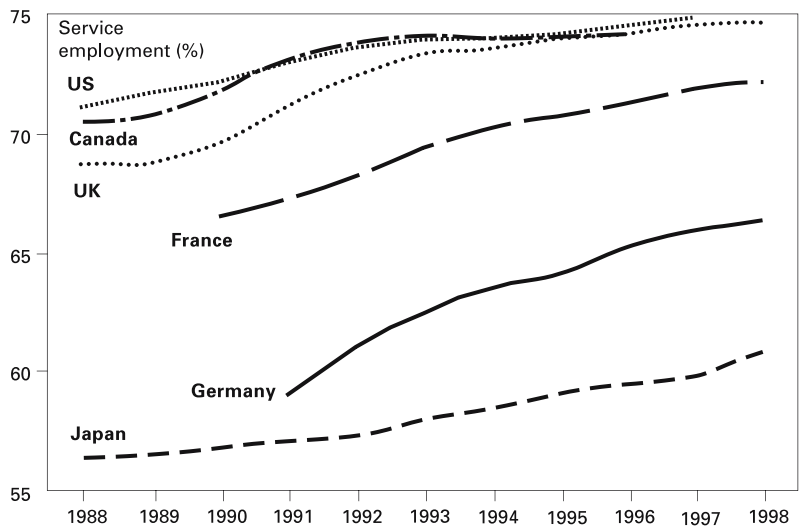
Female labour force participation rates have also increased significantly since 1970 - from 50 per cent to 67.5 per cent in the UK by 2000 or from just below 50 per cent in the US to 72 per cent. The share of total population enrolled in tertiary education between 1970 and 1996 has risen significantly in developed and less developed economies as one response to the changes in labour market requirements signalled by the restructuring of occupations (see Table 15.1). Such changes in the occupational order have of course been encouraged by the revolution in ICT, leading organisations such as the Progressive Policy Institute (www.ppi.org) to develop methods for classifying the US States on the basis of the extent of the restructuring and reshaping of their economies in accordance with the tenets of the "New Millennium Economy". A similar approach has been used for metropolitan areas using a new economy index (http://neweconomyindex. org). Even the language of the new economy has evolved in a way that suggests there is something new going on (Table 15.2).[9]

In a thoughtful analysis of the 'myth' of the new economy Gadrey (2003) suggests that the idea that employment in services has dominated growth during the last decade is over-stated. He focuses in particular on the US economy where employment growth rates were actually higher in the old economy prior to the 1990s. This is borne out by some comparative data for six leading OECD countries between 1988 and 1998. Service employment as

1991 (old economy)	*2002 (new economy)*
Voluntary redundancy	*Involuntary career event*
Rising unemployment	*Falling employment*
Manufacturing meltdown	*Global meltdown*
Unemployed	*Self-employed*
Between jobs	*Between projects*
Downsizing	*Rightsizing*
Early retirement	*Long-term sabbatical*
Laid-off	*Furloughed*
Life-ling careers	*Life-long learning*
Firing	*Negative hiring*

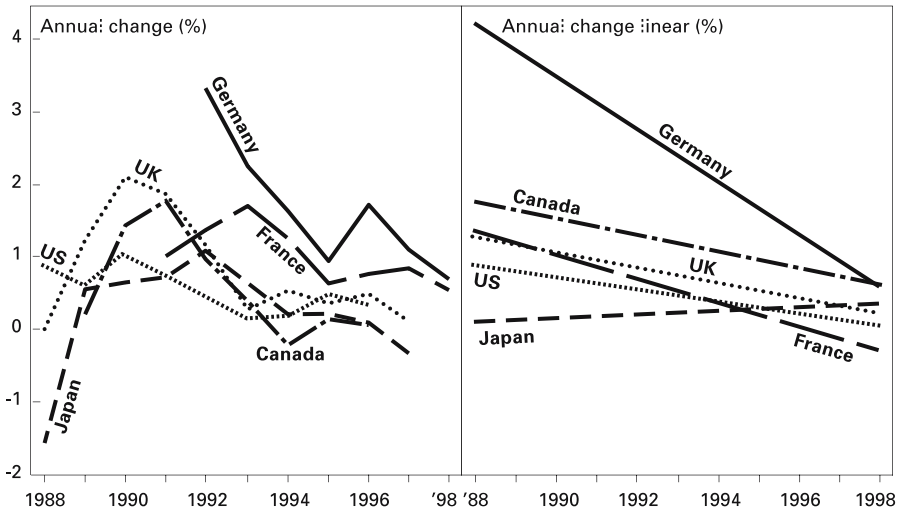
Table 15.2 Transformation of old to new economy jargon

a proportion of total employment certainly rose steadily during the late 1980s and the early 1990s, notably in Canada, France, the UK and the US (Figure 15.3). There are indications, however, that from the mid 1990s onwards, when the new economy was supposedly getting into its stride, the increase



Source: compiled from OECD data

Figure 15.3 Service employment share (%) of total employment, selected OECD countries, 1988-1998



Source: compiled from OECD data

Figure 15.4 Trend in average annual change, service employment, selected OECD countries, 1988-1998

in the share of service employment in total employment was slowing down and the curve has been levelling off.[10] Even Germany, which started from a lower baseline in the early 1990s reveals a similar pattern even though it is still some way behind its major competitors such as France and the UK. Not only have the annual changes in service employment been declining, they are also converging, so that by the later 1990s all the leading OECD economies were recording annual growth rates of less than 1 per cent (Figure 15.4).

At a more parochial level, the job losses in the UK during the first nine months of 2001 reflected this trend; reductions in excess of 800,000 jobs missed out few occupations, from factory workers, investment bankers, call-centre workers, hotel maids to management consultants. It seems that the historical tendency for service industries to weather downturns in the economy better than manufacturing now rings less true. During the first nine months of 2002, the UK regions continued to experience job losses, primarily in manufacturing, but the City of London is also expected to lose 30,000 jobs (almost all of them in business, professional and financial services) by early 2003. This is some 10 per cent down from the peak of 334,000 jobs in 2000 (Smith and Waples, 2002). This may be new but it is not the first time that it has happened. As noted earlier, one response to this phenomenon has been to label it as a 'new economy growth recession' (Meyer, 2001).[11]

Global dimensions of the new economy and services

At a different scale, if the new economy represents something different to the old economy it should be reflected in the evolving international regimes for service trade and investment. These will need to accommodate innovations in services and in the ways in which they are produced and consumed (Woodrow, 2001). The context within which the internationalisation of services is taking place is highly dynamic and the trade policy implications of the new economy have hardly begun to figure in discussions (Sauvé, 2000; Riddle 1999).[12] Clearly, measurement of the size and boundaries of the new economy is vital to an informed discussion of its policy implications, including trade policy.[13] ICTs contribute much to its development but 'if governments cannot adequately measure output, sales or cross-border trade in many of the sectors - especially services - where ICTs are important, it will likely be difficult for them to document the full potential of the new economy' (Muylle, 1999, 8).

Meanwhile, the General Agreement on Trade in Services (GATS) has an important influence on the content and pattern of services trade and investment. Its role in relation to the latter is particularly crucial because direct investment is often the only way for services to compete effectively in a market and stability is critical for effective long-term planning. The first round of the GATS negotiations largely predated the ICT revolution and the new economy and it is not clear that the new round of negotiations from Doha onwards recognise the changes that are occurring (even if the idea that they represent a new economy is contested). Yet there is general agreement that a more open regime for services generally will do much to enable countries, firms and skilled workers alike to take advantage of and spark further development of the new economy. ICT applications lie at the heart of many of the fastest growing components of services trade. In 1990 world exports of office and telecoms equipment rose by 10 per cent to nearly US$ 770 billion, well ahead of the overall rise in commercial services exports of 1.5 per cent (WTO, 2001). Many of them will feature prominently on the liberalizing agenda of the GATS 2000 round. These include energy services, environmental services, audiovisual services, express delivery; the professions, private education and training, private healthcare, travel and tourism. Similarly, the cluster of services that underpin, electronic commerce advertising, computer and information services, distribution, finance and telecommunications, as well as the movement of highly-skilled peoples, will also be a major focus of the discussions.

The sense that the new economy is a recognisable phenomenon in trade terms may only materialise when the challenges of regulatory convergence

and international regulatory cooperation posed by international e-commerce have been resolved. The issues for international e-commerce are wide ranging and include: data privacy, encryption technology, the development of secure payments systems, protection of intellectual property, strengthened systems of prudential supervision and finding the right balance between industry calls for a right to non-establishment and government concerns over the need for local presence requirements for consumer protection or tax collection purposes. These are very much new economy issues that may not be readily addressed by adopting old economy solutions.

FDI, the new economy, and services

Trade in services is often dependent upon direct investment that achieves the presence required to enable a particular service such as banking, auditing, or corporate legal advice to be provided in the way that clients expect. This is very much an old economy requirement that has not been modified by the appendages of the new economy such as ICTs. Worldwide services Foreign Direct Invesment (FDI), valued at US$210 billion in 1994 (60 per cent of total FDI), increased dramatically in the late 1980s and into the 1990s (UNCTAD, 1998). The sectoral composition of total outward FDI has been inexorably shifting towards services. The average share was in the range of 35-45 per cent in the mid-1970s, increasing to an average of around 50 per cent in 1990 and as high as 67 per cent in the case of Japan. This coincided with the growing international ambitions of service firms in one nation to serve markets or clients in another nation by integrating their operations across borders by trading intermediate goods and services (Dunning, 1993; McCulloch, 1996). The cumulative result of this shift is that approximately 60 per cent of the world's total stock resulting from FDI is in services, with distribution, professional and technical services and financial services being prominent. The most important single factor behind the increase in FDI is cross-border mergers and acquisitions (M&A) with services accounting for 60 per cent of the transactions (by value) in 1999 (up from 31 per cent in 1987) (UNCTAD, 2000). There has also been an upsurge in M&A activity by services within Europe associated with an increase in cross-border operations in services (Muylle, 1999). Indeed, the structural and dynamic characteristics of the world economy are increasingly a function of FDI and its close links with financial flows, technology transfer and international trade in services, as well as goods. This is demonstrated most clearly by the expansion of activities such as downstream services (where FDI in dealer networks and after-sales services is often necessary to promote sales) or financial services

(where the overseas activities of home-country clients often prompt FDI by their service providers). Whether these changes are a function of a new economy is a moot point.

15.4 Conclusion

It is now apparent that the notion of inexorable growth as an accompaniment of the new economy was misplaced. The expansion of the US and many other economies has slowed down or even ground to a halt, many dot-coms have failed, merger and acquisitions activity has slowed significantly, venture capital has become hard to obtain and confidence in corporate governance has been undermined by the Enron, WorldCom and other corporate accounting scandals. The Japanese stock market fell to its lowest level since 1982 in early October 2002, reflecting continuing uncertainties about the economy of its main trading partner, the US. The tragic events of 11 September 2001 in New York not only exacerbated an already extant downward trend in most of the world's economies but also slowed down their subsequent recovery.

To focus on the new *economy* and whether or not is exists is perhaps to miss the point. Thus, the 'new economy may or may not materialise, but there is no doubt that the next society will be with us shortly. In the developed world, and probably in the emerging countries as well, this new society will be a good deal more important than the new economy (if any)' (Drucker, 2001, 3). The formation of a new society is stressed because of the rapid change in the structure of the population pyramid towards an older population, the shift to a knowledge society in which knowledge will be the key competitive resource for organisations and individuals, the return of protectionism based on the emergence of regional trade blocs and changes in the future shape of corporations (especially transnational corporations) into groups (or confederations) held together by management control rather than unitary entities held together by control through ownership. Drucker might have added that service industries will have a very large part to play in shaping these societies.

No one would want to deny that there have been, and continue to be, ongoing changes in our economies and that many of them are now "a service economy supported by goods and service producing sectors" (Beyers, 2001, 28, see also Miles, 2001). It remains debateable, however, as to whether they can be characterised as symbolic of a new economy. The agenda for research by economic geographers on the evolving spatial and structural attributes of,

for example, employment or occupations and their impact on cities or regions that were previously marginalised is to be encouraged (Daniels, 2004, Daniels et al, 2004). Appending the label 'new economy' does not necessarily add value to this research.

Notes

1 Seminars such as those funded by the Economic and Social Research Council (UK) on Geographies of the New Economy (2001-2003 - see http://www.ges.bham.ac.uk/research/human/ neweconomy/abstract.htm); the ESRC Seminar on Work, Life and Time in the New Economy (2002-2004 - see http://www.lse.ac.uk/worklife) or The New Economy and Post-Socialist Transition (2003 - see http://www.tiger.edu.pl/english/konferencje/main.htm) testify to a strong current interest.

2 There is a problem about how best to use punctuation: 'new' economy or 'new economy' and 'old' or 'old economy'. With one or two exceptions and in the interests of simplicity, in the remainder of this chapter both terms will be used without quotation marks.

3 Knowledge production and consumption could be added to this list and has been explored in the context of agglomeration economies and urban economic development by Jan Lambooy (1997, 2002)

4 Productivity expressed as output per hour is one of the most important determinants of economic well-being and is closely related to real income per capita.

5 It is worth pondering the fact that the invention of the printing press in the 1540s was accompanied by talk of a new economy. The wider accessibility of the telephone during the early 1890s was also heralded as creating opportunities in a new economy, followed by similar ideas following the invention of the radio in the 1920s. Computers continued the sequence during the 1970s, followed by telecommunications and the widespread interlinking of computers during the 1990s

6 It remains the case that those workers most deeply embedded in the ways of the cyber economy (e-mails, video conferencing, telephone conferencing etc.) continue to complain that they spend too much time travelling to and from meetings (or in meetings). This explains why cities like London, New York or Singapore that are essentially 'service' cities will remain pre-eminent in the 21st century international economy.

7 Multi-factor productivity (MFP) growth is that part of economic growth not accounted for by the increase in the quantity and quality of labour, and physical capital, used in the production process.

8 See for example Bannon and Ward (1985), Bearse and Karasek (1981), Lambooy (1991).

9 The term itself may already be passé in that the 'real-time economy' is upon us (*The Economist*, 2002).

10 Statistics published by the US Bureau of Labour Statistics show that 'high technology service' jobs fell by 4 per cent (or 144,600 jobs) to 3.52 million during 2001-2002; software-related jobs declined more slowly at 0.4 per cent (9,300). During the same period manufacturing jobs in the ICT sectors decreased by 20 per cent (400,000) to a total of 1.62 million.

11 A 'growth recession' refers to a period of below-trend growth during which the unemployment rate rises. It does not fit well with the UK experience; the unemployment count was

at a 27-year low in October 2002, either because more people were in part-time jobs or, in the case of London, because those losing jobs have tended not to register as unemployed (preferring to live off savings and redundancy payments).

12 A symptom of this is the increasing disjunction between the ever-shorter product cycles typical of many firms trying to compete in global markets and the lengthening negotiating agenda that governments must contend with as the international trade agenda penetrates deeper inside national borders and touches issues that are domestically sensitive (in a regulatory sense). This may encourage the private sector to search for non-governmental routes to market access.

13 For example, according to the data published in *Fortune* (1997) almost 300 of the top 500 companies in the world are service companies, and the majority of these are controlled from the US, Japan, France, Germany and the UK.

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16 Economic Capabilities and Strategic Clusters: New Perspectives for National and Regional Economic Policy

Pieter P. Tordoir

16.1 Introduction

Since the early Nineties, national economic policy in the Netherlands has been limited to market liberalisation and safeguarding adequate market conditions and adequate collective factor conditions, including physical and knowledge infrastructures. Because of past policy failures and EU regulation, micro- and meso level industrial policy has become marginal. Some years ago, national policy makers were inspired by Michael Porter's diamond framework for the explanation of industrial competitiveness (Porter, 1990; Jacobs, Boekholt & Zegveld, 1990). Porter's concept of economic cluster formation became for some time a buzzword, but this did not lead to actual policy change. At the moment of writing, there is a growing awareness in national policy circles of the limits of liberalisation, particularly in the case of the network provision of products and services such as railroads and electricity and telecommunication networks.

In this chapter, a new case is made for meso level industrial and spatial-economic policy, not as a substitute but as a complement of policy aimed at general market and factor conditions. There are various reasons for a renewed meso level policy, some of which are rather pressing. First of all, the competitive strength of nations and regions depends not only on market efficiency and other general conditions but also on industry-specific and cluster-specific conditions at a deeper level which have been forged by long term investment and which are hard to copy. Such conditions, among which specific knowledge infrastructures, networks of synergetic and pre-competitive collective entrepreneurship and shared regional and national pools of experience and specialised labour, will gain importance in liberalised international markets. These specific conditions do not evolve through the market mechanism and self-organisation alone. Some collective action is needed, both by entrepreneurs and by government agencies. Adam Smith's invisible hand of the market needs the visible hand of

R.A. Boschma and R.C. Kloosterman (eds.), Learning from Clusters: A Critical Assessment, 367–387.

entrepreneurs and policymakers in order to produce optimal economic results in the realms of labour productivity, innovation, and competitiveness. Of course, the relevance of this Schumpeterian line of reasoning varies from one industry and economic cluster to the other. Second, and most importantly, the functioning of the market mechanism itself depends on some crucial capabilities of the economic system that cannot be produced by the market system only. Core capabilities in this respect are physical market access, governance capability (in its widest sense) and innovation capability. Specific clusters of business activities and specific competencies within business firms play a key role in the formation of these capabilities within the economic system.

In this chapter, an argument is made for industrial policy aimed at these activity clusters in particular. In the next section, three vital capabilities for productive and flexible market economies are explained in some depth. The key to competitive strength lies in combinations of these capabilities. The section concludes by referring to various avenues for national and regional economic development, while taking strategic capabilities into account. A subsequent section focuses on the contemporary Dutch economy. The productivity, innovativeness and competitiveness of various industries in the international market are explained by the development and intersection of strategic capabilities and activity clusters. The chapter concludes with some implications of the analysis for economic and spatial policy at the national and regional levels in the Dutch context.

16.2 Inside the grey box: vital economic capabilities

Are there any welfare theoretical grounds upon which we might assess the composition of industrial activity of national and regional economies? Must some activities be deemed more important than others? According to pure micro-economic theory, such assessments are futile. Industrial composition is a non-issue and a grey area for mainstream economics. It is not a black box, as innovation and technological development are a black box for economic analysis, since the activity composition of economies can indeed be perfectly explained by market theory (Rosenberg, 1982). The composition is a *grey box* in mainstream economics: explainable, but meaningless.

According to pure micro-economic theory, changes in the industrial composition of the economic supply-side follow from changes in the composition of final demand. Final demand composition is a datum for mainstream economic science and escapes economic analysis. Only the

efficiency by which changes in demand are translated into changes in supply matters. From the micro-theoretical perspective, policy should be limited to general conditions for efficient adaptation. Only the entrepreneur is capable to adapt. The government should not take over the rudder from the entrepreneur and should limit itself to the provision of free and navigable waterways (Arrow & Hahn, 1971).

Ricardo's theory of comparative advantages, explaining variations in the national and regional activity composition from relative scarcities of factors of production is derived from micro-economic theory. On the basis of his theory it follows that a welfare optimum is secured by free trade of goods and services (Hollander, 1979). When free trade is accompanied by free movement of capital and labour, geographical variations in wealth will, according to Samuelson's extension of Ricardo's theory, moreover evaporate. National and regional specialisation patterns, under such conditions, will not influence wealth. The goals and means of EU economic policy reflect this line of reasoning and give limited scope for national and regional industrial policy. Governments might invest in the supply factors of production, such as labour, infrastructure and the pool of technical knowledge but they are not entitled to protect this supply from foreign consumption. Thus, economic policy based on micro- and welfare economics prevents specific industrial policy at the micro- and meso level, apart from competition and market structure policy. Also, Porter's diamond model, which is one of the few meso level models explaining the competitiveness of industries, does not provide any other basis for public policy other than competition policy and the provision of collective factor conditions. Porter's model perfectly explains the Dutch advantage in flower bulbs, for example, but that does not imply that the flower industry should therefore be given preferential treatment by national policy.

Schumpeterian theory, the main rival of neo-classical theory, does supply us with grounds for more specific industrial policy, however. Schumpeter saw that perfect competition might stifle innovation and growth since it prevents organised and large-scale research and development (Schumpeter, 1942). The Schumpeterian advice would be to allow for some level of market concentration in order to reach sufficient scale for R&D (Nelson & Winter, 1982). Nonetheless, neither neo-classical nor Schumpeterian theory provide, in any case, sound reasons for favouring one cluster of economic activities over the other. Hereafter, it is argued that such reasons might however very well exist.

The theories mentioned above are based on an abstract and simplified representation of economic reality. Naturally, the supply system of the economy

is structured according to the structure of final demand by way of the free market. This is Adam Smith's famous 'invisible hand'. In theory, the invisible hand does the job, but in practise it needs a real-life hand. The formation of industrial structures and the growth and governance of markets is guided to an ever-increasing degree by specialised activities within the market economy that support the smooth functioning of markets, the decision making process by entrepreneurs, business organisations and investors, and innovation processes. In principle, there are three kinds of vital capabilities involved in the functioning and growth of advanced and complex market economies. These capabilities are to a large extent supplied by activities that form part of the industrial composition of advanced market economies. Nonetheless, the market mechanism by itself will not produce these capabilities to a full extent. Schumpeter followed this reasoning for the capability to innovate, but the principle holds as well for other vital capabilities. The argument presented in this chapter is that competition policy and the provision of general conditions for business development should be complemented, within limitations, by specific industrial policy oriented towards these three kinds of capabilities and the industrial clusters providing these.

Physical market access

A first and most obvious capability within a smoothly functioning market economy is physical and informational market access. Mainstream market theory addresses the economic and institutional structure of markets, but not the geographical structure and the physical accessibility of markets, notwithstanding the influence of the latter on market efficiency. Geographical market structure and physical accessibility pose severe problems for theory, due to increasing returns to scale and external effects that escape and hamper the market mechanism (Fujita, Krugman & Venables, 2001; Tordoir, 2001). These effects are particularly relevant in networks for the transportation of goods, people and information. Because of increasing returns, networks are not provided by the 'invisible hand' of market forces and are thus a natural concern for collective policy, aimed at public network provision when a monopoly is most efficient, or at Schumpeterian competition policy when an oligopolistic market supply structure will do.

In advanced economies, physical market access is not only a matter of networks. In many cases, physical networks are only one layer within a multi-layered structure of facilities and activities involved in transportation. Often, the utility of physical infrastructure, including roads, railways, airports and seaports, is also determined by the presence and qualities of

services providers. The services provision structure itself usually consists of various layers. The efficiency of physical networks will depend not only on the governance structure of the network itself, whether publicly or privately provided, but also on the structure and development of service providing industries. Hence, governments willing to invest in efficient networks should take careful notice of the quality and market strategies of these providers. Adequate size, industrial structure and innovativeness of intermediary service providers and clusters of supporting activities, positioned between a physical network and the final user, are essential for the utility of networks, for the efficiency of market interaction and for economic productivity and wealth in general.

Governance capability

Governments can only enforce competition (or self-organisation) in the event of market failure due to strategic behaviour of market participants. When market failures result from technical scale and external effects, organisation is unavoidable. This explains not only the role of government and collective action but also the existence of large and hierarchically structured companies. Where the market fails, efficiency results solely from managerial and administrative competencies in the public *and* private sector (Williamson, 1980). However, when markets do work, governance capabilities are needed for the continuous adaptation of companies to ever changing markets and institutional conditions.

The market mechanism does provide for the most essential of governance capabilities, namely entrepreneurship. More generally, it ensures a natural selection of governance capabilities, provided that companies with various governance practises compete with each other. Natural selection stops, however, if one practise becomes dominant. In that case, only a continuous learning process can take over the role of the market in stimulating innovation and progress in governance practises. Usually, progress in governance practises results both from selective market forces, knowledge spill-overs and collective learning processes via trade journals and management education. Cultural, social and physical proximity are key conditions. Governance in the economy means the co-ordination of human agency. Human agency can only be understood and influenced within a common cultural context (Beckert, 1997; Granovetter, 1985). Face-to-face contact is essential and that explains the physical proximity condition. Therefore, governance practices are often specific in a national and regional context. The Netherlands, for example, are known for the 'Poldermodel' of governance, a co-ordination practice

developed over centuries that differs significantly from the more centralised models in France and the USA (Aglietta, 1976; Boyer, 2000).

Governance in our advanced and complex mixed economies is highly knowledge-intensive. Nestled around governance centres, among which head offices and government departments, are extensive complexes of supportive knowledge services including consultancy, legal and information services. This complex of corporate activities forms the core of the Central Business District in large cities. At work is a cumulative causal process of spatial concentration towards a limited number of global control centres, triggered by the globalisation of the economy, that together form a system encompassing the various time zones in the world (Castells, 1996; Sassen, 2001). The result is the rise of the global network economy, where national and global control centres (CBDs) are interlinked by the global hubs-and-spokes system of air-links. International control centres are without exception also hubs in the global air-links network. Networks for physical market access and concentration of governance activities are tightly interlinked.

Innovation capability

Growth of productivity and GDP per head is eventually determined by the improvement of products, services and production processes. Innovativeness is therefore the last but certainly not least of the three propelling capabilities in advanced economies. The underlying innovation process is no longer a *deus ex machina* and *black box* for the economic and administrative sciences. Armed with insights into the social, economic and spatial foundations of the innovation process, policy makers can do much better than just subsidise R&D, which is still the favoured policy. Effective innovation policy is directed at the forging of connections with and within the creative core of the economy. Effective governance structures do a better job than just throwing public money at private enterprise. Innovation capability and governance capability are closely interconnected.

In abstraction, innovation concerns variation, selection and diffusion. There is some analogy with natural evolution, except that the latter involves self-organisation whereas the former demands a certain level of organisation and thus governance. Three forces are at work: the feeding power of knowledge development (technology push), the selective power of the demand market and the learning and diffusion engine of rivalry in the supply market. The obvious handle for policy is technology development, where the market mechanism might fail due to scale effects and high levels of risk. Organised R&D often requires large size companies to be involved and thus a relaxation

of competition policy. Since companies invest only in R&D if they can reap its fruits, some level of initial protection is necessary.

The scientific literature is overwhelmingly concerned with technical progress. Non-technical innovation in the 'cultural' fields of design and communication, and innovation in governance practices, are two increasingly important areas of creativity and economic progress that are neglected in the literature and in policy circles. In the field of cultural creativity and innovation, organised R&D is much less relevant. Innovation is usually a matter for the individual entrepreneur and individual specialists, including the artist. New ideas circulate in informal circles and new products and services are often developed in temporary project groups. For these reasons, individual independence, informal interpersonal contacts, shared life styles and languages, and knowledge spill-overs (as an external neighbourhood-effect) are crucial ingredients of fertile innovation environments. Such environments therefore often have a specific and local or urban character (Florida, 2002). In the case of both technical and cultural innovation, a critical local demand market of early adopters is often a necessary condition (Porter, 1990). Innovation not only demands contextual changes in firms since users have to adapt as well. In the case of intermediary users (business-to-business markets), the market concentration at the demand side is relevant. Concentrated or monopsonic demand markets are less conductive to innovation.

Finally, the spatial structure of the demand market plays a role. Knowledge spill-overs are just as relevant within the demand market as they are within the supply market. The neighbourhood-effect is a major driving force in the diffusion of innovation adoptions. The context of spatial structure is thus highly relevant for the development of innovation capabilities.

16.3 Structural and spatial interdependence of capabilities

Market access, governance and innovation capabilities are structurally and spatially interdependent. Taken together, they form a base for the competitiveness of industries, regions and nations. The value of interconnection of the three capabilities varies according to some basic market characteristics, among which the level of volatility, standardisation and industrial concentration.

The Dutch horticulture cluster is a fine example. Within this cluster, specialised firms maintain a worldwide network of channels for wholesale and retail distribution and sales of flowers, bulbs and greenhouse products,

supported by co-operative auction facilities and Schiphol Airport. The cluster therefore maintains a global hub position. The concomitant flows of information and interpersonal contact networks are, in turn, a fertile breeding ground for the creative core of the cluster, consisting of firms specialising in genetic engineering and in the development of dedicated ICT, logistics and marketing methods. Horticultural product markets are volatile and fragmented spot markets, where many small and interdependent players within the context of complex value chains have to react quickly to changes in world demand and supply markets. Such a combination of market characteristics is typical in many 'hot' consumer-oriented markets, among which fashion, media and advertising, but can also be encountered in innovative producer services industries and advanced manufacturing within complex time-critical chains, such as design furniture and race car construction. These types of industries all show functional and spatial clustering of firms and strategic capabilities. Clusters compete in the international market just as much as individual firms do.

In industries characterised by concentration of supply and demand markets, low market volatility, and mass production, the interdependence between market access, governance, and innovation capability is less pronounced and less critical for competitiveness. In consumer electronics, retail banking and the energy sector, for example, product development, governance, and distribution can easily be functionally and spatially separated. Nonetheless, even in these less complex industries, time-critical interdependencies between various strategic capabilities may occur at an intersectoral level. The Philips Group, for example, could move its global headquarters out of Eindhoven, its R&D seat, because of the slow interaction between R&D and governance, but it moved its headquarters to Amsterdam because of the high interaction between firm-internal administration and advanced financial and producer services. Located close to Schiphol Airport, the administrative centre of the company can easily interact with the main financial and business centres in the world.

More generally, we see spatial interdependency between economic and political decision centres, international transportation nodes and clusters of advanced creative services. The combination of physical node development, headquarter activities and creative activities is typical of metropolitan centres in the top and sub-top of the international urban hierarchy (Daniels, 1991; Tordoir, 2003; *see also Map 16.1*).

The above argument does not imply that the development of the three strategic capabilities explains the competitiveness of regional and national

industrial clusters in every instance. As stated above, the value of the capabilities depends on market and industry characteristics. This value is, for example, relatively low in cases of standardised production and services processes. In these cases, neo-classical economic theory, which does not mention any of the capabilities discussed here, can perfectly explain regional and national patterns of industrial specialisation and competitiveness. Thus, there are two explanatory models for regional and national industrial specialisation patterns, development and competitiveness: the mechanistic neo-classical model, based on regional and national differences in production factor scarcity, and an organic model, based on spatial differences in the development and interconnectedness of the strategic capabilities discussed here. Both explanatory models do not exclude each other, but overlap and intersect. Market efficiency and industrial specialisation demand physical market access and governance activities, in the same way as each of the strategic capabilities is, in principle, based on an efficient market mechanism. Like any other economic activity or resource, activities involved with strategic capabilities are subject to Ricardo's laws of comparative costs.

Strategic capabilities are thus subject to neo-classical economic laws. They have certain cost levels and carry price tags that will differ from region to region. Local price tags will vary according to local changes in supply and demand and according to changes in other regions. Apart from competition on the basis of strategic capabilities, therefore, there is also direct competition in markets for strategic capabilities. An international airport hub, for example, provides a basis for local industrial competitiveness, but the airport itself is also subject to international competition.

Nonetheless, strategic capabilities are a rather special type of economic activity. In other words, they are a special type of resource. Contrary to common types of resources such as labour, capital, and land, strategic capabilities generate *endogenous* regional and national development capacity. Industries, regions and nations with highly developed strategic capabilities are at the source of change and development in the global economic system. Regions less endowed with these capabilities behave as floating corks in the waves of economic change. There, waves of change are not initiated or changed in direction to the benefit of the region. Strategic capabilities are hard to develop and difficult to imitate. They are partly untradable and spatially highly immobile. Local companies cannot easily shop for them outside their region of establishment. Once established, physical market centrality, governance capability and innovation capability can give cities, regions and nations a remarkably robust competitive edge. Thus, the Southeast of England,

the Île de France and California, which are regions of comparable economic size and strategic capability endowment, have all shown rather stable growth potential throughout various upturns and downturns during the last century. On the other hand, many other regions in the UK, France and the US have witnessed sometimes drastic volatility in competitiveness and wealth in the same period. The three regions mentioned, which are not by chance endowed with highly diversified metropolitan economies, seem to weather the storm of the changing world economy with great ease. The next section provides some more detail regarding developments in the Netherlands.

16.4 The Dutch economy in perspective

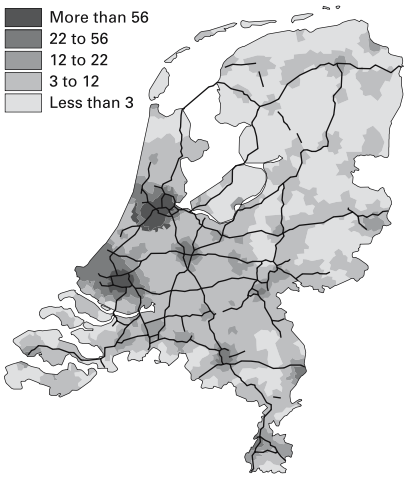
The industrial composition of the Dutch economy is highly sensitive to the relative costs of factors of production, particularly land, energy, and labour costs. The neo-classical perspective on national specialisation and competitiveness is thus quite relevant both for entrepreneurial strategy and national public policy. Labour costs moderation has for many years been, and still is, a main lever for national economic policy in the struggle for international competitiveness. The successful development of the Dutch economy cannot be explained on the basis of competitive factor costs alone, however. A strategic capability of rather overriding importance, by which the Netherlands have a quite unique international position, is the result of the central geographical position of the country in international and global market access networks. A majority of exporting local industries profit directly and indirectly from a strong embeddedness of the economy in international transportation networks. As regards the other two kinds of strategic capability discussed here, the Dutch position leaves a lot to be desired, however. A certain level of strength does exist in the field of governance capabilities, with the country being home to some of the largest multinational companies and a well-developed financial and business services sector. However, neither Amsterdam, the main centre for these activities, nor the Randstad region as a whole belong to the group of top-ranking economic decision centres in the world. Advanced economic governance capabilities and innovation capabilities as well are also concentrated in a handful of very large corporations. Thus, market access is in general by far the most important national capability with the widest implication in terms of profiting industries. Governance capabilities are present but not particularly strong. Innovation capabilities are the weakest of the three cornerstones.

Moreover, competitive advantage based on strong *combinations* of strategic capabilities is rather rare in the Netherlands. The aforementioned example of the Dutch horticulture cluster is an exception to the rule. The situation differs widely among the various exporting industries, however.

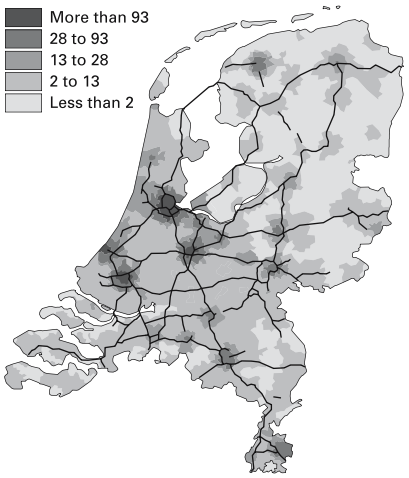
The neo-classical drivers of the competitive strength of the Dutch economy, including moderated costs of labour, land, and energy, increases in the economically active population due to immigration and increasing labour participation by women and the rather successful national deregulation and liberalisation policies, cannot be sustained in the medium-term and long-term future. The robustness of Dutch international competitiveness is therefore rather limited. Labour productivity growth levels have been low for many years. Only a few goods and services produced in the Netherlands exhibit high levels of exclusivity and low price elasticity of demand. These fundamental weaknesses of the national economy were hidden from view during the Nineties of the last century, a period of exceptional economic growth fuelled by a sudden rise in labour participation (of women in particular), soaring house prices and consumption loans.

Scarcity of land and labour, relatively high cost of living levels and structural cost inflation in construction and public services are a normal condition in advanced metropolitan regions. The Netherlands is in fact becoming a large metropolitan region and will have to deal with concomitant high cost levels. Population ageing puts extra pressure on costs. Moreover, the limits to the liberalisation policy are becoming obvious; market efficiency is in many sectors close to an optimum. For all these reasons, the country needs new and more sustainable engines for economic growth and international competitiveness. The final section of this chapter discusses avenues for the development of new growth engines on the basis of strategic capability development. Before doing this, however, we should have some idea of the actual development of these strategic development in the Dutch context.

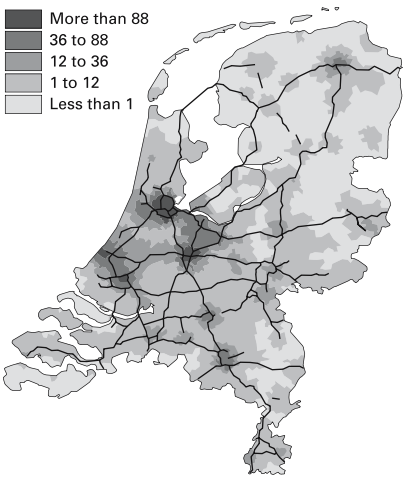
Map 16.1 shows empirical evidence of the development and spatial dispersion of business activity directly involved with the three capabilities discussed here. It highlights the dispersion patterns of selected clusters of highly specialised activities at the four-digit code level of the Standard Industrial Classification. Regarding market access services, for example, only those business activities are selected that are directly involved with international network development and services provision, including specialised intermediary activities. Thus, road transportation and distribution companies are excluded, but logistical services providers are included. Governance activities are interpreted as 'advanced business services', including knowledge-intensive consultancy and specialised



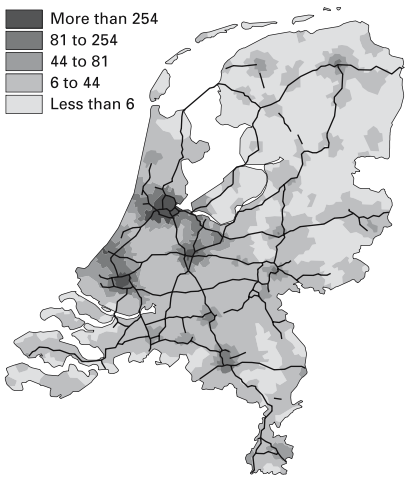
1a Distribution of advanced distributive services



1b Distribution of advanced business services



1c Distribution of advanced creative activities



1d Total, three activity clusters (1abc)

Source: Kleyn & Tordoir, 2003; Louter 2003

Map 16.1 Distribution of strategic activity clusters in The Netherlands, 2001 (workers per square kilometre)

headquarter activities, but excluding common accountancy and bookkeeping services for example. Map 16.1b therefore provides an indication of the extension of the *corporate* complex in the Netherlands. Finally, only advanced

creative activities are selected. Thus, R&D establishments, ICT developers and designers are selected among other advanced activities, but ICT installation and maintenance provides are left out of the selection.

The patterns that arise in Maps 16.1a to Maps 16.1d are telling and support the argument that providers of the strategic capabilities discussed here could be expected to agglomerate in large urban areas, for a wide range of reasons. Agglomerations differ in their share of the selected clusters, however. Only the northern wing of the Randstad conurbation, the highly urbanised western part of the Netherlands, exhibits high shares in all three clusters. This might be one of the reasons for the economic success of the northern wing, comprising the cities of Amsterdam and Utrecht. The southern wing of the Randstad, comprising the cities of Rotterdam and The Hague, is richly endowed with advanced distributive services (connected to the port and trading centres of Rotterdam) but less so with advanced business services. All three of the selected activity clusters show more or less the same pattern of spatial dispersion. There are some notable exceptions however. Outside the Randstad, strategic clusters are concentrated in cities, but specialisation plays a more pronounced role, except in the case of Eindhoven, the main city in the southern part of the country.

16.5 Policy implications

In principle, an advanced and highly urbanised society with a high level of solidarity between successful and lagging social groups and high levels of investment in education, culture and the natural environment can only be sustained by high levels of labour productivity growth and by high levels of exclusivity of the output of products and services. These two conditions have not yet been fulfilled in the Netherlands. Meeting these conditions will require some substantial changes in strategic management and policymaking, both in the private and the public sectors. New types of industrial policy, based on public-private co-operation and within the boundaries of EU regulations, will become necessary.

Through enhanced labour productivity and output exclusivity in terms of a low price elasticity of demand, Dutch industries will become an initiator and less of a prisoner to changes in the international division of labour. According to the American economist, Vernon, advanced and robust metropolitan economies shed activities with diminishing profit margins to low cost regions, using the thus freed resources for investment in innovation,

analogous to the portfolio and product lifecycle strategic management models (Vernon, 1966). Such a development course demands absolute advantages and organic, endogenous development capabilities. These capabilities do not arise by self-organisation alone and need some sort of co-operation. This chapter concludes with some policy recommendations regarding the three strategic capabilities discussed in the preceding sections.

Reinforcing international market access

Reinforcement of international market access by way of infrastructure improvement and 'mainport' development has been a leading policy in the Netherlands during the last half century (Gout, Haffner & van Sinderen, 1997). The value of the nodal position of the country in international transport networks does not need further argumentation. Public policy makers have, in order to secure that position, placed an emphasis on investment in physical infrastructure, including airport and seaport facilities. Apart from the quantity and quality of the physical infrastructure, the utility of the facilities involved depend very much on the development, quality, and competitive strength of service providers, however. Competitive airports and seaports need competitive airlines and shipping companies. Competitive telecommunications networks need strong communications and media industries. This fact has been acknowledged by Dutch policymakers in the past, as proven by the protective policy towards KLM, the national flag carrier. Nowadays, EU regulation prevents protective industrial policy, however. New avenues for the reinforcement of service providers, within the limits set by the EU level playing field, have therefore to be found.

The transportation and distribution industries first of all need to improve their knowledge base. The Netherlands is known as a transport and distribution centre, but less as a centre for innovation in the fields of distribution, logistics and related ICT development. American, Asian and French service providers lead the way in these fields. This calls for specific innovation policy which we will discuss at some length below. A second priority for policy is to enhance the utility of market access capabilities supplied by the complex of physical facilities and services providers for a wide scope of industries. The aforementioned horticulture cluster sets an example that might be followed by other industries. Connections between 'mainport' and 'brainport' functions are still rather weak at the moment. Airports and seaports in the Netherlands, notwithstanding their prime competitive position in the international theatre, are first of all hubs for international transfer, throughput and break-of-bulk. Value adding activities and origin-destination markets only play a secondary

role as a market basis for the physical infrastructure involved. In practical terms, for example, the activities of the horticulture cluster could be extended to encompass many more time-critical flows and value adding activities in the broad field of perishable goods. The large Parisian distribution centre for perishables at Rungis is setting an example in this respect. Such development can only be based on strong distributive services and on organisational and co-operative competencies within the industries involved. In order to extend the value-adding function of physical market access facilities, therefore, policymakers in the public and private sector have to strengthen innovation and governance capabilities as well as the quantity and quality of physical facilities.

Reinforcing innovation capabilities

Innovation has for some time been a main spearhead of Dutch economic policy but it has not received the same attention and investment funds as is the case with physical infrastructure (Ministerie van EZ, 2000; Centraal Planbureau, 2002). Current innovation policy is mainly directed at the stimulation of R&D for commercial application by way of subsidies and fiscal incentives and public-private funded research programmes. The policy is thus aimed at particular elements in the innovation process, using subsidies as a trigger. We can raise the questions of whether these elements are indeed the weakest link in the innovation process and whether monetary incentives will indeed do the job.

Most innovation processes and innovation systems comprise four main links: first, knowledge development within public and private institutions; second, the interface between these institutions and (potential) applicants of this knowledge; third, knowledge application within user organisations; and finally, diffusion of knowledge applications within and between industries. In well-functioning innovation systems, these links are both individually strong and collectively integrated. In principle, there are three ways to co-ordinate this collective integration, hierarchical co-ordination within the (large) firm, collective co-ordination within co-operative structures, and finally co-ordination by the market mechanism and by external effects via knowledge spill-overs (Marshall, 1919). The Dutch economy is strong with respect to hierarchical co-ordination within the boundary of large multinational companies, but less strong in co-operative innovation processes (apart from exceptions such as the horticulture cluster) and rather weak in market-driven integration of innovation processes. Apart from the activities of some large companies, co-ordination of chains of innovation therefore seems to be the

weakest link in the Dutch context. Recently, awareness of this has increased in policy circles, but this has hardly materialised in policy measures as yet. The currently dominant liberalisation policy might even be counterproductive in the field of innovation, since innovation often demands some level of co-operation.

The main problem is the weakness of the middle link, and specifically the absence of efficient interfaces within the triangle of public knowledge institutions, private knowledge applicators and financial investors and intermediaries. Apart from this, mechanisms for the diffusion of knowledge applications within and between industries are weak. Market incentives for knowledge application are insufficiently picked up by knowledge generating institutions. Within academia, researchers are driven by publication pressure and peer judgement and hardly by possibilities for application and patenting. Entrepreneurial competencies are rare within academia. On the other side of the academia-market interface, small and medium sized firms (SMEs) in particular are, with some exceptions, not able to translate market opportunities into research needs. Neither are many firms able to translate progress in research into market opportunities. Moreover, organisational fragmentation within industries dominated by SMEs prevents critical mass formation that is often necessary for R&D projects. Finally, the financial sector lacks specific competencies necessary for the funding of innovation-driven enterprises. Innovation driven financial markets, such as the Nasdaq and the many small private investment funds in the US, are much less developed in the EU. In the Netherlands, investment banking is strongly dominated by a few large banks that are mainly oriented to wholesale operations, with large transactions, low risk and small margins. Specialised small-cap and mid-cap funding, with high risk and high margins, which requires specific knowledge of industries and technologies on the part of financial investors and dealmakers, is a rare phenomenon.

These problems pose the policy question of how a 'triple helix' can be wrought between public research institutions, industries and investment agencies. Central issues for innovation-stimulating policy in this respect should be the improvement of governance competencies and incentives for co-operation both in the public and private sector and second, the improvement of competencies to translate between research and market opportunities, including the connection of R&D competencies with entrepreneurial competencies. In the US, the academia-private sector link has been drastically improved by a single act that gives universities a strong incentive to application-oriented work. In the well-known Finnish innovation policy model, the emphasis lies

on new co-operative structures whereby large companies, particularly Nokia, play a central role. The successful US model is interesting for the Netherlands and the EU in general because it does not involve any extra public money. The Finnish model has value for the Netherlands because of the role of large companies. Large companies are dominant in the Netherlands but do not work much with the local SME sector. Finland is leading the way towards successful cluster formation between large and small firms.

Apart from co-ordination oriented economic policy, other policy areas are also relevant to innovation capability. Spatial policy is one of these, for two reasons. First of all, due to the value of frequent face-to face contacts for the co-ordination of complex processes, spatial proximity (at the scale of daily urban and regional systems) is highly conducive to well-functioning innovation systems. It pays, for example, to locate new public research facilities close to potential industrial users, and vice versa, to develop new enterprise facilities close to research centres. It also makes sense to organise innovation policies at a regional rather than national scale, particularly so when SMEs are involved. Second, knowledge spill-overs, an external effect of the market mechanism, are conducted by proximity: the well-documented industrial districts-effect (Marshall, 1914). This effect is even more important for non-technical innovation than for technical innovation. Culturally innovative activities such as design, fashion, and the media industries are spatially clustered for the same reasons. Spatial urban planning can contribute to these beneficial effects. Urban planning is also highly relevant for the spatial facilitation of quick expansion of successful firms, for easy transformation of industrial locations and for environmental regulations suitable for new production processes. In the Netherlands, both land development flexibility and the local regulatory environment often pose severe problems for expanding innovative companies, particularly in urban areas.

Reinforcement of governance capabilities

Governance capability is the most encompassing of the three capabilities discussed here. Governance is a major ingredient of market access networks and services and of efficient innovation systems. In its widest sense, governance comprises both management and administration, *and* entrepreneurship. The governance of market economic systems, at the levels of individual enterprise, inter-organisational value chains and macro-economic systems, usually involves combinations of administrative and entrepreneurial activity. On the other hand, however, administration and entrepreneurship are completely different competencies that, in combination, provoke tensions.

This chapter concludes with the argument that economic policy, at the national, regional and urban level, should not only be more involved in conditions for good governance in the public and private sectors and in public-private arrangements, but should be able to cope with the inherent tension between administration and entrepreneurship, turning this tension into opportunity rather than conflict.

In theoretically perfect markets, co-ordination is purely a result of the market and entrepreneurship. In practise, the visible hand of an administrator will often be necessary due to the existence of scale effects and external effects. Moreover, even perfect markets demand many and strict institutional conditions that call for administrative competencies, such as a central monetary authority and an enforceable legal framework. Thus, organisation is not only an alternative to self-organisation but in fact complements it (Tordoir, 2001). Organisation, in turn, can either be accomplished by vertical and hierarchical structures, based on power, or by horizontal and co-operative structures, based on trust (Ouchi, 1980; Fukuyama, 1995). Collective, hierarchical and co-operative types of organisation have a major disadvantage, however. In these types of organisations, administrative leadership, political infighting and zero-sum gaming will quickly dominate entrepreneurial leadership and non-zero sum gaming (Olson, 1996).

This phenomenon is highly visible in the Netherlands. Efficient administrative control fits in rather well with the national culture, judging by the many successful large companies of Dutch origin. The country is also rather capable in co-operative co-ordination, judging by the internationally acclaimed success of the Dutch 'Poldermodel' of social-economic negotiation and co-operation between organised employers, labour and the state. The Poldermodel is not a recent invention but goes back to a centuries-old cultural tradition. Finally, entrepreneurial leadership, upon which large Dutch multinationals such as Philips and Shell were once founded, has during the last decades mainly been consigned to the SME sector. Thus, the three principal modes of governance, hierarchical administration, horizontal co-operation and individual entrepreneurship (in a context co-ordinated by the free market), are all present in the Dutch economy, but each in different sectors of the economy and society. Hybrid forms of governance, where entrepreneurship are combined with either hierarchical or co-operative administration, are rare. There are exceptions to the rule, for example in the horticulture cluster, where co-operation is mixed with entrepreneurship. Synergetic mixing of large hierarchies with small entrepreneurship, a cornerstone of the successful Finnish innovation model but also common to other

successful regions such as Silicon Valley, Bayern and Emilia Romagna, has almost disappeared from the Dutch economy. Organised, co-operative entrepreneurship, once a cornerstone of the international entrepreneurial success of the nation, has become indeed somewhat of a *contradictio in terminis* in the Dutch context.

Governance capability within the economy is not an explicit subject of economic development policy in the Netherlands. Surely, the tackling of governance issues and problems is often unavoidable in practice, since the successful implementation and accomplishment of almost any policy will depend on the development of adequate co-ordination and governance competencies. Nonetheless, governance is yet not regarded as a major issue by itself in economic policy circles. Here, a strong argument is made to change this. Synergetic combinations of administrative, organisational, co-operative, and entrepreneurial competencies are a principal key to competitiveness of any activity cluster, industry, and regional and national economy. Such combinations are weakly developed in the Dutch economy (as they are in most national and regional economies). The relevant knowledge is in ample supply in the Netherlands and elsewhere. The Netherlands has the highest number of management and administration consultants per inhabitant (De Jong & Tordoir, 1991). The country has a rich tradition in the administrative sciences. The national culture favours consultation and co-ordination and could give a right context for successful combinations of governance competencies. At the moment, however, the thickness of collective institutes and structures for co-ordination inhibits rather than stimulates such combinations. Administrative, co-operative, and entrepreneurial competencies are each imprisoned in different islands. Advanced administrative competencies are mainly locked in the world of large enterprises and public institutions (with little incentives to co-operate with third and smaller parties), co-operative competencies are increasingly confined to the 'Poldermodel' world of government-oriented representative business and labour organisations. Finally, entrepreneurial competencies are pushed back to the realm of small and medium-sized enterprise.

Eventually, the aim of the economic development policy suggested in this chapter is to stimulate the combination of hybrid governance capability with market access capability and innovation capability, in a customised manner that fits in well with the structure and culture of various economic clusters and industries. In this way, policy agencies must indeed show some level of entrepreneurship, not by taking over the driver's seat from the entrepreneur, but rather by enhancing awareness of the issues at stake and the capabilities

involved and by goal-oriented and co-ordinated action and investment in a long-term perspective. The principal key is co-ordinated entrepreneurship at the meso level of clusters, industries and regions, by private-private and public-private co-operation and coalition building. These will enhance the use value of public capital investments and subsidies, two mainstream policy instruments that will at times remain necessary but should preferably not be used in a stand-alone context. Public policy funds are a necessary but not sufficient condition for economic development policy at the regional, national and even supranational levels. We can do more with less.

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Part III Concluding remarks

17 Further Learning from Clusters

Robert C. Kloosterman and Ron A. Boschma

17.1 Shifting views on landscapes of production

At the beginning of the 20th century, most economists on both the left and the right expected large firms to triumph. Henry Ford showed the way with his production plant at Highland Park in Detroit, which was completed in 1914 and which, according to Alfred Chandler (1990, 205), became "the symbol of modern mass production and the exploitation of economies of scale". Firms like Ford would not only benefit from economies of scale but also integrate large parts, and in some cases even all the parts, of the value chain within one firm. Controlling, if not completely owning the whole value chain, and dominating the consumer markets together with a very small number of other giants, made these seem independent from their direct socio-spatial surroundings. Apparently, such production complexes could-given sufficient size on the one hand and adequate infrastructure on the other hand almost anywhere and be successful.

The narrative of *Fordism*, the system of fast mass production based on vast economies of scale, became so dominant that other forms of production were looked down upon or neglected altogether. Countries or regions with a relative or even absolute lack of these large firms were seen as obsolete and running the danger of missing the boat. After the Second World War, when states became more involved in economic matters and, at the same time, regional disparities appeared on the political agenda, the dominant narrative of Fordism provided the framework for regional economic policies. Where private entrepreneurs were absent, the state could step in and-in a typically modernist way (cf. J. Scott, 1998)-intervene to set up such complexes and create a 'growth pole'. Given their perceived lack of a need to be locally embedded, the relationship between the large complexes with the concrete particular socio-historic context was not a relevant topic.

It took some time to sink in but, at the end of the 1970s, it gradually became clear that the economic crisis was much more than a cyclical downswing. The crisis was very much a crisis of *Fordism* itself in the advanced economies. Many large firms were losing ground, shedding workers, closing plants and disintegrating. Other forms of competitive production were (re)discovered.

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These forms were not primarily based on (intra-firm) economies of scale (which refer to changes in the output of a *single product type*) but instead on economies of scope (referring to changes in the number of *different types* of products). This change partly reflected the sea change in advanced economies sometime in the 1960s when the locus of power had shifted from the supply side to the demand side. During the long post-war boom, the Fordist production system became highly successful in churning out (standardised) goods. As a result, many consumer markets became saturated as the pool of first-time buyers of, for example, cars, refrigerators or television sets gradually ran dry. Moreover, new suppliers from low-wage areas in Asia in particular entered markets in the US and many European countries thus conquering market shares at the expense of indigenous producers.

The rules of competition changed and competing on the basis of efficient production was no longer the only viable, or even the most viable, strategy in expanding segments of many consumer markets (cf. Porter, 2001). Competing on the basis of the qualities of products (technological, conceptual, image) offered an avenue of possibilities for firms in high-wage environments to keep their heads above water. To survive the increasing global competition, ever more firms in advanced economies had to deploy strategies of continuous innovation (cf. Storper, 1997). The dual requirement of flexible production and more or less permanent innovation favoured small firms that were able to tap into deep (specialised) sources of knowledge, which were largely external to the individual firm itself. Spatial clusters of small firms embedded in local networks that encompassed both formal and informal institutions aimed to create and reproduce this knowledge emerged as a successful form of production. This kind of production turned out to have survived the onslaught of Fordism in places such as Southern Germany and Northern Italy. Regional and local networks of specialised small firms based on highly skilled (artisanal) labour seized opportunities that large firms were apparently not able to grasp. In addition, Silicon Valley emerged in the 1980s as a newly created spatial cluster of small, very innovative high-tech firms.

Early pioneers like Bagnasco (1977), Becattini, (1979, 1990), Piore and Sabel (1984), Hirst and Zeitlin (1989) and Porter (1990) emphasised the role of proximity in creating competitive advantages (cf. Asheim, 2000). Geographic concentration made the sharing of inputs and a more refined division of labour possible, creating cost efficiencies or static agglomeration economies (Capello, 2001). Proximity also contributed to processes of innovation creating dynamic economies of agglomeration by facilitating the exchange of knowledge through dense local networks and by intensifying rivalry between

local entrepreneurs (Simmie, 2001). The new-found prominence of clusters even meant harking back to the work by Alfred Marshall in the early 20th century, which is quite remarkable given that economics as a discipline is usually known for the rapid expiration of the use-by dates of its publications. These pioneers not only put clusters on the agenda: they helped to change the research agenda for the following decades. In *The Regional World: Territorial Development in a Global Economy* (1997) Michael Storper weaved different strands of thinking on clusters, innovation, competition, and globalisation together in a masterly synthesis.

The contributions in this volume stand very much in the tradition started by these first movers and continued by Storper (1997), A. Scott (1998), Cooke and Morgan (1998) and, in the Netherlands, Jan Lambooy (2002; Boschma and Lambooy, 1999, 2002). The virtual-and to some extent even real-community of economic geographers and regional scientists shares a few key characteristics.[1] The members of this community all view continuous innovation and hence learning as the crucial point of departure for maintaining competitiveness in advanced economies in a global era. From this common point of departure, they all problematise the relationship between this sine qua non condition for competitiveness and spatial clustering. This endeavour transcends the ordinary boundaries of more orthodox approaches to economics by using a much richer ontology and by displaying a greater sensitivity to non-market relationships and non-price signifiers. By analysing the local or regional sources of innovation and learning, 'soft' aspects such as institutions, embeddedness, trust, social capital and complex forms of governance are explored. This rephrases the nexus between global and local and in doing so, undermines the myth of the death of distance (cf. Scott, 2000a).

Both the explaining variables (such as trust, social capital, untraded inter dependences, exchange of tacit knowledge) and the explained variables, innovation/learning, are rather hard to conceptualise, harder to operationalise and, arguably, even harder to examine empirically. This partly explains the mushrooming of theoretical approaches to clustering and innovation in combination with a severe empirical *underdetermination* of these theoretical approaches.[2] A dense set of partly overlapping and highly refined narratives on clustering is thus created. Many contributions to this volume are very much part of this ongoing theoretical debate. In this concluding chapter, however, we will not attempt to come up with our own overarching analytical framework, which would be a daunting if not impossible task. Instead, we will confine ourselves to pointing out some of the directions future research on clustering and learning may take.

17.2 A research agenda for further learning from clusters

Given the great complexity of the field and the already very extensive bibliography on it, any suggestion for a research agenda is inevitably biased (if not idiosyncratic), incomplete and, as a result, perhaps even presumptuous. We will nevertheless run this risk of being seen as pedantic and suggest lines of further research on clustering and learning. We will do this from an evolutionary and institutionalist perspective. Many others working in this field share this perspective, so our claims to come up with original suggestions can only be very modest.[3] We do, however, want to emphasise the overriding importance of empirical research at this stage. The very rich palette of theoretical perspectives on clustering and learning that is now on offer can then perhaps be trimmed.

a. Overall assessment of the absolute and relative importance of clusters

The narrative of clusters is nowadays so dominant that it seems that clusters are not a form but *the* form of advanced production. Just as when Fordism seemed to reign supremely, other forms of production are largely neglected since the main scientific focus (and, more and more, also that of policymakers) is now firmly on spatial clusters and innovation. Nowadays, clusters and small firms are the focal point of much economic geography, both theoretical and empirical. With some exaggeration, one could say that is almost a complete reversal of the situation during Fordism. These days the big firms tend to be ignored or seen as remnants of days gone by. This selection on the central dependent variable narrows the field of research and, moreover, ignores a more substantive point namely that economies-local, regional, national, international-can be conceived as potentially broad repositories of qualitatively different organisational templates. These templates have their own different historical origins and their own patterns of spatial articulation. The survival of clusters of small firms in Northern Italy and in Southern Germany during Fordism is a case in point. It seems highly likely that Fordist ways of production will continue to exist even in this so-called post-Fordist age. Maybe we should adopt a more Braudellian view of society and realise that in time, as in geology, different layers are deposited and that these may survive over long periods of time (Braudel, 1979).[4] Different places will show different mixes, we will come to that below. Moreover, different times will bring changes in the mix of forms of production although co-existence in whatever form is highly likely.

We therefore propose that a more comprehensive view on clusters should be developed by including other forms of production in the overall comparison. This should be done at different levels of spatial scales: local, regional, national and supranational (e.g. EU, NAFTA). Basic questions as to what extent employment, added value or exports are generated by the different forms of production should be addressed. Activities such as services - and also agriculture - should be mapped, analysed and assessed as well as they make up a significant part of advanced economies.

b. New interpretations of innovation

Although the industrial revolution is in more than one way a thing of the past, in a sense we still seem to be living in the iron cage of industrialism when it comes to innovation. Innovation is usually conceptualised from a technological, materialistic perspective: new machines, new gadgets or new technologies. These are without any doubt very important innovations, but being innovative can also be expressed, as Schumpeter already realised, in new ways of doing or presenting things. These innovations are much harder to lay down in patents and are therefore more difficult to quantify. However, that does not decrease their significance. As many advanced urban and regional economies are shifting to exporting concepts-e.g. cultural products, and organisational or financial instruments-conceptual or soft innovation is becoming more important (Hall, 1998; Porter, 2001). Allen Scott (2000b) has already pointed to the similarities in processes of innovation between high-tech and cultural industries and we want to broaden the conceptualisation of innovation even further by also including innovations in producer and personal services that can also give firms the competitive edge. Innovation, to put it briefly, can be conceived in high-tech terms but can also be about new concepts in designing, packaging marketing and distribution: *high-tech* and *high-concept* innovation.

c. Clusters and divergent capitalisms

Continuous innovation-technological or conceptual-is key to understanding the nature of the competitiveness of clusters. Innovations, like any other social process, are embedded within wider institutional contexts. In his brilliant *Divergent Capitalisms* Richard Whitley systematically analyses the relationship between this wider context or 'the dominant institutions' and 'the prevalent forms of economic organisation' (Whitley, 2000, 55). These forms of economic organisation can be seen as distinctive patterns or *business systems* that 'vary in their degree and mode of authoritative coordination of economic

Ownership co-ordination
Primary means of owner control (direct, alliance, market contracting)
Extent of ownership integration of production chains
Extent of ownership integration of sectors

Non-ownership co-ordination
Extent of alliance co-ordination of production chains
Extent of collaboration between competitors
Extent of alliance co-ordination of sectors

Employment relations and work management
Employer-employee interdependence
Delegation to, and trust of, employees (Taylorism, task performance discretion, task organisation discretion

Source: Richard Whitley (2000), Divergent Capitalisms; The Social Structuring and Change of Business Systems, *34*

Table 17.1 Key characteristics of business systems

activities, and in the organization of, and interconnections between, owners, managers, experts, and other employees' (Whitley, 2000, 33). He offers a very comprehensive, systematic and explicitly comparative analytical framework which could be very useful for a further exploration of clusters as socio-spatial phenomena. He distinguishes three main categories of characteristics of business systems: ownership co-ordination, non-ownership co-ordination and employment relations and work management (see Table 17.1).

By examining the interdependences between different business-system characteristics, he is able to rule out deductively a number of combinations because of incompatibilities. He ends up with just six major ideal types of business systems (Whitley, 2000, 41):
(1) *fragmented* business systems
(2) *co-ordinated industrial districts*
(3) *compartmentalised* business systems
(4) *co-ordinated* or *collaborative* business systems
(5) *state-organised* business systems and
(6) *highly co-ordinated* business systems

The first one, the *fragmented business system* is characterised by small owner-controlled firms that engage in fierce competition and short-term market

contracting with suppliers, customers and employees. This business system can be found, for instance, in Hong Kong. The second business system is the *co-ordinated industrial district* where small owner-controlled firms dominate but where there is much more integration within the production chain as well as across sectors with respect to inputs and outputs. The relationship between workers and employers is much tighter and this significantly enhances the scope for productivity gains and innovations. This is the business system that displays most of the characteristics typically ascribed to clusters. The *compartmentalised business system* is the third ideal type. This one is characterised by large unified ownership units that integrate activities within production chains and across sectors. There is little collaboration between firms and commitment between employers and employees is also rather weak. Ownership control is usually organised at arm's length through financial markets. This business system is typical of the Anglo-Saxon world. The fourth ideal type is the *state-organised business system*. This business system is also characterised by large firms that integrate activities within production chains and across sectors. In this case, however, families and partners retain ownership within a context where the state guides economic behaviour. Relationships between workers and employers are relatively limited. This business system can be found in South Korea. The fifth business system is the *collaborative business system*. There, strong integration within sectors is not coupled with strong integration across sectors. Ownership tends to be alliance-based (includes banks and financial institutions). Employees are seen as long-term assets and bonds between them and the firms are strong, thereby enabling considerable sector-specific and firm-specific investments in the workforce. Germany exemplifies this business system. The sixth ideal type is the *highly co-ordinated business system*. This one is also characterised by alliance forms of ownership and strong bonds between employers and employees but here co-ordination takes place within and across sectors. This last one can be found in Japan.

From a spatial perspective, the boundaries of these business systems are, in Whitley's view, usually those of nation states. Legal systems that define property rights are national systems and interest groups are in most cases organised on a national basis. According to Whitley, the same can be said for financial institutions. He does, however, leave open the option of business systems that are strongly regional as in Italy or in Germany (Whitley, 2000, 44-45). In these two countries, there are long-standing traditions of regional governance. Although the main thrust of his argument is on a national level he does recognise 'the need to identify the dominant role of institutions at each level of analysis' (Whitley, 2000, 45).[5]

One could argue, however, that Whitley's business-system approach lacks sufficient sensitivity for spatial scalar variation, but his analytical grid can still serve to examine clusters within their wider (national) context and, more particularly, as a guide to exploring the relationship between the different spatial scales. By looking at the key characteristics of business systems (Table 17.1) and their articulation at different levels - in descending order: from the national to the regional to the local level - clusters can be more thoroughly typified and, subsequently, analysed and systematically compared across borders and through time. The relationships between these scales would entail crucial questions referring to the compatibility of specific national business system characteristics and clusters as networks of small firms embedded in social networks. Is, for instance, the compartmentalised business system, which is dominant in the United States, compatible with clusters in the Italian or German style?

The different business systems all emerged during the first stages of the industrial revolution and have been reproduced ever since. Because of their complex co-evolution and myriad interlocking institutional arrangements, these business systems are strongly path-dependent. Divergent forms of capitalism have, therefore, existed since the industrial revolution. They have been reproduced during and after Fordism and Whitley expects them to be reproduced in the foreseeable future. The business system approach can therefore be used both for synchronic and diachronic comparisons of clusters. Synchronic cross-border comparisons of clusters have already been undertaken (see the contribution to this volume by Roberto Camagni and Roberta Capello), but still remain scarce (cf. Cooke and Morgan, 1998; Simmie, 2001). Diachronic, long-term analyses of cluster formation and reproduction are perhaps even rarer.[6] There is a world to be won by exploring the mechanisms of creation, reproduction and the ending of clusters from a path-dependent perspective (cf. Mahoney, 2000). Selecting cases with contrasting trajectories on the basis of most similar and least similar scenarios could provide insights into the dynamics of clusters formation.

e. The spatial level as an outcome of a co-evolutionary process

The empirical work that has been done on clusters and innovation often takes a particular spatial level *a priori* as a starting point This is most noticeable in the literature on innovation systems. The first proponents claimed that the national dimension is the decisive level for economic specialisation and innovation (Lundvall, 1988; Nelson, 1993). They argue that institutions at the level of the nation state in particular (e.g. legal system, finance, research,

education, labour markets) affect how firms engage in knowledge creation, interactive learning and innovation processes. Economic geographers have, instead, claimed the relevance of the regional dimension. Concepts like regional innovation systems (Cooke, 2001) tend to stress that knowledge externalities operate at regional level due to non-economic factors (i.e. cognitive and institutional factors).

However, we believe it is misleading to assume *a priori* a particular geographical scale when analysing interactive learning and innovation processes. We think there is a strong need for the application of a multi-level, dynamic perspective on regional development. First of all, it is wrong to treat nation states or regions as homogeneous units with respect to economic and institutional features. Malerba (2002), for example, claims that sectors, rather than regions, are characterized by particular technological regimes and institutional set-ups. Secondly, such a view overlooks the fact that knowledge creation and diffusion mainly take place in networks, or communities of practice, which are neither necessarily nor likely to be localized geographically (Breschi and Lissoni, 2002). Thirdly, we know little of how different spatial levels simultaneously affect the nature of innovation systems. This is important because an innovation system is a multi-dimensional phenomenon (Malmberg & Maskell, 2002) with many geographical scales being involved in interactive learning processes at the same time. For example, inter-firm networks (such as R&D-partnerships) often tend to operate at higher, more aggregate spatial levels, while alternative mechanisms of knowledge transfer, such as spin-off dynamics and labour mobility are more likely to operate at the more local level. In addition, informal institutions are often geographically localized (Gertler, 2003), whereas formal institutions (e.g. laws) tend to operate at the level of the nation state, or even beyond (Bathelt, 2003).

Therefore, instead of selecting a geographical scale *a priori*, we propose a more open attitude towards the relevance of spatial scales with it being made part of the study instead of assuming it beforehand. In the end, decisions about the spatial levels at which knowledge creation, knowledge transfer and interactive learning take place, and the extent to which nation states and regions are relevant in this respect, should be based on empirical analyses. In other words, there is a strong need to account for (the interaction of) various spatial scales that may influence the nature and evolution of innovation systems (Asheim & Isaksen, 2002).

Such a multi-level approach should be undertaken from a dynamic, evolutionary perspective. Although the innovation system literature is well-grounded in evolutionary economics (Cooke *et al.* 1998), it is quite

remarkable that it often overlooks the fact that innovation systems develop over time. In reality, innovation systems are created and modified through ongoing interactions between many agents and organizations (Carlsson *et al.* 2002). Therefore, systems of innovation should be seen as the outcome of a long evolutionary process in which technologies, organizations and institutions co-evolve. This raises interesting questions for geographers alike. It not only implies that innovation systems may extend and shrink in space and may even disappear over time (Boschma, 2004) but also puts some doubts on the inclination of much of the innovation system literature to overestimate the role of space (be at national or regional level) during its initial stage of development. Following an evolutionary, non-deterministic approach, we believe instead that historical accidents and human agency influence the emergence of new innovation systems. In later stages of their development, processes of increasing returns, path dependence and co-evolution become more important. These operate at different spatial scales at the same time thereby shaping space leading to place-specific features (Boschma, 2004). Thus, combining a multilevel approach (i.e. disentangling and analysing the different processes operating at different spatial scales) with a dynamic perspective would really contribute to a better understanding of the ways places evolve and are produced over time.

Adopting such a dynamic perspective means more light is shed on the particular role institutions play in processes of co-evolution. The innovation system literature primarily makes the claim that institutions affect the intensity and nature of relations and, therefore, the degree of interactive learning between agents. However, there is an increasing awareness that what really matters is whether institutions are flexible and responsive to change when required: the implementation and diffusion of novelty often requires the restructuring of old institutions and the establishment of new institutions (Freeman and Perez, 1988). Taking a dynamic perspective would increase our understanding of how institutions evolve and affect the capacity of places to upgrade, transform or restructure specific institutions (such as specific laws) required for the development of new economic activities. In addition, it would throw considerable light on the evolution of match and mismatch between a sector and its institutional environment, a topic which has hardly been examined empirically. For instance, 'is it the evolution of the structure of production that determines the evolution of the institutional set-up or vice versa and how is match and mismatch between the two reflected in economic growth patterns' (Lundvall et al. 2002, p. 220)?

f. New methods

These new directions for investigating clusters also require different methodologies to grasp the subtle interrelationship between the different elements of the local, regional and national business systems. We need rich historical case studies to investigate long-term developments in spatially concentrated production. We should also look at methods of participative (economic-anthropological) fieldwork to study how knowledge, especially the tacit variety, is being exchanged and under what conditions and in what kind of places. Diaries registering the contacts (virtual and physical) of the relevant actors could also be useful in providing the wealth of information on the kinds of embeddedness in social networks, on the kind of knowledge that is exchanged and on the spatial articulation of the exchanges. These diaries could be web-based surveys and GIS can be used to examine the spatial footprint of processes of innovation in a more rigorous and multi-layered way (cf. Schnell and Yoav, 2001).

17.3 Lastly

Spatial clusters of economic activities are treacherous beasts. They seem to be out there somewhere but are hard to delineate and even harder to create. However, as loci of continuing competitiveness, they might be crucial cornerstones for maintaining standards of living in advanced economies and for helping to defy predictions of a global race to the bottom. Whitley's business system helps to identify the potential roles of the state in different business systems. Successful business systems can include active states, not only as upholders of property rights but also as initiators of policies aimed at increasing the quality of labour through education, and policies aimed at strengthening the links between the different components of a business system. The concrete policy implications are strongly contingent on the specific business system and may be hard to transplant a policy that is successful in one business system to another. However, as the contributions to this volume make clear, forms of co-operation and collaboration between firms are not to be interpreted as only harmful aberrations from an abstract ideal but can, on the contrary, be essential elements of competitive milieus. One thing that can be learned from clusters is that the real-life economies can function successfully in ways that are quite different from the neo-liberal drawing board. These days, grasping this is an essential insight.

Notes

1 See for a brief overview: Newland, 2004.
2 The lack of empirical detail is also caused by an academic culture that is simultaneously characterised by pressure to publish and a chronic lack of funding which severely limits empirical work that is labour extensive and time consuming.
3 There are, however, also suggestions for a research agenda based on a more neoclassical, micro-economic approach. See, for instance, McCann and Sheppard, 2003.
4 Bathelt and Boggs (2003) make a similar kind of point.
5 "Where regional governments, financial institutions, skill development and control systems and broad cultural norms and values are distinct from national one and able to exert considerable discretion in the economic sphere, we would expect distinctive kinds of economic organization to become established at regional level. This is especially so if national agencies and institutions are less effective in coordinating activities and implementing policies", Whitley, 2000, 45.
6 See for an example of an exception: Glasmeier, 2000; Paniccia, 2002; Bathelt and Boggs, 2003; and Rantisi, 2004.

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