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Clusters:
A Survey of Research within Localized Economic Growth

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FOREWORD

This working paper is a part of a coordinated project being undertaken by an international research team organized by the Media Management and Transformation Centre, Jönköping International Business School, Jönköping University, Sweden. While working paper no. 2008-3, by Professor Robert G. Picard, explores the development and nature of media clusters, this one focuses on localized growth and clusters in general.

Economic geography, along with several other economic and social sciences, is firmly linked into a theoretical approach that has the ambition to explain local, regional and national economic growth in terms of clusters. The aim of this paper is to make a general survey of the concept of clusters – a term underlying a multitude of ideas. The subject is in fact broad with extensive literature rendering research focus a necessity. The emphasis in this paper is laid on the historic development of research in localized growth, and the main themes and concepts used.

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This paper explores the nature and development of research in localized growth, focusing on the development of economic and industrial clusters. The renewed interest in agglomeration and localized economic growth research has come from a variety of disciplines, but ideas and thoughts about local thickening have a much older origin. Research in local agglomeration and embeddedness crosses through expressions such as cluster, industrial districts, innovative milieu and networks. ‘Internal’ versus ‘external’ influences, weaknesses of research, definitions and new approaches of research in clusters are also discussed. Not all spatial agglomerations of firms in the same or related sectors necessarily comprise a cluster.
1 Introduction

The profound changes in the world economy in the last few decades accompanied by the displacements in parts of the old industrial cores and the duality between deterritorialising and territorializing forces have increased interest in localized growth in the spatial economy. Alongside significant changes such as the increased importance of East and Southeast Asia, especially China, the old industrial core has seen the emergence of new industrial spaces (various high-tech clusters, etc). The revitalization of industrial areas such as Third Italy and Baden-Württemberg, the rise of ‘world cities’, around which intense interdisciplinary debate is taking place, are part of this process (Conti, 2005).

The topic of clustering is a fundamental issue when discussing the relationship between the local and the global. We live in what is now considered a globalized world, a term which is widely used by many to bundle together a number of processes facing contemporary societies. According to the sociologist Castells (1996), the forces of globalization are replacing the “space of places” with a “space of flows”, thus more or less assuming that anything can be located anywhere and thus moved somewhere with ease. But Dicken (2007, p. 18) criticizes Castells argument:

*Seductive as such ideas might seem, they are highly misleading. The world is both a ‘space of places’ and a ‘place of flows’. Production networks don’t just float freely in a spaceless/placeless world. Although transportation and communications technologies have, indeed, been revolutionized, both geographical distance and, especially, place are fundamental. Every component in a production network - every firm, every economic function - is, quite literally, ‘grounded’ in specific locations.*

Economic activities are not only located somewhere, they also tend to be concentrated into various kinds of spatially localized agglomerations, where different groups and different mixes of activities tends to be clustered together in different places (Gordon and McCann, 2000).

The renewed interest in agglomeration and localized economic growth research has come from a variety of disciplines, but ideas and thoughts about local thickening have a much older origin. The phenomenon was first observed by Alfred Marshall. He noted a tendency for specialized firms to cluster together in a way that produces geographic concentrations of expertise and economic activity. In his 1890 book, *Principles of Economics*, he observes “how great are advantages which people following the same skilled trade get from nearneighbouring to one another …” This finding mostly resembles that of an industrial district. (Economists refer to them as Neo-Marshallian nodes). In subsequent editions of his work he mentions the industrial atmosphere (“were in the air”) found in some industrial areas, with a supply of skilled people and cooperation between different businesses and firms.

Marshall’s analysis largely overlooked the importance of the role of entrepreneurs. In the 1930s, Joseph Schumpeter acknowledged Marshall’s original insight, but highlighted the role of the self-interested economic agent, who took risks in order to generate substantial profits. In *Business Cycles: A theoretical, historical and statistical analysis of the Capitalist process* Schumpeter (1939) proposes the idea of “cluster-of-innovation hypothesis”, which is an early contribution to cluster thinking.
2 Main Research Themes

An early contribution to what later has been labeled clusters was made by professor Erik Dahmén (1950). Although not so well known outside Scandinavia, his ideas of synergistic development blocks have, from an historical retrospect, had an influence on other researchers.

During the 1950’s, the dominant trend in Europe and North America was the one of spatial concentration. The 1950s, as well as the 1960s, observed a decline in the intensity of local industrial linkages in many European countries which seems to have reflected new forms of industrial organization. Falling transport costs allowed firms to transfer semi-finished products and components between factories over considerable distances (Keeble, 1976).

The influential growth pole concept (Perroux, 1955) was based on input-output data that identified not only the upstream sectors on which other sectors relied for inputs, but also forward (downstream) linkages. A distinction was made between the growth poles, set in an economic space of input-output relations, and growth centres, propulsive industries set in a regional context (Moseley 1974; Polenske 1988). Growth centres were tied to optimism concerning the process of “trickle-down” or “spread effects”, based on Hirschman (1958) and Myrdal (1957) and the formation of industrial complexes (Czamanski, 1971). From the early 1970s, the general emphasis switched to the observation and explanation of spatial dispersion (Keeble, 1976).

To understand the main themes from the 1980s and onwards we need to widen the approach and look at the development which took place in France during the 1970s. In a preparatory work, Lipietz (1974) begins with a spatial regime which he labels “the Economic and Social Division of Space” based on the mechanisms when space reproduces itself under the private initiative of property developers. In 1970, Lipietz formulates the co-existence of different types of regions in the national space. Another fruitful approach has been the new spatial division of labour (Aydalot, 1976) as a consequence of the hierarchical dispersion of functions by large multi-plant industrial complexes.

Local milieus are regarded as the nurseries, an approach implying that innovative behavior is as much dependent on variables defined at the local and regional level as on national-scale influences. Access to technological know-how, the availability of local industrial linkages and inputs, the impact of close market proximity, the existence of a pool of qualified labour are important factors determining which are the successful areas and which are not (Aydalot and Keeble, 1988).

Another very important strand of interest, also influencing the research agenda later on, emerging from the early 1970s was due to the emergence of new industrial regions based on high-technology activities.

From the 1980s and onwards an important stream of research originated in Italy, mainly influenced by Giacomo Becattini who revitalized and elaborated Marshall’s old ideas of the advantages of geographical agglomeration of specialized firms in the so-called “industrial districts”. He extended the analysis of purely economic effects of agglomeration to a broader perspective, including social, cultural and institutional foundations on local economic and industrial growth.

Usually regarded as the single most important contribution is Piore and Sabel’s (1984) The Second Industrial Divide in which the authors use the Italian districts as the main example in their macro-historian analysis. This new industrial divide has been attributed in effect on the one hand to the
professionalism of the work force and on the other hand to decentralized innovation and co-
ordination.

One of the most valuable books about the Italian districts is Pyke, Becattini and Sengenberger's
(1990) Industrial districts and inter-firm co-operation in Italy. Within the sociological literature, interest
in spatial clustering has been underpinned by an interest in the relationship between an
individual’s environment and the development of “embedded” social networks of
communication and influence (Granovetter, 1985, 1992) which may transcend either firm or
industry boundaries.

A variant of the approach of industrial districts is the term “innovative milieu” (Aydalot 1986;
Camagni 1991a; Hansen 1992). A milieu is a coherent whole in which a territorial production
system, a technical culture, and firms and institutions are linked (Maillat and Lecoq 1992). In a
milieu, trust and reciprocity are based on a system of implicit rules or cultural norms (or modes
of social regulation) as well as on institutions that support innovation and flexibility.

The role of regional and local institutions is a key aspect of a milieu, an example of which is the
introduction of courses in micro technical engineering in the Swiss Jura region’s five technical
colleges (Maillat et. al. 1995). The links in a territorial network of this kind are structural, but they
are above all cultural, and serve principally to reduce uncertainty (Camagni, 1991b). Irrespective
of the use of ‘industrial districts’ or ‘innovative milieu’, the milieu can be seen as a community or
collective entrepreneur, with not only firms, but inter-firm associations, worker organizations,
financial institutions and governmental agencies playing important roles.

During the 1980s, Paul Romer (1990) developed a knowledge centered theory of economic
growth suggesting that technological progress is caused by the search for new ideas by
researchers interested in profiting from their innovations. Although he does not explicitly equate
entrepreneurship with innovation, his theory interprets growth as a process through which the
research sector creates new products for the market. The model proves theories for high-tech
clusters.

Within economics much interest in geographical dimensions draws primarily on applications of
modern trade theory (Helpman and Krugman, 1985). In the 1990s the interest in geographical
clustering was emphasized in the writings of some leading economists and management theorists,
The most well-known contribution is Porter’s (1990) identification of regional clusters in several
countries.

The Californian school of economic geography represented by Allen Scott and Michael Storper,
impressed by the growth of their state and particularly Los Angeles, emphasizes the interest in so-
called New Industrial Districts arising primarily from observations of the spatial organization of
production in several key industries, such as electronics in California (Storper 1992; Scott 1993),
and California and Massachusetts (Saxenian, 1994). These forms of districts have led to a re-
awakening of the possibilities for a renewed public policy role in local economic development
issues (Castells and Hall, 1994).

A study by Markusen (1996) rejects the “New industrial district” model in either its Marshallian
or the Italianate form. Instead, she identified three additional types. The findings suggest that the
study of industrial districts requires a broader institutional approach. Markusen’s paper urges a
larger focus on external influences as well as the importance of advances in transportation and
information.
During the 1980s the prevalent explanation was very much in terms of reduced transaction costs occurring in territorial systems due to social trust and social capital. More recently this explanation has tended to be replaced, or at least accompanied by the strategic role of knowledge accessibility. This would be higher in cluster/districts and would enhance and speed collective learning processes (Capello, 1999; Keeble and Wilkinson 1999; Maskell 2001). Physical and social proximity would favour communication and knowledge access. This would also explain why large multinationals locate subsidiaries in small clusters, like biomedical (Biggiero, 2002) and packaging (Belussi, 2003).

While the traditional cluster literature sustains the importance of local knowledge and spillovers as key drivers of cluster competitiveness, some studies have begun to question this view, emphasizing the need to reconsider the role of external linkages (Breschi and Lissoni 2001; Boschma and ter Wal, 2007). But the role of external linkages is not new. Sweeney (1987) states that the level of innovativeness in an area depends on the degree to which firms are linked to both local networks of suppliers and to external global markets. Regions with a technical culture (Sweeney, 1991) are able to adjust to changing conditions, such as the dramatic shock which took place in the watch-making region of Jura when electronic technology replaced mechanical technology (Glasmeier, 1991). The Swiss district had to form both internal and external links in order to learn and incorporate the new technology and to add fashion element on which it could capitalize in the Swatch (D’Aveni, 1994).

Bathelt, Malmberg and Maskell (2004) question the view that tacit knowledge transfer is confined to local milieus whereas codified knowledge may roam the globe almost frictionless. They highlight the conditions under which both tacit and codified knowledge can be exchanged locally and globally. This implies that particular successful clusters are the ones that are able to build and maintain a variety of channels, labeled ‘global pipelines’ for exchange of knowledge with relevant hot-spots around the world (Bathelt, 2001).

The structure of some high-technology industries seems to conceal globalization and regionalization through a small pattern of connections: the local dimension is connected globally through some bridge-firms. Thanks to their local and global connections, some local firms, often absorb non-local knowledge and transmit it into other firms or clusters (Eriksson, 2000; Owen-Smith and Powell, 2004; Trippl and Tödtling, 2007). Biotechnology and aerospace industries suggest this type of structure, although there is a need for additional empirical studies. Aerospace clusters are characterized by major geographical inertia due to heavy sunk costs in large plants with costly and complex sophisticated equipment that cannot be easily moved from one location to another (Niosi and Zhegu, 2005).

Studying the Austrian biotechnology sector, Trippl and Tödtling (2007) maintain that cluster relations go beyond the dichotomy of “local buzz and global pipelines” (Bathelt et. al., 2004) as they find evidence for “global buzz” as well as “local pipelines”. The importance of both strong local and global connections is highlighted in the development of a high-tech aerospace cluster in Taiwan (Eriksson, 2006), which is referred to as ‘design, manufacturing and innovation networks’.
Figure 1: Main knowledge and technology flows within Taiwan’s aerospace “clusters”

3 When is a ’cluster’ a cluster?

As previously discussed we have many names for things or phenomena that are very similar or closely related and seldom are sufficiently defined. Many studies of localized growth and embeddedness use different overlapping terms and expressions such as clusters, industrial districts, regional innovation systems, innovative milieu, learning regions, networks, etc. For instance, Becattini (1989) defines industrial districts as “a particular type of agglomeration, characterized by a localized ‘thickening’ of inter-industrial relationships which is reasonably stable over time”.

Not all spatial agglomeration of firms in the same or related sectors necessarily comprises a cluster. Of three textile regions examined in France, Italy and the U.K., only the Italian case represents a reasonable number of specialized and connected firms (Bull et.al., 1991). Thus, a functioning local network in a local area is an essential phenomenon for a cluster development.

According to Doeringer and Terkla (1995), industrial clusters are a variation on the theme of agglomeration economies and that the identification of clusters starts with linkages and proximity, and becomes dynamic through face-to-face collaboration economies. Dynamic local economies are open in giving as well as taking information and, like innovative firms, they continually search for information and maintain good internal information flows (Sweeney, 1987). The combination of sophisticated needs of customers and technical expertise in suppliers leads to mutually supportive interaction (De Bresson, 1989).

How then to define a cluster? The definition used depends partly, but not completely, on the scientific background of the researcher, but also the purpose of the study. According to Nooteboom and Woolthuis (2005), economists and management scholars emphasize the economic and technological features of a cluster, spatial economists and geographers emphasize spatial effects of localization. But scanning cluster-related literature, it is not hard to find definitions with different orientations.

According to Porter (1990), clusters are geographical concentrations of firms involved in similar and related activities, however, in a later book he defines them as a “geographically proximate group of interconnected companies and associated institutions in a particular field, linked by communalities and complementaries” (Porter 1998, p. 199).

For Cooke and Huggins (2003) a cluster represents “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” (p.52).

The latter definition differs from Porter’s as it reveals a sense that it has an awareness of shared goals, i.e. planning and growth dimensions of a cluster.

A basic way to define cluster is to have them divided into two major types (Dicken, 2007): Generalized clusters and specialized clusters. Both are based on the notion of externalities, i.e. the ‘spillovers’ created when activities in a particular place are connected with one another, either directly (by specific transactions) or indirectly. Both rely on the idea that the ‘whole’ (the cluster) is greater than the sum of the parts because of the benefits that spatial proximity provides.

Generalized clusters occur when human activities tend to agglomerate to form urban areas, which traditionally have been labeled urbanization economies. Such clustering of activities creates the
basis for sharing the costs of a whole range of services. Larger aggregate demand in a large urban area encourages the emergence and growth of a variety of infrastructural, economic, social and cultural facilities.

Specialized clusters reflect the tendency for firms in the same, or closely related, industries to locate in the area to form what is often termed ‘industrial districts’ (spaces), which often is labeled localization economies. The bases of specialized clusters arise from the geographical proximity of firms performing different, and linked, functions in specialized production networks.

Clusters generate two types of interdependencies, traded interdependencies and untraded interdependencies. The first are direct transactions between firms in the cluster, such as specialized input of intermediate products and services.

Untraded interdependencies are less tangible benefits, ranging from an appropriate pool of labour, to particular kinds of institutions, i.e. universities, business associations, government institutions, etc. This also implies a broader socio-cultural context where face-to-face contacts, social and cultural interaction as well as knowledge and innovation are embedded.

Once established, a cluster tends to develop through a process of cumulative, self-reinforcing development involving (ibid.):

- Attraction of linked activities
- Stimulation of entrepreneurship
- Deepening and widening of the local labour market
- Economic diversification
- Enrichment of the ‘industrial atmosphere’
- Thickening of local institutions
- Intensification of the social-culture milieu
- Enhanced physical infrastructures

The history and origin of specific geographical clusters are highly contingent and often shrouded in the mist of history. Many years ago Myrdal (1958, p. 26) wrote:

Within broad limits the power of attraction today of a center has its origin mainly in the historical accident that something once started there, and not in a number of other places where it could equally well or better have started, and that the start met with success.

Without doubt most clusters are the outcome of the historical process of cumulative, path-dependent growth processes although a few are the deliberate creations of regional or national policies, such as the Hsinchu Science-Based Industry Park, Taiwan (Mathews, 1997; Mathews and Cho 2000; Yeung et.al. 2006).

Policy initiatives to develop clusters have been very common in many countries in the last few decades. Governments with widely different ideologies and philosophies have instituted cluster promotion policies, such as Canada and the U.S. (N.A.), Australia, New Zealand, Malaysia, Singapore, Taiwan (Asia-Pacific), and not least the European Union.

With such different governments all adopting cluster-based strategies, it is easy to conjecture that we have either stumbled across universal truths, mass delusion, or used the same words to describe very different programs (Enright, 1998).
Proposals for policy initiatives to develop clusters need to include actual interaction rather than single-sector clusters or linked sectors on the basis of national-scale input-output linkages (De Bresson 1989; Held 1996; Rosenfeld 1995).

The nature of innovation makes it difficult to plan industrial clusters (Feldman et.al, 2005). The path of emerging industries is difficult to predict as new technology is extremely fluid, and planning efforts based on current assumptions will never be able to anticipate future scientific developments or the direction that technology may take (Lambooy and Boschma, 2001). The basis of localized knowledge clusters lies in several characteristics of the innovation process that are highly sensitive to geographical distance and proximity (Howells, 2000, pp. 58-59):

* Localized patterns of communication: geographical distance greatly influences the likelihood of individuals within and between organizations sharing knowledge and information.

* Localized innovation search and scanning patterns: geographical proximity influences the nature of a firm’s search process for technological input or possible collaborators.

* Localized invention and learning patterns: innovation often occurs in response specific local problems. Processes of ‘learning by doing’ and ‘learning by using’ tend to be closely related to physical proximity in the production process.

* Localized knowledge sharing: because the acquisition and communication of tacit knowledge are strongly localized geographically, there is a tendency for localized ‘knowledge pools’ to develop around specific activities.

* Localized patterns of innovation capabilities and performance: geographical proximity can reduce the risk and uncertainty of innovation.
4 Weaknesses of cluster research and new approaches

It is important to stress that a single unique interpretation or theory of localized economy does not exist. There are a number of different approaches often contradictory and sometimes not so well defined. In general there is a limited understanding of how innovative clusters take hold and transform regional economies (Feldman et al 2005). Boschma and Kloosterman (2005, p.1-2) address and summarize some important issues of cluster research:

* The conventional cluster model is often criticized because clusters tend to be treated as static, instead of dynamic, entities, which implies that development of clusters is 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.

* There is an epistemological point, i.e. an inherent tension in the cluster model between the general (as ideal type) and the particular, i.e. that each cluster tends to be considered as almost unique.

* Many cluster-model approaches have an in-built normative stance since the emphasis has been on positive rather than negative effects. Locked-in effects are taken for granted or ignored altogether. When adopting a dynamic perspective to clusters both positive and negative aspects of formation can be taken into account.

* Another tension in the cluster concept that is nearly insurmountable is related to one inherent cluster characteristic, namely the spatial concept (a geographic concentration) in which spatial processes play an important role. On the one hand, such a definition implies that there is a need to determine at what spatial scale clusters operate. On the other hand, there is increasing awareness that drawing geographical boundaries is an almost impossible task, because of the many processes (inter-firm linkages, knowledge spillovers, social networks, etc) that take place at different spatial scales at the same time, and because the spatial range of these processes will change over time (Martin and Sunley, 2003).

Rutten and Boekema (2005) suggest that researchers should take the spatial dimension as an outcome, rather than a starting point when analyzing processes and activities related to clusters.

Karlsson et al (2005, p. 3) address issues such as:

* Can policy-makers and planners initiate and stimulate the development of successful clusters and if so under what conditions?

* What determines the sustainability of clusters?

* Can strong clusters delay the renewal of regional economies?

Besides there is a need to broaden the research agenda regarding clusters by looking into other dimensions, such as:

* Development of more dynamic cluster models, which includes changes over time

* Differences of profitability and sustainability between various clusters
* Internal and external connectedness of clusters, including economic and technological spill-over/transfer and supply-chains

* The role of various cluster engines

* There is a need to understand more of the market dimension, i.e. the demand side

References


