Project West-East ID "Industrial Districts' Re-Location Processes: Identifying Policies in the Perspective of the European Union Enlargement"

Contract no. HPSE-CT2001-00098

INDUSTRIAL DISTRICTS:

A STATE OF THE ART REVIEW

SEPTEMBER 2002

Socio-economic Research

This document has been produced within the project West-East ID (HPSE-CT2001-00098), co-ordinated by Istituto G. Tagliacarne of Rome. The project is funded by the European Commission under the 5th Framework Programme – Key Action Improving the Socio-Economic Knowledge Base (1998-2002).

The document has been elaborated by a working group co-ordinated by Manchester Metropolitan University and composed by Istituto Guglielmo Tagliacarne, Luiss University, The University of Reading, Roskilde University, Landesinstitut Sozialforschungsstelle Dortmund

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Table of Contents

1.0 Introduction

This review outlines main areas of work relating to the literature on industrial districts and, more widely, examines the geographical concentration of firms in similar or/and related industries, which is sometimes encapsulated within frameworks that utilises the concept of clusters [1].

After the introduction (paragraph from 1.1 to 1.4), this work is divided into four main sections.

1. Theoretical foundations of the study of the industrial districts/clusters *(Section A*).
2. Defining, classifying and measuring industrial districts and clusters (*Section B*).
3. Public policies towards industrial districts/clusters (*Section C*).
4. List of References (*Section D).*

[1] In this text we use the words "industrial district" and "clusters" as overlapping concepts. A very detailed exam of the literature using these two concepts with different meanings is contained in Introduction (paragraph 1.2.) and in section A. On the other side, along the text we often refer to the expression "industrial district/clusters" when we intend to analyse the same phenomenon: the local aggregation of networks of small and medium sized firms specialised in specific products.

1.1 Theoretical foundations of the study of industrial districts and clusters

Interest in geographical concentrations of firms in the same or similar industries has grown considerable because of the 'success' of well-known industrial districts/clusters such as Silicon Valley and Route 128 in the USA (Dorfman, 1983; Saxenian, 1994). The contribution that industrial districts make to the Italian economy also stimulated interest in analysing the competitive performance of some specific geographical concentrations of "localised industries", such as the textile district of Prato. Starting from the pioneer work of Becattini (1979; 1987) who brought back to the international attention the seminal writings of Alfred Marshall, the interest toward the model of industrial organisation based on the agglomeration of small a medium-sized enterprises widely expanded in many branches of economic sociology, industrial economics, regional economics, and development economics (Pyke, et al, 1990). At the same time, the work of Porter on strategy and competitiveness also provoked considerable interest in clusters as a means of developing competitiveness (Porter, 1990, 1994, 1998 and 2000a). Studies revealed that industrial districts and clusters are widespread in many different countries and industries (Enright, 2001) and that they seemed to becoming more important in response to the globalisation process (Dunning, 1998). The widespread occurrence of the phenomenon of geographical concentrations of firms has led local, regional, national and international governmental agencies to create and implement policies to boost competitiveness and to help regional economies to develop by encouraging firms to form and build up industrial districts/clusters (for example, European Commission, 2001; OECD, 1999 and 2001). Interest in industrial districts and clusters has also encouraged the publication of extensive reviews of the literature on the theoretical underpinnings of geographical concentrations of firms (for example, Harrison, 1992; Belussi, 1999a; 2000; Biggiero, 1999; Belussi and Gottardi, 2000; Baptista, 1998; Brown and McNaughton, 2002; Paniccia, 2002).

Interest in industrial districts and clusters has also been stimulated by the new economic geography (Krugman, 1991), but also by work on increasing returns to scale (Arthur, 1990 and 1994). Work on increasing returns to scale and imperfect competition was integrated into new economic geography to deliver a theoretical explanation for the rise and evolution of agglomeration (Krugman, 1995; Ottaviano

and Puga, 1998). This strand of literature has its origins in an old literature on location theory (for example, Weber, 1929; Hoover, 1948). Research on industrial districts and clusters in the Anglo-Saxon world (Porter and Krugman) has emphasised the role of local or regional supply chains and networks of supporting firms and agencies (for example see, DTI, 2001 and Harvard Business School, 2002).

This research has also discussed the importance of technological spillovers deriving from agglomeration and of historical, geographical and cultural factors (for example, Krugman, 1996; Saxenian, 1994; Scott, 1988; Swann, 1998). This is strongly related to the concept of learning and to systemic and geographical factors that support the technological upgrading of individual firms and, as a whole, localised systems (Lundvall, 1999; Roelandt and de Hertog, 1999). The concept of National Innovation Systems (NIS), originally discussed by Nelson (1993) in the analysis of specific national characteristics of individual country has been applied also at regional or local level (Nelson, 2000) where the influenced of institutional factors for innovation within industrial districts and clusters is underlined in both European and North American cases (Acs, 2000). This literature has emphasised the importance of learning mechanisms and also the role of spontaneous interactions among co-localised firms stimulated by social and spatial proximity.

The Marshall's concept of industrial districts (Marshall, 1891), based on the importance of external economies to understand the development of the agglomerated cluster of small and medium-sized firms, informs much of the literature on Italian industrial districts on the learning issues. These works focus on the benefits of external economies emerging from the close proximity of actors in the process of economic activity. Particularly, they refer to the Marshall's concept of 'industrial atmosphere' that consist of a business and social environment conducive to the acquisition of the benefits of proximity deriving from imitation, vicarious learning, quick adoption, and technical change and innovation introduced thanks to the generation of collective new knowledge. Clearly this approach is linked to organisational theory and sociology as it highlights the socio-economic underpinnings of the networks and the processes of learning that is considered to be at the heart of the working of industrial districts. The Italian literature (Dei Ottati, 1996) has also been influenced by the work of transaction costs economics (Coase, 1937; Williamson, 1985) and institutional economics (Matthews, 1986; North, 1983; 1990).

Institutional theory emphasises that uncertainty and transactions costs and opportunistic behaviour can made organisational systems based on networks superior to markets to accomplish many types of business operations.

The transaction costs and institutional approach has led to a substantial body of work on the role of organisational systems (Vence-Desa and Metcalfe, 1996), institutions (Cooke, 2000), innovation and learning (Maskell *et al*, 1998; Brenner 1999; Fornhal and Brenner, 2002; Oinas, 2000) for the development of industrial districts/clusters.

Furthermore, regional/ local networks that provide proximity benefits and good relationship assets (social capital) are attractive areas for DFI inflows and as locations for the strategic development of subsidiaries thereby acting as a catalyst for developing geographical concentration in regions and local areas (Andersson and Forsgren, 2002; Heise, McDonald and Tűselmann, 2002; Malmberg and Sölvell, 1997). Industrial districts/clusters in local areas have also been found to help SMEs to compete in global markets (Brown and Bell, 2001). The idea that subsidiaries of multinational corporations may play an important role in districts has also been raised (Guerrieri and Pietrobelli, 2001; Ernst et al, 2001). A complex relationship between local and global networks (involving subsidiaries of multinational corporations) that involves the exchange of goods, services and knowledge has been discovered among high growth enterprises in Italian industrial districts (Becattini and Rullani, 1996; Maggioni and Bramanti, 2002).

A growing literature from international business academics links industrial districts and clusters to large multinational corporations by their direct foreign investment (DFI) activities and the development of their subsidiaries. DFI inflows and subsidiary development have been shown to create and develop local networks of Small and Medium Sized Enterprises (SMEs) centred around the subsidiaries of multinational corporations and these networks often involving significant technology transfer between the subsidiaries and the supplying and supporting firms in local supply chains (Gordon, 1996; Dunning, 1996, 1998 and 2001, Enright, 1998).

The origins and development of the various strands of the theoretical literature on industrial districts and clusters has led to different approaches to the study of the geographical concentration of manufacturing and service activities. These differences are often reflected in the names used to describe geographical concentrations of firms:

industrial districts or local systems (Garofoli, 1989a; Garofoli and Mazzoni, 1994; Belussi, 1996) often used in Italian research (in the Marshallian and post-Marshallian approach, for a review see Belussi, 2001 and Paniccia, 2002), clusters or industrial clusters (in the Anglo-Saxon research and in the literature strongly influenced by Porter and Krugman). While this has led perhaps to a wide and sometimes confusing variety of views and typologies, on the crucial factors that make up industrial districts and clusters, it has also stimulated many attempts to reconcile the various approaches in the literature on the Italian concept of industrial districts and clusters. The integration or identification of the most useful aspects of the different schools (emerging from the various approaches (Marshall, Porter, and Krugman) is further explored and developed in Section A, by listing the major factors that can influence the creation and development of industrial districts/clusters and the competitive advantages that can arise from these types of geographical concentrations.

1.2 Defining, classifying and measuring industrial districts and clusters

There is a semantic ambiguity in the concepts of industrial district or/and cluster because this literature has been developing starting from various disciplines and counts such a wide number of contributions that it has become difficult to denote with only one term a large variety of phenomena. In fact, under the umbrella of industrial district or/and cluster, extensively used in economics, business, regional economics, industrial economics, economic geography, and sociology, different models of (local) development and inter-firm arrangements can be recognised (Paniccia, 2002).

Most of the literature uses a case study approach that often lacks sufficient power of theoretical generalisation or empirical verification. Consequently, issues such as what are the main characteristics and evolutionary path of industrial districts/clusters and which are some testable regularities across all types of industrial districts/clusters are difficult to determine. Specific and not-replicable features of industrial districts/clusters are sometimes identified as general without any empirical assessment. In some cases a high geographical concentration of (small) firms is deemed sufficient to identify an industrial district/cluster (Staber, 2001a). This ambiguity may distort the efficacy of industrial policy interventions, since 'blanket' solutions are evocated to be applicable when this is not the case (Paniccia, 2002). For

example, are the cases of Prato and Silicon Valley a replicable phenomena? Can they be understood within a simple theoretical framework that considers only few parameters such as firm cooperation, entrepreneurship, local culture, and innovativeness? Such ambiguity also affects theory of industrial districts/clusters. On a theoretical ground, a critical question is to understand the relationship between the empirical forms of specific industrial districts/clusters from a 'normative' model. This requires the isolation of the industrial district/cluster rationale, whether it is rooted in economic or socio-economic theory. The economic rationale of industrial districts/clusters may be found in the notion of external economies, as it is found originally in Marshall writings then further refined by other scholars in economic geography and economics. Geographers have emphasised the role of agglomeration or proximity of firms and conceive the industrial districts/clusters as a model of economic development that base its efficiency on external economies. It is the sole factor able - by itself - to produce positive effects, in terms of efficiency and growth (Paniccia, 2002, p. 4).

Industrial economists or business economist have mainly stressed the synergy stemming from firm inter-relationships and cooperation among the chains of specialised suppliers-subcontractors-final firms. Porter particularly has emphasised the five factors of competitiveness that originally he applied in a macro context to explain the "competitive advantage of nations" based on firm rivalry and new entry of competitors, power of upstream suppliers and producers of machinery, threat of substitutive products, factors conditions and demand conditions. It is important to understand here that the Porter's cluster concept is manly a functional concept that is similar to the French idea of filière. It need not necessarily to be understood as a source of competitive advantage deriving from localisation, although Porter (1998) found numerous examples of "regional clusters", describing and mapping of regional districts in US, Portugal, Sweden, and Italy. It is interesting to observe that, at the end, also Porter, the inventor of the successful "cluster" brand, in his last writing, make an ample recourse to the term "industrial districts", bring us back to the original Marshallian meaning.

The Marshallian Discovery and its Development[2]

The term industrial district has a very prestigious ancestry, deriving from Alfred Marshall. In his books *Principles of Economics* and *Industry and Trade* he used the term to describe industrial agglomerations of small and medium-sized enterprises in textile and other industries in Lancashire and Yorkshire in the 19th century.

He observed that small firms could benefit from external economies by grouping together. External economies of scale are dependent on the general development of the industry and can often be secured by the concentration of many small businesses of a similar character in particular localities: or, as it is commonly said, by the "localization of industry"(Marshall, 1950, p. 266). In his view, an increase in the scale of production of any kind of goods generates both internal and external economies of scale.

In his last book, *Industry and Trade*, Marshall added some new qualifications to the concept of industrial district, but without a clear rigorous formalization of that notion. Notably, he introduced the notion of 'industrial atmosphere', which together with the existence of 'mutual knowledge and trust', already mentioned in *The Principles*, "facilitates the generation of skills required by the industry, and promotes innovations and innovation diffusion among small firms within industrial districts". (ibid, p. 96)

As examples of external economies, Marshall mentions the possibility of splitting the production process into specialized phases: a) the increasing knowledge of markets accompanying the expansion of industrial output, the creation of a market for skilled labour, b) for specialized services and for subsidiary industries, and finally, c) the improvement of physical infrastructures such as roads and railways.

The Marshallian industrial district was originally conceived as a socio-economic mixing, where social and economic forces cooperate with (Becattini, 2000a). Friendship linkages among local population and neighbourhood relations favour the diffusion of knowledge:

> The mysteries of the trade become no mysteries; but they are as it were in the air, children learn many of them unconsciously. Good work is rightly appreciated, inventions and improvements in

[2] This section relies on Paniccia, 2002, pp. 4-8.

> machinery, in processes and the general organization of the business have their merits promptly discussed: if one man starts a new idea, it is taken up by others and combined with suggestions of their own; and thus it becomes the source of further new ideas. (Ibid., p. 271)

The economies so far described consist of the localization advantages considered from the point of view of the economy of production, but Marshall suggests considering the convenience for the customer too, by implying savings on transaction costs:

> He will go to the nearest shop for a trifling purchase: but for an important purchase he will take the trouble to visit any part of the town where he knows that there are especially good shops for his purpose. Consequently shops which deal in expensive and choice objects tend to congregate together and those which supply ordinary domestic needs do not. (Ibid., p. 273)

Marshall also considered diseconomies of industrial concentration such as higher cost of labour and the rising cost of land in industrial districts. As a solution to these disadvantages, the Marshall underlines how different industries in the same neighbourhood may offer different job occupations to the various components of the society (for example, women) or mitigate each other industry's depressions.

Most of the Italian literature, pioneered by Becattini (1990) and supported by a number of contributions (for example, Piore and Sabel, 1984 and the Gremi approach[3]), would claim that the mere agglomeration of firms is not enough to denote an industrial district, but other conditions attaining to the attitudes and values of local population are also important to determine positive performance. In this view, industrial districts are *socio-economic systems joining together a community of people with common values or culture and economy (market*). Most of the social features of this type of industrial district resemble what in sociology has been termed the 'communitarian' model. On this level of interpretation, that parallels Becattini's approach, Brusco (1982, 1990) has stressed the importance of equilibrium between cooperation and competition in the industrial district model. This requires an extended division of labour to recognize an industrial district and its effects on social integration. The emphasis on intrafirm and interfirm relationships within industrial district is common to Piore and Sabel (1994), and leads them to qualify industrial

district as 'flexible systems of production', as well as alternative mode of organisation to mass production Paniccia, 2002, p. 4).

A main feature of an industrial district community, both in Becattini's view and in the writings of Dei Ottati (1987) is cooperation, which sustains the necessary condition for the success of the industrial district model. Cooperation economizes on transaction costs and fosters flexibility and innovation. Cooperation can be seen as a rule of governance of the industrial districts, and qualifies them as social networks or, according to some organization theorists, as an ideal-typical organization model between market and hierarchy. This view raises the question of whether cooperation – as a mechanism producing trust – is at the same time a necessary and pervasive rule of governance of the industrial district, and how we can "operationalise" the measurement of cooperation, and finally, whether it is possible to conceive (or empirically observe) industrial districts without significant levels of cooperation. A similar question concerns institutions that are considered an important ingredient for the efficiency or dynamism of industrial districts (Piore, 1990; You and Wilkinson, 1994; Asheim, 1997).

The interpretation of industrial districts as localised networks of inter-firm cooperation may legitimate organizational approaches based on 'cybernetic' concepts or on a competence-based theory of the firm. Some authors have looked at evolutionary path of industrial districts, conceiving them as 'self-organized' systems; that is, as complex social and economic systems resulting from recursive interactions between their components and autonomy with regard to their environment (Biggiero, 1999; Corò and Rullani, 1998; Belussi and Gottardi, 2000). Others have suggested the application to the industrial district model of the analytical tools of the competence theory of the firm, viewing industrial districts as learning systems and as a repository of local (latent) capabilities and tacit knowledge (Lawson, 1998; Maskell, 1999; Maskell and Malberg, 1999; Belussi, 2000a). The cognitive perspective approach (Nonaka, 1994) emphasizes both learning and the development of knowledge (Becattini and Rullani, 1996; Belussi and Pilotti, 2000; Pilotti, 1997; Belussi, Gottardi and Rullani, 2002). Another approach applies ecological theory (Hannan and Freeman, 1989) to industrial districts and clusters (Lazzeretti and Storai, 1999;

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[3] See Maillat and Perin (1992); Bramanti (1998); Colletis-Wahl and Pecqueur (2001).

Belussi and Scarpel, 2001), drawing attention to endogenous mechanisms of change (Garofoli 1989b; Staber, 1998).

Definitional Issues

A cluster is defined in the Concise Oxford Dictionary as – *'a group of similar things growing together'*. This definition implies proximity and functional relatedness of the same or closely related things that are involved in a dynamic process of growth. In terms of geographical concentrations of firms in the same or similar sectors or industries, a host of names are used to cover this phenomenon. These include: clusters, localised clusters, industrial clusters, new industrial spaces, spatial systems of production and innovation, science parks, local high-tech milieu, and regional industrial complexes. These terms are used to identify a multitude of geographical concentrations that have very different characteristics in terms of: sectors or industries involved in, prevailing size of the firms, nature of the factors that make the concentration grow, mature and decline, presence or absence of institutions organisations and agencies, and the extend of the geographical boundaries of the concentration (ranging from regions, macro- regions, local areas, and aggregations of individual municipalities).

Porter provides definitions of clusters that gives a wide ranging concept of what the phenomenon embraces. *"Clusters are geographic concentrations of interconnected companies, specialised suppliers, service providers, firms in related industries, and associated institutions (for example, universities, standards agencies, trade associations) in a particular field that compete but also cooperate. Clusters, or critical masses of unusually competitive success in particular business areas, are a striking feature of virtually every national, regional, state and even metropolitan economy, especially in more advanced nations."* (Porter, 1998, p. 197). "*A cluster is a geographically proximate group of interconnected companies and associated institutions in a particular field, linked by commonalities and complementarities"* (Porter, 1998, p. 1999). In his book he presents indeed the *Italian* (our italics) cluster of fashion and shoes and the *regional* (our italics) Californian cluster of wine. He goes on specifying that in order to trace the boundaries of a cluster is often a matter of degrees, and that this is a creative process, related to the understanding of links and

complementarities existing among industries and institutions. In fact he argues that the boundaries of the cluster are determined by these "external effects" which are significantly related with competitiveness and productivity. Cluster boundaries do not correspond to conventional industry boundaries classification, because they are formed by a combination of final producers, intermediate goods, and machinery industries. So, he continues, clusters belong both to traditional and to new technological sectors. Clusters, in Porter's view represent a different way of "data organising" and of interpreting the economy. In order to individuate a cluster, as Porter highlights we may start from a large firm or from a concentration of similar firms and then look up-stream and downstream, horizontally and vertically along the vertical chain of firms and institutions. The aim is to individuate the use of specific common technological factors and complementarities and to enlighten related institutions which provides infrastructures, norms, and public goods. This analytical exercise can be in substance "sectorial" or "spatial", according to circumstances, and is included in what we could call here "systemic strategic analysis" of clusters of firms or localised clusters of firms and networks competitiveness. Therefore the Porter's cluster concept contains an unresolved ambiguity; it escapes from "objective indicators" and clear cut measurements and enters within the territory of pure subjective definitions. However it is important to observe, that the individual firm is not anymore at the focus of the economic attention. Now analysis is shifted toward "economic interrelatedness", economic blocks, and activities, which are strongly interrelated and interconnected, either spatially (thus physically) within a geographical proximity, or virtually within functional bonds.

Porter's cluster concept clearly differs from the Italian neo-Marshallian use of the concept of industrial district of "localised industries" on which numerous researchers have worked looking for objective statistical parameters related to labour market (Sforzi, 1987), definitions (Paniccia, 2000), measurements of industry localization index (Anastasia, Corò, and Crestanello, 1995; Quadrio Curzio and Fortis, 2000) and empirical comparisons (Falzoni, Onida, and Viesti, 1992; Belussi and Gottardi, 2000), as it well shown by the extensive literature presented recently by Tessieri (2001). It has been maintained that the concept of clusters is elusive, heterogeneous and the literature on clusters a patchy constellation of ideas (Martin and Sunley, 2001). It would appear that the concept of clusters has been "marketed as a brand", rather than

as another intellectual product, to which it owns its popularity and general acceptance.

Clearly the concept of a cluster is much more elastic than the Marshallian definition of industrial districts, but with the time it has become a very near substitute. Very often a mode for referring to how industrial agglomeration is related to local and regional growth. Once we also include some socio-economic characteristics and the working of institutions the concept of cluster is becoming clearly indistinguishable from that one of industrial district. A possible line of demarcation that is here augured is at least the demarcation between functional clusters (national industry inter-connected filière) and localised clusters (local-sub-regional restrict areas of production specialisation[4]). Another possible line of demarcation is between localisation and embeddedness. So, "pure" agglomerations of firms (localised clusters) could analytically be separated by clearly interconnected localised systems where the analysis of socio-economic aspects is relevant (embedded districts). What is confusing in the recent literature is that often the two terms "clusters" and "districts", are used as synonyms, and thus they refer to both geographical proximity (agglomeration) and social and economic interactions (supporting institutions and economic interdependency).

Industrial districts and the importance of location

When Marshall describes the advantages which arise from external economies and territorial proximity, he comes close to some concepts that in the history of economic thought were developed much later, such as increasing returns (Young, 1928), cumulative causation (Myrdal, 1957), path-dependency (Arthur, 1994) and evolutionary theory (Nelson and Winter, 1982; Witt, 1993). When the neo-Marshallian perspective took a new drift, during the 1980s and 1990s, on the basis of the results of various studies which have looked at the industrial district "phenomenology" or at specific "local production systems", the issue of the industrial

[4] The geographical extent of the industrial district/cluster is one of the still open questions of this type of literature. While the Italian tradition focuses generally on small areas (formed by a high density of firms localised in few municipalities where the contiguity key is crucial to define the community and the related institutions, at the international level clusters are often thought as industries based in large geographical areas like regions (in Europe) or states (in US). See Swann and Prevezer (1998); Beaudry and Swann (1998); Breschi (1998), Tödtling (1994).

district started to represent a new cognitive device useful for analysing the economic reality from a "systemic perspective". From this point of view the writings of Becattini, the Italian artifice of the discovery of the Marshallian heredity, are clear. "The Marshallian industrial district constitutes, thus, a localised thickening (in this spatial determination we find its weakness and its strength) of inter-industry relationships, that show a consistent stability during time. … The unity to which Marshall refers to is not the technologically defined industry but the area or the industrial district. To this are referred the conditions of population density, the infrastructure endowments, the "industrial atmosphere", that are the source and the result, the cause and the effect, of that part of *increasing returns* that are explained neither with internal scale economies, nor with "real innovations". … If one reflects, what "takes together" the firms which belong to the Marshallian industrial district, emptying the meaning of cost determination of each product, is the complex and inexplicable net of internal and external economies, of conjunctions and connections of costs, of historical-cultural legacies, that are interwoven with both inter-firm and exquisitely personal relations" (Becattini, 1987; p. 47, our italics).

The study of the industrial district phenomenon has assumed in the past a paradigmatic value to test the dynamic properties of evolving complex and specific systems, endowed with path-dependency and irreversibility, dynamic capabilities of local agents, and learning potentialities.

In this perspective the Marshallian industrial district has internal self-sustaining forces which, in given conditions[5] are able to create an idiosyncratic form of economic organisation, realizing a permanent and cumulative surplus. These features, belonging to localised systems of firms, were not Marshallian in a classical term, if we refer to the standard economics textbooks that interpreted Marshall on the basis of the assumption of constant returns to scale and equilibrium prices.

Districts as local learning systems

The existence of a mechanism of increasing returns allows us to look at the mechanism of firm efficiency built-in within the model of the industrial district from

"inside". The positive feedbacks that Marshall also recognized are not just explained under the label of external economies, as the geographical tradition of urbanism and agglomeration as discussed later. Following Arthur (1994), mechanisms of increasing returns are associated with the use of a given technology, or with a product, or with a specific organizational arrangement (a firm, a group of firms, a district). Firms compete in a market and some get ahead, by chance or by clever strategy. Increasing returns can magnify this advantage. There is a tendency for the firm that is ahead to go farther, because positive feedbacks operate and reinforce those that gain success or aggravate those that suffer losses. Increasing returns characterize modern economies and, above all, high-tech and knowledge-based industries. The properties of an economic system exhibiting increasing returns are completely different from those framed within the neoclassical theoretical paradigm. Instead of an optimum, predictable equilibrium, we find a non-predictable solution, multiple possible outcomes, non-optimality, history-dependence results, lock-in and irreversible positions, and broken symmetries.

Only if we adopt an increasing-return approach we can appreciate the different pattern of evolution visible within the different industrial districts/local production systems. Let us say why the Biella district, specialized in wool, evolved differently from Prato, also specialized in wool production, or why in a similar production, like the one of leather sofas, very different districts emerged in Italy during the 1990s (Belussi, 1999b). It is, thus, the introduction of increasing returns the most striking features of the Italian industrial district model, not just the fact that a residual bunch of small and medium size firms resisted the capitalistic modernization of Fordism. The endogenous mechanism of building innovative capabilities within the industrial district follows a type of non linear model of innovation, and it is based on a model of continuous incremental innovations (Belussi, 1992; Bellandi, 1989), also defined "innovation without R&D". In other words, firms populating the industrial districts did not invest much in formalized in-house research activities but dealt typically with high levels of knowledge re-utilisation and routines replication, and with substantial processes of collective learning (Antonelli, 1999 and 2000).

Innovations may be created "by design", through a deliberate effort of firms or

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[5] For instance, the development of Italian districts was mainly realised during the post-war period, and

public agencies. Or, they may come up by chance, when people master the implementation of technologies or during the normal course of production activity. Changes are actively experimented because entrepreneurs or technicians must always solve new problems or encounter unexpected demands by their clients. So, old blocks of knowledge or the recombination of dispersed pieces of knowledge give rise to novelties. New knowledge and existing knowledge tend to circulate in the economic environment in a process that has no end. The advantage of an industrial district lies not only in the fact that: "when an industry has chosen a locality for itself it is likely to stay there long: so great are the advantages which people following the same skilled trade get from near neighbourhood to one another" (Marshall, 1920, p. 271). Subsidiary trade grows up in the neighbourhood and the long-term permanence of an activity in a locality tends to eradicate and to embed specialised knowledge (in firms, in workers, and in local institutions). When knowledgeable agents interact, the combination of their knowledge may give rise to innovations. The local accumulation of know-how and tacit knowledge are not simple transferable and copyable or imitable resources.

Learning activities related to interactions are of paramount importance. Learning is not clearly detachable only within the industrial district model. This is not the point. However, a dense network of inter-related firms, often integrated by family property assets, represents an ideal laboratory for the intensification and experimentation of imitative and innovative learning. Within districts, frequent modalities of learning are learning by client-supplier relationship, and by using innovative subcontracting.

Industrial districts are self-organized systems (Lombardi, 1999; 2000), characterized by a "deliberately" (depending on internal firm's strategies of decentralization) and historically formed ample inter-firm division of labour connected with firm specialization. They cannot at all be compared to some separate units of a huge factory, where the same advantage of large-scale production is obtained by grouping in the same district a great number of small producers, as Marshall argued in his early writing (Whitaker, 1975; p. 196).

Industrial districts are not an alternative model to large hierarchical organizations, but different systems, because they are founded on increasing returns, and on complex

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the opening up of the Italian economy to the European Community market.

inter-related networks of organisations, which enjoy dynamic scale economies. Therefore, the efficiency reached by these systems cannot be compared with that of large firms as Marshall stated.

These localized systems of specialized firms are formed by many complex networks of activities, overlapping filières, rival final firms and co-operative subcontractors, specialized agents, localized competencies, endogenously formed collective actors and local institutions (Belussi and Arcangeli, 1998). In many cases they also incorporate large size units, or large firms (Lipparini, 1995; Lipparini A and Sobrero, 1994; Lazerson and Lorenzoni, 1999; Lazzaretti and Storai, 1999). Industrial districts and local systems take advantage of multiple synergies, stemming from a strongly connected system. Industrial districts and local systems are "hyper-networks": this corresponds to the second magnitude order of input coordination and activity aggregation. This is why clusters must be distinguished from networks (Biggiero, 1999; Jacobs and de Man, 1996, p. 428). Localised clusters and industrial districts are "networks of networks". So, economies reached by these systems are obviously larger than those of any big firm if these systems reach a larger aggregated output. The dynamic efficiency obtained by these scale economies tends to grow in time. The growth mechanism occurring within the neo-Marshallian districts can be described around the development of three main processes: a wide inter-firm division of labour, a process of tasks decentralisation, a pattern of accumulation of tacit knowledge. In addition, within districts the presence of tacit knowledge can be considered an extremely important element of their competitiveness, and there are no clear signs of a decline of its relevance (Belussi, 2000a; Gertler, 2001). In fact, these processes have also been described in the literature on Silicon Valley, Route 128 and the high-tech clusters but clearly these cases can be indifferently named either "localised clusters", "clusters" or "industrial districts". This is a matter of semantic distinction rather than conceptual. These localised systems of firms (or clusters, using the Anglo Saxon definition) have strong, complex and deep networks, some of which embrace inter-organisational webs of contacts, suppliers linkages, innovations flows and learning processes. On the other hand, the existence of inter-organisational networks can characterise a cluster but it is only one of the pre-conditions to have and industrial district, which, instead, needs the existence of several <u>localised</u> inter-organisational networks embedded in the territory jointly to the social and institutional

structure. Therefore in order to have an industrial district, the existence of inter-organisational networks is a necessary but not a sufficient condition.

Using a wide sample of Italian local systems Belussi and Pilotti (2000) have identified different types of industrial districts and local production systems. They are classed into three main categories: a) systems with low levels of learning activities where tacit knowledge prevails, and learning takes place mainly through socialisation; b) systems based on a balance between tacit knowledge and codified knowledge (here learning appears to be a "pure" interactive process among localised agents with a rich absorption of external knowledge and recombination of innovative sources); c) systems where learning is based on more formal innovative activities (R&D type). In this third category some firms localised in the area share the feature of being Schumpeterian innovators, thus they feed the global circuits of knowledge with novelties and new original pieces of codified knowledge. These variegated sources of efficiency cannot be simply accommodated under the label of external economies.

The development of an analytical map of the typological characteristics of some Italian industrial districts and clusters.

On the basis of the prevalence of the pool of knowledge they have access to, which in turn appears in relation with the presence of various forms of learning, industrial districts and clusters may be distinguished into the following main categories:

→ *Weak learning systems*. Systems based mainly on the horizontal expansion of a given stock of knowledge, historically accumulated in particular localities, where tacit knowledge among agents is prevailing. Here knowledge is mainly embedded in social practices (Amin and Cohendet, 1999). The economic performance of firms belonging to these districts is still based on particular (craft-based) skills. A constant characterisation is that, within this cluster of districts, we find exogenous and endogenous reasons for a relative "stagnation" (limited technological opportunities and absence of entrepreneurial creativity and imagination). This typology, for instance, characterises the glass district of Murano, an island near Venice, or other

craft based districts spread in Europe. Also many other Italian districts specialised in traditional products within the textile-clothing industry fall in this category, as well the cutlery district of Maniago, studied by Albertini and Pilotti (1996), and many others.

This type of the ID may be described by the following features: a very fragmented industrial structure, the presence of low external economies, a scarce adoption of new technologies by local firms, and a dominant presence of small entrepreneurs who come from the surrounding area and who possess mainly craft-based skills. Production processes tend not to change very much during the time. Often also the product, remains through the time surprisingly unchanged.

→ *Systems characterised by significant absorptive capability matched with incremental innovations.* Here a significant level of innovativeness is detachable. Local agents have been able to activate a process of absorption of external knowledge, combining already existing pieces of knowledge, socially shared within the local networks, with new pieces of knowledge for improved products or improved machinery. The absorption of external knowledge is never a passive process of copying (Linsu, 1999). Knowledge is translated and integrated to specific circumstances. When absorption occurs, this new knowledge is transferred to the entire agent population of the district through diffusion. So, the local stock of knowledge grows. Often local training schools, entrepreneurial associations, and service centres contribute to the activity of knowledge absorption and contextualisation. The development of knowledge in these systems highlights a kind of gradual process without dramatic ruptures. The process envisaged here recalls the works of classical economists and their perception of the generation of technical change. For them there is not any analytical separation between the development of knowledge and the normal course of economic progress. Let us refer to Smith's work where the growth of knowledge is seen as that process which comes directly from the division of labour, and consists of improvements on "dexterity, skills, and judgment" and "invention of new machinery". But also for Marshall the growth of knowledge is intrinsically bound to societal progress and it is that source of increasing returns that is placed outside the firm. The industrial organisation is seen as a process of "differentiation and integration" of knowledgeable agents.

Some examples of this second type of ID may be mentioned here. For instance, in Italy, the Carpi district of knitting and clothing, the Vicenza district of jewellery, the Manzano district of chair production. At international level, many other districts or clusters are mentioned by Enright (2001).

→ *Dynamic evolutionary systems*. These industrial districts and clusters are organised around very innovative firms. Clearly not all firms located in the area share the same innovative capability. Typically only some strategic agents are strongly innovative (dynamic final firms, research centres located in the district, some specialised suppliers). Here firms are capable of combining different pieces of information, producing either incremental innovation or radical innovations. What characterises this cluster is the systematic presence of radical innovations. In this typology knowledge flows are significant: knowledge is imported (absorbed) but is often exported and used by external firms (the existing high stock of knowledge can also catalyse the relocation in the district of external firms or multinationals). We can include in this cluster some high-tech districts, or, again, districts specialised in specific products characterised by a high-knowledge content (Cooke, 2002a).

Also some Italian industrial districts belong to this category: the sport-system of Montebelluna, the auto-components of the Modena-Bologna area; the packaging machinery of Bologna; the biomedical instruments of Mirandola, near Modena, the eyeglass frames in Cadore, near Belluno, and the leather upholstery of Matera - Altamura-Santeramo.

In evolutionary districts leader firms emerge (Bursi, 1997; Grassi and Pagni, 1998; Lissoni and Pagani, 2001). Many leader firms perform R&D activities (but often only in the engineering department, where new products are launched). Typically radical innovations are found within final firms and specialised suppliers located in the districts[6].

[6] The indicator of patenting activity is not sufficient to detect the presence of a a radical innovation that implies a subjective judgement provided by technological experts. Only through a qualitative

The "districtualisation" of local economies facing the globalisation process

As Becattini argues (Becattini 2002b), the process of "districtualisation" describes the emergence of districts within local economies. However, not in all local economies a geographical concentration of firms specialised in the same industry or in correlated activities is detachable.

Not only local economies clearly differ from each other, but also industrial districts differ in terms of competitiveness, industry structure, size of firms and organisational arrangements.

In addition to that, many "local" districts contain "global" key firms and other organisations or agencies that play a national role in their country. Similar questions also arise about the geographic spread of markets, suppliers and supporting organisations and agencies (Enright, 2001). Amin and Thrift (1994), Castell and Hall (1994), Becattini and Rullani (1996), Asheim and Cooke (1999), Guerrieri and Pietrobelli (2001), and Maggioni and Bramanti (2002) have studied the complex connections emerging between local, national and global networks.

A variety of observed linkages between industrial districts/clusters located in different areas have led to many classifications of districts and clusters. Markusen (1996) has introduced, for instance, the "hub and spoke arrangements" that correspond to districts dominated by external multinationals, or the category of "science park", which correspond to a kind of science based "planned districts". Significant differences have also been observed between, for example, industrial districts in the USA and those in Italy in terms of sectoral specialisation, organisational structure, and geographical boundaries (Markusen, 1996).

The process of distrectualisation has been studied by many authors in Italy, as it emerges from a vast literature (Tessieri, 2001). Belussi (2000) has theorised that the distrectualisation process is generally related to the following determinants: first, as a slow accumulation of tacit knowledge and practical knowledge within the founder firms of the district, second, as a local enlargement of inter-firm division of labour and firm specialisation, and third, as a continuous process of task externalisation, firm decentralisation and creation of spin-offs. Bellandi and Sforzi (2001), describing the

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collection of information and specific case-studies we can be able to define the presence of this form

multiplicity of local paths, have presented five typologies: the industrial pole, the local system characterised by dependent firms (local subcontracting); the rural system, the large dynamic city, and the model of industrial district. They do not mention the high-tech districts such as Silicon Valley, neither the model of the Science Park that in countries like UK, US, or Taiwan, can represent an other morphological variation of the process of distrectualisation in science-base sectors like IT (Grotz, 2001), biotechnologies, aereospace, and nanotechnologies. These districts are clearly not at all spontaneous, and at least in part they have been created by the large public investment in defence related activities (such as in the early stage of Silicon Valley, as discussed by Castilla, Hwang, and Granovetter, 2000) or by the linkages existing with local universities and public laboratories, as in Cambridge for the district of biotechnologies (Cooke and Huggins, 2002; Cooke, 2002b). High tech districts or technopoles (Bellon, 1995), like Sophia Antinopolis or Toulouse, even if they have a development influenced by their national systems of innovation, and by a top-down policies, have been emerging as endogenous models of local development, showing during the time district-like reconfiguration of the productive structure (Longhi, 2002). As numerous failed experiences of top-down creation of technopoles (March Cordà, 1996) show, the focus on technological districts is not on the endowment factors as such, but on the interactions among them, on the feedbacks effects and cumulative processes they give rise to, and on the building up of a local trajectory of cumulative capabilities conducive to an innovative milieux. An interesting decomposition of the industrial district category has been presented by Becattini (2002b), who has highlighted the following steps: a process of gradual subdivision of labour, the formation of district institutions, the cognitive spiral, the productive diversification and the versatile integration of tasks, the sense of loyalty and belonging, the role of social mobility (dependent labour market plays the role of firm incubator).

The international literature has often blended the concept of industrial district with that of cluster, deriving from the Porter tradition of analysis. Clusters *á la Porter* has been studied in the Anglo-Saxon economic literature. This has lead to different typologies of industrial districts/clusters (Bergman, 1998; Jacobs and de Man, 1996).

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of innovation within the various Industrial districts and clusters.

Unfortunately, the different methodological approaches adopted in these typologies makes it difficult to make comparisons across different industrial districts/clusters. Similar problems emerge when considering the various typologies used to classify the evolution of industrial district/clusters (Belussi and Gottardi, 2000; Belussi, Gottardi, and Rullani, 2002; Rosenfeld, 1997; Brown and McNaughton, 2002).

Within the Marshallian tradition the localisation of geographical clusters and industrial districts is contrasted with the obtainment of localised economies (urban economies) growing within industrial cities. Urban economics distinguishes between Marshallian (related to the sector) and urban (related to agglomeration) economies (Jacobs, 1984). But are cluster and districts only characterised by a peripheral localisation?

During the last decades there has been also a debate about the importance of cities and metropolitan areas as emerging areas of agglomeration (Fisher et al, 2001; Storper and Venables, 2002).

Various means and methodologies have been used to identify and measure the type and characteristics of industrial districts and clusters. The predominant method has been by using case studies, some of them involving a large number of cases (European Commission, 1999; OECD, 2001). However, many are one-off studies of a particular cluster or industrial district (for example, Cooke and Hughes, 2002; Braadland and Hauknes, 2000; Cook et al, 2000; Belussi and Gottardi, 2000; Belussi, Gottardi and Rullani, 2002). The Italian Institute of Statistics ISTAT, with the contribution of Fabio Sforzi, on the basis of the analysis of the daily commuting of the local working population, divided Italy into different geographical areas of local labour systems (LLS). In 199 cases, these areas were considered, with a good approximation, as areas characterised by the presence of industrial districts (Sforzi, 1989; Brusco and Paba, 1997). In a complex cartographic elaboration recently the IPI Institute (2002) has published a series of maps confronting the various qualitative and quantitative methodologies used in various researches and in official regional documents for the industrial district identification in Italy. More quantitative and systematic approaches based on the use of regional input-output analysis, location quotient analysis and systematic benchmarking exercises have also been used (European Commission, 2001, DTI, 2001, Harvard Business School, 2002; Hill and Brennan, 2000; Held, 1996).

Consideration of how to classify and measure linkages in industrial districts/clusters is considered in Section B to provide a means to assess policies to help create and develop geographical concentrations in Eastern Europe.

1.3 Policies towards industrial districts/clusters

The increasing focus on industrial districts and clusters as a means of boosting competitiveness stimulated policies to encourage the development of industrial districts/clusters (OECD, 1999; European Commission, 2001; OECD, 2001, DTI, 2001). Policies to encourage geographical concentrations in response to the globalisation process also have found favour (Dunning, 1998; Enright and Ffowcs, 2000; Enright, 1992). The links between technology transfer and the accumulation of valuable knowledge in the regional/local context by developing industrial district/clusters has stimulated interest in public policy, especially in the context of regional development. However, there is also an increasing focus on cities or Metropolitan areas as the main centres of economic activity in an increasingly internationally competitive environment (Fischer *et al*, 2001; Fujita and Mori, 1996; Fujita *et al*, 1999).

A new emphasis on the role of learning at local or regional level (Lundvall, 1992; Lundvall and Borras, 1998) to boost competitiveness by encouraging innovation further increased the focus on public policies towards industrial districts and clusters (Malmberg and Maskell, 1999). Developing social capital by stimulating learning in regions and urban areas has also led to increased focus on public policy towards industrial districts/clusters. The focus of public policy has moved away from financial help (use of grants and subsidies) to the development of partnership between the public and private sector to encourage regional/local networks to facilitate innovation and productivity increases. This involves encouragement of universities and other public and quasi-public bodies to network with the regional/local business community to increase entrepreneurship, innovation and productivity improvements (Raines, 2001). These policies are often based on fostering the accumulating social capital and on learning issues, where the aim is the transfer of learning abilities and innovations from one context to one other, thereby linking industrial districts with other districts

in other regions or countries (Maggioni and Bramanti, 2002, Andersson and Forsgren, 2002).

Developing micro, meso and macro public policies to encourage the creation and development of industrial districts/clusters has become one of the central themes of, national, regional, local and increasingly metropolitan policy. Most of this policy rests on the idea that stimulating entrepreneurship and innovation via learning using regional/local networks is the key to successful policy. Clearly, 'successful' clusters such as Silicon Valley and Route 128, and the 'success' of many of the Italian industrial districts, is closely connected to the promotion of entrepreneurship and to the creation of innovation based on network interactions. However, the theory and evidence on the crucial factors involved in successful industrial districts/clusters is still not clearly formulated.

Hence, to base public policy on fostering regional/local networks and developing complex connections between local, national and global networks, and to encourage the development of social capital and learning, may be to build the house on sand if the prerequisites for successful industrial districts/clusters are not present in the area designated for policy action. To assess the usefulness of the various approaches to public policy as a basis for developing policies for Eastern Europe countries seeking membership of the EU, Section C outlines and reviews the approaches to public policy and seeks to draw lessons from the literature on the theory and evidence on industrial districts/clusters to indicate the information needed to help to place policy formation and implementation in this area on a more sound basis.

1.4 Re-location of industrial districts from West to East Europe

The main objectives of the project *West-East-ID* are, in the first instance, to identify and measure the impact of main factors that influence the creation, maintenance and development of industrial districts, especially in the context of re-location from West to East Europe. The four main factors are the following:

1. Structural factors – including economic, organisational (and inter-organisational) and industrial and business structures in West and East Europe.
2. Social factors – embracing entrepreneurial conditions, in particular the ability of local entrepreneurs to tackle successfully the problems of re-location; socio-

economic conditions to provide the necessary entrepreneurial talent, labour requirements, education and training; and wider socio-economic conditions that will permit effective participation in the networks necessary to create and develop industrial districts.

3. Learning factors – involving the creation and development of appropriate innovation and learning communities involving such issues as education and training levels and abilities of actors to learn and be creative.
4. Integration factors – comprising the physical infrastructure assets, institutional systems that are able to effectively create, implement and rule policies and programmes connected to the effective operation of industrial districts, and organisational matters connected to facilitate networks to enable R&D, support for innovation and product development and other practical issues connected to gaining the competitive advantages of being in an industrial district.

The literature review revealed that the four factors include the major determinants of the creation, maintenance and evolution of industrial districts.

The literature review also revealed that there many different definitions of and typologies of industrial districts/clusters in terms of their geographical extent, size of participant firms, industrial composition, depth of organisational and inter-organisational systems, importance of socio-economic networks to reap external economies of scale, and performance. Sound reasons connected to both reducing costs and improving innovation and learning, or acquiring desirable assets and knowledge were found in the literature to justify re-location from existing industrial districts and clusters.

The literature review also identified that networks involving flows of goods, and services and innovation-related flows were important to the effectiveness of industrial districts. Moreover, the literature review found evidence that institutional factors (largely path determined by historical and geographical factors and from the experience of existing organisational systems and innovation and learning communities) were important in the development of industrial districts. Infrastructure, national and regional business, and innovation systems were also important.

The combination of these factors lead to possible different streams of development or evolution of industrial districts. These streams either lead to the development of

industrial districts with complex organisational systems with dynamic activities of innovation and learning or simple with organisational systems that are stable. The literature review indicates that public policies should be important for the successful operation and development of industrial districts but above all in the second stage of development of the industrial district.

The literature review indicates that the four factors selected to investigate the development of industrial districts contain elements that are important for evolution of industrial districts in both West and East Europe and for the search for policies to help East European countries to benefit from re-location from West European countries. This will help in the adjustment to the enlargement of the European union.

Section A

2.0 Theories of Industrial districts and clusters

The theoretical basis for the literature on industrial districts and clusters has its roots in five main approaches:

1. Marshallian theory
2. Location Theory
3. Transaction cost and institutional theory
4. International business theory
5. Regional studies.

Of these approaches the Marshallian theory has been the most influential, but also the location theory, transaction cost and institutional theory, international business theory and regional studies have had an important influence on much of the literature that is related to industrial districts and clusters.

2.1 Main strands in the literature on industrial districts and clusters

Marshall is an early exponent of the view that small firms can have an important function within the economic system. In his analysis, as argued by Becattini (2002a), he disputed the standard view that the factory system, in which all manufacturing processes are integrated under one roof with a high degree of vertical integration, was necessary better that production systems that were technically less integrated but geographically concentrated. He advocated that, at least for certain types of production, there were two efficient manufacturing systems: the large vertically integrated production unit, and the industrial district, based on the concentration of many small factories specialising in different phases of the same production processes. He came to the conclusion that the same economies that benefit from the large factories can sometimes be secured by small factories placed in the same locality. He called these economies "external economies", to juxtapose them to those

related to the coordination of activities under the vertically integrated factory. Marshall was also interested in revealing the socio-economic nature of the economic process. The Marshallian approach based on 'industrial atmospheres', where a continuous flow of innovation spreads rapidly from one agent to the other, and good ideas are quickly appreciated, also encourages a socio-economic perspective to the study of industrial district. The development of the notion of the industrial district is used by Marshall to relate the individuals to the "communitarian" model of the working of the factory system, and then to relate these individuals to the specificity of the economic space where they operate (Gaffard, 1992). Here knowledge flows, spillovers are in the "air", and technical knowledge is simply transferred. Moreover, at the centre of external economies in Marshallian theory we find the existence of pools of skilled labour, and the availability of specialised suppliers and informed customers and consumers. Given the broad nature of the subjects covered by the Marshallian approach it is not surprising that it dominates in the literature on industrial districts and clusters. The Marshallian hypotheses have been taken up by academics, investigating the role of skilled labour markets in knowledge transfer, and the processes of knowledge diffusion, innovation and learning in industrial districts/clusters implied by the existence of a model of "diffuse creative capabilities" (Bellandi, 1992). The modern developments of the neo/post-Marshallian school are articulately along three main streams. Firstly, the Marshallian tradition can be found also in subsequent analyses focussed on the analysis of the resurgence of the model of the small firm based on flexible specialisation (Piore and Sabel, 1984). Secondly, the Marshallian approach is amenable to the examination of social interactions at regional/local level that leads to proximity benefits and it has been developed within the category of the phenomena related to "local or localised learning" (Becattini, 1990; Antonelli, 1999, 2000; Maskell and Malmberg, 1999; Maskell, 1998; Audretsch and Thurik, 1999; Asheim, 1996, 1999; Ciccone and Cingano, 2001). Thirdly, the Marshallian approaches to industrial districts/clusters have recently integrated the Schumpeterian concepts of competition, innovation, and evolutionary economics (Belussi and Gottardi, 2000).

The location theory has traditionally focused on the role of transport costs relative to internal economies of scale and provided explanations as to why industries subject to internal economies of scale will locate near large markets. While the Marshallian

focus makes the locational theory approach less directly useful for policy purposes and for investigating the dynamics of the sources and effects of human interactions (which gives rise to proximity benefits), the location approach is more focused on economic theories that make predictions about the impact of geographical concentrations on firm performances. Nevertheless, the new economic geography approach, which tries to explain the nature of agglomeration, does highlight important Marshallian factors, such as the importance of labour markets, the historical and geographical factors, and the localisation of service industries. It also highlights important forces leading to concentration, increasing return and the growth of monopolies.

Location theory suggests that transport costs will limit geographical concentration. However, firms can benefit from geographical concentration when economies of scale are available. Therefore, transport costs must be assessed in relation to the gains from economies of scale. If the benefits of economies of scale outweigh transport costs, the incentive for firms to cluster will be high (Krugman 1991, 1995). It is often advantageous to locate in the region with the largest market when demand varies between geographical areas and when there are economies of scale (Krugman and Venables 1990, 1994, 1995). The main limits of these theories are their dependence on internal economies of scale and transport costs within a standard neo-classical framework (Martin, 1999).

Models based on the new economic geography focus on the importance of factor mobility and availability and congestion costs as limiting factors in the incentives to cluster (Ottaviano and Puga 1998). In these models, the process of clustering initially leads to cost advantages from internal and external economies of scale and from the expansion of the size of the market as concentration raises the productivity of factors of production within the cluster. The advantage of clustering induces inputs to migrate to clusters, thereby creating a virtuous cycle of success breeding further success. However, as clusters develop, incentives to disperse operations increase because factor prices rise for those inputs that are immobile or that have inelastic supply. So, congestion costs also increase as clusters develop and grow. A trade-off emerges between proximity benefits, market size advantages, and rising production costs, associated with input supply and congestion.

Although transport costs relative to proximity benefits are important sources for

agglomeration, the origin of clusters in a particular area is not fully explained by the existence of these cost advantages because these benefits arise from the clustering process. In order to reap the benefits of geographical concentration in a particular location, there must be conditions that favour concentration in a particular area. That emergence and development of clusters is seen to be path dependent on geographical factors, historical events and institutional factors that are conducive to concentration. Silicon Valley grew out of the few electronic companies gathered in that area, in order to take advantage of the proximity of the aerospace industry and from a concentration of computer scientists in Stanford University (Saxenian 1985). The historical development of financial services, in order to facilitate international commodity trade, is an important reason for the success of the City of London as an international centre for finance (Casson and Cox 1993).

The process of path dependent clustering, arising from geographical and historical factors, leads firms to locate in close proximity of existing clusters. This type of evolution appears to be prevalent in many cities, where the existence of factors such as a natural harbour or navigable river leads to geographical concentration of firms engaged in activities that require low cost transport systems. These firms discovered in the past, by accident, the benefits of locating close to firms engaged in similar types of operations and, a process of clustering spontaneously emerged (Krugman 1995; Fujita et al. 1999). This analysis suggests that clusters are not planned, they emerge rather from the uncoordinated and self-interested actions of agents responding to historical accidents and geographical conditions.

Location theories of clustering emphasise increasing returns to scale, transport costs or other geographical and historical factors affecting costs. Once clusters are established, they generate cost and quality advantages that are not available to firms not located in clusters. The focus of these theories is on market mechanisms such as prices, market structure and performance (Martin, 1999). These theories do not focus on the rich human interactions connected to spillovers and 'industrial atmospheres' as do Marshallian analysis and they are therefore of limited value for examining these factors. The new economic geography shows little interest in the role of innovation, entrepreneurship and learning. The main driving force for establishing and developing such networks is to reduce costs. Consequently, they do not provide a means of

investigating the richness of human interaction that is at the heart of much of the Marshallian based analysis. But there is to say that historical and geographical factors are often neglected in some neo-Marshallian analyses, which sometimes offer the impression that the creation and development of industrial districts only require the correct policies to enable proximity to be created and spillovers and learning to be diffused.

The location theory has tended to develop along separate lines from the Marshallian theory although it raises relevant issues about the importance of the path-dependent determinacy of the origins and development of clusters that are often ignored in many strands of the Marshallian based literature. These theories have been extended into new economic geography theories by the addition of the concepts of increasing returns to scale (both internal and external), imperfect competition and locational advantages emerging from geographical and historical factors. These approaches tend to retain neo-classical economic roots but with the addition of more complex production technologies (increasing returns to scale) and imperfect competition. The tools and concepts deriving from this approach are mainly used to explain market mechanisms and consequently this approach is interested in equilibrium outcomes and tends to use comparative static forms of analysis (Baldwin, 1998; Krugman and Venables, 1990 & 1994; Ricci, 1999).

The concept of transaction costs focuses attention on organisational systems that can minimise these costs and has therefore appealed to those studying the organisational systems connected to industrial districts and clusters (Dei Ottati, 1996). The main influence of transaction costs and institutional theory has been to provide a richer view of economic rationality (based on bounded rationality in a world of uncertainty and opportunistic behaviour) than the neo-classical view of rational behaviour. Institutional theory, especially that based on the trust and cooperation, has influenced the literature on policy and learning in connection with industrial districts and clusters. This leads to attention in different types of locally based networks and in the design and evolution of learning and policy regimes that can deliver effective outcomes. This role of institutions has been discussed in terms of fostering trust, cooperation, embeddedness (Granovetter, 1985), and better performing National or Regional Innovation Systems (Lundvall, 1992).

The importance of clusters of SMEs for their ability to be successful at the

international level has also contributed to reclaim the attention of this literature to the study of geographical clusters. The contribution of international business theory literature to the study of industrial districts and clusters has been a growing tendency in the last decade, starting from an initial focus on the factors of competitiveness in an increasing internationalised business environment. This literature has also illustrated the important role that multinational corporations have on technology transfer (including management systems) in the nations, regions and local areas in which subsidiaries of multinational corporations operate.

However, the globalisation process and the need of regional integration in blocs such as the EU accelerates links between industrial districts/clusters across countries and regions (Maskell, 1999). This is leading to complex local and global networks in which there is considerable transfer of operations via integration of international supply chains. This is also leading to a complex interchange and transfer of technology and knowledge among the various localities, and the global and local circuits.

The theoretical base and main strands of the literature on industrial districts and clusters that has emerged from these bases is outlined in Figure 1.

Figure 1 - Origins of the main strands of the literature on industrial districts and clusters

Base Theory	Focus	Developments
Location Theory Weber (1929) Christaller (1935) Hoover (1948) Losch (1954)	* Transport costs * Internal and external economies of scale * Path dependency from historical events and geographical factors	New economic geography Krugman (1991a; 1995) Krugman (1991b) Increasing Returns Arthur (1990 &1994)
Industrial districts theory Marshall (1891)	* External economies of scale * Industrial atmosphere * Spillover benefits * Low search costs for customers * Favourable economic, social and institutional environment conducive to learning and spillovers	Flexible Production Piore and Sabel (1984) Localised learning Antonelli (1999; 2000) Belussi and Gottardi (2000) Social values conducive to spillovers Becattini (1990, 1998; 2000b)

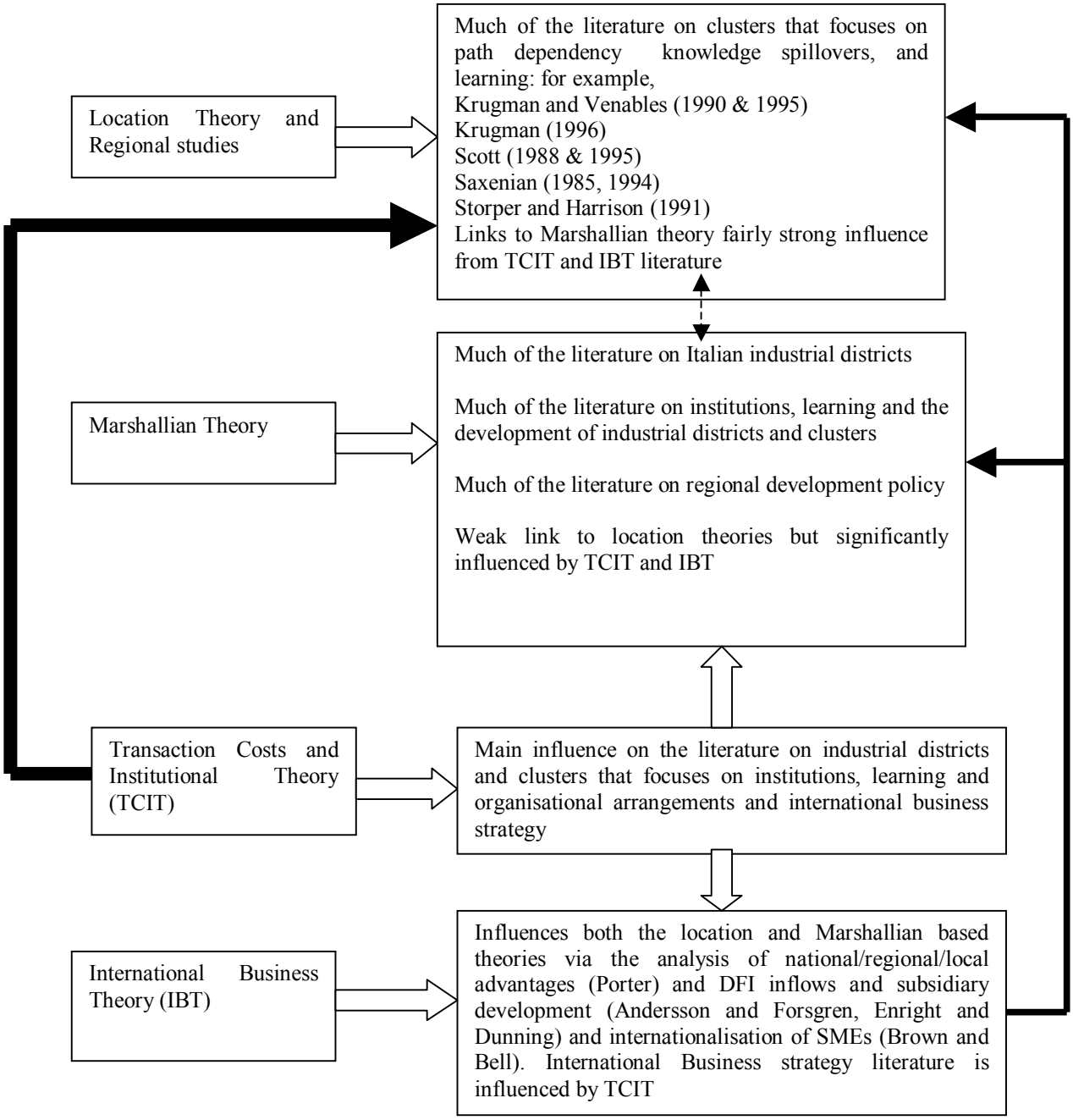
Base Theory	**Focus**	**Developments**
Transaction Costs and Institutional Theory Coase (1937) Williamson (1985) North (1990) International Business Theory Porter (1990)	* Transaction costs and organisational and institutional structures * Economic rationality constrained by uncertainty and opportunistic behaviour *Competitiveness by developing national/regional/local advantages *Development of subsidiaries to gain advantages from being embedded in local networks	Organisational theories Nohria and Eccles (1992) Sociological theories of embeddness Grabher (1993) Granovetter (1985) Uzzi (1986) **Innovation and Learning Institutional driven** Lundvall (1992) Dei Ottati (1996) Exploiting benefits of national/regional/local advantages Bartlett and Goshal (1989) Porter (1994, 1998 & 2000b) Porter and Solvell (1998) **DFI and development of subsidiaries** Andersson and Forsgren (2002) Dunning (1996, 1998 & 2001) Internationalisation of SMEs Brown and Bell (2001)

Base Theory	Focus	Developments
Regional studies Isard (1956) Perroux (1950)	* Growth poles around leading firms creating a favourable milieu *Spatial and social proximity *Innovation studies * Local systems taxonomies	**Knowledge Spillovers** Jaffe et al (1993) Saxenian (1985) Milieux innovateurs Camagni (1993) Case studies of favourable milieu from leading firms Maillat (1995, 1996) European Commission (1999) Harrison (1991) Storper and Harrison (1992) Scott (1988) Storper (1995) Maggioni and Bramanti (2002) **Local spiral of knowledge** Nonaka and Takeuchi (1995) Becattini and Rullani (1996) Belussi (2000)

2.2 Connections between the main strands in the literature

The various strands of the literature above presented are interconnected. However, location theory is not strongly linked to Marshallian theory, while regional studies (Scott, 1988, 1995) and the literature on technological spillovers (Saxenian, 1985, 1994) own entirely their debt to Marshall and to the concept of 'industrial atmospheres'. Moreover, some of the discussions on increasing returns and the concept of external economies link the new economic geography to the Marshallian theory. The main linkages between the strands of the literature are illustrated in Figure 2.

Figure 2 Connection between the main strands in the literature



2.3 Competitive advantages of industrial districts and clusters

Industrial districts and clusters lead to competitive advantages by generating a number of benefits that are not available to firms that are not located in geographical concentrations (Storper, 1995).

Competitive advantages can be grouped in the following categories.

- Increasing returns driven by the systemic properties embedded within the local systems in the context of globalisation
- Reductions in transaction costs
- Innovation and technological development depending on local interactions
- Reduced costs via effective learning (learning by imitation and emulation)
- Benefits provided by localised external economies (specialised labour market, specialisation led by the increased local division of labour, and competent specialised suppliers)
- First mover advantages from the initial territorial specialisation
- Advantages related to being customer driven organisations and to product diversification.

Increasing returns under globalisation

As it has proven for high-tech industrial districts and clusters in US (Silicon Valley) or for the low-tech industrial districts in Italy, these territorialized forms of industrial organisation can be a key determinant for the international competitiveness of nations. In a world of imperfect competition and increasing returns, international trade is driven by economies of scale (internal to firms) and external (localised) economies of scale (Krugman 1991, 1995; Krugman and Venables 1994). In the face of trade liberalisation and other aspects of the globalisation process, firms within clusters may obtain economic advantages by geographical proximity that could otherwise not be achieved (Krugman, 1991 and 1995). The importance of geographical proximity on international competitiveness is witnessed by the fact that regions with successful industrial districts performed particularly well during the global economic crisis of the 1970s and 1980s (Harrison 1992). This has been also

discussed by Porter. The geographical concentration of specialised industries allows some general advantages, visible also in the competitiveness of nations (Porter, 1994, 1998 and 2000b). Porter suggests the following factors of competitive advantage related to proximity: firm local rivalry, presence of specialised industries, presence of supporting institutions, learning processes induced by the existence of a sophisticated demand, and the increased competitiveness linked to the threat of product substitution which favours product diversification. Increasing returns driven by the systemic properties embedded within a local system may be understood as dynamic efficiencies, related to a path-dependent process, and to competences and capabilities built-in in the districtual firms during the time. This in some ways is opposed to the idea of static efficiencies that can be reached increasing size and volumes.

Reduction in Transaction Costs

The economical theory of transaction costs states that the firm is a hierarchical form of organisation that internalises transaction costs. Thereby, organisations emerge because in some circumstances they provide a specific organisational form with lower transaction costs in comparison with what can be achieved by the use of markets (Coase 1937). Firms are not the only type of organisation that can reduce transaction costs relative to the use of the market. Indeed, a multitude of organisational arrangements can deliver preferable outcomes to market allocations, depending on the size and extent of transaction costs (Williamson, 1985). Transaction costs derive from three different failures - bounded rationality in decision-making, opportunism of agents, and market uncertainty (Williamson, 1985). Bounded rationality is the result of human limitations on the ability to gather and process information; opportunism is the result of self-interest; and uncertainty is the result of unforeseen difficulties embedded in every transaction. Under these circumstances, prices do not provide sufficient information to make decisions. Therefore, additional information is required to help to make decisions that produce desirable outcomes. It is impossible to accurately define and estimate transaction costs because of the many different definitions of transaction costs and due to the difficulty in distinguishing transaction from production costs. It is, therefore, very difficult to calculate the benefits due to the reduction in transaction costs. However, reductions in transaction costs between

cooperating agents enhance the possibilities of increasing the amount and level of beneficial exchanges.

External economies of scale and quality improvements depend on the level and extent of exchanges between partners. Therefore, reducing transaction costs (by forming appropriate networks) provides opportunities to widen and deepen beneficial exchanges and thereby enhances the ability to reap networking-associated external economies of scale, district-specific systemic efficiencies, and quality improvements depending by a better fit of firms needs (Storper and Harrison, 1991). When contract, negotiation, monitoring and enforcement are expensive, exchange will be concentrated within groups that trust the members of the collective. By contrast, when information, measurement and enforcement costs are low, exchange can take place over anonymous agents or markets. Moreover, cultural, legal, political and institutional factors affect transaction costs by influencing the levels of uncertainty in transactions (North 1990). Therefore, some institutional frameworks are better than others at reducing transaction costs. Hence, firms located in areas with institutional frameworks conductive to reducing transactions costs will reap advantages that are not available to firms located in areas lacking such favourable institutional conditions. Moreover, the concentration of business activities in these districts encourages the evolution of a favourable institutional framework.

An institutional framework conducive to efficient business relations is characterised by the development of rules, routines, habits that reduce uncertainty in transactions and that favour business coordination and cooperation. Trust can also be considered a relational good endogenously created by firms cooperation and as a by-product of a positive interaction occurred between two or more partners. Industrial district constitute close "communities" of individuals (Pyke, Becattini and Sengenberger, 1990; Dei Ottati, 1994; Cossentino, Pyke and Sengenberger, 1996) and firms where the thickness of the social structure helps to maintain low transaction costs. Markets and community constitute the two basic fundamental regulatory mechanisms, both of the initial start-up phase of the post-war development and of the subsequent consolidation phase of 1980s and 1990s, where economic order and institutional variety have been successfully managed (Parri, 2002).

Innovation and technological development depending on local interactions

After Marshall, who emphasised the role of industrial districts as models conducive to an "industrial atmosphere" where the spread of innovation are the consequence of a decentralised industrial creativity, we have to turn back to a French economist: Perroux. Perroux (1950) identified the benefits that can emerge from growth poles around leading firms that stimulate innovation and entrepreneurial behaviour conducive to high growth. This milieu approach has been developed in the context of innovation in a spatial context that leads to high growth within geographical concentrations (Camagni, 1991; Stroper, 1997). It is also argued that the advantages listed above (external benefits, reduced transactions costs, etc) promote an environment conducive to innovation and the accumulation of human and social capital that boosts growth within industrial districts/clusters (Martin, 1999, Krugman, 1995; Feser and Sweeney, 1998).

The proximity of firms (Bellet, 1993) and supporting organisations and agencies can, in cases where there are indivisibilities among inputs, lead to a spillover effect on production costs. Pecuniary external economies (Scitowsky, 1954) lead to benefits from internalising these externalities within the industrial district/cluster (Antonelli, 1999; Brusco, 1982; Becattini, 1987). These benefits appear to be strong in the case of R&D expenditures and process and product development in high-tech areas (Swann, et al, 1998).

However, they are also prevalent in many Italian industrial districts that are not involved with high-tech products or processes. Within the industrial district model and in localized clusters the creation of new knowledge appears to be the output of localized agents' interactions. However, this is more the result of search strategies and random interactions, rather than a planned and deliberate effort in which R&D activities are involved as described in the standard economic model. Dynamic feed-backs and positive interactions are created along the productive *filière* and the various networks existing in each district/local production system, where firms co-operate in the manufacturing of the various components and sub-components. The generation of new knowledge (innovation) occurs via numerous sources: design and engineering activity, learning processes coming from the production departments, interactions with clients and suppliers, re-use and re-working of existing external knowledge.

This model has been defined by Belussi (2002) as a model of localized "interactive chains". It envisages the innovative process as a circular process with feedback and information links between markets needs, design, production and search processes. It recognizes that to create innovation many forces are at work: design and product development departments, production engineering departments, machinery producers, and customer suggestions. While standard economics treats the creation of new knowledge as a "one-shot" process, in industrial districts and localised clusters it is a type of continuous process. From time to time, the existing pool of knowledge is re-used, and re-combined with new knowledge, for contingent problem-solving goals, or for implementing new entrepreneurial ideas. This model points out the importance of innovation as a collective and historical process of accumulation of know-how.

Firms belonging to industrial districts are often not only innovative leaders but also fast adopters. What are the economic incentives to accelerate the process of adoption of innovations? To begin with, let us discuss the case where the innovation is freely available on the market. The original innovation, during its diffusion within industrial districts and local systems, has typically improved, and it changes considerably (in the cost of adoption, or in performance, or, again in other important intrinsic characteristics). The higher is the population of potential adopters, the higher is the generation of variety, and the higher is the probability that some modifications are introduced along the diffusion cycle. This appears to be the first advantage that firms enjoy. A second advantage is the existence of an ample range of firms endowed with differentiated capabilities and resources. This preserves the versatility of the local structure. A third advantage is the inter-firm linkages with the suppliers of machinery localized very often in close proximity. Porter (1990) has also noted this element. A fourth advantage relies on informal channels of information and knowledge sharing and transmission. They may be considered a collective sunk investment in immaterial capital (Antonelli, 2000).

The dominance of the industrial district model is particularly visible in Italy in both traditional sectors, and niches of industrial machinery (for instance: machine tools, medical instruments, and machinery for packaging).

In the first type of cluster, the strength of the innovative performance of the Italian firms lies essentially in the firm's design capability (this includes the ability to integrate innovative parts and components into products). In the latter, Italian firms

are sophisticated specialized suppliers and are able to provide specific applications to demanding customers (large multinationals, health institutions, mass-production oriented producers) in a segment of the market characterized by high quality performance. In this group of firms, engineering skills, product know-how, and understanding customers' requirements, are the major sources of incremental innovations and product customisation.

In relatively low-tech sectors, the accumulation of firm-specific competencies has implied a transformation of these firms into quite modern organisations, very different from the analogous firms existing in many developing countries.

Reducing costs via effective learning (learning by imitation and emulation)

The firm is a learning organization and the capacity for learning is related to individual skills, as well as the organization of the firm and the institutional set-up of the economy. The learning potential of firms increases as they form effective regional/local networks (Asheim, 1996; Amin and Wilkinson, 1999). Yet, individual skills are very difficult to transfer due to the tacit knowledge they incorporate (Howells 1995). However, personal contacts and interpersonal relationships may enhance the diffusion of this tacit knowledge among people sharing the same culture, traditions and history (Belussi, 2000). Organisational systems that enhance the potential to learn also reduce the costs of learning (European Commission, 1998, CEDFOP, 1999). When economic agents belong to the same "four spaces" - economic, organizational, geographical and cultural - the transmission of tacit knowledge becomes easier (Lundvall, 1992). Industrial districts and clusters meet these requirements, because they geographically concentrate firms in an area where people share the same culture and the same economic and organisational system. Geographically concentrated firms support and enhance the feasibility of transmitting tacit knowledge. Furthermore, it is widely recognized that knowledge is the crucial resource and that the process of learning is the most important process within modern capitalistic societies. Network relationships are indispensable to transfer knowledge but, in particular, that part of knowledge which is tacit and difficult to codify. Indeed, one of the reasons why firms establish networks is to gain access to such knowledge (Lundvall and Johnson 1994).

In some cases, within the Italian districts/local production systems, innovation diffusion is also a "sponsored" process. In order to control costs, compatibility and standardisation, producers typically press their subcontractors to adopt the more advanced models of new machinery just launched on the market. In any case, spatial proximity activates imitative and emulative behaviour ("learning by watching"). The dense net of social relationships acts as a means for accelerating the natural rate of adoption and for absorbing the inevitable spill over of knowledge. If innovation (and invention) is less protected, innovative firms have only a single chance to maintain their technological leadership. They must accelerate their rate of introduction of technical change. As in other cases discussed in the literature on innovation economics, competition is managed moving down along the learning curve or maintaining the lead-time. Among rival firms the "innovative" pressures become stronger. This accelerates the rate of adoption of technical change and, as a consequence, the international competitiveness of firms.

While intra-district diffusion may be accelerated, extra-district diffusion remains blocked by the existence of elements of tacit knowledge and by cultural barriers.
Thus, local bandwagon effects and production network externalities emerge, thanks to market-driven or voluntary and involuntary strategies of co-operation and "forced" quick adoption.

Benefits provided by dynamic localised external economies

Within industrial districts/clusters local external economies can be analysed in a Marshallian type of context, focusing on the advantages for local firms of utilising specialised skilled labour markets, special suppliers, and having access to local division of labour among firms. In a static approach these factors constitute what geographers call agglomeration economies. When a dynamic approach is applied (Belussi, 2001; Cohendet et al, 1993), the evolution of districts/clusters appears to be a local-specific phenomenon that involves open complex systems. The characteristics of these systems give rise to different dynamics, depending on the systemic efficiencies realised, and on the increasing return reached by the system that, as a whole, is more than the arithmetic sum of the single units (Carlsson and Jacobsson, 1996). This has to do with the ways in which new knowledge is generated, absorbed

and integrated in the local system that shows a distinctive character of embedded capital (Antonelli, 2000; Maskell and Malmberg, 1999). A recursive sequence of a cumulative growth-inducing mechanism can be described, and the various stages of growth of industrial districts/clusters can be modelled. Typically, in industrial districts and clusters each system starts with a small group of firms endowed with some artisan skills. At the beginning, a distinctive competence appears which can be mobilized by local productive forces. The origin of industrial districts/clusters (Belussi and Gottardi, 2000b) may be very different: a motor enterprise, a substratum of competencies embedded in small craft base firms, a public agent like an university able to develop crucial competence in an emerging high-tech field, playing the role of small firms incubator. In the case of Italian districts, initially, firms were characterized by being "phase-enterprises". Many high-tech clusters grow on the basis of public procurement and because high-tech final firms localised in the area demanding high-tech components (aerospace in Toulouse, or Taiwan), or exactly because an exogenous shock stopped public procurements (as in Silicon valley). What characterised the local system is that the governance of the local production cycle is highly decentralized among small entrepreneurs. Cost competitiveness (and self-exploitation by self-employed small entrepreneurs) may be typically the principal attribute of the start-up for traditional sectors while in high tech districts is the production of innovation and the relation with advancements in science the crucial factor.

Once the local system is able to capture a specific segment of demand, the growth-mechanism starts. In traditional industrial districts the first earnings are invested in the modernisation of production processes. This tends to maintain at a minimum level all the production costs. So, the shares of the national or international market initially acquired tend to expand. For high-tech sectors as Saxeninan (1985) has emphasised, is not just the reaping of agglomeration economies that counts, but the ability to respond to fast-changing markets and technologies, and the existence of a social and institutional setting able to promote innovation.

When demand increases the returns from a further division of labour among firms can be locally organised. Specialisation increases economies of scale and may induce the generation of new knowledge with the introduction of incremental innovations. In turn, this renders the local production system more competitive. The proximity of

agents forms an integrated system where interactions are fluid. Over time many channels (both informal and institutionalised) are created through which information and knowledge circulate quickly within the productive matrix of subcontracting and specialized firms.

The capability of combining "dispersed pieces of knowledge" (Hayek, 1945), within these channels, is intensified when the proximity of agents allows for repeated interactions. So, the evolutionary pattern of diversification among the various local production systems starts, depending on the type of learning they are able to develop. Using their absorptive capability, firms change and continuously improve their performance in products and processes (Cohen and Levinthal, 1989 and 1990). If the cumulated effect of changes is radical, the competitiveness of the local systems may be affected and its (national or international) market shares will grow again. A higher volume of production allows a greater division of labour among enterprises, and the sequence begins again.

The evolutionary path of growth of industrial districts/clusters starts with the growth of a few firms: the founders of the district. Knowledge propagation is achieved *via* the entrepreneurialisation of technical and professional people within the founder firms. Their level of professionalism allows them to leave their employer and become small independent entrepreneurs themselves. The industrial structure expands through a process of "scission of firms" (just as in biology we describe the "cellular reproduction") . Subsequently, new waves of spin-offs occur, populating the district with small innovative producers. This process, thus, is highly path-dependent, and it is built up upon a nucleus of original local skills and competencies.

The production chains organised within industrial districts/cluster are subject to a continuous rebalance: a sequence of nearly infinite micro readjustments. There is no centrally planned unit that governs these systems. The industrial district/cluster model represents a type of a Hayekian model of decentralised coordination, where market regulation crosses the sphere of resource allocation. This exploits organisational efficiency and incentives, achieving a high level of economies of scale and scope within a market model (Choo, 1998; Cohen and Sproull, 1996). Industrial districts/clusters are not just productive systems, but an inter-organisational hyper-network (Biggiero, 1999), composed of a large population of firms (leading firms and routinised producers), local institutions, research centres consortia, and

entrepreneurial associations.

The number and kinds of links between the industrial district members are very high and determine district density (Baptista, 2001). Typically there are many localised production networks, with different degrees of stability (Belussi and Arcangeli, 1998). Adopting the Marshallian static view, the population of firms can be compared to the separate departments of a single large firm, on the same scale as the total activities of an industrial district. On the contrary, the mechanism that leads to a highly localised dynamics has a different competitive nature, because it is related to the consequence of repeated firm interaction, differentiation, mutation, selection and individual firm growth patterns. This process needs time to be fully exploited. Clearly, in the end, the dynamic efficiencies realised within each industrial district/cluster may be greater than the individual efficiency of a large firm. Here learning processes occur thanks to the accumulated output realised by the district firms which is correlated to the experience of firms (Pine & Gilmore , 1999).

As a matter of fact, the point of observation of an industrial district/cluster is not the individual firm, isolated from its productive context, but the integrated matrix of firms located in a determined area. Then we have to consider that, in many industrial districts/clusters large firms are contained within the industrial structure of the district. Firms belong at the same time to numerous networks, where they establish relations of co-operation, dominance, knowledge and information exchange, and imitation. Synergies are obtainable, at system level, only if there is a significant co-ordination of activities. So, large territorially based production networks, thanks to their inherent efficiency, may show a better performance than that of large verticalised firms. Since specialised firms that co-operate in the manufacture of a certain product cannot be seen as competitors: they belong to the same production matrix and constitute an explicit co-ordination network.

Another important feature resides in the process of cognitive division of labour among firms. The notion of cognitive division of labour evolved from the thought of Adam Smith. However, while Smith is often quoted only for the division of labour related to the increase in productivity of partitioning tasks (an intra-firm division of labour), the cognitive division of labour focuses on a general societal process of division of labour, focused on inter-firm division of labour that operates on a system level within each industrial structure (an inter-firm division of labour). The process

envisaged here is one of slow differentiation and specialisation of firms, which can be further, qualified (Belussi, 1996).

In this schematic description of the systemic specialisation of the industrial structure, the most important category of firms identified is the final firms or (final) end-assemblers. They devote much of their resources to the more creative tasks of product design, engineering, marketing, innovation, and new product development. In each local industrial district final assemblers are at the centre of the cognitive division of labour and typically they specialise in the less routinised activities. These strategic agents are the dominant actors of the productive *filière*. In fact, the average level of innovation in each industrial district/cluster depends greatly on them. On one hand, they are responsible for the absorption of external knowledge that always needs to be adapted quickly to local conditions and socialised by the firms belonging to the networks of subcontractors and specialised producers. On the other hand, given their position in the chain of interactions between producers and final users (with their *antennae* in markets that put them in direct contact with the consumer needs), they are able to make original innovations, particularly in products. Very often final firms compete on international markets.

Other firms specialise their activities in the production of intermediate strategic components and often develop a crucial competence for the final assemblers. They may be called specialised suppliers. The presence of this type of firms leads to externalities and spillovers of knowledge. Over time, the accumulation of localised knowledge occurs. This influences the intrinsic quality of the components (and semi-finished goods), their average cost, their level of differentiation and innovativeness. This increases the global competitiveness of final firms.

Finally, industrial districts/clusters are populated by decentralised producers (routinised subcontractors). They possess a lower level of specific knowledge, and are typically specialised in simpler production activities. The high level of production decentralisation that we can observe within industrial districts/clusters reduces, as a whole, the internal governance costs of the entire system. A vast majority of districts/clusters firms lack economic autonomy: they perform routine activities usually subcontracted by the final assembler.

In many cases, during time, the districts/clusters have experimented a growth of their market shares at international level; this has increased the scope of the

specialisation process and the division of labour among firms. Thus, the system has become even more competitive, in a recurring run between efficiency and growth of the districts/clusters international market share. Therefore, scale and scope economies have been more widely exploited.

In this interpretation, the cognitive division of labour among firms structurally imposes firm diversity. This also explains why districts/clusters are populated by differentiated agents: routine producers, innovative agents, and collective meta-organisers or problem-solving actors (the district's regulative institutions).

First mover advantages

First mover advantages are related with lead-time innovation. It gives cost advantage to producers enabling them to retain competitive advantage even if some other producers could potentially supply the same goods or services more cheaply, because in the mean time the product manufactured by the first producers can be significantly improved in terms of quality or performance. Since these potentially competitors are not first movers, it is difficult for them to compete because they cannot gain the agglomeration economies which are typical within industrial districts and clusters. Thus, a pattern of specialisation established, for example, by "small events" (Arthur, 1989) or by "historical accident" might persist even when new producers could have lower costs if they could form geographical concentrations and thereby reap external economies of scale (Krugman 1995). This is because, in the old district, a pattern of knowledge accumulation occurs, which tend to re-enforce the abilities of firms to introduce better products, or differentiated products, shifting competition from costs to innovation and quality. These advantages explain many examples of national export success as the result of self-reinforcing clusters or industrial districts, where first mover advantage of firms in some particular industries has led to a continuing international competitiveness (Porter 1990 and 2000; Belussi, Gottardi and Rullani, 2002).

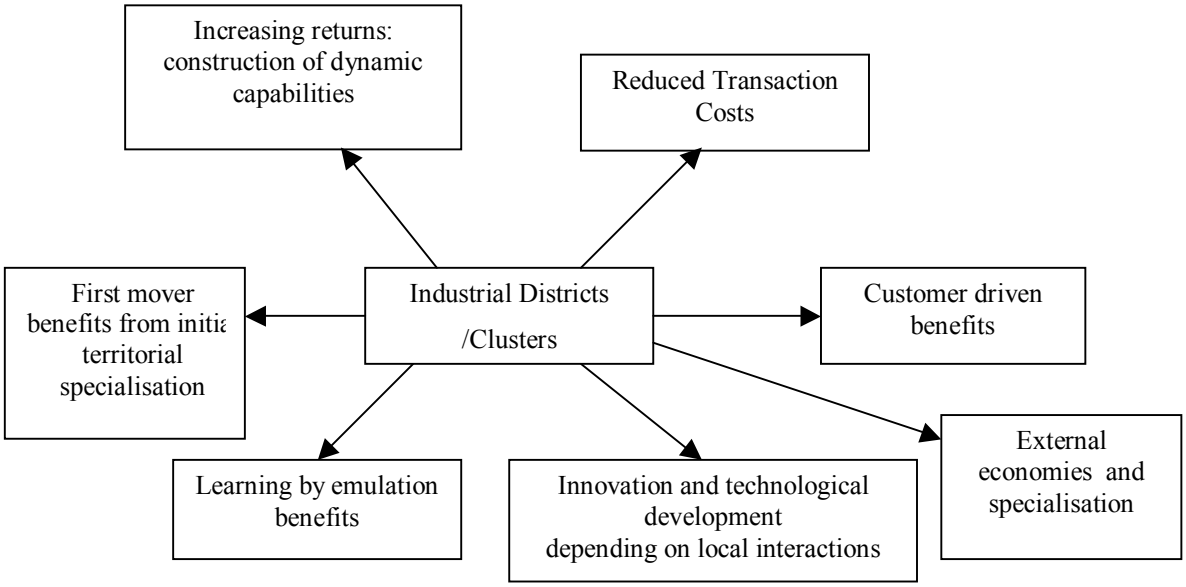
Customer driven organisations and product diversification advantages

In market where non-price competition is a crucial element, quality advantages and

advantages related to being a customer driven organisation are an important part of the competitive environment (Porter, 1990). In these markets, firms must provide the quality of products and services that are demanded. Firms are, therefore, obliged to obtain suitable factors of production in order to supply what the markets require. In this case, proximity plays a crucial role because firms, organizations and people are related in networks where continuous changes are built-in and monitored. Localised firms acquire specific absorbing capability of new ideas and technological innovations, often suggested by the same clients (Biggiero, 1999; Belussi, 2002). This model can be contrasted with that one of the Fordist verticalised firm, where innovation is centrally planned and confined in separated ad hoc departments, without closer links with firm suppliers and with others department of the firm organisation. Quality advantages can also arise from access to localised skilled labour (Pyke, et al, 1990), from rapid local diffusion of innovation (Antonelli, 2000) and, more generally, from the adoption of flexible production systems to overcome problems of differentiation, adaptation and compatibility (Piore and Sable, 1984).

The competitive advantages of geographical concentrations are illustrated in Figure 3.

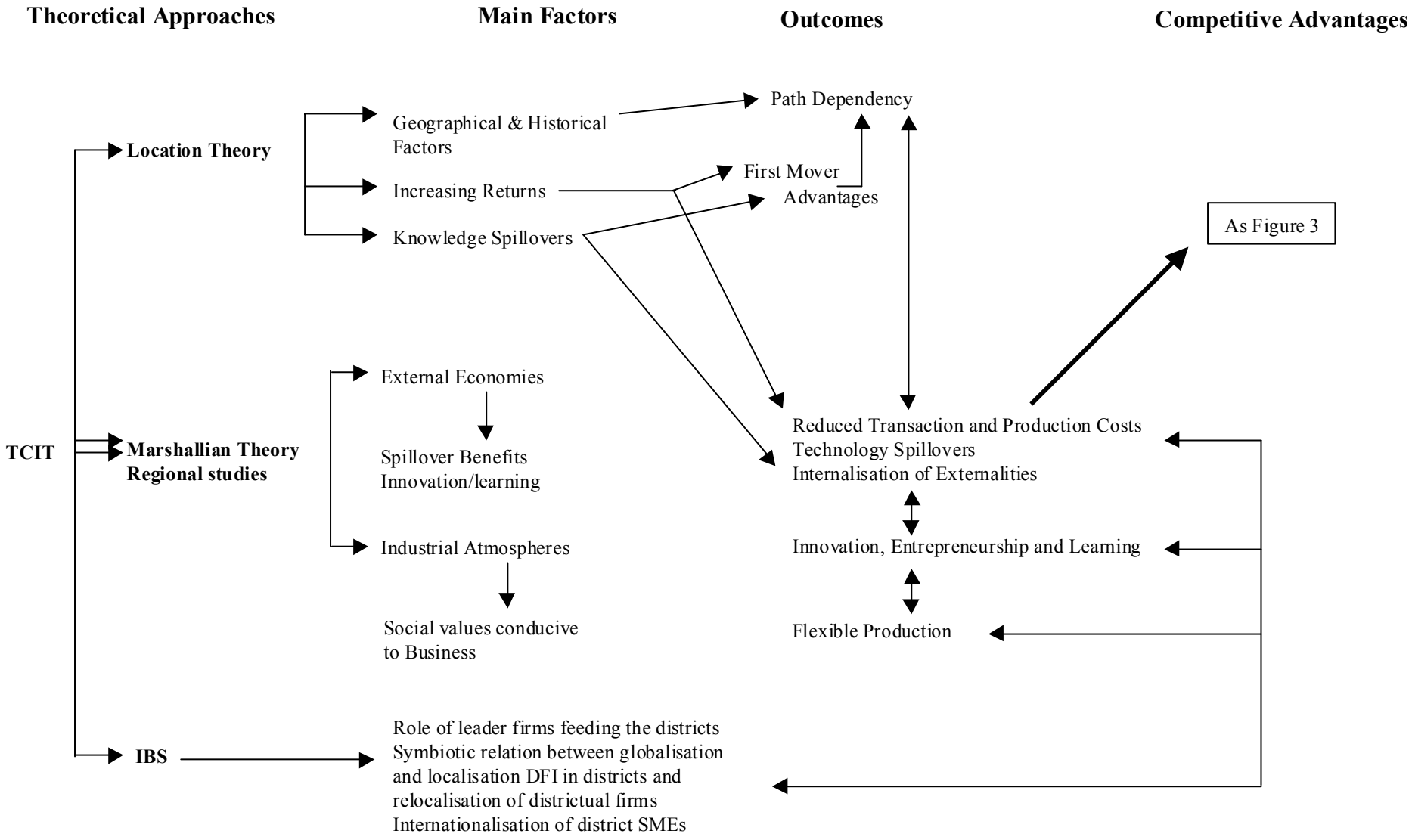
Figure 3 Competitive Advantages of Industrial districts and clusters



2.4 Main factors leading to competitive advantages

The review of the main strands of the literature in this section and consideration of the possible competitive advantages from membership of industrial districts/clusters indicates that the Marshallian theory has provided the major background to the study of geographical concentrations. However, location theory has also made a significant contribution, especially with regard to the path dependent nature of 'successful' clusters arising mainly from historical and geographical factors. The dynamic aspects of "distrectualisation" (Becattini, 2002b) were highlighted by the Italian Marshallian School and by regional studies literature. The international business strategy (IBS) has exercised an increasing influence on work in this area. The contribution of transaction cost and institutional theory (TCIT) was indirect, but after the seminal contribution of Dei Ottati and Grabher there is a growing interest on this area and a forthcoming fusion between TCIT, Marshallian theory and post-Marshallian approaches. Figure 4 provides an illustration of the influence of these theoretical approaches to the study of the factors that are important in delivering superior competitive performance in firms located in industrial districts/clusters.

Figure 4 The Main Factors Leading To Competitive Advantage



2.5 Empirical studies on industrial districts/clusters

Since the illuminating writing of Marshall, the issue of the industrial district has remained latent in the economic literature until the rediscovering made by Becattini, during the early 1980s of the new unit of analysis, the industrial district, placed between the notion of the firm and the industry. The work of Becattini was supplemented by a rich series of empirical studies, such as the textile district of Prato which became a paradigmatic case able to furnish the theory with the necessary evidence provided by the facts: IRPET (1969), Becattini (1975), Sforzi (1987). Along the analytical perspective launch by Becattini, other Italian economists develop interesting analyses on the "peripheral development" of the Third Italy, and on "local systems of production" based on the specialisation of small firms, initiating a long drift towards the methodological appreciation of individual empirical case studies[7] (Garofoli, 1978; Bagnasco and Trigilia, 1984). During the 1980s and the 1990s a flourish literature grew on industrial districts around the work of some Italian journals, like *Sviluppo locale*, *Economia Marche*, *Economia e Società Regionale-Oltre il ponte*, *L'Industria,* and *Economia e Politica Industriale*. They were publishing the contributions of the various groups of research clustered around the Florentine school (Becattini, Bellandi, Dei Ottati and Sforzi), the Veneto area (Rullani, Di Bernardo, Mistri, Pilotti, Belussi, Gottardi, Corò, and Anastasia), the Emilia Romagna group (Brusco, Bursi, Lorenzoni, Russo and Solinas), and the Milanese section of the French "innovative milieux" school (Camagni, Cappello, Rabellotti and Gambarotto).

Numerous collective works, containing empirical case studies, both published by Italian or international publishers, have enriched the theoretical interpretation of the industrial district model (Bellandi and Russo, 1994; Pyke, Becattini and Senbenberger, 1990; Cossentino, Pyke and Senbenberger, 1996; Dei Ottati, 1995, Corò and Rullani, 1998; *Human System Management*, 1999; Garofoli, 1991b; Belussi and Gottardi, 2000; Belussi, Gottardi, and Rullani, 2001, *Small Business, 2000*; *Journal of Industry and Studies, 1996; Cambridge Journal of Economics,* 1999; *L'industria,* 1998; Benko and Liepitz, 1992; Varaldo and Ferrucci, 1997; Onida , Viesti, and Falzoni, 1992; Becattini, 2001; Camagni, Fiorentini, and Mistri, 2002; IPI, 2002).

[7] See the rich bibliography presented by Bellandi , section B2 (1989).

This literature, based on the concept of the Marshallian district, can be juxtaposed to the stream of research on the clusters, which has a more international scope, and that interpreted the phenomenon of local agglomeration as high-tech districts, technolopole, local clusters, and local agglomerations as loci of spillovers (Antonelli, 1994; Keeble and Wilkinson, 2000; Bania and Eberts, 1993; Biggiero, 2002; Braadlan and Hauknes, 2000; Castella et al, 1999; Cooke, 1999; Cooke *et al*, 2000; Cooke and Huggins 2002; Cook *et al*, 2000; Feldman and Autretsch, 1999; Feldman, 1999; Fujita and Ishii, 1998; Fujita and Mori, 1996; Glasmeier, 1999; Longhi, 1999; Pandit *et al*, 1999; Porter, 1990; Pvalik, 1999; Swann, et al, 1998; Harvard Business School, 2002; DTI, 2001; UNIDO, 1995 & 2001; OECD, 1999 and 2001; European Commission, 1998, 1999 and 2001, plus re-location studies in Guerrieri and *et al*, 2001).

Large-scale quantitative studies have also found beneficial competitive effects as well as positive employment effects from clustering (IPI, 2002; DTI, 2001; Harvard Business School, 2002). There is also evidence that firms outside of industrial districts and clusters do not capture these benefits, at least to the same extent (Enright and Ffowcs, 2000; Swann *et al*, 1998; Signorini, 1994). Appendix to this document includes large lists of studies that provide evidence of the positive advantages that are available from Italian industrial districts and from effective locally based innovation and learning communities. A small number of studies raise questions about failure of industrial districts/clusters to deliver beneficial outcomes on the factors affecting lock-in, and structural blockages (Hochman, 1992; Ganne, 1992; Zeitlin, 1995; Pouder and St John, 1996; Portes and Landolt, 1996; Provasi, 2002; Hassink, 1997, 2001; Grabher, 1993b; Enright, 2001).

Some of the attempts to investigate these issues provide an indication of the variety of factors that are involved in organisational systems, such as, the geographical extent of industrial districts/clusters, types and size of firms and the complexity of the business networks and socio-economic underpinnings of industrial districts/clusters (Markusen, 1996; Enright, 2001; Jacobs and de Man, 1996). Others seek to distinguish between national, regional, supranational regional and local networks such as those defined by Porter (Bergman, 1998). Attempts have also been made to classify the evolution of organisational systems in industrial districts/clusters (Belussi, 1996; Belussi and Arcangeli, 1998; Belussi and Gottardi, 2000; Rosenfeld, 1997). Organisational theories, largely based on transaction costs theories, (Granovetter, 1985; Nohria and Eccles, 1992; Storper and Harrison, 1992; Uzzi, 1986) have provided the basis for very large organisation theory based literature that seeks to analyse the

organisational systems that permit industrial districts/clusters to capture increasing returns to scale, externality benefits and innovation and technology advantages.

There are also many studies that extend this organisational theory literature by investigating the role of trust, socio-economic networks and inter-organisational networks as means to create, develop or sustain industrial districts (Amin and Cohendet, 2000; Biggiero, 1998; 1999 and 2001; Castilla *et al*, 2000; Garofoli, 1991a; Lazerson and Lorenzoni, 1999; Paniccia, 1998 and 2002, Stalber, 1998). The links between particular institutional structures and organisational systems, particularly using the concepts of national or regional business systems and innovation and learning communities, have also been the subject of many studies (Amin and Thrift, 1994; Amin and Malmberg, 1992; Asheim, 1996; Keeble *et al*, 1999; Keeble and Wilkinson, 2000; Lorenzen, 2001; Maskell and Malmberg, 1999; Nooteboom, 1999). Much of the learning communities literature is based on the value of local networks (normally based on socio-economic networks where high levels of trust that ease the problems of conveying and understanding tacit information) that enhance the learning communities ability to be innovative thus enabling the tackling of problems emerging from technical change, increasing competition (often regarded as coming from the process of globalisation) and negative externalities such as rising input prices and congestion (Howells, 1990; Lundvall, 1992; Lundvall, 1999; Lundvall and Borras, 1998).

Markusen established a complex typology of the organisational structure of industrial districts based on the observation of the differences between US and Italian geographical concentrations (Markusen, 1996). This typology includes detailed classifications based on geographical coverage, links between different industrial districts, organisational structures, market structure, linkages to supporting organisations and agencies. Markusen's typology has been refined to reflect new conditions affecting Italian industrial districts, especially the pressures arising from globalisation (Guerrieri and Pietrobelli, 2001).

These types of typologies are useful as they focus on the many and complex factors that impact on industrial districts/clusters. However, they require very large amounts of quantitative and particularly qualitative data to be operationalised and they need extensive modification to account for changing economic and social environments. Furthermore, they appear to lead to a large number of typologies. As the empirical basis of most of these typologies comes from case studies there are nearly as many typologies as case studies. The terms used to describe or classify factors are many and there is often no agreement on what these terms mean. Thus, industrial districts are variously-tight socio-economic networks of

SMEs, in a fairly small geographical area that permits the reaping of Marshallian proximity benefits (Becattini, 1990; Brusco, 1982); a congregation of multiplant firms largely based on subcontracting (Belussi, 1992); canonical industrial districts based on SMEs reaping externalities via a variety of complex organisational forms but founded on inter-organisational systems normally based on trust (Paniccia, 2002); "hub and spoke" industrial districts based on few large firms with many small firms and agencies linked to the hubs (Markusen, 1996); complex local, global and regional networks based on re-location to meet the challenges of globalisation and technical change some of which involve only very limited inter-organisational interaction (Guerrieri and Iammarino, 2001; Guerrieri and Pietrobelli, 2001). Innovation and learning in industrial districts can be radical or incremental (Belussi and Gottardi, 2000; Guerrieri and Pietrobelli, 2001). Industrial districts can be state driven by policies that encourage network developments (Markusen, 1996); largely an offshoot of science parks connected to excellent universities (Bania and Eberts, 1995; Cooke and Huggins, 2002); many industrial districts and clusters are deemed to be mainly driven by the process of globalisation (Biggiero, 2002; Guerrieri and Pietrobelli, 2001; Ernst *et al*, 2001).

Table 1 Some examples of industrial districts/clusters empirical studies

Study	Country/Industry	Focus	Approach	Main Findings
Audretsch (2001)	Clusters in US cities	Role of regional clusters in helping firms to adapt to pressures of globalisation	Study of innovation in US cities using econometric estimates	Knowledge spillovers resulting from proximity in cities helps firms to adjust to globalisation by providing knowledge bases that cannot easily be transferred
Bergman & Feser (1999)	Clusters in North Carolina	Importance of geographical proximity for cluster development	Measurement of 'spatial tightness' - geographical proximity - between firms using employment data & distance between firms	Spatial tight clusters tended to develop faster both in expanding and contracting size and interconnections within clusters
Braadland & Haukne (2000)	Food cluster in Norway	Detailed study of innovation & supplier networks & industrial structure	Case study describing relationships & industrial structure	Food cluster is a complex and evolving phenomena
Brown & Bell (2001)	Clusters in New Zealand	Importance of business networks in generating marketing, production, & distribution and in boosting performance	Survey of SMEs	Externalities and networks within clusters important for development & helping SMEs to internationalise
Chaminade (1999)	Information Tech & Communications (ITC) in Spain	ITC cluster in Spain	Input-output analysis & survey of innovation flows	Public policies helped effectiveness of cluster development

Study	Country/Industry	Focus	Approach	Main Findings
Charles & Benneworth (2000)	High-tech clusters in the UK	Importance of high-tech clusters for innovation in Scotland, Thames Valley & Cambridge	Use of location quotients to identify clusters with case studies to explore the development of clusters	Successful clusters are based on effective learning backed by public policies
European Commission (2001)		SEE paragraph 3.1		
European Commission (1998)	Comparative study of high-tech clusters in Cambridge, Oxford, Goteborg, Helsinki, Munich, Sophia-Antipolis, Grenoble, Barcelona, the Randstad, Pisa/Piacenza/NE Milan	Investigation of innovation and R&D networks, role of multinational corporations in cluster development & innovation and learning communities & public policies	Case studies using mainly qualitative data	Networks important for innovation & learning as are multinational corporations and public agencies such as Universities and public R&D Agencies
Cook, Pandit & Swann (2000)	Cluster in Broadcasting in the UK entry by new firms	Growth of cluster, technological spillovers, & growth of congestion costs	Econometric estimation of spillovers and entry	Companies in clusters grow faster than those not in clusters, spillovers are significant for growth, entry into clusters mainly by supporting firms - congestion costs rise as cluster develops

Study	Country/Industry	Focus	Approach	Main Findings
Den Hertog & Maltha (1999)	Information Tech & Communications (ITC) cluster in the Netherlands	Evolution of ITC cluster the Netherlands	Input-output analysis& survey of innovation flows & performance measures such as exports and output	Found evidence of improved performance by firms in clusters
DTI (2001)	SEE paragraph 3.1			
Guerrieri & Iammarino (2001)	Textile and clothing industrial districts in Italy (Prato, Termamo Carpi)	Evolution of clusters in the face of increased competition from lower cost producers	Survey on performance-exporting, output and innovation flows	Tendency for industrial districts to re-locate parts of operations to cheaper locations but that benefits of 'industrial atmospheres' helps to retain core business in district
Harvard Business School (2002)	SEE paragraph 3.1			
Haukes (1999)	Norwegian Clusters	Clusters and Innovation	Input-output analysis & Survey of Innovation flows. No investigation of proximity	6 clusters identified responsible for 62% of Norwegian GDP and 42% of employment.
Heath (1999)	Canadian High-Tech clusters	Evolution of a cluster in Ottawa and links to public policy	Survey of firms and supporting agencies	Cluster development appears to be mainly due to changes to competitive and technology environments and public policies

Study	Country/Industry	Focus	Approach	Main Findings
Kuo & Wang (2001)	Clusters in Taiwan (Taipei City)	Rise of electronic cluster in Taiwan assess importance of innovation flows, network, government policies & multinational corporations	Survey of firms in area of Taipei City	Growth of electronic cluster to counteract decline of textiles & clothing industries has been successful but the evidence on effects of proximity is not strong
Marceau (1999)	Australian Clusters	Are clusters simply co-located or are they underpinned by networks	Input-output analysis & case studies	Many Australian clusters appear to be primarily based on co-location with limited intra-firm networks.
OECD (2001)	SEE paragraph 3.1			
Sternberg (2001)	Role of clustering in German regions	Innovation in regions	Use of location Quotients to identify clusters with statistical analysis on age of firms, start ups and link between proximity & innovation	Proximity not sufficient requirement to lead to benefits from clustering - new firm start ups best way to stimulate innovation
UNIDO (1995)	SEE paragraph 3.1			

Section B

3.0 Types of Industrial districts and clusters

The literature suggests a wide variety of definitions, approaches, and terminologies, to describe the concept of industrial districts/clusters. Furthermore, the theoretical and empirical work on industrial districts/clusters has investigated a host of different factors. Figure 4 illustrates the main factors with the complex interactions that it is argued are at work in industrial districts/clusters, while Figure 5 outlines the main definitions of industrial districts/clusters that can be found in the modern literature. From these definitions it emerges first, that there are some "common" elements in the various streams of the literature, second, that, among many authors, it can be observed a convergent trend towards something like a "unified" perspective of analysis (see in Figure 5: Maskell, Asheim and Isaksen and Cook and Huggins).

Clearly, there exists many different ways to classify industrial districts/clusters and the process of distrectualisation (Becattini, 2002b) of local economies and clusters (Bergman, 1998; Jacobs and de Man, 1996; Markusen, 1996); a host of organisational and structural differences exist in industrial districts (Paniccia, 1998; 2002).

Several attempts have been made to find common ground based on the identification of generic factors that can be used to define geographical concentrations into a manageable and useful classification system (Sforzi and Lorenzoni, 2002, Brown and McNaughton, 2002, Enright, 2001; Paniccia, 2002, Biggiero, 1998, 1999). Some of these classifications have also sought to classify and define the stages of evolution of industrial districts/clusters (Rosenfield, 1997; Belussi and Arcangeli, 1998; Belussi and Gottardi, 2000; Brown and McNaughton, 2002).

Italy has a long tradition in the identification of industrial districts (IPI, 2002), both using qualitative information and statistical analyses, based on disaggregated data, while there are also at least two major country studies that have sought to define and measure clusters (DTI, 2001; Harvard Business School, 2002), a benchmarking exercise by the EU to learn from best practice among seven automobile clusters in Western Europe (European Commission, 2001), another benching marking exercise by UNIDO to help cluster growth in developing countries (UNIDO, 2002); a project for the large scale sharing of case study material organised by the OECD (2001a) and a study on innovation and clusters (OECD, 1999).

Figure 5 Main definitions of industrial districts clusters

INDUSTRIAL DISTRICT S

Pyke and Senberger (1990, p. 16-17), "Industrial districts are geographical defined systems, characterised by a high number of firms active in different stages and in different modes of the production of a homogeneous product. A significant characteristic is that a large part of these firms are small firms or very small firms….The various districts are specialised in different products with various degrees of complexity and with different final uses. ... A characteristic of the industrial district is that it has a to be thought as a unique unity, a social and economic system… The population of district small firms is not just a productive aggregate. What renders this more specific is the special systemic way with which they are organised and the ways in which they relate to each other and with the environment…Important is the fundamental role played by the various forms of cooperation among the firms that is communitarian" [translated from the Italian version].

Becattini (1990, p. 52-53) "The industrial district is defined as a socio-territorial entity, characterised by the active co-presence, in an area territorially circumscribed, naturalistically and historically determined, of a community of people and a population of industrial firms. Within the district, differently from what occurs in others environment (for instance the manufacturing city), the community and firms tend, as we can say, to penetrate one other. The fact that the dominant activity is that one industrial differentiates the district from a generic 'economic region'. The self- containment and the progressive process of division of labour, together with the realisation of productive specialisation, produces a growing surplus of products that can not be sold in the district. …This surviving condition imposes a connection of the district with a stabile net of suppliers and clients. An economic definition of the district, adequately inclusive, thus, must add to the local characteristics… this stable nets, and also the interactions of this with the others elements… This stylisation and problematisation has been freely extracted by myself from the studies on industrial districts conducted up to now and from the few theoretical hints that I am aware of."

INDUSTRIAL DISTRICT S → CLUSTERS

Paniccia (2002, p. 6) "the term industrial district [can be operationalised].. to denote the agglomeration of small and medium-sized firms specialized in one or a few industries in a bounded area. This 'agnostic' definition of industrial districts is comprehensive enough to include areas showing different organizational arrangements and avoindustrial districts and clusters qualifying the industrial

district with precise socio-economic features (for example, horizontal and vertical networking, innovativeness, cooperation, trust, and so on) which imply different theories."

CLUSTERS

Porter (1998, p. 199), "A cluster is a geographically proximate group of interconnected companies and associated institutions in a particular field, linked by commonalities and complementarities".

Crouch and Farrell (2001, p. 163) "The more general concept of cluster suggest something looser: a tendency for firms in similar types of business to locate close together, though without having a particular important presence in an area".

Rosenfeld (1997, P. 4) "a cluster is a very simply used to represent concentrations of firms that are able to produce synergy because of their geographical proximity and interdependence, even thought their scale of employment may not be pronounced or prominent".

Feser (1998, p. 26) "Economic clusters are not just related and supporting industries and institutions, but rather related and supporting institutions that are more competitive by virtue of their relationships".

Swann and Prevezer (1996, p. 139) "Clusters are here defined as groups of firms within one industry based in one geographical area".

Roelandt and den Hertag (1999, p.9), "Clusters can be characterised as networks of producers of strongly interdependent firms (including specialised suppliers), linked each other in a value-adding production chain".

Van der Berg, Braun and van Winden (2001, p. 187) "The popular term cluster is most closely related to this local or regional dimension of networks. Most definitions share the notion of clusters as localised networks of specialised organisations, whose production processes are closely linked through the exchange of goods, services/or knowledge".

Enright (1996, p. 191) "A regional cluster is an industrial cluster in which member firms are in close proximity to each other".

Lundvall and Borras (1997, p. 39) "The region is increasingly the level at which innovation is produced through regional networks of innovators, local clusters and the cross-fertilising effects of research institutions".

CLUSTERS → INDUSTRIAL DISTRICTS

Maskell (2001) The term cluster is used synonymously in the literature together with industrial agglomeration or localisation, while the term industrial district …is often applied when wishing explicitly to emphasise to values and norms shared by co-localised firms….*The horizontal dimension of the cluster:* "Clusters exists because of locational economies that are independent of the internal degree of interaction… the sole requirement is that many firms undertaking similar activities are placed in circumstance by co-locating.where they can monitor each other constantly, without effort or costs... *The vertical dimension of the cluster*: Only by a steady increase in the number of firms in a cluster it would be possible to create knowledge simultaneously by variation and by division of labour.

Asheim and Isaksen (2002, p. 2) "The crux of the regionalisation argument is that the regional level, and specific local and regional resources may still be important in firms' effort to obtain global competitiveness…firms in the cluster relay on unique regional resources and local are cooperating when innovating" .

Cooke and Huggins (2002, p. 4) "Clusters are geographically proximate firms in vertical and horizontal relationships, involving a localised enterprise support infrastructure with shared developmental vision for business growth, based on competition and cooperation in a specific market field".

Source: partially based on Martin and Sunley (2001) and other sources

3.1 Major studies on industrial districts/clusters

A number of major studies have recently been activated by governmental bodies to help to clarify our understanding of what constitutes a geographical concentration of firms, to assess their effects, and to help devise policies that might help promote the development of such concentrations. The main studies are:

- World Congress on Local Clusters Study (OECD, 2001)
- EU study on automobile clusters (European Commission, 2001)
- UNIDO studies on industrial clusters in developing countries (UNIDO, 2001)
- OECD study on innovation and clusters (OECD, 1999)
- Study on industrial clusters by the Harvard Business School (Harvard Business School, 2002)
- DTI survey of clusters (DTI, 2001)

OECD Local Clusters Study

The World Congress on Local Clusters by the OECD is based on a large number of case studies of industrial districts/clusters presented at conferences (with abstracts available on www.oecd.org). The case studies cover a wide range of developed, developing and emerging countries and embrace a large number of operational, organisational and policy issues. Different approaches are here taken into account and there is no national surveys based on a consistent classification system, for industrial districts/clusters in terms of industry or sector specialisation, typical size of firms, and nature and extent of the local networks. The main value of this study is that it provides a wide range of rich qualitative data on industrial districts/clusters in many different parts of the world.

EU study on automobile clusters

The EU study is based on an investigation of automobile clusters in seven European regions.

- Nordrhein-Westfalen - Verbundinitiative Automobil
- Styria (Austria) – Acstyria
- upper Austria – AC, Autoomobil-Cluster
- Wales – WAF
- Piemonte – CISFI
- Nord-Pas de Calais – ARIA
- Basque country – ACICAE

The objective of the study was to assess the requirements to create and develop transnational regional clusters based on networks of SMEs by establishing the conditions necessary to create networks across European regions by subcontracting, exchanging information and knowledge and creating systems to encourage cross-frontier systems to encourage entrepreneurship and innovation. The study sought, by use of questionnaires and interviews and assessment of data, to promote 'best practices' to establish and develop transnational regional clusters. Policy recommendations were made (at local and regional level) in the areas of support for information and communications, cooperation, training and marketing. The policy recommendations also included a sequencing process.

Upgrading of regional networks ⇨ exchange of experience ⇨ agreement of regulations and standards ⇨ creation of basic infrastructure ⇨ involvement of enterprises in provision of support services ⇨ creation of relationships between enterprises.

A blueprint for accomplishing this process was also draw up, which includes practical issues such as creating a database, organising meetings and advice on obtaining support from governmental agencies at EU, national and local level. The study clearly identifies the major problem as dealing with cultural and institutional differences in transnational regional clusters, and proposes that gathering information on these differences and establishing problem solving systems is the answer to these difficulties. The full report is available on http://forum.europa.eu.int/irc/sme/euroinformation/info/data/sme/en/library/studies.html

This study provides a practical and clear system to establish and develop policies to encourage the emergence of transnational regional clusters. Therefore, it provides also useful information to help develop policies to promote such clusters between West and East Europe. However, the study is based on clusters in a particular industry and all potential partners are located in Western Europe.

Adjustments, therefore, need to be made for different industries and for the large differences existing in the institutional, cultural, organisational and infrastructure conditions between West and East European countries. Moreover, the study assumed that it was worthwhile engaging in the investments necessary to create and develop these transnational regional networks and that the partners were located in the 'correct' places and had the appropriate skills, capacities and assets that were desired by participants in the existing clusters.

This implies that a lot of work needs to be done to identify where existing clusters are well performing in order to desire EU integration with the formation of such transnational regional clusters before the blueprint for policy development and implementation can be used. This implies the need to identify clusters/ industrial districts and assess their network connections, level of development, direction of evolution, and abilities to deliver high external economies, learning and innovation.

UNIDO studies on industrial clusters in developing countries

The UNIDO studies focus on the problems that SMEs in developing countries face that limit their ability to compete in domestic and international markets (UNIDO, 2002; Nadvi 1995). The studies suggest that SMEs in developing countries can acquire competitiveness through clusters not only to take advantage of low labour costs but also by combining low labour costs with innovation led clusters, able to develop high quality and functionally flexible production systems (Humphrey and Schmitz, 1995). The recommended means to develop such clusters is to use benchmarking to identify the roots of successful networking among SMEs in existing clusters and to apply the lessons to the emerging clusters in developing countries.

This approach has similarities to the type of policies and programmes outlined in the EU study on automobile clusters (UNIDO, 2001; Ceglie and Dini, 1999) and is subject to similar reservations as the EU study. In particular, the need to identify emerging clusters that are capable of delivering high proximity benefits and to assess the problems and difficulties of finding and developing organisational systems that will effectively work in the context of the institutional setting in which these organisational systems operate.

The UNIDO studies and the EU study on automobile clusters provide useful guidelines on

the types of policy frameworks and programmes that are helpful in transferring best practices across national and cultural frontiers. However, they are dependent on prior identification of emerging clusters and on the conditions necessary for the creation of 'successful' clusters in the locations that are subject to the benchmarking exercises.

OECD study on innovation and clusters

The OECD study – Boosting Innovation: The Cluster Approach (OECD, 1999) – investigates the contribution of clusters to innovation applying the concept of National Innovation Systems (NIS) to a more disaggregate level of local systems. The OECD study places the investigation of clusters firmly in the context on innovation, the knowledge based economy and learning communities. This approach links the interactions of producers, users and research communities to the institutional setting in which these actors are embedded. The focus is on the knowledge based and learning community as the driving force of innovation (Lundvall, 1992 and 1999). The role of networks to boost social capital accumulation and the use of strategic alliances (Dunning, 1998 and 2001) to encourage learning to boost innovation links the idea of the learning community to various types of clusters. Three major types of cluster are identified in the OECD study (Roelandt and de Hertog, 1999).

1. Macro – national level clusters of industry groups.
2. Meso – branch or industry level groups based on inter and intra firm linkages
3. Micro – specialised supply chains (inter-firm linkages) based around one or more core firms (the geographical extent of these clusters is not clear).

The OECD study also provides a detailed overview of various methods of measuring linkages in clusters. The study provides the basis for assessing possible policy advice to stimulate innovation by promoting and developing clusters as effective learning communities. The geographical extent of the cluster analysis is not clear. The main definitions of types of clusters outlined in the OECD study provide no clear indication of the characteristics of clusters it terms of depth or effectiveness of clusters, neither are the geographical boundaries of clusters clarified in the case of meso and micro clusters. Furthermore, the three broad classifications of clusters do not consider the evolution of clusters.

Study on industrial clusters by the Harvard Business School

The Harvard study is seeking to discover the extent of clusters in the US and to assess their impact on employment and technical development. Clusters are defined following the consolidated US tradition initiated by Porter to describe geographical concentrations.

'A Cluster is a geographically proximate group of interconnected companies and associated institutions in a particular field, including product producers, service providers, suppliers, universities, and trade associations. Clusters arise out of the linkages or externalities that span across industries in particular locations' (Harvard Business School, 2002, Data Glossary). This definition includes all types of industries and sectors, organisational systems, size of firms and it is very vague about geographical borders of the cluster itself. The study clarifies four types of clusters.

1. Local cluster – supplies only its local market and is composed of local firms and supporting organisations and agencies.
2. Traded cluster – firms and supporting organisations and agencies are locally clustered but output is traded across locations.
3. Narrow traded cluster – firms and supporting organisations and agencies in one national industry, for example, Radio and TV Communications.
4. Broad traded cluster – firms and supporting organisations and agencies that operate across many industries (or a widely defined macro sector) such as Computer Storage Devices or Computer Peripheral Equipment.

Locations are considered at State level, in Economic Areas (based on counties within states; at total of 172 such areas; see www.bea.doc.gov for details) and in Metropolitan Areas (318 areas – cities or densely populated counties; see www.census.gov for details).

The Harvard study provides a clear classification system to identify clusters in terms of their location at State, region (Economic Areas) and local (Metropolitan Areas) level, by industry or sector and whether the cluster trades outside of its local area. The study is based on quantitative research based on regional input-output analyses (and inter-industry flows) so it does not directly assess some of the major areas of interest to policy makers, for example, learning and innovation systems and the role of socio-economic factors. However, it is gathering information on the measurable links between firms and supporting organisations

and agencies at all levels that clusters have been classified. It is also assessing the effects on employment and labour markets and the extent and type of innovation and technology exchange (measured by patent data) between agents in clusters.

DTI survey of clusters

The DTI survey is a large-scale survey of the UK to identify clusters and to uncover their nature and main characteristics. The main purpose of the study is to stimulate regional development agencies (RDAs) to promote clusters in their region as a way of boosting the competitiveness of firms and thereby to promote employment growth both in terms of absolute employment but, more importantly, to increase the productivity of the labour force. The theoretical basis of the study has been strongly influenced by the work of Porter because his work refers directly on to the issues connected to improving competitiveness. However, the Marshallian literature, especially that connected to enhancing innovation and entrepreneurship via learning and internalising externalities is also used to inform the methodology of the study.

Clusters are defined in a variety of ways including classifications of the evolution of clusters. The basic definition of clusters is – *'local concentrations of small and medium enterprises which are specialised in stages of the production process and some are embedded in local communities'*, (DTI, 2001, Technical Annex). This definition is enlarged upon to classify clusters in four ways.

1. Stage of development – classified as embryonic, established and mature. The stage of development is assessed mainly by use of the growth of employment and output flows related to goods and services.
2. Cluster depth – defined as deep, shallow and unknown. Deep clusters have large number of industrial and institutional-organisational linkages, shallow have small number of linkages.
3. Employment dynamics – defined as growing, declining and stable. Clusters with employment +/- 10 % are defined as stable, above minus 10% declining and greater than 10% growing.
4. Significance – is defined as regional, nationally or internationally competitive. Significance is measured by the share of cluster on national output and exports.

The DTI study, like the OECD and Harvard studies, illustrates the benefits of large studies based mainly on quantitative data and information to establish the analysis of cluster activity using a variety of different classification types. The main original contribution of the DTI study is the classification by depth and significance and stage of development of clusters that provides a useful overview of the features of evolutionary clusters. However, the DTI study does not provide rich information on the extent and qualitative nature of linkages of the clusters considered, or the details of the milieu that are conducive to innovation, entrepreneurship and learning, neither does it clearly define the spatial boundaries of the examined clusters.

Approaches to industrial districts/clusters

Studies such as those conducted by the IPI, OECD, Harvard and the DTI provide various methodologies for mapping clusters and identifying broad trends. The IPI approach has compared the different identification of industrial districts in Italy, on the basis of ISTAT SLL, of some qualitative pieces of research (IL Sole 24 Ore, 1992; Fondazione Brodolini, 1996, il Club dei distretti, 1999), and in relation with the subsequent identification provided by the various Italian regions. IPI has identified about 1999 types of local systems that conform with the definition of industrial district (the regions with more localised districts are: Lombardy, 42; Veneto, 34, Marche, 34, Emilia Romagna, 24, Tuscany, 19). The districts underlined are mainly specialised in the "made in Italy" sectors and in mechanical engineering. This analysis is only focused on the geographical identification and does not provide any economic parameter or analysis of each individual case. The DTI study provides a method for classifying clusters in terms of depth, significance and stage of development, which is a good starting point for the selection of clusters for in-depth case study work, if we want to uncover rich details about the nature and extend of networks. The EU study, which also has evaluated existing clusters in a specific sector, in order to developing transnational regional clusters, provides a basic methodology for the creation and implementation of policies. Figure 6 provides a summary of the major typologies of industrial districts/clusters outlined in the OECD, Harvard, IPI and DTI studies.

The various typologies outlined in the OECD, Harvard, IPI and DTI studies provide a starting point for identifying industrial districts/clusters and indicate some of the key characteristics of the networks that underpin such geographical concentrations. However, with

the exception of the Harvard study, there is no clear indication on the different types of geographical extension of the individual industrial districts/clusters examined. Furthermore, the types of interaction between the various agents that leads firms to learning and to innovative behaviours are not clearly classified.

Consequently, the main limitations of the classification systems used in these studies is that the wide ranges of relational and spatial linkages that can exist in industrial districts/clusters are missed or, at least, not clearly classified. On the one hand, only the Harvard study seeks to provide a kind of spatial classification. On the other hand, both the OECD and DTI studies offer general indications about the characteristics of the various relational linkages. The DTI study is the only one of the three that explicitly uses the idea of evolution of clusters. This study also provides a classification of significance or performance (in terms of competitiveness) by clusters. The OECD study provides much empirically driven method to identify and classify clusters, and to assess their stage of development by using data on innovation and the flows of goods and services between the various industries or firms that form the clusters.

Figure 6 Major approaches to Industrial districts/clusters

Type	Characteristics	Geographical Extent of Cluster	Focus of studies
OECD Macro Meso Micro	Industry groups Branch or industry level networks Inter-firm networks	Nation Unclear Unclear	Encouraging innovation by developing knowledge based economies and effective learning communities
Harvard Local Traded Narrow Broad	Clusters supplying only local market Clusters in one industry supplying many markets Clusters involved in many industries (macro sector) supplying many markets	Local (Economic or Metropolitan areas) State or Economic or Metropolitan areas	Encouraging innovation, technical change and entrepreneurship to boost competitiveness and employment
DTI Stage of Development Cluster depth Employment dynamics Significance	Embryonic, established or mature Deep, shallow or unknown Growing, declining or stable Regionally, nationally or internationally competitive	Unclear Unclear Unclear Unclear	Encouraging innovation, technical change and entrepreneurship to boost competitiveness and employment with special emphasis on regional development

3.2 Measuring linkages in industrial districts/clusters

The Harvard and the DTI study provide means to measure concentration and linkages using quantitative data. Concentration in both studies is measured using a location quotient (LQ). The LQ is measured using employment by calculating the ratio of industry's region share of employment relative to the industry's share of total national employment. The Location Quotient is defined as LQ = (Eij/Ei)/(Ekj/ Ek) where Eij = employment in area i in industry j; Ei = total employment in area i; Ekj = sum of total employment in country k in industry j; Ek = sum of employment in nation k. A LQ>1 indicates higher than average concentration. The use of LQ measures provides the first indication that a cluster exists in a particular region. If disaggregated data on employment by industry is available, the LQ method permits the identification of possible clusters at national, regional, local (Metropolitan) level.

The OECD study outlines several ways of identifying and measuring clusters by using innovation interaction matrices, input-output matrices and graph analysis (DeBresson and Hu,

1999). Innovation interaction matrices are constructed using R&D and patent data and information on flows of information and knowledge between firms and other cooperating agencies and organisations. The latter information is gathered by survey with estimation from national and regional data to close gaps in the information available. These innovation interaction matrices are then compared with input-output matrices for the same cluster to examine flows of goods and services. This provides a means of spotting possible emerging, mature or declining clusters. For example, high innovation flows with low flows of goods and services might indicate an emerging cluster where innovation activity was high in preparation for the development of production and sales; or mature clusters might display high flows of goods and services with low flows of innovation information, indicating a maturing of the cluster. DeBresson and Hu used graph analysis to map innovation flows between firms and organisations within the clusters and these maps were compared to flows of goods and services to classify clusters according to type and intensity of these flows. For example, graphs showing strong innovation flows between a few leading firms and agencies with the bulk of the other flows in the network being primarily flows of goods and services, indicates a cluster with a leading innovation group with supporting firms playing little role in innovation. Such graphs can also map the spatial as well as the relational aspects of industrial districts/clusters. This approach permits a wide variety of industrial districts/clusters to be classified based on measurement of innovation and business linkages with estimates of the type and depth of flows between the network linkages that have been graphed (DeBresson and Hu, 1999).

This approach provides a comprehensive system of measurement that can be used to identify and classify clusters using both flows of goods and services and innovation related flows. However, it requires large amounts of detailed information (at a disaggregated level). Moreover, important aspects of clusters such as the development of learning are only captured if quantifiably and disaggregate data relating to these factors exists or can be estimated. Notwithstanding these rather onerous information requirements and the inability to capture important data that cannot be quantified, the methods outlined by DeBresson and Hu provide a useful way of classifying and measuring industrial districts/clusters based on empirical evidence.

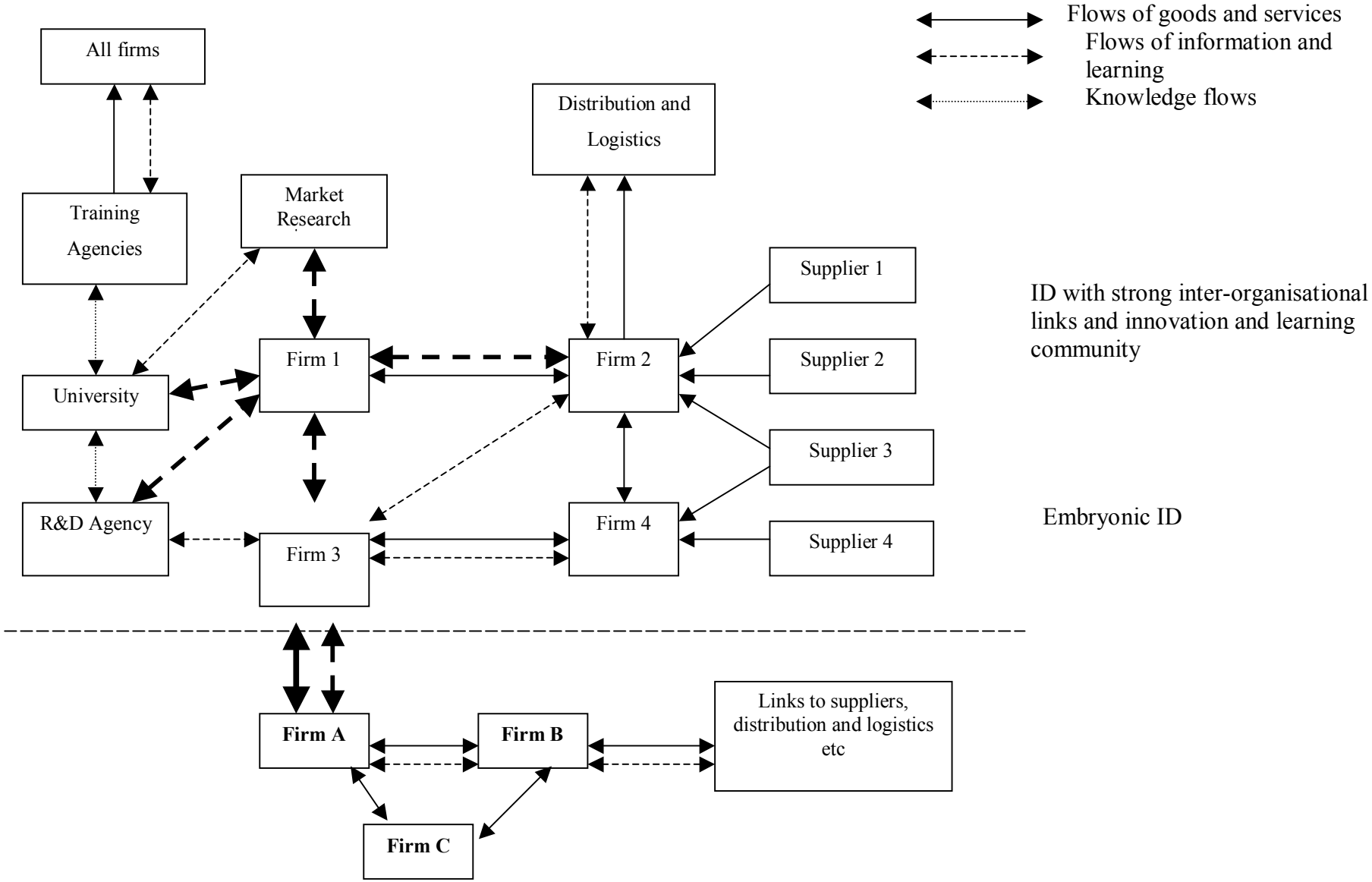
The DeBresson and Hu system uses graphs of network connections on innovation flows

and flows of goods and services to identify and measure these flows and comparing the flows to classify industrial districts according to the information revealed in the graphs. Thus a graph that showed high innovation flows between two or three groups of firms located in different locations with high flows of goods and services within the particular location of these three groups would be one type of a supra regional network with high innovation flows across frontiers and high local embeddness in flows of goods and services.

A number of possible types of industrial districts/clusters could be defined using this method and the data would be gathered and processed in a systematic way. Gathering and processing information on the infrastructure, institutional and industrial systems that underlay the industrial district provides data on the direct of innovation, learning and goods, services, knowledge and labour flows. Correspondence analysis can be used to assess the direction and magnitude of the various flows and the quantitative and qualitative data can be mapped using graph analysis to provide a classification of the district in terms of these flows of innovation and learning related factors and the quantity and quality and direction of flows of goods, services and labour. This provides information on the depth of the industrial district in terms of innovation, business and learning linkages. If the mapping exercise is conducted over a period, the evolution of the industrial district can be assessed. Mapping flows of goods and services and perhaps innovation and learning enables an assessment of the significance or performance of the industrial district by comparing this data to other districts, within or outside the region. Comparison of the flows of goods and services particularly for final output and exports should be possible. Such mapping exercises enables a classification of the underpinning networks that is informed by the generic factors identified in the literature but backed by consistently gathered empirical evidence. These graphs (or maps) indicate where flows were strong or weak and if backed by in-depth interviews and questionnaires reveal where problems, blockages and hold ups exist that impede the process of effectively operating industrial districts. This information could be used to suggest policies that could alleviate these problems. Moreover, such graphs could be used to predict the effects of undertaking significant alterations to the underlying networks if estimates of the new flows that would result from such changes could be estimated. A hypothetical example of such a map is given in Figure 7 where an industrial district with strong inter-organisational linkages and a well-developed innovation and learning system is linked by the subsidiary of a MNC to an embryonic industrial district in another location. Maps such as these can be constructed using

the approach of DeBresson and Hu by a systematic study of industrial districts. These maps provide a rich means of understanding the evolution of industrial districts and also of analysing the impact of changes in the inter-organisational linkages and of policies that seek to aid the development of industrial districts.

Figure 7 Hypothetical Map of Industrial District



The Harvard and DTI studies (and indeed most of the empirical work in the OECD study) used a set of ad-hoc techniques to measure linkages in clusters. The DTI study includes the use of activity analysis (to investigate the impact of larger firms in regions) on possible clusters to control if their flows are not captured by the official industry classification. Cluster significance was estimated calculating the share of cluster's output on regional and national output for the industry, and international significance was estimated using the cluster's share of national exports for the specific industry. Cluster depth and stage were estimated by using input-output and activity analysis (and also qualitative data obtained from firms, governmental and non-governmental agencies).

The Harvard study used input-output analysis, factor analysis, patent data and employment data to measure the key characteristics of clusters. The OECD study used a host of analytical techniques to measure linkages within clusters, including factor analysis, principal component analysis, multi-dimensional scaling, canonical correlations and network analysis. The DTI and OECD studies also made use of case studies to provide richer information on the nature of linkages within industrial districts/clusters and to try to capture the elements that could not be quantified.

A four-stage system for measuring linkages within industrial districts/clusters can be identified from the approaches taken by these three studies.

1. Identification of industrial districts/clusters using quantitative measures – for example, LQs, input-output and innovation interaction matrices.
2. Mapping of networks using graph analysis to identify and measure types of industrial districts/clusters.
3. Correspondence analysis using for example, factor analysis, principal component analysis and activity analysis to measure the depth, significance and stage of development of industrial districts/clusters.
4. Qualitative case studies to explore the rich detail of the linkages in industrial districts/clusters.

In principle, the combination of these techniques provides many methodologies to investigate, in detail, the location, type and evolution of industrial districts/clusters. However, the information requirements are high, and disaggregated data is needed. Moreover, much of

the detailed information on the workings of the specific industrial districts/clusters would require detailed surveys of rims and supporting organisations on the extent and characteristics of the networks that underpin industrial districts/clusters.

The different focuses and typologies used in the approaches to the study of industrial districts/clusters, (for example, innovation and learning, competitive advantage, inter-organisational structures, the importance of historical and geographical factors) means that the approach to the methodology tend to be largely informed by the interests of the researchers. This can lead to studies that produce results that are not easy to refute. For example, assessing the role of the social embeddedness of firms in an industrial district/cluster for inducing innovation involves problems of clearly defining and measuring what is meant by embeddedness. Again, the typology used to specific the industrial district/cluster (for example, geographical borders, identification of the relative importance of inter-organisational structures, cluster depth and significance etc) is depended on the major research questions that the analysis want to explore. Given the wide variety of typologies and methodologies that can be used in empirical studies it is often not easy to compare industrial districts/clusters because the use of terms and concepts may not share a common meaning among researchers (Stabler, 1998).

Given these problems it is difficult to compare and contrast the rich literature existing on the wide variety of industrial districts/clusters because the studies often have different focuses and a "bewildering" range of typologies. This means that it is not easy, for a policy maker, to develop appropriate policies, based on systematic studies.

3.3 Evolutionary approaches towards industrial districts/clusters

Many studies have focused on a variety of organisational, spatial, operational and evolutionary aspects of industrial districts/clusters. Three major approaches can be mentioned:

1. Competitive evolution of industrial districts/clusters
2. Internationalisation of industrial districts/clusters and role of MNCs
3. Evolution of innovation systems and learning.

These three perspectives will be discussed in the following pages.

Competitive evolution of industrial districts/clusters

This approach focuses on the competitive advantages that emerge from industrial districts/clusters. The foundation of this approach is in the works of Porter (1998 and 2000), and also in the research by economic geographers (for example Scott, 1995), and in the rich literature existing on the issue of Italian industrial districts. The research has underlined the importance of strategic factors that promote competitiveness (Porter, 1998; Enright, 1998) and the benefits deriving from the lowering of transaction costs (Storper and Harrison, 1991; Uzzi, 1997) for those organisational systems that are based on geographical concentration. Some studies have also discussed the issue of cost advantages depending on the geographical concentration of firms (Krugman, 1991 a & b). Some of the competitive advantages are also arising from the presence of supporting institutions and from the existence of local learning communities able to introduce new innovative products and to bet on new technological trajectories (Saxenian, 1994).

From the existing literature we can extract a stylised development path (Belussi, 2000b; Klink and de Langen, 2001; Brenner, 2001a; 2001b), of development, expansion, maturation and transition. Locations that have some favourable starting conditions begin to grow due to the rooting in the territory of some founder firms. The development of extensive external economies allows the starting of a recursive trend towards the consolidation of the industrial district/cluster. The initial development of district/cluster capabilities can be re-enforced by the development of an institutional system conducive to growth, where network benefits will emerge and an extensive cooperation is promoted among the local agents (Langen, 2002). Cluster dimensions have been studied also in terms of scope (horizontal, vertical, lateral, focal, technological, quality of the network) and policy related (Jacobs and De Man, 1996).

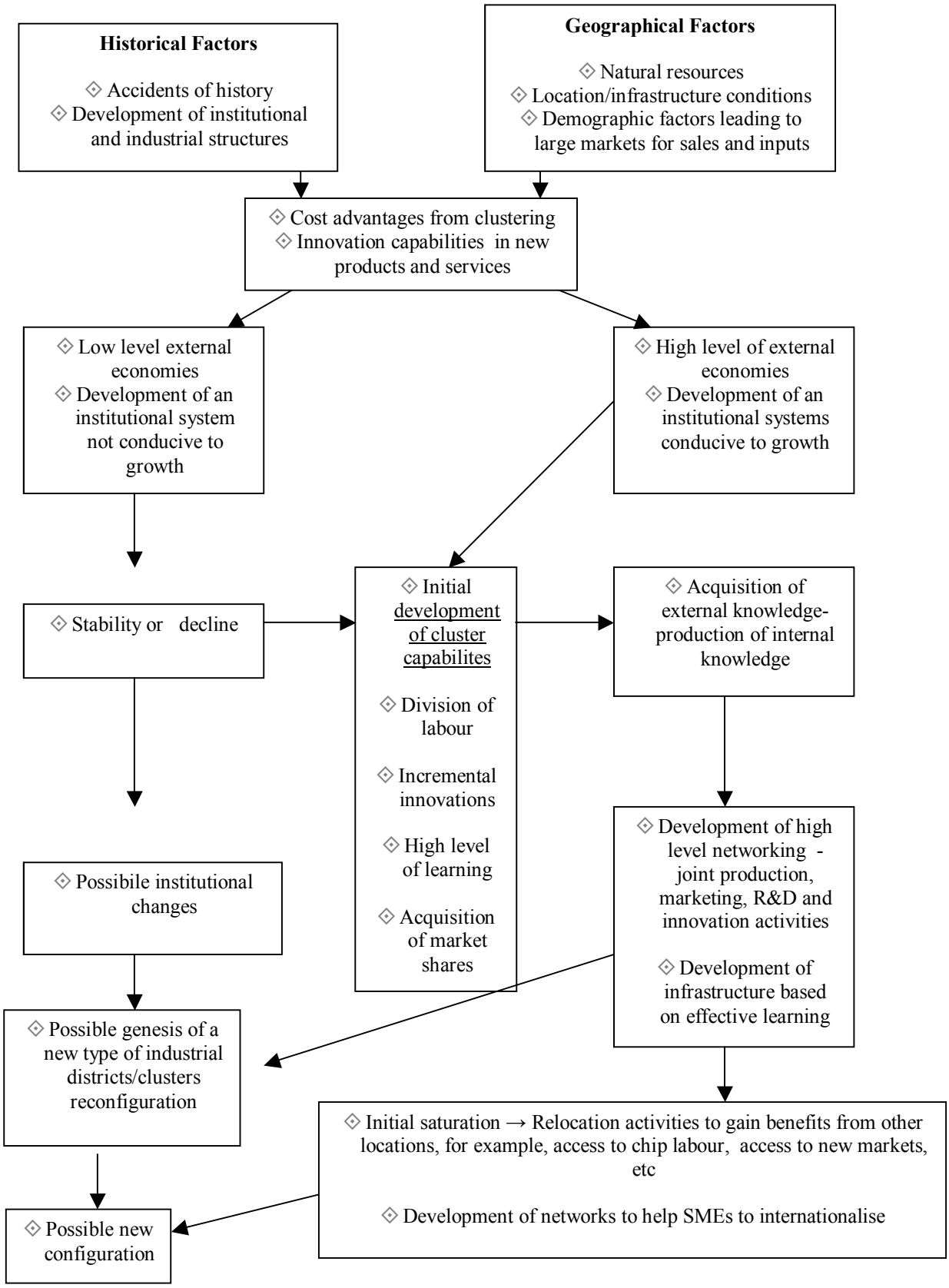
This is not a linear process, because, in some localities, the path determined nature of local institutions and a weak innovative system might bring about a stationary situation, and the industrial district/cluster during the time may decline, and concentrations might stop (see Figure 8).

The emergence of negative externalities is a common experience of industrial districts/clusters "story" (Ottavianno and Puga, 1998; Hochman, 1992). These negative externalities include congestion, cut-throat competition in final markets among local firms, increased prices for inputs and property, too much embeddness of the institutional context (Grabher, 1993b), and locking-in into obsolete and/or ineffective innovation and learning

systems (Locke, 1999; Portes and Landolt, 1996; Pouder and St John, 1996; Hassink, 2001; Staber, 2001b). However, there are also positive reasons for the activation of centrifugal forces that disperse the local concentration of firms in a district/cluster and push towards the re-location of local firm in other countries. These include: a) the need to access to a different of pool knowledge, extending and developing new innovation and learning systems by embracing firms and organisations situated in other locations, b) the development of new markets, c) the desire to gain access to valuable assets that are embedded in other locations, d) the use of wage differentials (Cantwell and Iammarino, 2000, Maggioni and Bramanti, 2002; Andersson and Forsgren, 2002; Guerrieri and Iammarino, 2001).

Often one of the advantages of re-location is to enter into already highly developed industrial districts/clusters in order to rapidly gain access to local knowledge and capabilities. In this way, the concentration effects can be multiplied. It also can be proved that well developed districts/clusters, beyond a certain threshold, act as centripetal systems that attract external firms and MNCs.

Figure 8 Evolution of Industrial districts/clusters



The business strategy literature tends to stress the importance of non-transferable (or difficult to transfer) assets and advantages that tend to enable industrial districts/clusters to retain competitive advantages during their different stages of development. These include first mover advantages from initial territorial specialisation, endowment factors, and institutional embeddedness.

In some cases, these factors cannot be easily replicated elsewhere, or improve upon in other locations. The business strategy literature has been focusing particularly on the organisational aspects of industrial districts/clusters leading firms or focal firms (Lipparini, 1995; Lipparini and Lorenzoni, 1996; Lazerson, and Lorenzoni, 1999), but it has not pay much attention to the dynamics of these systems as a whole in terms of geographical concentrations.

Ineffective systems, declining mature localised areas or moribund industrial districts/clusters have been less studied by the business literature than successful industrial districts/clusters (Belussi, 1999b; Casson and Paniccia, 1996; Tappi, 2002; Provasi, 2002) . The main concern of the business strategy literature is the path-determined nature of the evolution of industrial districts/clusters. Indeed, the business strategy literature suggests that one of the driving forces of industrial districts and clusters is the existence of an efficient institutional context. This approach has also centred the attention on the dangers of seeking to replicate elsewhere what has been successful in one location, because the existence of territorial specificity.

Internationalisation of industrial districts/clusters and role of MNCs

The direct foreign investment (DFI) activities of multinational corporations (MNCs) together with the liberalisation and integration of markets promoted by regional integration agencies such as the EU and NAFTA, and the multilateral trade liberalisation policies of the WTO, have highlighted the growing importance of the process of internationalisation for regional development and the subsequent effects of these processes for the geographical concentration of firms (Amiti, 1998; Chesnais et al, 2000; Dunning, 1996, 1997).

This literature has extensively investigated the wide variety of internationalisation strategies. Traditionally, the focus of international business literature has been on the development of internationalisation by firms in terms of their motivation to re-locate to

different countries (Dunning, 1993; Johanson and Vahlne, 1977), the type of activities that are re-located, regarding for instance areas such as production, R&D and marketing and the ways in which multinational firms develop subsidiaries (Buckley and Casson, 1976, Dunning, 1993; Bartlett and Ghoshal, 1989; Birkinshaw and Hood, 1998; Andersson and Forsgren, 2002). This work has centred on the variety of modes of internationalisation, ranging from exporting to licensing, and to the various types of DFI, such as joint ventures and wholly owned subsidiaries. The motivation for the internationalisation of activities has been attributed to various factors: the benefits of developing markets, the access to desirable resources, the seeking of lowering manufacturing costs, and the rationalisation of operations to reap economies of scale and scope. The use of DFI as opposed to market based international activities (export flows) has been largely attributed to the benefits of internalisation.

Until recently, little focus has been given to the geographical concentration of firms in industrial districts and clusters (Guerrieri, 2001) and on their processes of internationalisation, although international business literature provides a rich understanding of why and how the international relocation occurs via the various types of DFI.

The process of internationalisation of industrial districts/clusters, centred on the importance of DFI flows, has been studied mainly only on the light of considering the advantage taken by relocating firms which enter in advanced regional innovation systems (Dunning, 1996 and 1998; Dunning and McKaig, 2001; Enright, 1998; Dunning and Wymbs, 1999; Cantwell and Iammarino, 1998 and 2000; Dunning and Lundan, 1998; Lundan, 2001, 2002). However, the internationalisation process of small and medium sized enterprises (SMEs) by the use of networks, often involving geographical concentrations of SMEs, has also recalled the attention on the role of the process of internationalisation of industrial districts/clusters (Brown and Bell, 2001, Enright and Ffowcs-Williams, 2000; Corò and Rullani, 1998; Braczyk, Cooke , and Heidenreich, 1998). Some of the economic implications of the globalisation process on the development of industrial districts/clusters have also been investigated (Maggioni and Bramanti, 2002; Guerrieri and Pietrobelli, 2001; Ernst et al, 2001; Biggiero, 2002). Centres of competence (Heise et al, 2002) based on MNCs can stimulate the development of industrial districts/clusters, by encouraging the development of innovation and other desirable assets or to develop their organisations into effective cross-frontier differentiated networks (Holm and Pedersen, 2000; Andersson and Forsgren, 2002). The beneficial aspects of leading firms locating in clusters have been found in France (Dunford,

1994) and in high-tech clusters in the UK (Cooke and Huggins, 2002; Swann et al, 1998).

The location of centres of competence is sticky because they are firmly embedded into their host region. Some times these centres are often prime candidates for further development by parent companies (Birkinshaw and Hood, 1998; Holm and Pedersen, 2000). MNCs that develop centres of competence are not virtual networks, or dispersed geographical networks, rather they are networks (often spanning many countries) where some subsidiaries are strongly embedded into an industrial district/cluster. Some global or transnational regional clusters linkages are organised around extensive local networks (involving suppliers, supporting firms and agencies), but clearly these networks exert their influence well beyond the district/cluster walls. Some of these locally based networks include many subsidiaries of competitors. This is particular evident in high-tech clusters where the entry of MNCs is explained by the need to tap into the local innovation system (Cooke and Huggins, 2002; Swann et al, 1998).

Empirical work on the role of multinational firms in clusters in the UK has revealed some evidence that the advantages of clustering are enhanced by DFI, because of the improvements in productivity that MNCs often bring to their host locations and the spillover effects (Driffield and Munday, 2000). In 'leading edge clusters' (Porter 1990) foreign subsidiaries tended to have more autonomy (Birkinshaw and Hood, 2000). MNCs appear to have a strong presence in the 'leading edge clusters' in Canada, Sweden and the UK (Cooke and Huggins, 2002; Enright, 2000; Swann, et al, 1998). However, other studies on the impact of DFI on clusters based on expert evaluation, and regarding countries such as in Canada, Sweden and Scotland, found that clusters with high levels of foreign ownership tended to have subsidiaries that had low levels of autonomy and low mandates. This implies that clusters with high levels of foreign ownership are perhaps likely to be less dynamic than those with a high degree of domestic and endogenous ownership.

In general, the limited empirical evidence that is available on the role of DFI in the development of industrial districts and clusters suggests that it tends to help with the development of 'leading edge clusters' but that high level foreign ownership in districts and clusters may limit the dynamism of these systems.

The literature on internationalisation of SMEs and industrial districts/clusters indicates that large multinational firms may play a role in the development of geographical concentrations (Brown and Bell, 2001, Enright and Ffowcs-Williams, 2000; Ernst, et al, 2001; Guerrieri and Iammarino, 2001; Maggioni and Bramanti, 2002; Peck, 1996). However, some of the

literature has discussed the advantages to SMEs in being located in districts and clusters because local networks help SMEs to penetrate and develop foreign markets (Brown and Bell, 2001).

Thus, SMEs become involved in both local and global networks, and this helped them to internationalise. This type of development has been particularly observed in the Italian industrial districts (Maggioni and Bramanti, 2002). The development of information and communication technologies is regarded as a major challenge to develop global networks (Guerrieri and Iammarino, 2001).

From the perspective of developing countries, the existence of a good level of infrastructures and institutional setting is important to attract MNCs to develop centres of competence and/or models of industrial districts or clusters (Lundan, 2002). Informal institutional constraints can lead to many locations being unattractive for MNCs (World Bank, 1997). In addition to that, some industrial districts/clusters may limit the access of MNCs to local networks, because 'outsiders' are perceived as a threat for the tight socio-economic networks (Jaklic, 2002; Granovetter, 1995).

Evolution of innovation systems and learning

Clearly, the influence of historical and geographical factors lead to path determined evolution of the industrial districts/clusters, and a crucial role is related to the local innovation system and the local learning communities that underpin industrial districts/clusters. This leads to significant differences in the types of geographical concentrations that emerge both between and within countries.

Some of the various spatial and relationship networks that do or may underpin industrial districts/clusters are extensively discussed in this literature. Furthermore, although evolutionary paths are discussed in this literature the paths of development of organisational systems and innovation and learning communities are explicitly analysed (Antonelli, 2000). However, there exists a voluminous literature on these topics (see Appendix).

Although the literature on innovation, influenced by the Schumpeterian view, had assigned an overwhelming importance to the generation of technical change portrayed by heroic entrepreneurs, the type of technological knowledge, on which firms in industrial districts/clusters base their competitiveness, is mainly the result of learning through the daily life routine and by the experience acquired (Ryle, 1949), sense-making, accumulation of tacit

knowledge (Polany, 1967; Nightingale, 2001), and knowledge conversion (Nonaka and Takeuchi, 1995).

The process of learning within the industrial districts/clusters is the result of a process of knowledge building related to four main mechanisms. The first is the absorptive capacity of knowledge; the second is related to the specific types of learning modality; the third is the complex governance of the various innovation sources; and the fourth is the firm cognitive ability set in specific processes.

The generation of technical change in districts and clusters is quite a continuous activity, stimulated by the use of specific capital goods and processes, by the deliberated processes of search for, and by the results of vicarious and involuntary learning through various relationships and sources: sophisticated clients, lead users (von Hippel, 1988), knowledgeable suppliers (Lundvall, 1992), specialised firms, and marketing activities.

Technological knowledge is here considered the product of a bottom-up inductive mechanism, rather than a top-down deductive one, that starts from general scientific principles, develops new "public good" technological knowledge and that derives innovations only directly from R&D activity, as is assumed by standard economics (Lissoni and Metcalfe, 1994; Edquist, 1997). A large share of innovation activity in industrial districts and clusters derives from knowledge exchange and learning among firms. In firms, the capability of generating innovations is based on a continuous effort to absorb external knowledge and to contaminate it with internal knowledge, and to capitalise the opportunities of learning from all opened communicative channels (Antonelli, 2000). It is the result of a conjunct effort of specific internal search (R&D, engineering departments), external absorption and knowledge recombination (Cohen and Levinthal, 1990).

Once we theoretically link, within firms, the process of absorption and generating technological knowledge with the existence of learning capabilities, we abandon the linear model of innovation (science →technology →invention →innovation →diffusion) for hypothesising an interactive and evolutionary model of innovation, based on firm specific competencies, where the internal level of technological knowledge and the firm cognitive capability are the key factors explaining their innovative performance and their ability to appropriate the rents generated by their activity (Kline and Rosenberg, 1986; Imai et al., 1985). This implies that we explain the process of technological change not just as a simple shift of techniques (and a deterministic and equilibrated process of "innovative" contagion), but also as a troublesome competitive gale among firms for building "knowledge-dealing"

capabilities and learning to learn abilities (Georghiu et al., 1986; Foray and Freeman, 1993). Also to adopt externally generated innovations, firms will need the necessary information and knowledge decoders. Some degree of technological appropriability will block the dispersion of new knowledge among firms. Diffusion processes must be portrayed as a local incomplete, path-dependent (out of equilibrium) cycles (David, 1993).

The industrial district model can be characterised here as a specific form, between the market and the hierarchical form, to organise production in such a way that the problem of knowledge use and coordination is realised through a decentralised mode, formed by a stable network of relationships among co-localised actors. If knowledge is not a free good, as we argued in the previous sections, and the absorption of information requires interpretation and decoding capability, innovation and development of knowledge is efficiently set within industrial networks where agents continuously interact. In doing that, they not only exchange part of their knowledge and information (and also tacit knowledge), but they socialise their mental models and their cognitive maps. As argued by Aage (2000), in fact, industrial districts and clusters can be seen as interpretative systems, able to adapt to external pressure and to innovate through the external relations built by firms. Socially shared knowledge is created and district institutions cooperate to limit uncertainty, to reuse knowledge and to create convergent expectations through the presence of leadership and indirect authority.

Economic literature has tended to separate the growth in the stock of knowledge from its diffusion. This distinction, going back to Schumpeter, has proved to be useful when a new piece of knowledge can be identified, such as a particular invention.

However, most advances in knowledge are not achieved at once, and then slowly adopted by potential users. New technical knowledge is often the outcome of many building blocks, and it embodies many ideas. In the assembly of innovations, many agents and sources are involved (Carlsson and Jacobsson, 1996). If this is the case, the growth of knowledge may be portrayed essentially as an interactive process of learning and invention.

It is the combination of different ideas that produces new knowledge. And different ideas give rise to better ideas because knowledge (both tacit and explicit) is unevenly distributed among agents. If each agent knew exactly the same thing, the exchange of information would not produce any increase in the amount of knowledge in each firm. So, learning activities may also be portrayed as a decentralised process of diffusion of knowledge. Spillovers of knowledge depend in part on how hard firms are trying to capture new knowledge. This may be measured by the length, extension, and numerosity of informative channels, and by the

frequency with which information passes through them. But they also depend on knowledge gaps: the existing differences in what firms know. Some agents are rich in accumulated knowledge, and they may play the role of activators of knowledge and competencies, within the system of relationships they govern. Spillovers and learning efforts may be analysed from a territorial perspective (Gottardi, 2002; Garofoli, 2001). Different forms of learning have been proposed by the literature as regards industrial districts and clusters (Belussi and Gottardi, 2000; Oinas, 2000; Howells), distinguishing from point of view of the innovative output: imitation, incremental innovation and radical innovation. Here we have sketched three forms of learning, which take place among the firms of the Industrial districts and clusters.

Learning as diffusion of practical know-how

This form of learning is mainly related to the transmission of simple instructions from skilled workers to apprenticeship through (intra-firm) transfer of tacit knowledge or it refers to the technical specification provided to subcontractors (inter-district firms). Knowledge is transferred among the production networks, where firms co-operate in relationships more or less at arm's length. This learning method refers mainly to the transfer of tacit knowledge (Belussi, 2000a). This, in any case, requires the exchange of a lot of information and knowledge both tacit and codified. Practical knowledge represents a large part of the embedded knowledge of the districts and clusters. Often practical knowledge has been called contextual knowledge (Lorenz, 2001). Loasby (1998) has even argued that districts are knowledge communities. A similar perspective is in Parri (1997). The transmission of tacit knowledge occurs through apprenticeship works by observing the behaviour of one or more "masters" in a community of "practices", as it has been discussed by Brown and Duguid (1991). Learning is a fragile, experimental and uncertain process, but in communities of practice imitation, selection, variety and replication can take place because it is a "situated practice" embedded in the everyday humdrum of interaction between everyone and his or her peers' community. Learning is not sometimes matter of conscious design, recognisable rationality, and cognitive maps, but a matter of new meanings and emergent structures arising out of common experiences. The diffusion of practical know-how in industrial districts and clusters, is related to learning by doing and by using. Learning is to pass through repeated interactions, the formation of a local code of practices, a regime of mutual and collective evaluation and accountability, and a shared repertoire of stories, facts, discourses, and

historical events. A community of practice (Wenger, 1998) acts locally as a "negotiated regime of competence" (Amin and Cohendet, 1999). Learning is here related to the maintenance of the existing locally based stock of knowledge. Its socialisation avoids the degradation of the existing stock of knowledge. This stock of knowledge refers mainly to traditional manufacturing skills.

Many authors have emphasised that social networks are place-specific "communities". So, learning can be achieved "being there" (Gertler, 1995) or sharing some common features and institutions (Kenney and Burg, 1999), that are able to enforce forms of collective learning (Saxenian, 1999; Gambarotto et al., 2001). The growth of knowledge and learning procedures may be bounded (Young, 1993) by the absence of relevant innovations (once the ability to perform a certain task is settled only minor modifications may be introduced). Craft skills form the main component of the existing stock of knowledge that is embedded in some particular Industrial districts and clusters specialised in clothing, footwear, furniture, etc.

Learning as absorptive capabilities

Absorptive learning characterises a process of knowledge acquisition. As seen above, learning opportunities are influenced by agents' mental models, and by their conceptual level of knowledge representation. These activities are goal-directed: individual agents, or firms, must look for the relevant pieces of knowledge they need (Loasby, 2001). Here interactive learning (Morone and Taylor, 2001) takes the form of problem solving methods, using various sources of innovation external to the district firm or even external to the district. Typically absorptive learning involves learning by interacting (as in the case of client-supplier relationships). Dense and territorially concentrated networks are the ideal frameworks for the development of learning through interaction and for the exchange of tacit knowledge among "cognitive" distant agents. It must be noted that the absorption of external knowledge has been pushed in Italian Industrial districts and clusters by public organisations, like training centres, or ad-hoc founded research laboratories.

Learning within epistemic communities and community of practices

We owe to Marshall the first statement on the role of districts in enforcing knowledge diffusion processes. At local level, learning processes, following the Marshallian metaphor

has been often described as the effect of knowledge spillovers of what is already "in the air" being embedded in the so called "industrial atmosphere" of the district. Loasby (1998) and Bellandi (1992) have emphasised also the "creative" role of industrial decentralisation, which enforces knowledge specialisation and processes of exploitation and experimentation on new technical solutions. In this sense, the district/cluster model of "problem solving" and "searching for" (a decentralised interactive chain-linked model, Belussi, 2002) is quite opposite to the planned activities of large oligopolies, where only one agent (or a group of researchers authoritatively scrutinised by a central authority) is responsible for the setting of the research path, with the consequence of bearing a very high risk and requiring a high amount of efforts invested deliberately in the research activity (Zollo and Winter, 2001; Grandinetti, 2002). The "distributed" innovation process model stresses the role of cooperative arrangements and involuntary interactions, versus the individual firm model of production of innovation (Coombs and Metcalfe, 1998; Foray, 2000). This model seems to work quite effectively in low tech sectors (see the brilliant results of the Italian industrial districts during the post-war), and in some high-tech communities like in Silicon valley, where research efforts can be decomposed in a myriad of research sub-units, sustained by a rich network of knowledge institutions and specialised research bodies.

Within industrial districts and clusters, the density of specialised firms and specialised suppliers, possessing a common but differentiated body of knowledge may give rise to an activation of new knowledge just through firm-interactions and non-deliberate innovations. However, often knowledge is not just dispersed among many agents, but it is accumulated in district founder firms, or among a small group of specialised agents, able to absorb and recombine knowledge from the outside.

In particular, technical knowledge existing in districts is embedded also in explicit codes (which allows the transmission of articulable knowledge through informal channels) of the global "epistemic communities" of experts. This community comprises all scientists and technologists who share common interest and expertise (Cohendet and Llerena, 2001). Thus, it goes over the boundary of the district because it belongs to a national and international larger community. In addition, new codes are continuously created by many of specialised agents internally and externally to the district. So, the competitive position of firms is not just determined by the fact of being immersed in this static "industrial atmosphere" but by the dynamic competence of being able to follow these changes.

Learning as generation of innovative capabilities

The generation of innovative capabilities in the form of generative learning (Wikström and Norman, 1994) characterises the most creative form of learning in the Industrial districts and clusters. Agents are able not only to absorb external codified or tacit knowledge, but can also activate generative processes to create new knowledge (framed in a tacit or in an explicit setting). Generative relationships are conducive to innovation activity, as in the absorption method, but here agents explore and exploit a more intense process of new knowledge creation. In these examples of evolutionary Industrial districts and clusters, structural change has been introduced by internal agents. Innovation portrayed by new pieces of knowledge takes place within multilevel loops, or in network supply chains. At local level the existence of a milieu effect on collective learning processes has been studied by Camagni and Capello (1999). The variety of organisational systems and innovation and learning communities that appear in the literature are closely connected to the various and complex types of industrial districts/clusters that are highlighted in the literature. Furthermore, as some clusters do not lead to high networking benefits, they are unlikely to require complex inter-organisational systems or highly developed innovation and learning communities.

Some approaches have tried to use computational frameworks and simulation models to understand the complexity of the technological, organisational, institutional and socio-economic relationships that are at the heart of industrial districts/clusters (Bernard and Vicente, 1999; Squazzoni and Boero, 2002; Fioretti, 2001). This approach (if it can be developed) would permit the use of both quantitative and qualitative data to build models and to run scenarios on the effects of changes in the external environment (technical change and changes in the competitive environment) and the results of various possible responses of actors in the local networks related to these changes.

As regards to the different modes of learning, considerable differences exist across industrial districts in various countries. The type of evolutionary process outlined by Belussi and Arcangeli (1998) does not seem to have occurred in some high-tech clusters in Europe (Dunford, 1994; Swann, et al, 1998, Cooke and Huggins, 2002). Moreover, significant differences in classification and types of organisational systems and innovation and learning communities exist in industrial districts in France (Maillat, 1996), Italy and the UK. The failure to find, in the UK, the type of socio-economic networks that are prevalent in Italian industrial districts has led at least one study to conclude that industrial districts do not exist in

the UK (Zeitlin, 1995). However, there are without doubt geographical concentrations of firms, some of them underpinned by extensive networks, in the UK (DTI, 2001; Cooke and Huggins, 2002). Another but not fully developed approach is the analysis between local clustering and global connections. In fact the existence of agglomeration does not say much about the ability of localised firms to interact with external actors. External interactions, in principle, could also reduce the impact of local spillovers and local learning (Felsenstein, 2001).

3.4 Classifications of industrial districts/clusters

There is no agreement in the literature about the ways to define and classify industrial districts and clusters. While, "orthodox economists" (as Becattini) will never shift toward a "chaotic concept" and a "political panacea" as a cluster really is (Martin and Sunley, 2001), seeking rather for the "purity" of the model, it is clear from the table reporting the various definitions of industrial district and cluster that there is now a level of convergence between the two terms and research approaches. In his last writings Porter is more interested in "territorial clusters" than before, and he seems to abandon partially his previous focus on "functional clusters". Porter 's recent definition of cluster (1988) clearly includes the role of local supporting institutions, getting closer to the Marshallian tradition (in fact, in the new chapters enclosed in his last edition there is now a broad referring to Marshall's work, and to the Italian tradition of studies on industrial districts). On the other hand, Italians economists are now exploring new avenues of research, which departs from "pure" Marshallian models in order to dig the analysis on Schumpeterian and cognitive approaches for the study of the industrial district model (Belussi and Gottardi, 2000). Becattini himself, in his latest article (2002a) builds a bridge towards this terminological explosion: system areas, local production systems, *milieu innovateur*: "Having determined that Prato was an industrial district, perhaps the archetype of all industrial districts…. What did we find in this industrial cluster?" (p. 97). Once we abandon the ground of terminological contraposition, we remain with the difficulty of determining some "impure" criteria for the categorisation of that form of geographical concentration which is not related to urbanisation but which is linked with "industry agglomeration" and with economies of localisation. For practical purposes it is necessary to provide a classification that is broad enough to permit the inclusion of obvious cases of real

geographical concentrations but narrow enough to exclude those cases that have no real underlying physical proximity or that are above a significant threshold (this is clearly a relative parameter that must be evaluated in each case considered). It is also necessary to focus on geographical concentrations that involve a large number of SMEs (please note: numerical dominance and not economical dominance) and on concentrations that are not exclusively formed by large MNCS.

Our workable definition of industrial district/territorial cluster will be composed of three necessary conditions. The first that must hold is the presence of a geographical proximity of a group of firms specialised in a particular activity (not necessarily an industry, conceived narrowly, but a filière). This is the bottom level condition (A) for the existence of a geographical district/cluster. Geographical concentrations that fulfil A must also be composed predominantly of SMEs or at least the number of SMEs must be greater than that one of large firms (note that we abandon the Marshallian hypothesis on the exclusive presence of small firms). This is the condition (B). Geographical concentrations of type B must be formed by inter-organisational networks (where the inter-firm division of labour, based on the Smith-Marshall-Young principle creates complex open economic systems) and supporting institutions related to the same type of industries that characterise the industrial/service local structure. This is the condition (C). The C type of geographical concentration may be defined an industrial district/cluster.

This classification is not overly restrictive as it permits industrial districts/clusters to be composed of a mixture of SMEs and large firms (but where SMEs are the majority). It also encompasses a wide variety of organisational systems, innovation models and learning behaviours. We leave open the question about the geographical extent of the industrial districts/clusters, given the different structure of industry localisation within the different countries. However, a concentration of firms in a country or large region does not meet the criteria to be classified as an industrial district or a territorialized cluster.

Using this definition it is possible to taxonimize a broad classification of industrial districts/clusters using a number of generic parameters such as, composition of the industrial or productive structure, presence of institutions and supporting agencies, external relations (Vatne, 2001) of firms (links to other locations) and development trends. This is done in Figure 9 that presents four broad types of industrial districts/clusters, and in the last row, a typical example of this type of industrial district/cluster. These types are better illustrated in the Methodological Framework and Tools Design document (Deliverable of the WP 2).

Figure 9 A General Classifications of Industrial Districts/clusters

	Canonical Marshallian	**Satellite**	**High tech**	**Evolutionary post-Marshallian**
Composition	Exclusive presence of SMEs, normally family owned. **Internal mechanism of learning with multiple flows of information and knowledge**	Production structure dominate by external firms (MNCs or subcontracting firms) **Knowledge and information flows mainly between leading firms**	Wide variety of firms both large and small. Loose and fast changing networks Connections between entrepreneurs, scientists and engineers **Decentralised knowledge and information flows**	Local structure formed by a dual system: large vertically integrated firms (normally technical and commercial leaders) and a multitude of SMEs **Information and knowledge sharing prevalent among specific channels and agencies**
Institutional characteristics	**Strong socio-economic community. Trust and cooperation** Possible presence of supporting agencies.	**Socio-economic links tend to be unimportant** Dominant firms are normally at the centre of local networks. Possible presence of supporting agencies.	**Strong socio-economic community.** Presence of universities or R&D and government research agencies	**Socio-economic links less important than links to actors that can provide useful knowledge and information.** Presence of supporting agencies
External links	Only tradesmen Limited external links	Limited external links other than from subsidiaries of MNCs located in the industrial district	Strongest links external sources of knowledge	Active in creating and developing external links

	Canonical Marshallian	**Satellite**	**High tech**	**Evolutionary post-Marshallian**
Development trends	Slow move away from self-containment by linking with other areas to obtain better/cheaper inputs and access to markets and knowledge	West : relocation East: need investment to acquire better infrastructure	High growth clusters if successful	Movements of some Marshallian districts towards a kind of knowledge based district in low and middle technologies Relocation High-grow in output but decline in local employment Growth of service industry
Typical example	Traditional Italian industrial district	Car assembly in South Wales	Route 128 and Silicon Valley Cambridge biotechnologies UK Silicon Fen.	Montebelluna district in the sport system

3.5 General factors affecting the evolution of industrial districts/clusters

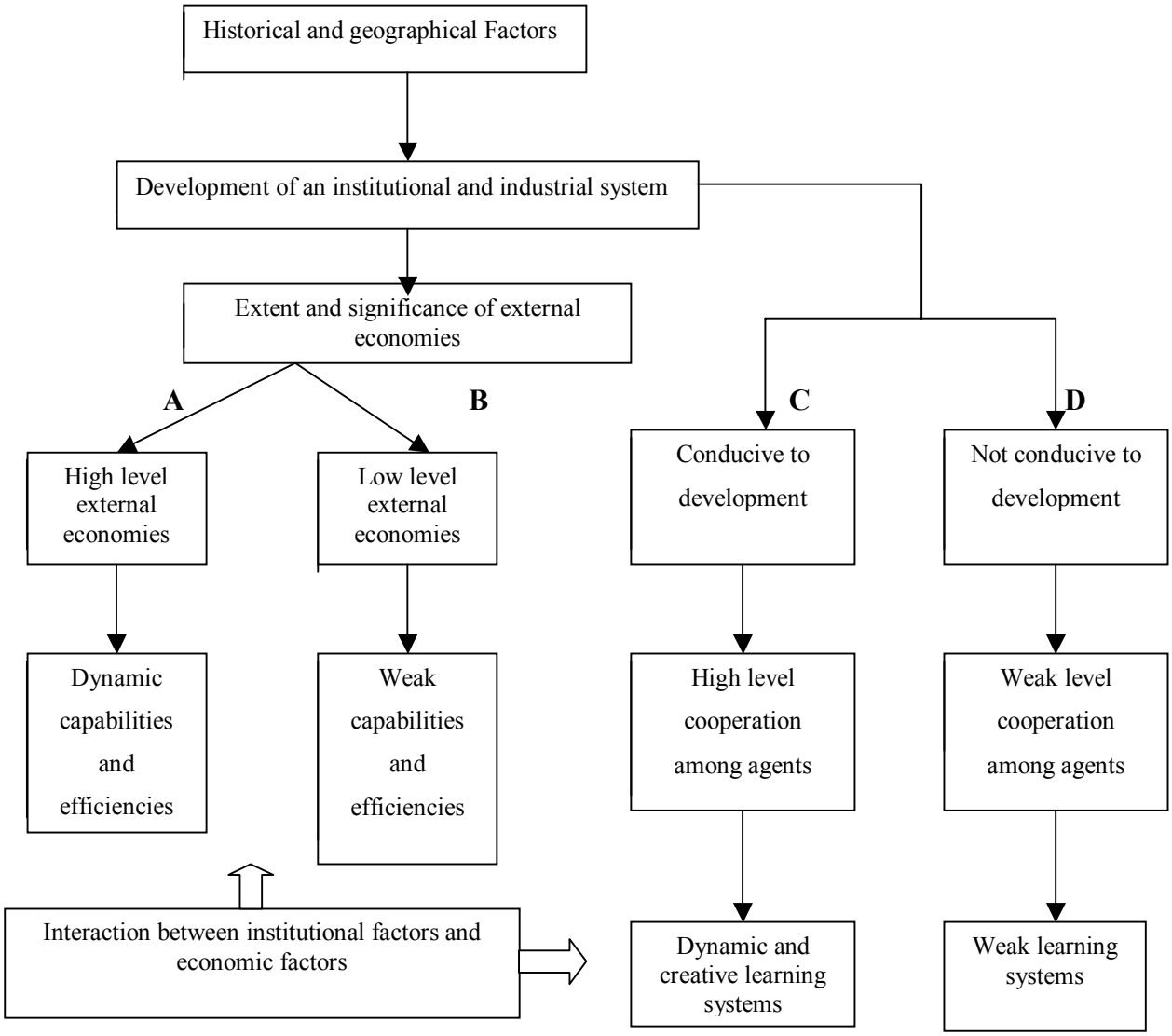
In Figure 9 we have outlined the possible taxonomy of four types of industrial districts/clusters: three endogenous (Marshallian, High tech, Evolutionary), and one exogenous, externally dominated (Satellite). High tech industrial districts/clusters are more common in US and UK while Marshallian are typically specialised in traditional industries ("made in Italy" sectors). Satellite formations are expected to be found in Central and Eastern European countries. This figure elucidates also a way in which industrial districts/clusters can develop. However, this may not be a linear and discrete path of development. The influence of path dependence from historical and geographical factors and the path determined nature of technical change and organisational systems and innovation and learning means that a wide variety of types will still remain. This possible path that we are interested in is from Marshallian to Evolutionary, and from Satellite to Marshallian (in the East countries this could be the target of local policies). Dependencies also influence the evolution of industrial districts/clusters.

A number of general factors appear to influence the development of industrial districts/clusters:

- historical and geographical factors influencing the foundations of geographical concentrations
- the extent of external economies and of district firms capabilities
- the institutional and setting of industrial districts/clusters
- the evolution of cooperation and learning.

These factors interact to determine the type and development of industrial districts/clusters by their influence on the evolution of the pattern of development that underpin geographical concentrations and permit to reap the competitive advantages from proximity. An outline of the main combinations of these general factors is given in Figure 10. The figure highlights low and high institutional efficiency patterns and low and high efficiency depending on dynamic capabilities, economic and technological factors.

Figure 10 General factors and the evolution of the networks of industrial districts



Advantages from proximity must be balanced by disadvantages by congestion. In addition, institutional mismatching may create a serious blockage (Locke, 1999), together with the process of rising input prices by congestion (Ottaviano and Puga, 1998, Heise et al, 2002).

The industrial districts and clusters facing the greatest challenges are those located in streams B and D. Developing innovation and new organisational systems will not of itself overcome the problems if the institutional inefficiency, and by converse, a good cooperative environment without dynamic agents is not conducive to high-level development. Consequently, the main hope for industrial districts located in streams B and D is to attract re-located investments and seek to develop the potential for high-level external economies.

Section C

4.0 New policy trends in the 1990s and early 2000s

The increased focus on industrial districts/clusters/local production systems in most European countries has been one of the most significant changes in industrial and economic growth policies of the 1990s. This is so because these local productive systems have been perceived as effective means of attaining and developing competitiveness in the face of the globalisation process. Why is this the case? Why in the 1990s have industrial policies focused on territorial aspects? One might say at the first sight that the massive media coverage and general public attention that some agglomerations acquired in the 1980s (i.e. the Silicon Valley) lies behind this new policy approach. However, taken to its limits, such an understanding, would fail to acquaint the tremendous and in-depth reformulation of industrial policies in the past decade, and would suggest policy change based on mere media reaction. The early 1990s have experienced a truly new trend in the design of industrial policy, particularly salient in Northern and Central European countries, where industrial districts/clusters/local production systems have gained a growingly central position. This new policy trend has been developed in close relationship with new advances in the social sciences, most notably related to new growth theories, to regional economics, and to knowledge-based/learning economies.

The new policy trend has moved away from the traditional policies on regional development and industrial policy of the late 1970s and early 1980s that were based on 'picking the winners', subsidies and regulation, and has moved towards a new line of public action where the territorial dimension gains significant centrality and where other, more intangible assets are taken into consideration (Lundvall and Borras, 1997; Storper, 1997). In the new trend, measures for the development of local productive systems/clusters/IDs in the 1990s include instruments, like: reinforcing public-private partnerships for development in the territory (Raines, 2000, 2001), reinforcing local and sectorial networks of SMEs, developing a more horizontal approach to industrial policy where servicing firms are more directly under focus, and an increased emphasis on improving the framework conditions and knowledge/learning abilities both at large and in the territory. It is important to note at this stage, though, that the development of this new policy approach in the 1990s has not per se

interfered with other important governmental actions towards economic growth in functional areas like public purchasing, competition policy, education, research, employment, finance and general physical infrastructures, which do also have an important effect upon the industrial dynamics at local level. This is to say that the new trend of industrial/economic growth policy has not been conceived as a substitute to other economic growth-related areas, but mainly as a substitute of the old industrial policy of the 1970s.

Parallel to these changes in the theoretical/normative background of the policy design, the transformations of political structure in Europe have also influenced the contents of policies towards local production systems. On the one hand, the move towards greater autonomy for local and regional government following the decentralization of political structures in the 1980s and 1990s both in Western and Eastern Europe, have contributed to a more complex role for public action in the area of economic/industrial development. Regional and local governments have been granted with new economic and legal competences to engage actively in the development of the territory. And these new competences have been translated in a vast and diverse array of policy instruments at the sub-national level, and in an increased awareness of these policy-makers of new scholarly developments in this field. On the other hand, inter- and supra-national organizations above national level have also increasingly become engaged in the issue of economic development and competitiveness, and have turned their eyes to the new theories about economic growth focused on territorial dynamics that could provide novel instruments for public action. In a more explicit or implicit way, these organizations have actively promoted the new policy paradigm, gaining momentum in the late 1990s. Yet, despite the notorious expansion of the local and international levels of policy action, it can be argued that in many cases, the national level continues to be pivotal and highly influential for the fate of industrial districts/clusters/local production systems.

This section reviews in an approximate manner the actual policy actions being recently or currently undertaken at macro and meso levels of government. The macro-level refers to supra- or inter-national public actions, particularly the European Union, UNIDO and the OECD. The meso-level corresponds to national governmental action. As we will see below, variation is great within each of both levels. The policy initiatives launched by the EU, UNIDO and OECD are quite different from each other, due to the scope and political mandate of each of these three international/supranational organizations. And variation is great at the meso/national level, mainly because of two interrelated reasons. Firstly, because each country has a unique political system (federal, semi-federal/strongly decentralized or slightly

decentralized). The way in which the relationship between the central/national government and its constituent political units is politically organized has obviously important implications to the nature and instruments of policies towards local production systems. And secondly, because each country follows its own traditions and evolution patterns in the design of industrial policy. Here it is interesting to remark that the nature, range and scope of policy instruments for economic/industrial development has generally evolved very rapidly in the second half of the 1990s, with new "policy experiments" (like innovation or sectorial networks) that have given mixed results.

4.1 Macro-level of policy action: UNIDO, the OECD, and the European Union

This report reviews shortly the policies launched at macro-level by three different inter- and supra-national organizations, namely the EU, OECD and UNIDO. There are different reasons for choosing them. Starting with UNIDO and the OECD, these two international organizations have developed very interesting policies and approaches to industrial districts/clusters, which can be considered rather successful. They have different mandates and geographical scope, yet, common for both is that these policies might represent interesting experiences for local development, most particularly for the purpose of developing policy options that will help industrial districts in the different parts of Eastern Europe to prosper, and therefore to help in the adjustment to the Eastern enlargement of the European Union. With this perspective in mind, a review of EU's own policy instruments for territorial development is also necessary. This section will provide a succinct presentation of the different strategies and initiatives launched in this regard, their complementarities or the lack of it. In the concluding section, emphasis will be placed on the need of the EU to develop more tailored policy instruments to address the challenges and developmental issues emerging from the re-location of western firms towards Eastern clusters.

UNIDO

UNIDO (United Nations Industrial Development Organization) was created in 1966 with the aim of promoting industrial development in less developed countries in partnership with national governments, business associations and individual firms, and by channelling multilateral aid to development from donor countries. This organization undertook a major

reform in 1998, and partly as a result of this, the Programme "Development of clusters and networks of SMEs " acquired centrality within the strategic actions of this organization.

Launched in 1993 the UNIDO cluster/network development programme has sought to strengthen the development and to impulse the creation of new clusters/localized networks in developing countries, since it is believed that SMEs play a key role in the economic growth patterns and possibilities for these countries. The need of UNIDO action is explained in terms of the difficulties that these firms encounter in the process of rapid globalisation and increased market competition. Some identified problems that these firms face are:

- Difficulties to capture market opportunities, which require production quantities, regular supplies and completion with standard and technical specifications.
- Difficulties in the purchase of inputs (equipment, raw materials, consulting services)
- Difficulties to internalise functions such as training, market intelligence, logistics.
- Difficulties to introduce innovative improvements in their products and processes.

UNIDO has envisaged two types of actions: those directed towards networks of SMEs, and those directed towards clusters (understood as geographical and sectorial concentrations of SMEs in given locations). There are many similarities between the two actions, since both are directed towards developing stronger links and trust among the SMEs in order to give mutual support and create joint initiatives for collective and individual benefits. The differences, however, rest on the fact that the actions towards developing existing clusters generally take into consideration other actors operating in the territory, and not just SMEs. These other actors are for example suppliers of raw materials, testing and certifying laboratories, research and development institutions, training institutions, industrial associations, etc. typically operating in the territory, but traditionally without connections to the existing clusters. In particular "the UNIDO cluster approach is an attempt to address knowledge fragmentation, lack of coordination and joint action" in already existing local production systems. Three sets of specific activities are envisaged, namely, awareness and trust building, dissemination of best practices, and generating a discussion forum and eventually a governance framework.

The countries were network and cluster actions have been introduced include: India, Indonesia, Malaysia, Mexico, Nicaragua, Honduras, Jamaica, Bolivia, Madagascar, Morocco and Tunisia. And a recent report brings to the fore an apparent success of many of these initiatives, like for example the Ludhiana cluster in India, the Boaco and Chontales cluster in

Nicaragua, or the Jaipur cluster in India (UNIDO, 2001).

It is worth pointing that one of the most interesting actions related to cluster development has been the training of cluster development agents. Initially related to generating some leaders in the territory, this training methodology has been refined and turned into a fully-fledged training program of several weeks of duration. The first of these has been carried out in 2001-2002 in India, with 25 trainees. This stems from the experiences built up in different cases, and from the understanding that such agents are essential nodal points for the success of the developmental strategies of the clusters.

OECD

The OECD has always been very active in the fields of STI (science, technology and innovation), in education, employment, and economic growth in general. This responds to its political mandate, which is to support its 30 member states to build strong market economies, and to foster good governance in the public service and in corporate activity. Since its creation in the early 1960s, the OECD has worked in different policy sectors, and has produced a series of statistics, strategic reports, and country monitoring documents, which have turned out to be rather influential, though somehow unknown for the general public.

The OECD does not have a "cluster policy" as such. This is due to the advisory and "intelligence" profile of this international organization, and its lack of direct instruments to launch autonomous public actions, in the style of UNIDO or the EU. Nevertheless, the OECD has increasingly paid attention to the territorial dynamics of industrial development, and has recently tackled the question of how to develop optimal policies towards clusters.

LEED (Local Employment and Economic Development) is one of the eldest OECD programs related to territorial development. Created in 1982 under the name ILE (Initiatives Locales pour l'Emploi), the program has unfolded the past 20 years contributing to the analysis of a range of economic and social themes relevant to local development, in particular employment. Among the issues that concern LEED are: decentralization of employment policies, entrepreneurship, globalisation and local authorities, local partnerships and social innovation. The wide range of these themes indicates the general and overview approach of the program. There are currently 24 countries and major international development organizations involved in this project. One of the latest initiatives has been the so-called

"Clusters in Transition Economies", in collaboration with the EBRD (European Bank for Reconstruction and Development). Launched in November 2001, this specific initiative has envisaged a series of five seminars hold in five Eastern European countries (Slovenia, Slovakia, Czech Republic, Poland and Hungary), and a final conference. The main objective is to gather information and knowledge about cluster dynamics in those countries, and enhance the learning process about them among key local and national actors. The specific focus is on SME-based clusters and on the interrelationship between clusters and local economic development. The final publication of this initiative is expected in 2003[8].

The OECD has also paid increasingly attention to local clusters from its overall work on technological development and innovation studies, most particularly in relation to its active role in launching the notion "national innovation systems". Therefore, an important part of the OECD studies and recommendations about policies for clusters and networks of SMEs have been undertaken under the "National Innovation Systems Project" (NIS project), that was launched in the late 1990s. In the first phase of the NIS project, one of the six working groups focused on clusters, and published a report "Boosting innovation: the Cluster approach" OECD (1999), collecting different experiences in OECD member countries and considering some general policy recommendations. The second phase of the NIS project focused much more on clusters, with a recently published report "Innovative clusters: Drivers of National Innovation Systems" OECD (2001b). Both reports work with a rather pragmatic definition of cluster that includes a geographical dimension, either as local or as regional mini-innovation systems. And both reports are built up by a series of national-cases contributions, where experiences of local and sectoral dynamics are explained together with the role of public actors in them. One of the most interesting points raised in the second report is the importance of value-chains for industrial dynamics and innovation processes. This means that differences in the nature and length of the value-chains in advanced or mature clusters has tremendous importance in terms of how the knowledge is created and used within the cluster. "We should therefore expect to find that value chains of varying lengths and technological stability have markedly different degrees of reliance on implicit vs. explicit knowledge and on endogenous vs. exogenous sources of knowledge" (OECD, 2001b, p. 10). Although in that report there are not normative lessons for effective clusters policy design, most of the chapters indicate the

[8] Analysis of the final findings of the project "Clusters in transition economies" will be part of a further stage of

role of public actors, particularly at meso-level (national) in their recent efforts towards this.

The OECD has also recently dealt with SMEs and territorial development in a publication about "Learning Cities and Regions" (OECD, 2001c). Although this publication does not address directly the question of local industrial production systems in terms of clusters and industrial districts, its emphasis on human resource development, education and employment at this sub-national level has some indirect implications about cluster development. Interesting to note here is the emphasis placed on the need to developed tailored policy solutions according to each region/location needs, but also to develop such policies on the basis of some policy principles in terms of the "inputs to the learning process", like high-quality and well-resourced educational provision, coordinate the demand and supply of training, facilitate organizational learning, and fostering social capital; and in terms of "mechanisms of the learning process" like effective horizontal and vertical co-ordination of policy actions in the territory, evaluate continuously interactions between individual learning, labour market conditions and innovation process, and ensuring that the general strategy is democratically legitimate.

The OECD is key-organization, particularly regarding the spread of new policy rationales, emerging strategic issues, and exchange of information about different countries' initiatives and performance. This means that the role of the OECD in terms of cross-national policy transfer should be underlined. Hence, its recent focus on clusters and industrial districts might bear fruit as to raise the awareness of industrialized countries to improve and launch new public actions in this particular field.

European Union

The European Union lacks of specific policy instruments on development of local production systems. Therefore, we will shortly focus on three EU policy fields of action, namely, the regional policy, its policy towards accession countries, and other (potentially) relevant policy instruments.

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the project West-East ID (Work Package 5, devoted to "Policy Options").

The EU regional policy

The regional policy of the EU is organized in two major groups of policy instruments. The first of these are the Structural and Cohesion Funds, organized in multi-annual programmes and following a co-financing principle between the EU and the respective member state. In financial terms, these funds constitute the bulk of EU allotments to reduce inter-regional disparities within the EU. The second group of instruments are the so-called "Community initiatives", of much lower endowment, but of greater flexibility in operational terms, since the Commission has full decision and managerial responsibility. In what follows, a rapid examination shows the absence of cluster or industrial district development strategies in these two groups of instruments.

There are 5 different funds, namely, ERDF, EAGGF, ESF, FIFG and the Cohesion Fund[9]. Almost all of them have a sectorial nature, for example EAGGF is for agriculture, FIFG is for fisheries, and the 1993-created Cohesion Fund operates exclusively in the fields of transport and environmental infrastructures. This leaves the ERDF to be the only truly generic fund, which could in principle address questions of cluster and industrial districts' development. However, when examining closely the implementation of ERDF and the other Funds altogether, there is no apparent cluster policy action envisaged, neither in the recent years nor in the newest reform of these funds for 2000-2006 [10].

The structural funds channel currently their resources to three types of regions: poor regions under 75% of the EU's average GDP (objective 1), regions under structural/industrial adjustment (objective 2), and regions with problems of employment (objective 3). Following these three objectives, there could be a scope for public action towards clusters and industrial districts, particularly for objectives 1 and 2 regions. However, this possibility has not been exploited in the actual implementation of the funds.

The funds are generally implemented by the so-called "Community Support Framework" (CSF) program, a multi-annual plan for economic development of objective 1 (very poor

[9] ERDF: European Regional Development Fund; EAGGF: European Agricultural Guidance and Guarantee Fund; ESF: European Social Fund; FIFG: Financial Instrument for Fisheries Guidance. There are also two further funds, namely, ISPA: Instrument for Structural Policies for Pre-accession; and the SAPARD: Agricultural instrument for pre-accession; but they will be examined in another section, related to the overall EU actions supporting clusters in the CEECs (Central and Eastern European Countries).

[10] The Funds have been reformed recently for the period 2000-2006 in order to accomodate to the coming Eastern enlargement, and following the political agreement stricken at the Berlin top summit in 1999. See Borrás and Johansen for the major hints of this reform, the political debates around it, and its significance for the overall political economy of the Union (Borrás & Johansen, 2001).

regions) and objective 2 regions (industrial decline regions), elaborated in partnership by the corresponding national and regional authorities, and negotiated with the Commission. To our knowledge, none of the previous CSFs (1994-1999) for the cohesion countries (Spain, Portugal, Greece, Ireland) envisaged direct actions towards clusters or industrial district development, though this should be confirmed in a detailed analysis. For the current 2000-2006 programs, and following the annual review of year 2000[11], only the Italian CSF has envisaged direct actions towards local production systems, mostly visible in the multi-regional program for 'Local development'. The Portuguese CSF, for its part, has placed the issues of the information society and innovation process as a priority for the overall economic development of the country. Whereas, a more careful analysis of each national CSF is needed in order to determine to what extent the different regional and operative programs for 2000-2006 have launched specific actions towards clusters and local production systems, a first view of these in the Commission document does not indicate a decidedly cluster approach in the implementation of the EU Structural Funds.

The second group of EU instruments under regional policy are the so-called "Community initiatives". Here the absence of an industrial district/cluster perspective is blatant. The 1999-reform of the EU's regional policy reduced the number of Community initiatives from 13 during 1994-1999 to the current 4 for 2000-2006. These are: Interreg III, which aims to stimulate cross-border, transnational and inter-regional cooperation; Leader+, which promotes rural development; Equal, which combats discrimination in access to the labour market; and Urban II, which encourages the economic and social regeneration of declining towns, cities and suburbs. None of these initiatives does deal directly with clusters/IDs development, not even Urban II, which is dedicated to questions of social housing and urban-architecture renewal.

It is worth pointing at this stage, that one of the most successful Community initiatives in the 1994-99 exercise was the so-called RIS/RITTS initiative, which promoted the regional actors to develop a collective 'regional innovation strategy'. This Community initiative was interesting because it promoted collective action supporting SMEs and firms in the territory, in an approximate way as the UNIDO cluster program does, yet at a regional and not local level.

[11] Report from the Commission - Twelfth annual report on the Structural Funds, 2000. (COM (2001) 539 final). This report summarizes the implementation of these Funds on all member states.

A last remark about EU regional policy would be relevant here. This is the fact that the Commission still has a little latitude of manoeuvre in EU regional policy. The 1999-reform allowed it to support new and little-exploited ideas through novel policy measures. And despite that among the three recently selected[12], none does deal with cluster or industrial district development, the existence of these new working themes provides some possibilities to introducing new issues in the EU regional policy agenda.

The EU accession policy for Central and Eastern European Countries (CEECs)

Again, in the array of EU policy instruments helping accession countries and the CEECs, there is not a specific industrial district /cluster development policy yet. The existing financial instruments are divided in 2 groups: firstly, the 2 pre-accession funds created in the 1999 Berlin summit; and secondly the PHARE program for infrastructure development in CEECs.

The 2 Pre-accession Funds are IPSA (Instrument for Structural Policies for Pre-accession) and SAPARD (Agricultural Instrument for Pre-accession). The financial assistance of the first is limited to programmes for the environment and transport infrastructures, in what seems to be quite similar arrangements as in the Cohesion Fund. This instrument has been allocated 1billion € for each year in the 2000-2006 period. The essentially sectorial approach is also evident for the second pre-accession fund, namely, SAPARD, which commits financial assistance for agriculture and rural development in the accession countries in view of the transformations required in the process of full adoption of the acquis communautaire.

The PHARE programme is the European Union's main instrument of financial and technical cooperation with the central and eastern European countries (CEECs). It was set up in 1989 to support the process of reform and economic and political transition in Poland and Hungary, but it now covers 14 partner countries in the region. Following the Agenda 2000 strategy, PHARE is now being reformed in order to assist countries in the accession phase. Therefore the objectives have been concentrated in two, namely, helping the administrations of the candidate countries to acquire the capacity to implement the Acquis Communautaire; and secondly, helping the candidate countries bring their industries and basic infrastructure up

[12] The three working themes selected are: (1) Regional economies based on knowledge and technological innovation; (2) eEurope-regio: the information society and regional development; and (3) regional identity and rural development.

to EU standards, particularly where EU law is most demanding, namely, environment, transport, product quality, and working conditions. The novelties from 2000 include also a managerial reform where projects are larger, and where the co-financing principle is introduced so as to the Member States, the European Investment Bank, third countries or other funding agencies, together with the own recipient can be financially involved. The PHARE's budget has been increasingly gradually until 1999, and from 2000 allocations from the EU will be at a maximum of 1.560 million € for each year.

The infrastructural nature of PHARE objectives, and the new willingness to implement it through larger projects, do in fact limit significantly the possibilities of PHARE to develop in its current form any clear-cut industrial district /cluster development policy.

Other EU instruments

Among the other EU policy instruments examined here, namely enterprise policy and the actions of the EIB (European Investment Bank), no industrial district /cluster development specific policy emerges either.

The enterprise policy of the EU has traditionally devoted considerable attention to SMEs, and before the 2000 reform of the Commission, there was a separated Directorate General on SMEs, which merged into the current 'Enterprise DG'. This traditional attention to SMEs has not been translated yet into specific actions devoted directly to develop and improve the conditions of clusters/IDs and local production systems all through the EU. Admittedly, in the recent years, a network perspective has gained a firm foothold. However, networking is essentially conceived in a rather des-localized manner, that is, networks of centres assisting SMEs to gain information across the EU. The two most salient operating business support networks to SMEs, are the Euro Info Centres (contact points for SMEs providing information and assistance in order to access EU programs and initiatives), and the Innovation Relay Centres (for technology transfer between research institutions and firms in Europe, particularly SMEs). Other EU instruments towards SMEs include: entrepreneurship promotion, business partnership events, inter-enterprise relations and subcontracting, or access to finance, in what is a rather 'non-territorial' approach of SMEs activities.

Most recently, though, the Multi-annual Programme for Enterprise and Entrepreneurship (2001-2005) has paid significant attention to innovation processes and SMEs. Among the objectives, however, there is nothing directly related to local production systems in the form

of industrial district or clusters. The objectives are: enhance competitiveness in knowledge-based economy, to promote entrepreneurship, to simplify regulatory framework for business, to improve the financial environment for SMEs, to develop networks for improving the access of firms to Community programs and services.

The European Investment Bank (EIB) is a rather unknown EU institution, whose main aim is to grant low price loans to countries for specific projects related to socio-economic development. The EIB grants these loans to EU member states, and also to other countries, following the agreements concluded under European development aid and cooperation policies. The EIB has various scopes of action, since it finances very diverse projects ranging from environmental protection measures to health and education. Among its areas of involvement that has some interest for us, the EIB is engaged in developing venture capital funds for innovative SMEs and in matters of urban renewal, most notably social building. Besides these lines of action, the recently launched i2i (innovation 2000 initiative) has been allocated the generous amount of 12-15 billion € over 3 years, in order to support research and technological innovation by loans, complementing the efforts of the Sixth RTD Framework Program (2002-2006). Despite these lines of actions (venture capital, urban renewal and the R&D-focused i2i), the EIB does not envisage to support projects for industrial district /cluster development, nor does it have a clear policy stimulating such line of action at national/regional/local level.

4.2 Meso-level of policies

Having examined briefly the actions (or the lack of them) undertaken at macro-level, it is not adventurous to assert that the greatest bulk of policy initiatives towards ID/cluster development takes place at meso- and micro-level, that is, at national and sub-national level of government. In what follows, a succinct view of the most salient ID/cluster development policies at national level in the 15 EU member countries plus Norway is provided, and commonalities are identified. After that, a section will be specially devoted to the national cluster/ID policies of the 3 Western European countries involved in the WEST_EAST IDs project (namely, Italy, Germany and the UK).

Before moving ahead, though, it is important to underline that the type of public actions developed, and the level where these have been launched from (national or sub-national, meso- or micro-level), depends pretty much on the structure of the state, and the way in which

the distribution of powers between the national state and its political constituent parts has been organized, particularly in the field of socio-economic development and innovation.

A last remark is that the policy initiatives to be presented below for each country are not exhaustive, and hence should be considered as an approximate collection of policy actions willing to provide a general view of the most recent trends towards industrial district /cluster policy in Europe.

4.2.1 Industrial district /cluster policies in the member states of the EU: similarities and differences

The national approaches to cluster policy are very diverse in nature, as the policies are embedded in different business environments, cultural and institutional framework, as well as different governance systems[13]. Figure 11 summaries regional cluster policies in EU member states plus Norway, demonstrating this large variety in approaches.

From what can be seen from the table, some countries have a distinct national cluster policy that aims to support national and regional clusters in different ways. These countries are Belgium (Flanders), Denmark, France, the Netherlands, Portugal, Luxemburg, and the UK. A national cluster programme has also been launched very recently in Sweden. Other countries have specific regional cluster instruments. In these cases, the promotion of clustering is used as an element of innovation and regional policies. Austria, Finland, Spain, Germany, Italy and Norway are seen to have some cluster instruments operating mainly at the regional level. Still other counties have neither a national cluster policy nor specific cluster instruments. One example is Liechtenstein. Another is Ireland, in which, however, some policy tools have an impact on cluster building.

Although the approach and the phrasing differ, the national policies share a number of key objectives and characteristics:

(i) The cluster policy (and to some extent also cluster instruments) deals with broader issues as it is seen as a mean to promote economic development and structural changes, often through enhancing (regional) innovation capacity. The policy often stresses the need to be global competitive in the 'new economy'.

[13] The governance system ranks from federal or quasi-federal states with a large regional autonomy (in Germany, Austria, Belgium and Spain) to very centralised countries with little regional autonomy (as Greece, Portugal, the Nordic countries, and to a lesser extent France and the Netherlands) to countries with newly created

(ii) The policy is based on improved business co-operation and networking, which may demand the stimulation of social processes.

(iii) The policy also emphasises the linking of firms to the (regional) technological infrastructure of HEI and R&D-institutions in which knowledge irrigates the regional economy. The policy in particular tries to bring new technology to regional networks of SMEs. More co-operation may demand attempts to change attitudes in both the technological infrastructure and in firms. Thus, regional located higher education, research institutions and technology transfer infrastructure should develop their competence and services to be more appropriate for local firms, and SMEs in particular should learn to use R&D when innovating.

(iv) The policy emphasises the role of public or semi-public organizations having a role as mediators in encouraging inter-firm networks and joint projects. Especially in the early stage of cluster building, a third party is seen to be required to care for the necessary co-ordination, flow of information, subsidize the organization of business networks, building of mutual trust between cluster members etc.

(v) All policies also underline the need to better innovation capability, knowledge management etc. in firms. However, the policy focuses on how these aims may be reached by improving the interactive learning process between firms and their environment.

(vi) All policies are focused on the need to stimulate the creation of specialized factors, and specialized knowledge in particular, in regional clusters.

(vii) The policy (often implicitly) seems to imply that intervention can only apply to industries that have an appropriate "critical mass" of cluster characteristics. Thus, some policies stress the need to reach critical masses of firms, co-operation and organizations.

The cluster policies also realize that although cluster policy instruments are a powerful means of developing competitiveness within industries and the economy, it is by far the only means. Thus, the promotion of clustering and specific cluster instruments is often used as an element in other policy areas.

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decentralised regional development institutions (as the UK) (Landabaso, 2001).

4.2.2 Industrial district /cluster policies at the national level in Italy, Germany and the UK

Italy

All since the mid-1960, and particularly in the 1980s, some schemes of the Italian government have helped the local industrial districts in an indirect, yet effective, manner. This is the case of the "Sabatini law" in the 1960s which supported SMEs investments in new machinery, or the incentives to promotional and financial associations of sectorial/territorial nature, that were developed at the late 1980s (legge 83/1989 and legge 371/1991).

In the 1990s, however, the Italian government has launched some incentives directly envisaging the development of local industrial districts. This is particularly the case of the legge 317/1991, which provides for support schemes for industrial districts, and which is supposed to be implemented by the corresponding regional governments. Two critical points can be individuated in the Law. Firstly, the restrictive definition of industrial district in the law, hindered a wider application of the incentive schemes, as only 9 of the Italian regions have officially identified such industrial districts; and secondly, the financial commitments envisaged were very scarce. Most recently, though, the Italian government has tried to overcome such limitations by expanding notoriously the official definition of industrial district in law 140/1999.

All in all, however, the most prominent public actions promoting industrial districts in Italy have come from regional and local levels of government, with significant variations in terms of schemes and success (Belussi, 2002).

Germany

Something similar seems to happen in Germany. The German federal system is very decentralized, which means that the different Länder hold many relevant competences in order to foster the socio-economic and technological development of the territory. It can be argued then, that most of the public activities towards industrial district /cluster development have been undertaken at Land level, in what we have defined in this report as micro-level/sub-

national level of public action.

Nevertheless, the federal government still retains some relevant powers in the field of economic and industrial development, as for example in the fields of information society, energy, science and technology, and SMEs development. It is within this latest scope of action that a Federal-level cluster/ID policy could have partly emerged. However, in its otherwise rather active SME policy, the federal government has not considered direct actions towards local production systems, nor in the form of networking nor in terms of more territorial-bounded initiatives. The measures envisaged by the Federal government SMEs policy includes among others: tax relief schemes, reduction of red tape, stimulating the use of new technologies (most particularly ICTs), and stimulating entrepreneurship.

The UK

In contrast with the German and Italian governments, the UK government has recently launched a pro-active policy action towards clusters with a national reach. The strategic document "The Competitiveness White Paper" of December 1998 identified clusters and networks of firms as an important area for the economic development of the entire UK, and most particularly of the regional development agencies. In 2000 the Minister for Science, created a "Cluster Policy Steering Group" which was to recommend policy initiatives to the government. In February 2001 the Department of Trade and Industry (DTI) published the report "Business Clusters in the UK, A First Assessment", which is a systematic analysis of the cluster dynamics in the UK. Later the same year, the DTI hold a "Clusters Workshop" with the objective of building on best practices around the country.

Most interesting from all these first-step initiatives at national level, is the fact that they have been launched in accordance with the operations of the regional development agencies in the UK. Yet, the UK government is also allocating significant economic resources to foster ID/cluster developments. In the 2000 Budget there have been allocated 50 million GBP for an "Innovative Clusters Fund", designed to allow regional development agencies to co-finance business incubation and small-scale infrastructure. In the 2001-02 Budgets an additional fund of 54 million GBP for a "Regional Innovation Fund" is being used to support clusters and networks of small businesses.

4.3 Some policy considerations about macro and meso-level of policy towards industrial districts/clusters in Western Europe

Summing up from the information provided in this section about ID/clusters policies at macro and meso-levels, it can be said that there is a relative wide variation of policy action in this topic. On the one hand, most scholars and most policy-makers recognize today the importance of local production systems in terms of competitiveness and job generation. This is particularly evident in the OECD, UNIDO and some national governments like the Netherlands, the UK or Denmark, which have fully endorsed the industrial district /cluster approach and have launched specific national actions in this regard. On the other hand, however, it seems that not all national governments follow such general trend, nor all international organizations, most notoriously exemplified by the EU and the German federal government, which still have a rather 'hands off' attitude, either in their respective SME-enterprise policy or in its regional policy, which leaves to the regional governments entire responsibility for these matters.

Most interesting for us is to examine among the most pro-active industrial district /cluster policies what lessons are emerging from recent and current experiences, in order to assess the possibilities for a solid EU policy measures for industrial district /cluster dynamics. This is particularly important for Europe in view of the imminent enlargement Eastwards, both in terms of the re-location processes in Western industrial district /clusters, and in view of the rapid re-location processes in the East. Next paragraph deals with the policies for the later.

4.4 Policies to help the development of industrial districts and clusters in Eastern Europe

Clearly, the countries of Eastern Europe will benefit from the development of policies that will encourage the development of industrial districts/clusters. Such policies will need to help develop the ability of East European industrial districts/clusters to develop organisational systems and innovation and learning communities that are conducive to adapting to technical and competitive changes, particularly in the light of closer economic integration with the EU. These policies will have to develop the close collaborative public-private sector enabling policies that are already evolving in Western Europe to become a reality in Eastern Europe (Raines, 2002). Moreover, they will have to be effective in the sense that they are focused on

clearly identified and relevant problems and deliver benefits that are greater than the costs of these policies in terms of monetary and transaction costs (Enright, 2001).

This requires a policy paradigm that stimulates learning by all relevant actors in industrial districts/clusters, integrating and coordinating policies to ensure that policies impact on all relevant actors and developing these policies in the light of changing circumstances, particularly technical and competition changes (Lundvall and Borras, 1997). These conditions also prevail in Western Europe and much can be learned from experience in West European countries to help the process of policy formation, implementation and development in Eastern Europe. However, there are a variety of approaches to public policy towards industrial districts/clusters in Western Europe, ranging from a strong legal foundation with well-specified institutional and organisational structures in Italy, with well-specified organisational structures but limited legal and institutional structures in Germany, with no legal foundation and mainly informal institutional and organisational structures in the UK.

It is not clear what type of polices should be developed in East Europe. As the differences in macro, meso and micro policies in West Europe at least partly reflect political and institutional conditions in these Western countries. The approach developed in East Europe should be guided by their actual or desired political and institutional systems. For example, are they developing legal and formal based policies such as Italy or are they adopting a more informal approach such as that of the UK? As political and institutional systems are strongly influenced by historical factors, there may not be a wide choice in this area. Moreover, MNCs are often attracted to particular types of political and institutional systems, that is, those that lead to low uncertainty and transaction costs (Lundan, 2001). Some East European countries may be attracted to those types of institutional systems that are attractive to large MNCs. This will have implications for the type of policies that should be developed.

There is also a need to avoid traps of constructing, implementing and continuing with policies that are inappropriate because they do not take into account infrastructure, institutional and industrial structures failings in Eastern Europe. New institutional economics suggests that changing the formal but especially the informal institutional constraints in many Eastern European countries will take many years. This implies that failures could arise from developing policies that are based on Western institutional constraints. Similarly, using of-the -shelf blue prints from even successful policies in Western European countries may not be appropriate in East European countries that have many institutional failures, particularly in the area of informal institutional constraints. This line of reasoning suggests that policies will

have to be developed that are in accord with current institutional constraints, or policies will have to include as part of the learning process the need to develop new informal institutional constraints. Given the path-determined nature of institutional constraints such policy formation and implementation is likely to be very difficult. The infrastructure and innovation and business systems of many Eastern European countries also suggests that they are likely to be, at least for sometime, in streams B and D in Figure 10. This means that policies suitable for the development of high-tech or complex inter-organisational systems will not be appropriate until these locations move to streams A and C.

Harmful location tournaments among East European countries and within regions/Metropolitan areas may also emerge from badly constructed policies. If all locations seek to develop the same polices to attract the same types of investments (both domestic and foreign) they are likely to end up with foot loose investments given that many firms are looking for shady corners in open fields (Lundan, 2001). However, for many East European countries any investment (particular foreign investment) will be attractive to help to generate employment and economic development. The trick is to develop into open fields to attract even foot loose investment and then use the benefits of these investments to develop 'shady corners' by encourage the growth of organisational systems and innovation and learning communities that are conducive to the construction and growth of 'shady corners'. This is a difficult task, given the historical and geographical factors that path determine Streams A and C as shown on Figure 10. Moreover, in some cases, locations will be unable to enter into streams such as A and C. This does not mean that no benefits will emerge from policies that are successful in linking Eastern European locations to competitive industrial districts/clusters in Western Europe. The benefits of such policies may be short lived as foot loose investments disappear. Even if they are able to retain such as investments they are unlikely to help to close the relative gap with richer regions in both West and East Europe.

Figure 11 Characteristics of regional cluster policy in western European countries

COUNTRY	OBJECTIVES	MEASURES
Austria (Upper Austria)	Upper Austria is seen as the most dedicated of the Austrian federal states to the concept of clustering. Clusters are actively nurtured by a cluster-oriented technology policy aimed to foster the innovation potential by strengthening the capability and willingness for co-operation. However, business network should not be restricted to a specific region and industry. Rather, companies should be integrated into national and international networks.	The existing and planned instruments to achieve clustering is non-financial support measures such as strengthening the information and communication flow, the mediation of co-operation between companies and R&D-institutes, the stimulation of qualification of the labour force and the support of shared marketing and export. Existing services are primarily oriented at SMEs as they have the most severe problems with gathering external information
Belgium (Flanders cluster policy)	The region of Flanders has carried out a specific cluster policy since 1994. Clusters are defined as enterprises or/and HEI- and R&D-institutions in the region that voluntarily but actively join to create synergies in areas as R&D, innovation, training, production, commercialisation. The policy supported such clusters and 'valleys' through different measures. The policy ceased to exist in June 2001, however, was replaced by a new tool named 'Flemish Innovation Cooperation'.	The policy consists of two main steps: (i) Accreditation by the Flemish Government of clusters that apply for it and fulfil certain requirements. Public authorities can have a coaching role in the creation and working of the 'cluster network'. That is help and advice partners with their application and with the building of the network. (ii) Cluster may get some 'soft' support (advice of an consultant, training), and grants and loans for R&D and innovation projects
Denmark (Clusters of Competence)	A new cluster policy emerges in Denmark. The policy aims to upgrade existing and emerging Danish clusters (both national and regional ones) in face of the increased competition in 'the new economy'. Knowledge is seen to become an even more determining factor of competitiveness. Thus, the policy stresses the need in particular to support the very specific competence of individual clusters that are not easily copied. Many clusters need to develop a critical mass of companies, of specialised services and infrastructure, and of organisations and channels for the spreading of knowledge.	The first step taken to construct an industrial policy addressing the Danish clusters entails identifying relevant clusters of competence. 29 such clusters are singled out in a 2001 report; 16 with a national span and 13 regional ones. The second step is to tailor-make measures towards individual clusters. Thus, critical factors of success are seen to vary from cluster to cluster. Policy instruments must then be created within the context of a dialogue between cluster firms and the political entities, either at the national or regional level.
Finland (The Centres of Expertise programme)	14 regional Centres of Expertise (CoEs) and 2 national networked CoEs are in operation. The aim is to pool local, regional and national resources to develop internationally competitive fields of expertise. Two important functions have been (i) to advance networks and co-operation between different regional actors, and (ii) to contribute to increased competencies in SMEs through training. The programme contributed to 8.500 new jobs and	The individual CoE is realized through co-operation between industry, local government, other public authorities, technology centres, universities, polytechnics and research institutes. The local technology centre generally has the responsibility for running the CoEs. The CoEs are selected by competitive tendering. The main criteria for selecting CoEs are a concentration of expertise of an internationally high standard, innovative

COUNTRY	OBJECTIVES	MEASURES
	290 new high-tech firms in the period 1994-1998.	approach, potential impact of proposed measures and efficient organisation.
France (Support Local Productive Systems)	The space planning agency DATAR carries out a policy targeting Local Productive Systems (LPS). The policy aims to encourage the co-operation of firms within LPS, further contact between firms and higher education and research institutions in the regions, and institute communication between public authorities and local actors in order to develop local development policies.	The French 'LPS policy' includes two main steps: (i) Two calls for proposals (in 1998 and 1999) on LPS, in which 96 projects out of 202 proposals were selected as 'official' LPS. The projects contain firms that propose to carry out a common project or work together in an organized way. (ii) The selected project and organisation in charge of the project may then apply for public fund to carry out their plans.
Germany (REKON-Project)	The REKON-Project aims to promote structural change in North Rhine-Westphalia. The project includes the use of a cluster approach as a policy tool. Appointed clusters share a 'cluster management' for a defined period, with the aim of self-sustainability afterwards. The development of new 'cluster organisations' may be one important task in order to secure the working of the clusters after the project period. The REKON example points towards a more general trend in which the development of clusters in Germany is used to promote structural change in the regions. This represents a new orientation of regional policy.	Measures are targeted towards needs in individual clusters. The construction cluster in the Ruhr area is one member of the REKON-project. This particular project targets SMEs in construction and handicraft. One task is to replace the traditional way of performance in handicraft (all by oneself) by co-operation in developing new product and entering new markets. The cluster managements (two consulting companies) perform management advice, development and performance of co-operation projects
Greece *	Industrial district policy in Greece initiated as early as 1962 by the parliamentary act 4256 of 13/19-10-62 (A168). Article 6 of the same act passed the jurisdiction for subsequent policy to National Organisation for Industrial Development (NOID). A number of studies by leading economic policy research centres (e.g. Stanford) ensued. In 1963, such studies taken on board by the ministry of coordination led to the identification of 5 ID locations (viz. Thessaloniki, Volos, Patra, Iraklio and Kavala). These remained the sole ones until 1977 when a new law (parliamentary act 742/77) extended the number of Industrial districts and clusters to 20, by identifying 15 additional urban centres in rural areas of Greece. Until 1985, only 16 of them were in operation. The following year a new law (parliamentary act 136/28.3.86) allowed the formation of one ID per prefecture under the jurisdiction of the Greek Bank of Industrial Development (GBID)**. This increased the potential number of Greek	The best way to understand the pursued measures is to view them in a general context. In particular, following the years after World War II, economic and industrial policies attempted help Greece 'catch up' with the most developed Western economies. Such policies transformed Greece from a traditional economy to a modern market economy with a substantial industrial base. Moreover, after the early 1960s the implemented policy of Industrial districts and clusters attempted to achieve high national growth rates in conjunction with a more even regional distribution of economic activity. To that effect a number of measures were developed (ranging from town planning to the positive portrayal of peripheral regions in the mass media. Due to space limitations the following six measures are mentioned: a) infrastructure building, (e.g. roads, banks, hospitals) as well as reduction of red tape, b) provision of incentives for the (re)location of firms in the

COUNTRY	OBJECTIVES	MEASURES
	Industrial districts and clusters to 52. One of the most recent accounts*** in the area) brings the number of operating Industrial districts and clusters to 21 and the number of Industrial districts and clusters in infancy to 5; obviously more have flourish since then. Although jurisdiction for ID policy remains with the GBID, nowadays it collaborates with EU and Greek local authorities more than ever before. This 40 years history was far from trouble free. During this time regional development policy in large came and went out of fashion with detrimental ramifications for peripheral regions. There is thus also a parallel history based on grass roots initiatives and efforts for the self-formation of Industrial districts and clusters throughout rural Greece (primarily based on proximity to natural resources. Such grass roots developments often lobbied the passing of supportive policies. Firms located in Greek Industrial districts and clusters cover a variety of industrial sectors with stronger emphasis on traditional manufacturing, e.g. SIC 20 to 30. Contemporarily the super ordinate objectives of ID policy actively pursued concern: a) the enhancement of industrial infrastructure, b) industrial decentralisation (bear in mind that almost 50% of manufacturing is located in the capital, viz. Athens), c) attraction of foreign direct investment, d) improvement of manufacturing productivity by the formation of scale, scope and agglomeration economies as well as by pre-selecting the firms requesting to locate in the Industrial districts and clusters, and e) environmental protection.	Industrial districts and clusters. In particular, provision of fiscal (e.g. subsidies in key or exporting industries) and tax (e.g. lower rates of taxation, lower or no VAT), lower prices for industrials lots, c) networking; for example at the level of guilds, unions and national sectoral chambers, d) formation of peripheral universities and support/ incentives for their involvement in the regions' Industrial districts and clusters, e) the deliberate creation of 'Technopolis' through industrial R&D (grants)., f) active support for the formation of ship building and related activities (e.g. petrochemicals) Industrial districts and clusters in major portal cities.**** Such national and regional ID policies were complemented by various EU policies (e.g. Mediterranean Integrated Programmes, 2nd European cohesion funds framework, programmes for scientific training and exchange). The implementation of such measures and their effects have been varied, ranging from the creation of new class of Greek 'incentive hunting' entrepreneurs to substantial improvements to the level of infrastructure in disadvantaged regions. Overall, the 1980s were characterised by a reduction in the regional disparities in Greece driven primarily by the improvement in the industrial structure of the regional economies. However, the 1990s saw a change in the policy interests that became increasingly focused to national rather than regional economic development measures that resulted to a widening of the gap between central and peripheral regions.
Ireland (Business, Education and Training Partnership)	The Business, Education and Training Partnership is not a cluster policy tool, however, has in practice had important impacts on Irish clusters, and the ICT sector in particular. The partnership aims to ensure a balance between skill requirements and the supply of skills. Its work resulted in significant additional investment by the government in expansion of third level college, as well as increased numbers of places on relevant training	The partnership develops national strategies to tackle the issue of skill needs, manpower needs estimation, and education and training for business. There are three components in this development: (i) The Partnership Forum (with representatives from the highest level of the business and public sector) meets about once a year with the objective of achieving a broad consensus among all interested parties to meet pressing skill requirements. (ii) The

COUNTRY	OBJECTIVES	MEASURES
	programmes, notably in the ICT sector. Thus without specifically setting out to be a 'cluster policy' instrument, it has in fact proved to be a useful instrument addressing one key issue for the development of the clusters of ICT activities in Ireland. More recently, the instrument has moved on to broaden its focus by addressing skill shortage issues in a wider range of sectors.	Expert Group on Future Skill Needs examines issues in more detail, collecting and organising relevant research and producing reports. (iii) The Management Implementation Group (with top civil servants) works to implement appropriate proposals as quickly as possible.
Italy (Regional centres for innovation support)	Following laws 317/1991 and 598/1994, industrial policies oriented towards local productive systems and industrial districts have been developed. Mostly, these policies have aimed at developing centres and intermediate structures for research, experimentation, pilot projects and demonstration, personnel training, production upgrading and technical consultancy in SMEs. The centres aim to increase the technological level and innovation capability in (networks of) SMEs.	Policies targeting information and technological diffusion to SMEs in local productive systems are characterised by the intertwining of national policies with regional and local initiatives, which have arisen in a decentralised and bottom-up manner. Important actions have been the creation of science parks, centres for innovation support at the regional level, and sectoral centres for technology transfer and general technical assistance aimed at the local level. In general, the 'centres' are promoted and managed jointly by regions, regional financing institutions, chambers of commerce, together with private firms and entrepreneurial associations.
Luxemburg (Increase competitiveness of the construction sector)	Since 1990, the Centre de Ressources des Technologies de l'Information pour le Bâtiment (CRTI-B) has aimed to enhance the competitiveness of the construction sector. The productivity of the sector should be improved through the creation of an information and communication system between the actors in the sector	The main mission of the CTRI-B is to normalise the documents with the procurement requirements, to standardise the forms for tender procedures, to perform individual and collective consulting, and arrange specific conferences. National working groups gradually elaborate on the basis of consensus technical clauses that bind all the industry associations and public administrations involved in the construction sector
Netherlands (National cluster policy)	The cluster policy of the Dutch Ministry of Economic Affairs focuses on technological co-operation aimed at improving the competitiveness and innovativeness of firms. The basic roles of the policy are (i) to create favourable framework conditions for industry and service in general, (ii) to act as broker, in which government identify cluster opportunities by bringing together supply and demand and provide strategic intelligence, and (iii) the government plays a role as a demanding and sophisticated customer to provide societal needs.	The cluster policy uses two main instruments. Firstly, creating favourable framework condition by the use of several policy fields. Secondly, by acting as a broker. The Ministry of Economic Affairs tries to stimulate clustering by giving information upon the opportunities and possibilities of clustering, arranging dialogue and contact between potential cluster parties, directing the cluster process, and bringing in its own contacts, networks and financial instruments. The Ministry has involved in 12 cluster initiatives, which cover quite diverse industrial sectors and types of projects.

COUNTRY	OBJECTIVES	MEASURES
Norway (REGINN)	The REGINN (Regional Innovation System) programme was introduced in 1998 as the first policy tool in Norway focusing on regional clusters. This was an experimental programme lasting four years. However, some initiatives are followed up in the programme Regional innovation pilot, running from 2002. REGINN aims to stimulate co-operation between firms in specific sectors and regionally located research organisations and regional colleges, in order to stimulate increased innovation capability in important industries or clusters in the region.	The initiative and money as concerns REGINN comes from the national level. The 19 counties in Norway competed for participation in the programme through a pre-qualifying round of regional innovation analyses and proposals for concrete innovation projects. The projects are then carried out at the regional level, often organised by a regional research institute. Typical projects are the development of new process technology, organisation methods, knowledge etc. jointly between a local network of firms and a regional college or research institution.
Portugal (PROINOV)	The Integrated Innovation Support Programme (PROINOV), that will introduce a new growth model in Portugal, has innovation and clusters as key words. An important aim is to develop innovative clusters, departing from a well-defined group of national clusters, however, which often involve the concentration of actors in a specific region. Increased collaboration between firms, and with business associations, and education, innovation, R&D, financial and interface institutions should develop clusters.	Clusters are developed by attempts to construct a common vision among relevant actors, identification of priorities for action, improvement of the interfaces in the innovation system in the clusters, encouragement of co-operation between cluster members, and support of the development of products and services. Individual clusters require targeted policy, however, a main task is to improve product quality, innovation and customer contacts in traditional clusters.
Spain (Basque Cluster Policy)	The Basque country aims to stimulate the development of specific enterprise groupings (clusters) belonging to current important industrial sectors in the region, or sectors deemed to be of future importance. The clusters act as a sort of interface institutions intended to develop activities that improve the competitiveness of the sector. The instrument improves inter-firm co-operation among Basque firms in the same industrial sector	The policy instrument started in 1991, and currently cluster institutions have been set up in 10 sectors. The public support is mainly through financial assistance to partially cover the costs for activities performed in the cluster. Each cluster is responsible of developing relevant activities for 'their' firms. Activities include training, information transfer, co-operation with technological centres etc.
Sweden (Emerging cluster programme)	A new national programme for clusters and innovation systems is about to start in Sweden in autumn 2001. A cluster programme will run in the period 2002 – 2004. The main purpose is to strengthen the policies of regional and industrial development, as the programme is meant to form a basis for other long-term actions to support the development of different innovation systems and clusters, both at the national and regional level. The cluster programme is seen to enlarge the strategy of networking in order to facilitate the industrial transformation and ability for Swedish to compete globally.	The cluster programme emphasises several measures: (i) The programme will be supported by analyses. (ii) The programme will work to identify threats and opportunities for industrial development as regards the efficient working of innovation systems and clusters. (iii) The programme will support the examination of quality, the performance of R&D and the creation of networks in clusters. The cluster will also be closed connected with the regional growth agreements between Swedish regions and the government.

COUNTRY	OBJECTIVES	MEASURES
UK (Scottish Cluster Policy)	The Scottish Enterprise Network (SE) has given priority to supporting clusters in the Scottish economy. There are four pilot clusters in Oil and Gas, Food, Semiconductors and Biotechnology. All four cluster are in the process of developing industry action plans to upgrade their industry over the next five to ten years. The four pilot clusters have all undertaken research looking at the connections and opportunities within their industries, and have designed processes to get industry participants to talk, work and learn together.	Instruments have to be tailored to the needs of the specific cluster. In a fragmented industry like Food, on of the key actions has been to create an atmosphere where collaboration and competition can happen alongside each other. An emerging cluster like Biotech has a greater emphasis on delivering infrastructure, e.g. research and incubation facilities. In Semiconductor, the cluster approach has encouraged industry to work closely with academics in devising new strategies for research collaboration.

Source: The ENSR network

* The entry for Greece has been coauthored by Dr Dimitrios Tsagdis (Research Fellow at the international Business Unit of MMU) and Mr. Stilianos Alexiadis (PhD student at the Economics Department of MMU).

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Section D

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