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LEARNING AT THE BOUNDARIES FOR INDUSTRIAL
DISTRICTS BETWEEN EXPLOITATION OF LOCAL
RESOURCES AND EXPLORATION OF
GLOBAL KNOWLEDGE FLOWS

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Learning at the boundaries for industrial districts between exploitation of local resources and exploration of global knowledge flows

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1. Introduction¹

In this chapter we develop an integrated view on how knowledge is developed in localised systems of specialised firms (industrial districts - IDs), through informal social networks (communities of practice - CoPs), and firms networks, in an osmotic process between the internal to the district knowledge and the external to the district knowledge. Contrary to consolidated tradition, which is based on Marshall’s early writings, we describe the functioning of the modern industrial district emphasising not just the role of the local “industrial atmosphere” but the modern aspect of “learning at the boundaries”, where local actors mix sources of knowledge located inside the district with external sources (Bathelt et al., 2002). Starting from the concept of knowledge (Nonaka and Takeuchi, 1995), the purpose of this work is to understand how CoPs, a new concept that arose from the management field, can be useful for deepening the process of knowledge creation, absorption, and sharing of IDs. This chapter is organised as follows. Section 2 provides some notes on the evolution of capabilities in social systems. Section 3 offers a unified view of the contemporary phenomenon of industrial clustering. Section 4 offers a new approach to the learning process in social systems (IDs, CoPs), based on individual and collective capabilities. Section 5 illustrates an

¹ This chapter benefited greatly from comments and suggestions by Peter Maskell. We also wish to thank participants in the Danish Research Unit for Industrial Dynamics (DRUID) Winter conference in Aalborg, Denmark, January 16-18, 2003 for comments on an earlier version of this work. The usual disclaimer applies.

interpretative framework of learning activities by: 1) classifying two types of knowledge management at the firm level and the ID level: gardening activities and investments in capabilities; 2) identifying the importance of internal/external switchers for learning at the boundaries. Section 6 proposes some empirical evidence, illustrating three case studies. The objective is to measure the relative capacity of a single industrial district to “cultivate” the growth process of local knowledge and to face effectively the challenges of the globalisation process, being able to learn at the boundaries. In Section 7 some conclusive remarks are drawn.

2. The evolution of capabilities in social systems

Mainstream economics describes capital stock and natural resources as strategic factors for organisations. In his “Wealth of Nations” (1776), Adam Smith underlined the effects of both specialisation and technical change on the economic growth. Marshall (1920), Chamberlin (1933), and Nelson and Winter (1982), following the Schumpeterian legacy, added the power of innovation. Nonaka and Takeuchi (1995) developed some thorough insights on the importance of knowledge creation. As Teece (1998), Lundvall (1988) and others have argued, producer learning is one of the factors driving the increasing returns phenomenon (Arthur, 1994), together with network externalities. How can an organisation learn? How does it access knowledge “repositories”? What are the institutions that might aid organisations to recognise and enhance its resources?

In order to explore the ways through which an organisation, a community, or an industrial district learn we must discuss the way in which individuals absorb and possess new pieces of knowledge. The fundamental assumption adopted here concerns the individual-based approach to knowledge transfer and learning activities. This approach stresses the diverse combinations of knowledge possessed by individuals (Foss and Foss, 2003: p. 5):

“Knowledge still ultimately resides in the heads of individuals; however, when this knowledge is combined and “aggregated” in certain ways, it means that considered as a system, a set of agents possesses knowledge that they do not possess if separated.”

Knowledge possessed by individuals is further extracted in firms and organisations.

Therefore the competitive advantage of firms in today's economy stems not just from market position, but from difficult to replicate knowledge assets and the manner in which they are deployed (Teece, 1998). While the production of "commodities" plays a marginal role, competition appears to be based on knowledge assets, and firm-processing information has become more strategically relevant than manufacturing activities *per se* (Castells, 1996, 2000). Knowledge assets are the result of a complex process of interpretation of information obtained by data elaboration.

Knowledge can be obtained from information by an individual who processes information. Data can be defined as "observations of states of the world" (Davenport and Prusak, 1997). Peter Drucker (1988) defined information as "data endowed with relevance and purpose", stressing the crucial existence of the human mediation occurring during the phase of data elaboration. Databases can be easily organised to answer many queries, thanks to the possibility of crossing different data-matrixes, through a connecting key-code. ICT tools allow us to "manage data" and to extrapolate information from them. The absorption of information by the human mind also includes contextualisation, validation, reflection and synthesis.

Individuals and organisations can shift from data to knowledge articulating a fluid mix of framed experience, values, contextual information, and expert insight. In this manner they provide a framework for evaluating and incorporating new experiences and information (Davenport and Prusak, 2000: p.5). In organizations, knowledge is embedded not only in documents or repositories but also in organizational routines (Nelson and Winter, 1982) building a collective intelligence (Lévy, 2002), which ultimately leads to organisational wisdom (Pór and Molloy, 2000). Collective intelligence represents the evolution of knowledge from a "property" of individuals to a "resource" of social organisms (Pór, 1995). This process implies a progressive empowerment of the organization.

The capabilities to acquire new pieces of knowledge or to re-use an old knowledge base in an innovative way imply the existence of learning processes.

Starting from the assumption that individual knowledge is scarce and incomplete, intelligent organizations should be able to valorise employees' diversity, encouraging processes of learning by interaction (Laszlo and Laszlo, 2002). Nonaka and Takeuchi (1995), drawing on the Polanyi notion of tacit knowledge, suggest the identification of two types of knowledge: tacit (not codified, not easily transferable) and explicit (codified, easily transferable). Within firms, the conversion of tacit to explicit knowledge, and vice-versa, gives rise to a four-phase learning process (Nonaka and Toyama (2002):

- a. Socialisation → learning as knowledge transfer from one agent to another, sharing and creating tacit knowledge through direct experience (tacit to tacit knowledge);
- b. Externalisation → learning as the capability to produce new relevant pieces of knowledge, articulating tacit knowledge through dialogue and reflection (tacit knowledge to explicit knowledge);
- c. (Re-) Combination → learning as knowledge improvement, systemizing and applying explicit knowledge and information (tacit plus explicit knowledge into new tacit knowledge);
- d. Internalisation → learning as absorption capability, acquiring new tacit knowledge in practice (explicit knowledge to tacit knowledge, but also absorption of tacit knowledge from outside).

The presence of tacit knowledge in individuals and organisational routines explains why knowledge maintains a high degree of subjectivity, influencing the evolution of capability, and supporting the various modes of learning in social contexts. Capabilities evolve in firms because processes of knowledge creation are at work. The “evolutionary view” of capabilities has two quite distinct “progenitors”: Edith Penrose (1959) and Nelson and Winter (1982), whose works have been slowly integrated in a converging approach where firms can be described as coordinators of “organised” and “collective” specific knowledge.

Nelson and Winter interpreted capabilities as “the nature and sources of continuity in the behavioural patterns of an individual organisation” (p. 96), in other words as a

“routine” or “program” which refer to a repetitive pattern. In their conceptualisation routines are organisational memory: a set of skills that a particular member of the organisation can perform in some appropriate environment. Routines are a *repertoire* where knowledge resides, and where organisational knowledge is stored. It is also a matter of knowing what routine to perform, and when to perform it. Thus, tasks are typically complex and composed of various abilities. Productive capabilities include the “ability to operate plants and equipments”. Organisations do not become capable of a productive performance merely by acquiring all the necessary “ingredients” (inputs, like technology or capital). They must have the “recipe” (prescriptive instructions on the use of resources), and the ability to perform it based on a fine-tuning of complex activities of coordination. “Blueprints” are only a small part of what is needed to be stored in the organisational memory of a firm, in order to reproduce and replicate a task effectively. Routines, and therefore capabilities, change when the process of searching and exploring ends up with an innovation. The menu of routines in firms is not broad but narrow and idiosyncratic: routines in organisations are equalized to genes. The important consideration captured by this model is that “imitation, though costly and imperfect, is a powerful mechanism by which new routines come to organise a larger fraction of the total activity of the system”. (p. 135). A similar analysis has been provided by Penrose² (1959). A firm may be regarded as a “repository of assets”, a pool of resources, the utilisation of which is organised in an “administrative framework” (p. 149). Capabilities are a collection of physical and human resources, which may be developed in a variety of ways to provide a variety of services. As commented by Loasby (1999, p. 49), Penrose avoided the term “factors of production” because she did not want to obscure the difference between resources and the services that they yield when they are oriented. Penrose’s definition of the firm fits with the Marshallian tradition where firms are organisations which develop knowledge (Loasby, 1999).

It can be argued that “routine” is an ambiguous surrogate for capabilities, because an executable program for repeated performance is something different from the organisational knowledge that lies behind the execution of a performance. However,

² Nelson and Winter (1982) make a singular comment on Penrose’s work “Though she was apparently unaware of Coase’s (1937) transaction costs approach to the nature of the firm, her analysis is largely consistent with it”.

these two conceptualisations share a mutual understanding, and the contemporary evolutionary literature generally refers to both (Loasby, 1999). It must be mentioned that after its introduction in 1959, the term capability was subsequently discussed by Richardson (1972), in a seminal paper in which he set down the criteria on the basis on which, in the industrial organisation, an extensive cooperation emerges in the market. Activities in firms are carried out by organisations with “appropriate capabilities, or, in other words, with appropriate knowledge, experience and skills” (p. 888). The emergence of a complex web of cooperation is explained by the need to combine closely complementary but dissimilar activities that in certain circumstances cannot be allocated either straightforwardly to the market (because of the existing complementarities with firm assets), or to the firm itself (because it lacks the required capabilities). So, the capability view explains the distribution of economic activities between firms in competitive markets and the ways in which these activities are coordinated through indirect and direct forms of cooperation. Firms exist as independent actors from the enlarged mechanism of atomistic exchange in the market because they possess “distinctive” capabilities, which markets, in their pure form, do not have. Capabilities influence the way in which firms choose to coordinate their resources. Richardson’s contribution of 1972 can be considered the necessary complementary explanation for Coase’s motivation of the existence of the firm as a separate agent in the markets. Markets lack strategic behaviour and imagination. Firms are guided by strategic behaviour and entrepreneurial imagination (Witt, 1996). Capabilities are directly related to the technological activity of firms and share a cumulative nature, being path-dependent. Firms may be victims of their past history, experimenting lock-in effects (a successful organisation will tend to conserve its capability even if the context would require some adjustment or replacement as in the examples cited by Fransman, 1994).

In order to develop their capabilities – as underlined by the business literature working on firm “competitive strategies” (Porter), core competences (Prahalad and Hamel, 1990)³, “dynamic organisational capabilities” (Grant, 1996; Zollo and Winter,

³ Core competences allow firms ample access to the market (for instance competences in display systems enable a company to participate in such diverse business as calculators, miniature R.V. sets, monitors for

2002), and organisational learning (Argyris and Schön, 1978) - firms invest in knowledge creation and acquisition through in-house R&D and new knowledge absorption through search processes (Cohen and Levinthal, 1990). Firms become here in this vision “assemblers of specific competences” (Nelson, 1992; 1994; Foss and Loasby, 1998) and related complementarities (Teece, 1987), basing their existence on a chain of articulated knowledge, learning, innovation, and experience, knowledge exploration and exploitation (March, 1991) and efficient relations with suppliers and sub-contractors, marketing and after-sale services (Wernerfelt, 1984; Teece, Pisano, and Shuen, 1997). In this context numerous channels to absorb information can be organised by individual firms (meetings, participation in fairs), which can blend internal knowledge with the external experience localised in universities, consultants, strategic alliances, and so forth.

3. Industrial districts as spatial knowledge repositories

Knowledge does not only reside in individuals and organisations, but is also localised in hybrid organisational forms (networks and districts), thus, it is concentrated in specific local systems⁴.

Becattini (1979) defines an industrial district, in a neo-marshallian perspective, as a local agglomeration of small and medium enterprises, all of them involved in the same productive process, but where everyone is specialised in a particular phase, everyone is independent of each other, but it lies in a local network of geographic and productive relationships with the others. As a result, an integrated industrial area arises, which produces economies that are external to the single firm, but internal to the localised thickening of intra-inter industrial and social relationships. The ID is the extreme synthesis of the social-economic interactions between the mechanism of light industrialisation and the embedded territory or institutional space (Maskell and

laptop computers, and automotive dashboards, p. 83-84); in addition, competences are difficult to imitate because they show an important tacit dimension.

⁴ The key assumption here is the existence of an intermediate form of knowledge appropriability, something in the middle between the modality of private knowledge (firms and individuals that protect their knowledge through secrets, internal know-how, and patents) and public knowledge (a public good, exogenously given). On the existence of different regimes of appropriability see Antonelli (2000) and Belussi (2003).

Malmberg, 1999; Storper, 1997; Amin, 1993; Belussi, 2006). Now, at the beginning of the 21st century, the idea of the localisation of the economic development in specific places and its organisation in clusters has become a widespread convention (Rullani, 2000).

One of the sources of competitive advantage of local systems lies in the capability to share tacit knowledge between all the nodes of what may be called a “Multilevel Neural Network” (Pilotti, 1999).

The neoclassical approach, as argued by Tsoukas (1996), which sees firms as black boxes, characterised by input-output regularities and predictable behaviour, clearly does not take two important factors into account: time and space, which make every kind of organisation and every environment rather unique. This uniqueness is one of the roots of the success of IDs, which were born and grew in specific spaces, developing local specific knowledge, and whose evolution is often dominated by the innovations (most incremental) they are capable to create and to adopt during time. Sticky, non-articulated, tacit forms of knowledge (see also Von Hippel, 1998)⁵ are among the most relevant drivers of innovations for firms located in an ID. Firms’ histories, their lived experiences, the routinisation of the production activities, the amount of relationships they are able to build up, and the common sharing of the same “norms and rules” are the main sources of tacit knowledge (Belussi and Caldari, 2003). These relationships characterise what is called social capital (Jacobs, 1961; Bourdieu, 1985; Coleman, 1988; Putnam, 1993, 1995)⁶, which, in fact, contributes to shape tacit and contextual knowledge, embedded in individuals belonging to a community. Furthermore, groups of locally situated firms naturally benefit from this embeddedness that allows substantial reductions in the costs of accessing this type of knowledge (Cainelli and De Liso, 2004).

However, the understanding of ID evolution might become even more complicated if we consider the process of globalisation that has opened up the district borders,

⁵ The author refers to the concept of stickiness of a given unit of information, in a given instance, as the incremental expenditure required to transfer it into a form usable by a given information seeker. When this cost is low, information stickiness is low; when it is high, stickiness is high.

⁶ For a comparison between Bourdieu’s and Putnam’s concepts of social capital, see M. Siisiäinen (2000), for a contribution focused on trust, see Belussi (2002).

fragmenting at international level the sources of subcontracting and the entire global value chains (Belussi and Sammarra, 2005). In fact, thanks to the recent development and diffusion of ICT the access to resources become potentially ubiquitous (Castells, 1996; 2000), and time is compressed and de-sequenced (time sometimes tends to zero in on-line transactions). Many virtual connections overtake the role of geographically bounded social interactions.

Building new “pipelines” (Bathelt et al., 2002) induces firms to sustain huge investments that might be perceived either as sunk costs or as knowledge channels. Industrial districts are experiencing a period of transition where the neo-Marshallian nodes (closed local networks) are immersed in global networks (Amin and Thrift, 1992). Closed systems are no longer representatives of the huge variety of existing organisational models (Belussi, Gottardi and Rullani, 2003; Giuliani et al., 2005; Zucchella, 2006; Iammarino and McCann, 2005). While some districts during the last decades have suffered from a lock-in mechanism , which did not allow IDs to grow and take advantage of potential external sources of knowledge, others have evidenced a striking capability to build global supply chains (Coró and Grandinetti, 1999; Belussi and Samarra, 2005). This “opening” process, obviously, occurs at different levels, but we mean to strike here the arising consciousness of the potential advantages, achievable from the exploitation of new communication channels , through which new resources, competences, and knowledge can be absorbed. In order to maintain their competitiveness, and to introduce complex innovation, IDs must be able to develop strategic relations with external service providers (KIBS), in fields where the internal competences are difficult to develop (Camuffo and Grandinetti, 2005), such as information technology, quality management, marketing, communication, R&D activity, and so forth.

Bathelt, Malmberg and Maskell (2002) have emphasised in their theoretical work the duality that characterises the process of local learning in districts, facilitated both by local “buzz” and “global pipelines”. These two modalities are strictly connected. On the one hand, some learning stems from the district model of organisation, which takes advantage of the embeddedness, and on the other hand some useful knowledge is exchanged and absorbed through long distance channels. This becomes possible thanks

to the “absorptive capacity” of local firms (Cohen and Levinthal, 1990). With this term Aage (2001) addressed the districtual firms’ capability of achieving external knowledge, which is re-processed inside the system, through a boundary spanning mechanism (direct peer or gatekeeper). The latter alludes to paths of “internalisation” within firms of the competences acquired (Aage, 2005). The recent “openness” of the Italian IDs is partially due to the use of new ICT tools (Belussi, 2005a). This process is not to be viewed as a “killer” of the competitive advantage derived from the sharing of tacit knowledge among actors belonging to the “small community” of the industrial district (Chiarvesio, Di Maria, and Micelli, 2004). Many economists (Cooke, 2001; Biggiero, 2002, Morrison, 2004; Brenner, 2004) have argued that knowledge embedded in local communities, firms, and specific networks, remains relevant also during the process of globalisation, and it helps to “lubricate” the efficacy of international relationships, allowing the enlargement of the whole system through the creation of new nodes, maybe new “growth poles” (Perroux, 1955). The new challenge is to establish to what extent this “contamination” of new knowledge might be profitable for the ID, considering the price of obtaining it (because of the great degree of uncertainty that is involved in building new partnerships with distant-not direct observable actors).

Geographical proximity has allowed so far the growth of reciprocal trust (personal capital, or self-interested trust) among the actors of the district, derived from repeated exchanges and from the sense of belonging to the same community⁷ (collective capital, or social-oriented trust) as discussed by Dei Ottati (2001), Lyons and Mehta (1997), and Mistri and Solari (2003). Trust can “survive” and be built also in a virtual network, where the advantage of proximity no longer exists. Network externalities⁸ can be localised or not, and they depend on the shape of the network (Wasserman and Faust, 1994).⁹ Networked agents, covering the position of structural holes, develop more

⁷ For the definition of an industrial district as a community see the works of Becattini (1990) and Dei Ottati (1995).

⁸ The concept of network externalities (or network effects) is rooted in Metcalfe’s Law (Shapiro and Varian, 1998). This law is based on a natural observation: if a net is formed by n units and the value that every one of them gives to the net is proportionate to the number of other units in the net, then the global value of the net (the value assigned by all the units) is proportionate to $n*(n-1) = n^2-n$. Substantially, it states that the value of a network increases with the square of the number of members of the network, showing a form of increasing returns or positive feedback to network size.

⁹ As Arthur (2000) points out in his dissertation about myths and realities of the high-tech economy, we should more precisely pay attention to the type of network we are dealing with. In a radial network, where

power than others operating in closely dense distributed networks (Burt, 1992). Similarly, different advantages from knowledge replication are reached in various networks. In the local environment of an ID, an agent's behaviour is pushed by reputation-saving constraints, fearing a possible exclusion from local transactions. Nevertheless, if trust is strictly connected with the sense of belonging to a community, and it is not based on individual experience, we can accept the hypothesis that it can exist in a virtual community (Orléan, 1994). In this way, future cyber-marketplace might be an efficient solution for the connection of agents over long distances. Information and communication technologies allow the matching of the benefits of physical proximity with those depending on institutional and organisational proximity (Gallaud and Torre, 2005).

Most agent interactions occurring inside the local network are spontaneous. Economic order is reached without any deliberate planning, because IDs are flexible self-organised systems (Pilotti, 2000). Can this random process of interactions survive also in the tough times of globalisation? A higher level of firm hierarchisation is observed in many Italian IDs (Cainelli, Iacobucci and Morganti, 2006; Belussi, 2005b). High fashion global brands (and large international Italian firms) now orchestrate the production of many districtual firms, for instance in the Veneto region or in Tuscany (Amighini and Rabellotti, 2006; Rabellotti, 2004; Bacci, 2004). Thus, global leaders have emerged in the last decades (for instance: Geox in Montebelluna, Luxottica in Belluno, Prada and Gucci in Florence, Callegaris in Manzano, and Dideco in Mirandola). This is clearly forcing the delicate districtual dynamics, changing the district flows of communication, knowledge, and productive transactions.

For firms based in western countries' IDs, the possibility to have access to low-cost labour forces in developing countries has given rise to the creation of global nets of international suppliers for the production of the more labour-intensive components. Firm networks, in Italian IDs specialised in mature sectors (clothing-textile-footwear), are often long-distance networks. With time, practical know-how and codified

members are connected with a common node, but not with each other, for instance, benefits from network effects could not occur or could be very weak. In a combinatorial network (combination between people), a community can be formed and it can exhibit network effects.

knowledge incorporated in new machinery tend to go beyond the boundaries of the districts (for instance in Italy the new clients of ID suppliers are actually located in developing countries, like China or Romania). The diffusion of know-how takes time, but it is an unavailable process developed in parallel with the internalisation of the supply chains. The recourse to KIBS (Knowledge Intensive Business Services) and to new linkages related to R&D cooperative agreements shows also for the firms localised in IDs the crucial role that the process of knowledge offshoring deserves in modern times. While the Marshallian IDs were described as closed systems, where knowledge mainly spilled over around, in modern IDs knowledge spreads inwards and outwards within districts in different ways, and through multiple channels: personal relationships, firm-to-firm transactions, institution-to-firm (or to individual) relationships, new start-ups (where prior acquired practical knowledge is applied to new business ideas) or entry from outside, in and out labour market mobility, and so on.

Local learning and global learning tend to coalesce. Thus, the strong embeddedness of the social interactions co-exist with processes of knowledge exchanges external to the district.

4. Knowledge in social networks: the role of Communities of Practices (CoPs)

The ID has been described as a local system dense with social relations: a community of firms and a population of individuals tied by bonds of solidarity and cooperation (Becattini, 1979, 1990). However, following the Marshallian tradition, while the role of external economies has been deeply analysed, the specific social mechanism through which knowledge in individuals and organisations is “put in practice” and further developed has been quite obscured. On the one hand, the geographers of innovation have assumed that spatial proximity *per se* plays the role of knowledge diffusion, because knowledge spillovers are activated quite in automatism (Audretsch and Feldman, 1996). On the other hand, it has been argued that in IDs and in clusters knowledge diffusion is selective and not pervasive (Giuliani, 2005). As regards knowledge creation and diffusion in IDs we encounter here a problematic dichotomy of over socialisation or under socialisation. Is knowledge belonging to individual and firms

free to move within IDs? Can we better describe under which conditions the existing social networks do play a role? In order to improve our understanding of the mechanism of knowledge creation and diffusion we have to turn to the concept of CoPs.

Lave and Wenger (1991, p. 98) first introduced the concept of CoP in 1991, underlining the importance of sharing practice in the process of learning in large corporations. They describe a CoP as:

“...a set of relations among persons, activity, and world, over time and in relation with other tangential and overlapping CoPs”.

And also:

“...an intrinsic condition for the existence of knowledge”.

The CoP is an organism constituted by a group of professionals, informally bound together, who, guided by a common purpose, share their distinctive capabilities to solve organizational problems. They could be, for example, engineers engaged in deep-water drilling, or consultants specialised in strategic marketing, or reps offering technical support (Brown and Duguid, 1991). One of the most important features that characterises the existence of a CoP is its organic, spontaneous and informal nature. The member's attitude of giving their own contribution to the problem-solving process is reinforced by the self-selected membership mechanism of participation. The CoP main purpose is to develop members' capabilities and build forms of knowledge exchange. This quality marks the difference from other forms of aggregation, such as a formal working group or a “team”. The latter, for example, is normally formed by a group of workers built to accomplish a specific task - as described by Nonaka (1991) - and further refined by him using the Japanese concept of “ba”¹⁰ - and exists until the project has been completed. In a different way, CoPs, as Wenger and Snyder (2000) explain, have the property of lasting for long time, thus allowing the sedimentation of a social capital. In fact, the CoP strength is self-perpetuating (Wenger, 2000). This tacit and

¹⁰ The concept has been proposed originally by the Japanese philosopher Nishida and (afterwards) Shimizu and it is close to the English word “place”. It refers to organizational contexts within which individuals interact at a specific time and place over a certain time period, a kind of shared space for emerging relationships, as has been described by Pilotti (2000).

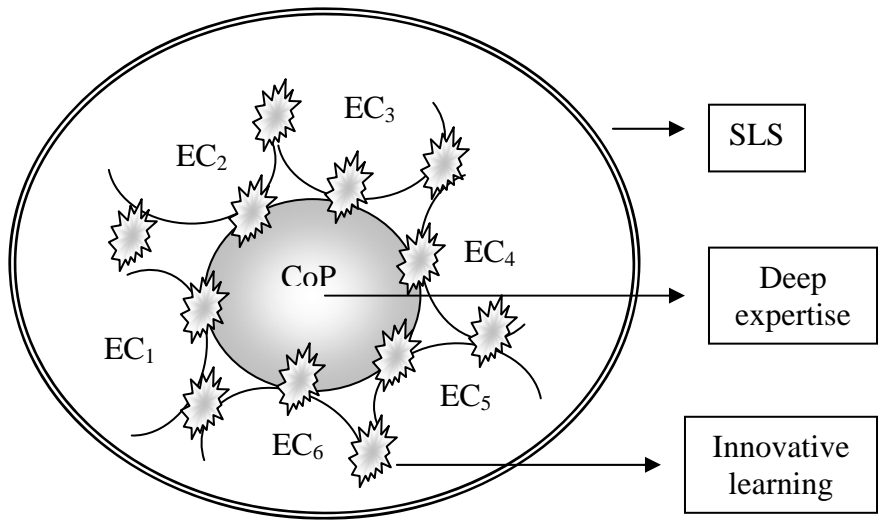
common sharing of knowledge enhances over time the potentialities of the community and its ability to solve problems (Lesser and Everest, 2001).

Although CoPs are fundamentally informal and self-organised, they need to be “cultivated” (Wenger, McDermott and Snyder, 2002). Wenger and Snyder (2000) use a nice metaphor to illustrate their dynamics. They compare them to gardens, which give the best results if someone takes care of them, without forcing the natural and biological rhythm of “reproduction”. In firms, managers must identify potential communities, providing the support-infrastructure, and using non-traditional methods to measure their value. But, if CoPs are completely absorbed into the organisational task they decay (Thompson, 2005).

CoPs play a key role in the process of organizational learning, mostly if we look at learning from a social perspective (Wenger, 1999). Under this view, learning takes place thanks to the interplay between competences defined in a social community and personal experience. Moreover, a community of practice can be analysed as a social container of heterogeneous but complementary competences. There are, in particular, three ways of experimenting social learning, through:

- engagement → doing things together, everyday routine, face-to-face contacts;
- imagination → creating an imagine of yourself and your community, self-consciousness, identity;
- alignment → sharing experience with others that can contribute with their efforts.

One mode can dominate the others, giving different qualities to different social structures. For example, a nation is a community based on imagination; a community of practice at work is based on engagement. Going further, two strategic issues arise. They are the following: “learning at the boundaries” and “identity”. Let us start from the first: the existence of a CoP implies the existence of a boundary, as Wenger (2000, p.) writes: “*shared practice by its very nature creates boundaries*”. The boundary divides what is the core experience of the CoP from external competences that can be useful to create new opportunities for enhancing the competitive advantage of the whole



Note:


 = learning at the boundaries	EC = external competences	SLS = social learning system
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Fig. 1. The process of learning at the boundaries.

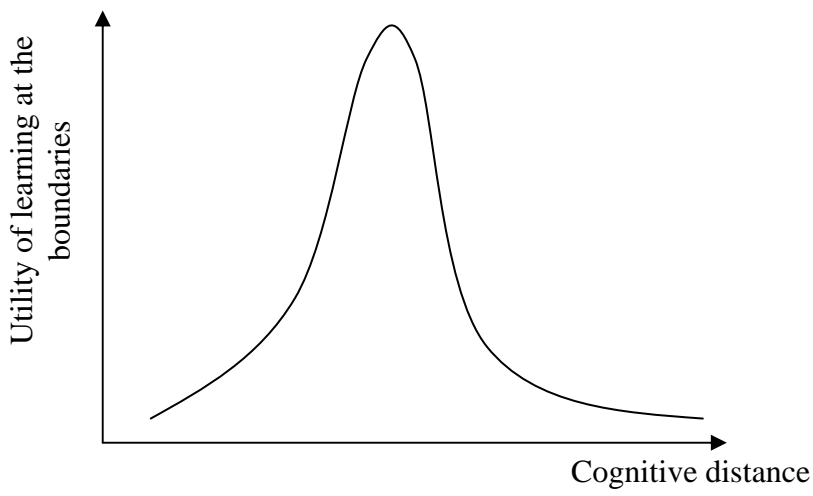


Fig. 2: The utility function of learning at the boundaries

organisation (as illustrated in Fig.1). Boundaries are both sources of new opportunities and potential difficulties, according to the cognitive distance between the CoP's own experience and the external competences (Fig.2).

The interaction with new CoPs can be worthy if their competences are sufficiently different; at the same time, if they are too dissimilar, the inter-community learning will cease. In other words, learning, both in firms and in districts, is possible only if the cognitive distance is neither too short, nor too large (Nooteboom, 2000 and 2002).

Furthermore Wenger (2000) discusses three dimensions of the boundary effects:

- transparency → to make the access to the boundary easier
- negotiability → to find an equilibrium between the powers of the actors involved
- coordination → to discriminate what is really useful to the organisation.

The act of crossing the boundaries can be improved by the existence of intermediaries, which work as links for the dissemination of knowledge and trust Granovetter (1973). Coordination implies that some bridges have to be built to activate the connection within the boundaries and in relation to learning at the boundaries. Again, Wenger (2000) proposes four kinds of bridges: a) brokering between communities (where actors play the role of boundary spanners, create connections that move knowledge by going from place to place, activate personal relationships, and capture "forefront" novelties), b) boundary objects (we are referring to tools supporting connections between different practices, common language to communicate easily, shared processes and routine, artefacts, documents or models), c) boundary interactions (related to practices of encountering, through visits and common discussions, and distant connections through fairs or use of websites), and d) cross-disciplinary projects

(combining knowledge of multiple practices or establishing learning loops through project teams - as argued also by McDermott, 1999).

The strength of a CoP is also determined by the members' sense of belonging to a unifying identity:

“Knowing is an act of belonging, then our identities are a key structuring element of how we know” (Wenger, 2000, p. 238).

In the case of CoPs, identity involves also the concept of “multi-membership”. Individuals have the opportunity to belong simultaneously to different communities (i.e. the community of workers, friends, neighbours, relatives, etc.) and to switch from one to another, without losing personal identity. Similarly, members of a specific CoP can share some information with another community, involving a natural process of learning at the boundaries through networks of CoPs (both physical and virtual – Ward, 2000).

5. The evolution of IDs' capabilities between the exploitation of local resources and the exploration of global knowledge flows

In our analysis the evolution of capabilities in IDs appears to be related to two main processes activated by the principal ID actors – local firms and district institutions: the direct and indirect investment in augmenting local capabilities

We are referring here mainly to two forms of knowledge management in IDs:

- Gardening;
- Investing in capabilities.

Gardening is a form of indirect investment in capabilities. Several researchers have used the gardening metaphor to describe the way in which organisations, managers and coordinators can act to develop a community (Brown & Duguid, 2000; Schlager et al, 2004, Wenger et al. 2002). Indeed, the concept can be applied to understand an alternative way to develop local capabilities in an ID (i.e. a community of firms and persons). The theoretical base of this concept is rooted in the ecological view of the

economy (Arthur, 1995), where the complexity of human interactions and the multiple ways of combining different subjective beliefs can neither be formally driven, nor perfectly ruled. According to the evolutionary and complex approach of the Santa Fe Institute (Anderson P. W., Arrow K., Pines D., 1988; Arthur W. B., Durlauf S. N., Lane D., 1997), an industrial district can be seen as an evolving complex system, formed by an evolving network of heterogeneous, localized and functionally integrated interacting firms (Boero and Squazzoni, 2002). The system governance is based on self-organizing dynamics, developed from long-term interactions and vertical and horizontal complex connections amongst spatially located firms (Biggiro, 1999). Typically top down interventions are not suitable for enhancing the capabilities of the district, which benefits, instead, from a local activity of gardening, i.e. of nurturing the internal dynamics by promoting specific initiatives.

In relation to “gardening” we suppose the existence of an actor that “takes care” of the knowledge flows, somehow enhancing the capabilities of “absorbing” new knowledge and transforming it into tools useful to the wealth of the organization/district. Firms and institutions (spontaneous or designed for *ad-hoc* purposes) as highlighted in Tab. 1 are responsible for this function.

	<i>Actors</i>	<i>Gardening</i>	<i>Investing in capabilities</i>
<i>Firm level</i>	- Manager - Entrepreneur	- CoPs cultivation	- R&D investments - Venture capital
<i>ID level</i>	- Institutions - Meta-organisers	- CoPs cultivation - Trust diffusion - Cooperation incentives - Providing support to create external links - Guiding processes of firms modernisation - Improving business strategies	- Physical and ICT infrastructure - Training and education - KIBS

Tab. 1: Gardening and investing in capabilities at the firm level and the ID level

The concept of gardening is strictly connected to the activity of direct investment in capabilities. Clearly this last function too is very important. Managers/entrepreneurs empower firms’ capabilities accumulating R&D investments, adopting new

technologies, and developing training activities. This creates the firm's knowledge reservoir (Argote and Ingram, 2000). The term "reservoir" derives from the French "réserver", meaning "to keep for future use", giving the idea that knowledge can be used again (see the debate around the re-use of knowledge – Langlois 1999). In aggregate the accumulated knowledge existing in the district represents a multiple reservoir, which, as discussed by Argote and Ingram, is composed of human resources, tools (machineries, documents, hardware and software), and tasks (organisational practices, goals and purposes). Knowledge is transferred in the combination between them. Moving people is one of the easiest ways to transfer knowledge (embedded knowledge transfer). The investment in capabilities is also organised through the activity of the district meta-organisers which promote training activity, collective R&D investments, and other initiatives. Pilotti identifies meta-organisers as peculiar subjects in a local system with the specific function of connecting the multiplicity of technologies, the heterogeneity of organisations, and the internal market transactions, achieved through cooperation and competition (Albertini and Pilotti, 1996; Pilotti, 2000). These operators could be innovative firms as well as local institutions, which are in charge of integrating different flows of resources in a horizontal dimension. The result of their efforts is the promotion and diffusion of a generative learning, rooted in the capability to mix effectively tacit and explicit knowledge. The meta-organiser promotes initiatives that work as an occasion of cooperation and joint activities for the local firms, involving also local research centres and universities, following a "triple helix" model of local development (Etzkowitz and Leydesdorff, 2000).

The ID's capabilities can be detected not only through the aggregation of the capabilities of all local firms but also through the activity of the meta-organiser, which develops the district public goods, like physical and ICT infrastructure, training and education activities, foundation of research centres, and activation of KIBS.

It is important to stress that co-location *per se* is not enough to guarantee knowledge transfer between firms and what matters is being connected either locally or non-locally (Boschma and ter Wal, 2006). Therefore, the institutional setting, the implementation of specific policies and the individual engagement in learning activities occurring in an ID constitute the determinants of higher firms' performance and innovative activities, as far

as the process of establishing external knowledge channels and boundary objects as shown in Fig. 3.

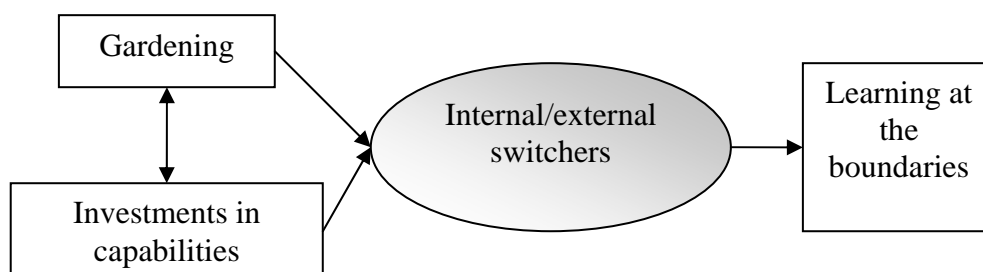


Fig. 3: The role of internal/external switchers for learning at the boundaries

The existence of direct investments in new knowledge acquisition and the constitution of CoPs reinforces the individual capabilities through social participation and knowledge sharing within a pool of practitioners. However, these individuals may suffer from lock-in and path dependency, provoking the asphyxiation and decline of the pool of district knowledge. Therefore, they need access to external relations by means of boundary spanning mechanisms and boundary objects, facing the chance to integrate the district capabilities with other external competences and favouring a larger knowledge circulation.

However, in IDs, problems of coordination arise.

The activity of the manager/entrepreneur and of the meta-organiser give rise to a complex form of learning that we have called here “learning at the boundaries”. On the one hand, this concept identifies the way through which different local CoPs interact, on the other hand, it sums up the process of exploration, selection, activation, monitoring, and nurturing of knowledge through production networks outside the boundaries of the district through “internal/external switchers” (Amin and Cohendet, 1999). One of the most important tools for guaranteeing the effectiveness of the use of external knowledge is the capacity of selection. Simon (2002) faces the problem of the over-abundance of information that needs to be filtered to contrast the scarcity of attention that characterises modern life. What we really need, he says, is not to increase the number of accesses to information, but the quality of the information selected, suggesting the need

for some information processors, which are able to justify (Nonaka and Toyama, 2002) the cost of achieving a new piece of information. This implies a constant analysis of the “state of the art” of the held resources and a possible matching between “old” and “new” inputs. Often a single small firm is not able to sustain these costs of judgement. Firms located in IDs might avoid this type of sunk-cost allowing the constitution of “ad hoc” observatories, which might spread around information useful for all the system.

Cohen and Levinthal (1990) speak about “gatekeepers”, or “boundary spanners”, referring to members of an organisation that are able to “translate” strategic external information into opportunities for improving the ongoing activities. At the same time, they point out that background knowledge is necessary for the success of the transmission, arguing that, without it, even with the presence of a highly capable gatekeeper, knowledge short-circuits are not avoided. Similarly, the meta-organiser in an ID can work as an interface between the local firms/actors and the external (extra-district/extra-region/global) environment, allowing not only the diffusion of the tacit knowledge embedded into the elements of a local system, but also the selection of the external knowledge that could be absorbed. Visits, labour mobility, fairs, virtual marketplaces, and other activities can be viewed as internal/external switchers for knowledge exchanges. These activities aid the process of building pipelines between internal and external actors (both to the firm and/or to the district).

6. The mechanism of knowledge creation in industrial districts:

some empirical evidence

In this section we shall discuss the application of the analytical framework proposed to the evidence emerging from the analysis of three Italian industrial districts, where, in relation to the aspect of exploitation of local resources, the investment (both direct and indirect) of firms in augmenting their capabilities is juxtaposed to the activity organised by the district meta-organisers of cultivating local resources; furthermore, in relation to the exploration of global knowledge, internal/external switchers allow the exploration of global knowledge flows. It is a process that combines forms of localised learning with

learning at the boundaries, through the access to pipelines (FDI, firms networks, distant KIBS) and boundary spanning actors (external CoPs).

6.1 The Montebelluna district¹¹

The Montebelluna district is localised in the central area of the Veneto region, under the province of Treviso. The whole area of the district is composed of the following municipalities, which include both the “historical part of the district” (Caerano, Cornuda, Crocetta, Pederobba, Montebelluna, Maser, Nervesa, Trevignano, Volpago, and Giavera,) and the “fringe area” of the adjacent external municipalities, populated by new firms (Altivole, Arcade, Asolo, Castelcuoco, Castello di Godego, Cavaso del Tomba, Fonte, Monfumo, Povegliano, Riese Pio X and Vedelago).

	<i>Firms</i>	<i>Employees</i>
	<i>a.v.</i>	<i>a.v.</i>
Accessory manufacturing companies	10	84
Materials coupling companies	7	201
Assembly and fitting companies	29	362
Trading companies	12	201
Die-cutting companies	4	54
Shoe string manufacturing companies	4	29
Patternmaking	2	8
Clothing manufacturing companies	12	439
Footwear manufacturing companies	104	2.979
Clothing and footwear companies	21	1.777
Machinery manufacturing companies	16	117
Services	2	48
Die-sinking	23	509
Die-sinkers ?	11	153
Design studios	27	112
Sole makers	6	197
Cutters	28	72
Upper makers	51	224
Others	22	310
Total	391	7,876

Tab. 2: The productive filière

Note: a.v.=absolute value

Source: OSEM Report 2005

¹¹ Based on Belussi (2005b).

It is formed by about 400 firms (300 producers of footwear and 100 producers of clothing) that employ about 8000 workers (6000 units in footwear and 2000 in clothing) (See Tab. 2 for details).

Montebelluna is the world leader in technical sport shoes, ski and trekking boots, motorcycle boots and bicycle shoes. The dominant strategies of the districts' firms are: 1) openness to the international business; and 2) strong propensity towards innovation. The district is formed by a combination of a good number of mid-size family-owned firms and few important local larger companies. The latter derive from the original nucleus of the first founders, who established an enterprise at the end of the nineteenth century and during the first decades of the twentieth (Tecnica, Caberlotto, Calzaturificio Alpina, Dolomite, Munari, Nordica). Half of them remained successfully active on the market place even after the third generation. Some international companies settled down in the district during the 1990s, through acquisitions.

History

Originally the district's first specialisation was the mountain boot (made in leather). At the beginning of the twentieth century, we witnessed the birth of the first examples of the industrialisation of ski boot production, through the factory system. It is in these years that Tecnica (1890), Dolomite (1897), Alpina and Munari (1908), Pivetta and Vendramin (1919), and Nordica (1926) were born. Most of these firms are still active (and they have become, over time, the leading firms in the area) or the brand name is still used. In 1937 Vitali Bramani (from Turin) introduced the Vibram sole, made of rubber, a waterproof material, particularly resistant for walking in the mountains. This innovation was promptly adopted and adapted in Montebelluna by local entrepreneurs.

After WWII, during the '60s the entrepreneurs of Montebelluna started to modify the ski boot, rendering it more stable on the ski, and more robust. They introduced a steel plate on the sole and a new system of blockage. In 1962, the boot with the metal lever was applied by the district firms for the first time, it was a minor innovation, which offered a better closure compared to the traditional shoe-laces. In the same period, the vulcanisation of the sole, a method that allows the sole to be joined to the upper part of the boot, was introduced. Subsequently the PVC injection method, a much more rapid

system was applied. It was in this period that the producers sponsored a wide product standardisation of both components and ski bindings. In 1967 Montebelluna experimented the first models of boots with plastic-covered leather, an innovation that was not very successful and was not widely adopted.

The real big technological revolution, with the creation of a new technological system, occurred with the exploitation of the patent registered by Lange in 1964 in Colorado. Lange, which presented its first exemplar of plastic boot in a US exhibition, was not able to produce a really workable boot, ready to be manufactured for the mass market. On the contrary, Montebelluna entrepreneurs, after participating in the exhibition, promptly decided to use and to improve Mr. Lange's invention. His invention was in fact perfected by Nordica, which substituted Lange's fusion with the injection method, using some competences developed by a firm situated in Padua (the Lorenzin firm). After a while, Lange himself opened a factory in Italy near Montebelluna, in order to have access to the modified technology and to the local well experienced suppliers of technology. During the '60s and '70s we have the stable growth of the firms in the district; the production of ski boots shifted from 180,000 in 1963 to 1,000,000 in 1970 and to 4,100,000 in 1979. Many of the historical firms adopted the new technology (Dolomite, Munari, S.Giorgio, and Tecnica), many others, which did not believe in these novelties (or that did not have the necessary funds to reorganise the productive cycle), started to diversify into new products (sport shoes, leisure shoes, etc.). This radical change also produced a new district division of labour between the final firms, the subcontractors for the more simple tasks, and the producers of technology (specialised suppliers).

The second relevant diversification was the introduction of the after-ski boot in plastic material. The first model was the Moon Boot by Tecnica (1970) which was inspired by the astronauts that flew to the moon. In a few years the production of after-ski items took off. At the end of the '70s Montebelluna was producing about 7.5-8.0 million pairs of this new product.

The third diversification was quite parallel, and was in the field of sport footwear like jogging shoes, ice and roller skates, basketball, football, motocross, dancing, cycling, tennis, and leisure shoes. The over-production of the '80s created a typical firm shake-

out, with the permanence of some important producers from the district, but new products (with the fourth productive diversification) substituted the decline of the demand for the more traditional production.

During the '90s, new products like trekking, snowboards, in-line skates, football shoes, and sport shoes for walking (city-shoes), were created. During the '90s two local leading firms emerged: Geox and Stonefly, which applied the district technological competence on technical shoes to walking shoes. These two firms were able to “stabilise” the whole output of the district.

Between the beginning of the 1980s and the end of the 1990s, Montebelluna became an area of extraordinary international concentration of competences and production capabilities: a globally specialised area, which directly or indirectly produces a large share of the total worldwide output of a distinct range of products. In the mid 1990s the Montebelluna district was already very open to international markets. About 70-80% of ski boots production was exported. At the end of the 1990s, considering all the diversified range of products, half of its total production (600 millions of euros)¹² was exported to EU countries (such as Germany, France, Spain, and the UK), the US and Japan. Many large local companies had opened commercial offices abroad, and local firms exhibited an intense exchange of information on the fashion trends with external international organisations (Aage, 2001). After the important date of 1989, the East European countries provided a unique opportunity to develop international supply chains, based on the manufacturing of simple phases, like shoe assembling (Belussi 2005b).

As a result, the openness of the district, given by the internationalisation of firms, works as a knowledge switcher, activating learning at the boundaries activities.

Investing in capabilities

The historical evolution of the district is largely influenced by individual firms' investment in enlarging internal capabilities, as it appears by looking at the R&D investment in innovation. For instance, a recent survey (Belussi, 2005b) reported that, in

¹² Data provided by the Chamber of Commerce of Treviso.

2001, out of 30 firms interviewed, 22 were organised with internal R&D departments, and 19 firms out of 30 held international patents. The study also reported a total value of R&D expenditures of about 27 billion Euro, 127 patents registered by district firms, and a number of employees in R&D activities of 329 (about 10% of the employment). Clearly, this information supports the idea that investment in capabilities by individual firms (direct investment) increases the local learning abilities.

Other types of investment in capabilities occur at the district level, mainly through the work as a meta-organiser of a very active local institution: the Foundation “Museo dello Scarpone di Montebelluna”. It was established in 1992 and it has always played the role of a catalytic organiser of entrepreneurs for many projects (training, information and knowledge diffusion). Another important meta-organiser is the centre “Tecnologia & Design”, established in 1998, with the aim of diffusing the application of CAD-CAM technologies for more rapid prototyping. It provides training courses for technicians operating within the district, playing an important role in the innovation process. An important role has been played also by the local Chamber of Commerce, which in Italy is a public institution, whose management is left to the members of the local productive associations (entrepreneurs and trade unions). The most important firms in the district can easily benefit from the activities of the Chamber of Commerce, which sponsors the participation in fairs, finances the activity of local institutions for the promotion of training and technology transfer, and for other interesting new activities like the just implemented “Osservatorio Internazionale sulla Moda” - an observatory on fashion trends.

Gardening

Gardening activities are registered mainly at the district level, well rooted in the historical local social tissue. At the origin of the district, in fact, there was the presence of a community of very integrated people, which developed strong social and civic relationships. All this represents an important aspect for the development of the subcontracting nets, because all local economic relations are based on trust developed within relational networking. The high level of division of labour among firms created, over time, a group of mid-size family-owned business linked in the subcontracting of

special components and activities. The presence of a strong economic community is traceable, above all, in the periods in which the district suffered from economic difficulties and firm crises. Then, local entrepreneurs intervened directly in the district to avoid local bankruptcies, and they worked together in order to “save” the district firms suffering from economic difficulties (a famous case is that of the saving of the Lotto Company). Many observers have underlined the strong propensity for cooperation among people living in Treviso. Also public bodies work “in team” with the local economic community and share a “team spirit”¹³.

The social environment allows personal and professional relationships to take place and to be easily nurtured. It is the case of the recent institution of the community of Montebelluna designers on-line, which virtually transposes the local CoP of designers (De Alberti, 2006). It counted 83 designers in the year 2004, and has now risen to 226 professionals (including designers). The gardening activity is carried out by a pool of local institutions (including TeDIS - Centre for Studies on Technologies in Distributed Intelligence Systems), working on a project coordinated by Treviso Tecnologia.¹⁴ Veneto Region and the Chamber of Commerce of Treviso, in fact, co-financed a project called “Ekmdicamo” (Italian acronym for electronic knowledge management in sportswear industrial district of Montebelluna). The project aims at developing and consolidating a community of designers and creative people within the province of Treviso and within the sportswear district of Montebelluna. In particular, “ekmdicamo” aims to foster the aggregation of designers and creative people and increase the visibility of these professional figures both at local and national/international level. A Web portal has been developed in order to make it easier for designers to meet each other and exchange experience and knowledge. Moreover, the portal aims to be the place where designers have the opportunity to post their works and portfolios and establish connections with local enterprises. The website plays the role of both local and global knowledge switchers, allowing processes of learning at the boundaries.

¹³ For example, recently, the association of local entrepreneurs founded an “innovation club”, with a modest membership fee of 250 euros, to promote innovation among their member firms.

¹⁴ Treviso Tecnologia is a company created by the Chamber of Commerce of Treviso in 1989. It is a KIB providing services for the territory and its firms, specifically oriented to technological innovation.

6.2 The Matera sofa district¹⁵

The district, located in South Italy between the Provinces of Bari and Matera, is specialised in the production of leather sofas. Today 55 percent of the Italian production of upholstered furniture is made in the Matera district, accounting for about 11 percent of the world market in the sector. Of this, 80 percent of local production is destined for international markets. The district evolved during the 1980s from a bunch of craft firms endowed with manufacturing skills in the upholstery of chairs and couches. Three main entrepreneurs founded the focal firms of the district: Natuzzi, Nicoletti, and Calia Italia. The main municipalities of the district are three: Altamura with 271 firms (37%), Santeramo with 88 firms (12%) and Matera with 96 firms (13%). Santeramo is the headquarters, since the biggest firm of the district is located there (Natuzzi), while in Matera are located the other two leading firms (Nicoletti and Calia Italia). Tab. 6 shows some information on the structure of the district and its productive filière.

	<i>Firms</i>	<i>Employees</i>
	<i>a.v.</i>	<i>a.v.</i>
Sofa components	106	929
Transformation of polyurethane	36	838
Packaging	12	92
Sofa external covering	183	590
Finished product	380	13,521
Prototype	2	2
Mattress	19	500
Services	2	316
Total	738	16,786

Tab. 6: The productive filière

Note: a.v.=absolute value

Source: our elaborations on Inps and Cerved

History

The history of this productive district began at the end of the '50s. During those years a first nucleus of small artisan enterprises specialised in carpentry and upholstery was formed, producing upholstered furniture in small series, destined above all for the

¹⁵ Based on Belussi and Caldari (2005).

Lucania and Puglia market, which were part of the lowest economic market band. Around this small but well-established centre of productive activity the first shoots of industrial initiatives began to emerge. A number of artisans, on the crest of a wave of success for their products, began to develop the first production lines in series, exploiting a number of positive local traditions, above all in the leather-working sector. This trend continued up to the '60s and '70s, when some local entrepreneurs paved the way to a progressive transformation of the productive system. Natuzzi, today the leading world producer of leather sofas with about 7,000 employees, imported into the area some new methods of assembling inspired by the Mercedes' assembly line for car seats that he had seen in operation in Germany during the 1970s. Over time he built a continuous process of upgrading of technologies, inventing numerous new machineries for the process of sofa assembling. His relationships with some ex-Italian immigrants in the US helped him to penetrate the US market with his low-cost production. He played the role of internal/external switcher of technical and market knowledge for the district firms. Natuzzi is nowadays the only firm which invests strongly in R&D activity in the district, while the other firms, using some common specialised suppliers and subcontractors, can easily have access to the new knowledge created. For example, Natuzzi has recently set up a research centre for testing raw materials and sofa components as well as for looking for new technology aimed at increasing production performance. While in Montebelluna many local agents build their external pipelines for acquiring new knowledge and new ideas on fashion trends, in the Matera sofa district it is the leading local firm which is playing the role of boundary spanning. Integrating the overall production process, Natuzzi directly controls purchasing, leather tanning, polyurethane transformation, assembly, logistics, production development and marketing activities. This has allowed new approaches to innovation, for example by improving the quality of the most strategic raw materials: leather and polyurethane.

During the '80s, the district faced the great leap towards international markets, being able to offer good quality products at very competitive prices. At the head were a number of firms: Natuzzi, but also Calia Italia and Nicoletti.

In the last twenty years the firms grew from 88 in 1981 to 738 in 2002, and employment reached about 17,000 employees. The evolutionary trend occurred thanks to a threefold

mechanism: decentralisation of production, firms specialisation within an inter-firm division of labour, and a growing technical capability related to the numerous incremental innovations introduced by the leading local firms. In the district we find a large variation of products, firms, specialised skills and suppliers. This area represents a truly Marshallian district because there is a high level of cooperation between final firms, specialised suppliers and sub-contractors, as emerged from a recent survey, reported in Belussi and Caldari (2003), and here below in Tab. 7.

<i>Type of firm</i>	<i>In a district everybody trusts each other</i>	<i>Generally I trust people</i>	<i>I have good relations based on reciprocal trust</i>	<i>I don't trust people easily</i>	<i>I don't trust anybody</i>	<i>Total</i>
Final firm	12.5	3.1	68.8	15.6	0.0	100.0
Supplier	7.4	7.4	51.9	22.2	11.1	100.0
Specialised supplier	7.7	7.7	61.5	15.4	7.7	100.0
Total	9.5	5.4	59.5	17.6	5.4	100.0

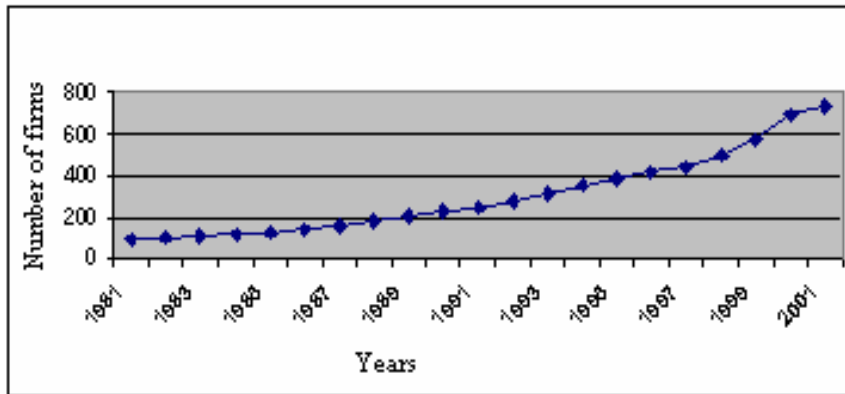
Tab. 7 Trust diffusion among local actors in Matera

Sources: Belussi and Caldari (2003)

The survey, based on 100 interviews with local entrepreneurs, informs us of the great propensity of the district's actors to trust each other. Almost 60% of the respondents, in fact, say they have good relations with buyers/suppliers, based on reciprocal trust.

Indeed, imitation has taken place both in terms of firm strategies and product design. An all-round innovative process, touching on processing technologies, product design, and above all, organisational and managerial aspects, is in place. An almost total standardisation of products has been achieved: different phases of work were delegated to external contractors; the wooden frames for sofas were produced by specialised firms, upholstery by others, dressing and leather-cutting by others. The mother firm could therefore proceed directly to the assembly of the sofas, using productive systems in series, not unlike those used in the vehicle industry.

During the time a mechanism of firm-scission has increased the local firms population (firm's birth and start-up), as emerges from Graph. 1.



Graph. 1: The Matera district’s firm dynamics 1981-2001

Source: our elaborations on Inps and Cerved.

It was only starting from 2001 that a slowing down in this development began, caused by the international crisis and the currently unfavourable euro/dollar exchange rate. Therefore a process has begun to review marketing targets through a gradual move towards the medium-high market bands, on which the entrepreneurs of the Matera district are counting to re-launch their firms.

Investing in capabilities

Traditionally the district has been marked by the huge innovative activities of the leading firms, such as Natuzzi, Calia Italia and Nicoletti. Therefore the technological development of the district firms relies on the local leading largest ones, rather than organised international relationships with external R&D centres. Investing in capabilities is not a diffuse activity among the district firms. Few pipelines characterise the structure of external relationships, which are strong only in the relation with export flows. Nowadays only 380 final producers have external relations with the market, while the others work with the local market for intermediate products and activities.

Meta-organisers in the district are quite weak if not absent. The district lacks infrastructures, and collective investments. Schiuma G. et al. (2003) clearly stressed in their report the lack of human resources training and education programmes in the district, where only the 9% of firms hold specific training courses for their employees upgrading. Mainly large leading firms invest in human capital development, the

remainder apply forms of learning by doing mechanisms, where learning takes place prevalently on the job.

Gardening

The collective identity and the entrepreneurial culture, although very strong, are not supported by local organisations. CoPs are not very well developed, and learning at the boundaries through networking is very scarce. The existence of a district web-site is not a sufficient condition to stimulate interactions between the members of the district community. In the case of Montebelluna a specific project realised a web-site oriented to activate local communities in a global network, on the contrary, the Matera district website is poorly suited to perform the same function. The latter, in fact, neither offers any possibility to contact local firms, nor promotes any local initiative of aggregation for professionals.

6.3 The Riviera del Brenta district¹⁶

The Riviera del Brenta is one of the oldest Italian industrial districts, specialised in high-fashion women's footwear production, located in the Veneto region. In 2000, 88% of the shoes produced in the area were medium-high price women's shoes, with an average ex-factory price of 58 Euros (Rabellotti, 2004).

	<i>Firms</i>	<i>Employees</i>
	<i>a.v.</i>	<i>a.v.</i>
Footwear companies	315	7,568
Accessory manufacturing companies	359	2,923
Shoe designers	68	224
Trading companies	44	261
Total	806	10,976

Tab. 5: The productive filière¹⁷

Note: a.v.=absolute value

Source: ACRIB (2005)

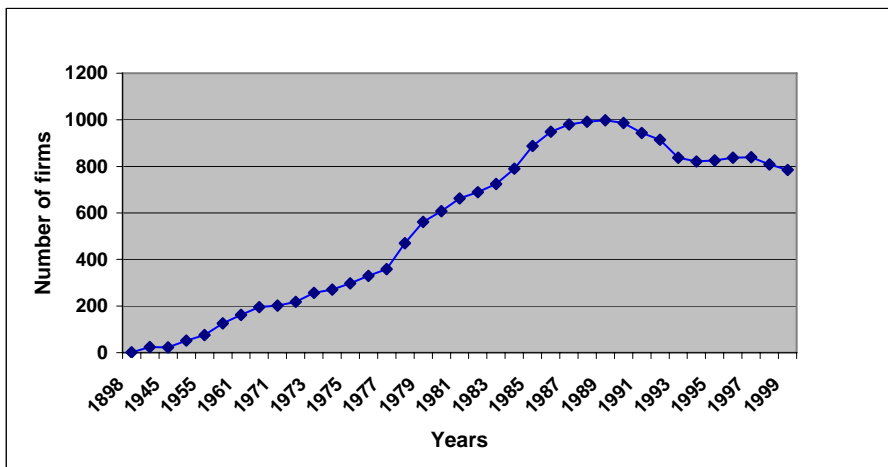
¹⁶ Based on Belussi (2000).

¹⁷ Data refer to firms and employment operating in the footwear production in the whole provinces of Venice and Padua.

The district covers geographically the province of Padua and Venice. A synthesis of information about firms and employees in the Brenta productive filière is provided in Tab. 5.

History

The origins of the Riviera del Brenta district date back to the year 1898, when Giovanni Luigi Voltan founded the first footwear firm (*Calzaturificio Voltan*) around Stra (a village situated in the province of Venice). The founding of the first district firm is related to the application of Fordist methods to the craft production of shoes. Voltan learned these methods when he emigrated to the US and, on returning to his native village, he employed these new techniques in his factory. The district emerged when the best blue-collar workers of Voltan decided to set up a factory, giving rise to flows of start-ups. No real original innovations were introduced by the district firms during the expansion of the Riviera del Brenta footwear system. Competition was exerted through a continuous process of cost cutting reached through firm fragmentation and decreasing of administrative costs (through the prevalent small size), and productive gains reached by the inter-firm division of labour and specialisation. The building of internal capabilities of firms was realised through a continuous upgrading of the product, firms investment in up-to-date-technologies, and improvements of selling abilities (during the 1960s some local entrepreneurs started to participate in foreign exhibitions, in Germany). Thus the firms in the district were able to specialise in the upper segments of the market, starting to export their production to the German market. The district faced a large expansion during the '80s, as we can see from Graph. 2, when firms shifted their production upwards, in market niches (*haute-couture and prêt-a-porter* collections). The proliferation tendency stops during the years 1989-1990, when a declining path characterises the local firms.



Graph 2: The Riviera del Brenta district's firm dynamics 1898-1999

Source: Our elaboration on Cerved and ISTAT

Within the district, a co-evolution of firms and institutions growth may be seen. Along with the development of the district, we may observe the constitution of many specific “district institutions”, which have been created during time: a type of problem-solving institutions that have played the role of enforcing innovation diffusion among local firms and fostering the local collective learning mechanism (Tab. 3).

<i>The institutional set up of the Riviera del Brenta industrial district</i>
1923 Foundation of the design school O.T. Fava
1955 First exhibition of shoes produced in Riviera del Brenta organised by a group of small local entrepreneurs.
1962 Birth of the local Association of Entrepreneurs Acrib.
1976 Foundation of the Consorzio Maestri Calzaturieri
1986 Foundation of Centro Veneto Calzaturiero
1999 Patto territoriale (collective agreement between trade unions, entrepreneurial associations and municipalities for actions of local policies)

Tab. 3 The evolution of institutions in the Riviera del Brenta district in the period 1989-2000

Source: Fontana (1998) and Belussi (2000)

These institutions were: training centres for the development of critical technological competencies and skills, centres for the organisation of commercial missions, institutions devolved to organise the interests of local entrepreneurs (Acrib), and to provide them with *ad hoc* services (for instance on the evolution of market demand in various countries, and a data bank on the reliability of national and international clients, based on insolvency payments). In recent years, the collective agents operating in the district (Local trade unions, Acrib, on behalf of the national association of

entrepreneurs, and many public institutions and local municipalities) signed an agreement (*patto territoriale*), which designates a series of measures needed for the further development of the local system.

The positive effect of the existence of these institutions is powered by the local social environment, built on diffuse trust, as we can appreciate in Tab. 3. The table shows some of the results obtained by a survey conducted on 100 enterprises in the district, reported more extensively in Belussi and Caldari (2003).

<i>Type of firm</i>	<i>In a district everybody trust each other</i>	<i>Generally I trust people</i>	<i>I have good relations based on reciprocal trust</i>	<i>Normally I don't trust people easily</i>	<i>I don't trust anybody</i>	<i>Total</i>
Final firm	14.3	4.8	66.7	14.3	0.0	100.0
Supplier	5.6	0.0	77.8	5.6	11.1	100.0
Specialised supplier	8.6	8.6	68.6	11.4	2.9	100.0
Total	10.3	5.2	68.0	11.3	3.1	100.0

Tab. 3 Trust diffusion among local actors in the Riviera del Brenta district

Sources: Belussi and Caldari (2003)

Investing in capabilities

Investing in capabilities is an activity mainly provided by the local association of entrepreneurs (ACRIB) and by the local municipality, which, for instance, financed a renewed training school for pattern makers and designers. Over time ACRIB also began to provide some services to firms (economic advice, support for the adoption of new technology, adaptation of CAD technologies to the needs of the small local firms, financial and commercial support for fair participation, and so on). The association of entrepreneurs also created some important selling points in strategic foreign markets (New York, Tokyo, etc.), working as knowledge switcher.

New internal/external switchers are actually playing an important role in the recent district restructuring. Because of the district reputation in high quality shoes, a large number of local final firms are now working for the most important international stylists and high fashion Haute Couture: Prada, Valentino, Gucci, Chanel, Christian Dior, Ungaro, Etro, Guess, Iceberg, Louis Vuitton, Miu Miu, Ralph Lauren, LVMH, etc. In some cases, this has implied that final firms have lost their distributive channels and agents, in others, like in the case of Rossi Moda, a joint venture has been set up with a

prestigious French group, for the production and distribution of branded high fashion shoes. Interactions with distant high fashion distributive firms and stylists open new informative pipelines to the advantage of local firms, activating the learning at the boundaries mechanism.

Gardening

In the Riviera del Brenta district we witness spontaneous mechanisms of CoPs setting, not properly guided or supported by any institutional intervention. The interviews conducted on the 100 firms informed us of the existence of a local community of designers, which designated a local bar as meeting point for information and knowledge exchanges on recent trends of the market and technicalities. The community is entirely spontaneous, and is driven by the local proximities of firms and the light boundary existing between work and leisure time, typical of an industrial district. No gardening activities of the community are in place. The Montebelluna project could be a good inspiration for future development policies of the district.

6.4 A comparative framework

In the cases presented above, we see that industrial districts are characterised by weak or strong capabilities, and by few or many internal/external switchers. The Matera district is characterised by a significant absence of global pipelines, and it also lacks collective efforts in gardening. Investment in capabilities at the firm level touches mainly the largest leader firm, and few others. On the contrary the Montebelluna district is associated with a high level of global interactions together with a significant presence of gardening and investment in local capabilities. The Riviera del Brenta district does not exhibit a high level of investment in capabilities, but the role of local institutions in gardening is very important. Here many external channels are created by the interactions with external high fashion distributors and stylists.

A synthesis of the three cases, focused on the role of direct and indirect investments in capabilities and of the number of internal/external switchers of the ID, is graphically represented in Fig. 4.

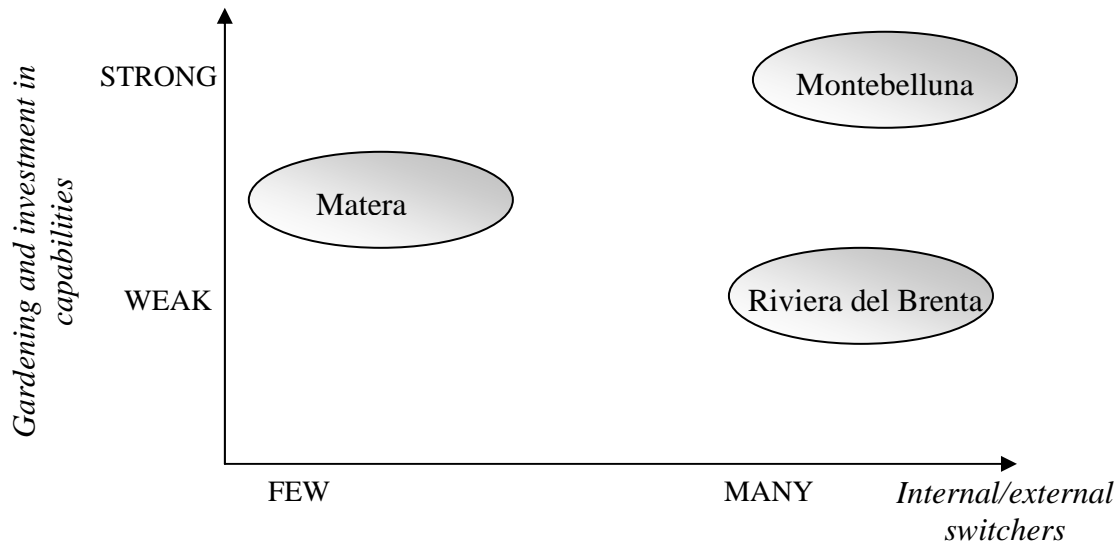


Fig.4: An interpretative framework for the “learning at the boundary dimension” of IDs using some empirical cases

7 Some conclusive remarks

This work explored the possibility, offered by the ideas connected to the concept of CoP and capabilities, of finding new keys to analyse the process of knowledge creation and sharing within an ID. In a world dominated by high degrees of uncertainty, deriving from growing global competition, the process of creation and transfer of knowledge holds a strategic role.

Having defined the relation between the concepts of knowledge, capabilities, CoP and ID, the attention has been shifted towards an integrated view of the ID model, in which learning at the boundaries appears to be a crucial aspect of firm competitiveness. In the end, the application of the CoPs concept to the IDs helps to measure the “evolutionary attitude” of these territorial organisations. The existence of internal/external switchers, both coming from gardening activity and direct investment in capabilities, generates a process of learning at the boundaries, which increases the ID competitiveness in a global market. Our empirical work has shown that, while some districts are only able to exploit local resources, developing inner learning activity, others also build long bridges towards the exploration of new external sources of

knowledge, using internal/external switchers (i.e. leading firms, local meta-organisers, institutions, networks of communities).

To conclude, in order to study the development of IDs, we complemented the Marshallian tradition, by adding a new focus on ID global learning. Alongside this more complex theoretical view, the concepts of CoP, capabilities, and gardening offer a new approach to the study of IDs, escaping the “Marshallian trap” of looking at them as closed systems, where the analysis of social interactions is limited to the well-known metaphor of the “industrial atmosphere”.

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