THE ROLE OF RECONNECTION OF COMPETENCIES AND INSTITUTIONS IN THE COLLECTIVE LEARNING PROCESS

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Abstract

This paper proposes a study on collective learning (CL), a concept which, despite its popularity, remains relatively unspecified from the theoretical point of view. We address this analysis taking a cognitive-organisational perspective in order to connect individual and social features of learning processes in local economic systems. The individual learning dimension is observed via the modification of firms’ competencies, while social learning is taken into account by observing production and labour organisation. We define CL as a “co-ordinated change of competencies of firms and local institutions” in order to capture the local production system dynamics. We emphasise the relationships that organise the division of labour of a local system because co-ordination introduces problems of synchronisation and assignation of competencies. Moreover, local institutions can contribute to promoting governance changes or inertia. From our analysis, CL emerges as crucial for material and immaterial resources allocation, for local system performance and for the setting of policies.

In the first part a conceptual framework for the empirical analysis of CL based on the concept of competence is introduced. In the second part two case studies are illustrated using the correspondence analysis: the eyewear milieu of Cadore and the sports shoe milieu of Montebelluna, both from the Veneto region.

Key words: collective learning, competencies, institutions, milieu innovateur, relational assets.

INTRODUCTION: OPEN ISSUES ON COLLECTIVE LEARNING

In 1999 a special issue of this review was dedicated to the topic of collective learning (CL) from a theoretical and empirical perspective. The aim was to deepen analysis of the cooperative and competitive behaviour of SMEs belonging to industrial clusters in order to explain the allocation of production and organisational resources and the role of social learning mechanisms.

The theoretical underpinning of CL is due mainly to the GREMI research activity which concentrates in particular on highlighting innovative processes and information sharing
among firms in industrial clusters. These scholars define CL as “a social process of cumulative knowledge, based on a set of shared rules and procedures which allow individuals to co-ordinate their actions in search of problem solutions”. The concept is rooted in two basic propositions:

- *interactive learning is a vehicle for technological innovation*. In the milieu approach firms’ spatial interaction abilities create and spread innovations. Interactive learning emphasises the social character of economic relationships be it competitive or co-operative.

- *Technological innovations depend on local information transcoding capability*. Firms need to gather information to evaluate the return of different technological investments. On the one hand, this decision process is based on self-interest and on the other it requires social exchange. In local systems and milieux, many small and micro-firms are risk-adverse because of the bounded endowment of their capital stock. Such a condition affects the entrepreneur beliefs in the investment portfolio return, restricting the range of possible investment options. To overcome this limitation and not incur information costs, CL becomes the social mechanism fostering the adoption and spread of innovations. Thus, local information transcoding means that the SME population shares informal institutional standards which makes inter-firm communication easier and speeds information accessibility, reducing its cost.

In the milieu approach the CL process takes the form of a high mobility of the labour force within the milieu, intense innovative firm interactions with suppliers and customers and local spin-off.

GREMI scholars assert that the main difference between the *tout court* learning process and CL lies in the social feature of the latter (CAPELLO, 1999). In fact, the learning activity is a cognitive process generally studied with respect to a single individual and only marginally investigated with respect to the relational social dimension of individuals. However, this approach has not significantly translated the concept of individual learning to a social sphere. This is not an easy task because a shift from individual routines analysis to interactive mechanisms investigation requires the investigation of spatial, organisational and economic interactions among firms.

This direction was followed by the “Cambridge group” which connects the CL process to the competence theory of the firm. LAWSON, 1999; LAWSON and LORENZ, 1999; LORENZ, 1994 assess that capability and competence concepts can be very useful for clarifying the information transcoding property of CL. Shared knowledge and the ability to exploit external knowledge are key elements for supporting the creation of new technological and organisational competencies as well as their co-ordination within the local labour market. In this way, CL represents a precondition for problem-solving strategies, i.e. it can be
considered a vehicle for overcoming organisational inertia due to the distribution of quasi-rents among firms.

However, from our viewpoint, the CL theoretical underpinnings offered by these studies suffer to a certain extent from indeterminacy of the concept itself. It is not clear whether CL is simply individual learning which takes into consideration the social nature of knowledge or whether it is a learning process stemming from the system level. In the latter case, it is difficult to connect the system outcome to individual learning of a variety of different agents even if, to overcome this limitation, CL is considered the result of shared knowledge or shared communication codes (KEEBLE and WILKINSON, 1999).

Empirical detection of CL has been based on proxies like spin-offs and local labour market turnover in order to observe the territorial dimension of learning (CAPELLO, 1999). Unfortunately, in this methodological choice no space is left to the firm’s learning ability – the primitive element for innovation decisions. Moreover, there is the risk of confusing diffusion processes and CL. We would argue that CL is something more than diffusion and that often there are many kinds of knowledge which do not spread in the local systems even if they are assets of that system (ARGYRIS, 1995).

Our contribution to this debate stems from the idea that we need to investigate the system’s organisation taking into consideration both micro and macro levels. To display this, we need to observe firms’ behaviour when they face a changing economic context, considering their differentiated production role within the milieu. In fact, the population of production units consists of firms that react differently to changes because of their different role and position in the production system: some of them are subcontractors, others produce for market niches or supply specialised services, while others occupy a more strategic position for product commercialisation and distribution. This differentiation of roles within the firm population plays a crucial role for enacting of the learning process which maintains or improves firms’ performance. Thus, the outcome of these individual behaviours at the system level depends on the composition of the firm population and on firms’ relationships. For the latter, the local labour market, i.e. the availability of competencies, and institutions play a crucial role. As suggested by LAWSON, 1999, such a viewpoint allows us to connect CL with industrial economics by concepts of the competence-based view. The CL analysis based on the "cognitive division of labour" - here represented by the competence set and by relationships interoccurring among competence holders – can provide an interesting picture of knowledge distribution and co-ordination in the milieu. Policy implications of such an approach concern the importance of producing new competencies as well as restructuring connections among firms when a loss of profitability and competitiveness at the milieu level is observed.
In the next paragraph we introduce our viewpoint recalling some fundamental points of the learning literature and we tie the two theoretical levels, the individual and the social, reinterpretting the Bateson model of learning (BATESON, 1972) also applied to organizational studies by ARGYRIS and SCHÖN, 1996. This model relies both on the theory of logical types and on the principle of recursivity to unfold the concept of learning at different levels of description. Eventually, this view of learning will be structured to be understood in a territorial process of learning and the necessary conditions will be illustrated and discussed. Finally, an exemplificatory attempt to study CL in two milieux by means of non-parametric statistics will be presented and the policy implications of the model discussed.

LEARNING AND INDUSTRIAL ORGANISATION

The economic relevance of learning is that a competitive advantage may be obtained by improving the knowledge used in all the firm’s activities. Information represents a precondition for the exchange of knowledge and, in turn, requires processing and assimilation of existing knowledge. Entrepreneurs design their actions intentionally or unconsciously using their own knowledge continuously modified and organised thanks to the information coming from the environment and especially from the niche in which they operate. COHEN and LEVINTHAL, 1990 label “absorptive capacity” the ability of firms to use information efficiently in order to improve their knowledge. Stocked knowledge may remain latent for a long time and be activated subsequently, when embedded in the ‘right’ context. As a consequence, the most immediate way to observe the learning process of firms is to study effective actions deriving from their knowledge, where the latter concerns specific functional interrelationships and operating abilities.

However, as NOOTEBOOM, 2000 states, actions are framed by cognitive capabilities (perception, interpretation and evaluation) and the information exchange (interaction) between social-institutional environment and individuals. Moreover, the cognitive distance or proximity of human beings has a direct impact on firms’ management. Indirectly, cognitive distance and proximity affect economic co-ordination and competitiveness of the milieu. While a social cognitive difference is necessary for novelty and innovation adoption, cognitive proximity is crucial for aligning perceptions and interlinking firms’ competencies in a complementary way.

There are many theoretical paths an applied economist can take to examine the CL concept starting from these points. He could stress the innovation attitude of entrepreneurs observing, for example, the financial resources assigned to R&D, and investments in design and technology. This perspective emphasises the cognitive distance between firms as a source
of CL: innovation spreads within the milieu because it increases or improves profitability. Otherwise, CL can be studied stressing the social embeddedness of economic actions, i.e. how social interaction affects knowledge development and what the role of common communication codes is (KEEBLE et al, 1999). The focus is on the level of cognitive proximity among firms, and co-ordination problems are taken into consideration. From this viewpoint, institutional elements enter the design of cognitive division of labour, carrying out specific competencies or activating economic relationships.

Here, our concern lies in-between the two previous cases: to observe CL we focus on the effective change in observable behaviour. What really counts is the change in the visible effects of knowledge, that is to say the improvement in the know-how displayed by actors. From what we have pointed out, the only observable knowledge is practical knowledge; abstract knowledge can be productive only if it is enacted, i.e. if it is transformed into effective action, otherwise it remains a potential without any specific effect on the economy.

The concept of competence may be a suitable basis on which to focus attention in order to address the learning process at the local system level. Therefore, at this level, learning may be empirically reduced to a change in competencies without losing too much in terms of meaningfulness. In fact, the concept of applied knowledge functional to some goal is nothing more than the concept of competence (PENROSE, 1959). Moreover, the usefulness of such a concept lies in its suitability to include relational competencies, the latter being stressed by STORPER, 1997; AMIN, 2000, 2001, as a key factor of local system competitiveness. It also fits a behavioural approach to the learning process such as that of BATESON, 1972.

Besides competencies, the other relevant visible elements are information channels. In fact, firms are the basic units where competencies can be studied. The latter are interconnected by a variety of relationships which also represent their information channels. This means that complementarity and substitution relationships among competencies – external to the firm and internal to the milieu – are a mechanism for co-ordination of innovations and for alignment of perceptions. Given that co-ordination reduces the risk-cost of individual firms to adopt innovations and modify their competencies, firms’ efficiency strongly depends on the milieu’s relational organisation. Obviously, this definition of CL as a “co-ordinated change of differentiated competencies” is strongly dependent on individual learning processes and on the institutional context that can either foster the local system’s learning capability or lock it in a set of organisational routines that reduce the competitiveness of the milieu.

BATESON, 1972 assesses that the learning function denotes both some kind of change and the unfolding of a process. Moreover, the process itself is subject to changes because a process can speed up, slow down or be affected by other changes. Thanks to such modifications we can say that we are observing a different kind of change. This behavioural
and cognitive definition of Bateson is here translated into a pragmatic competence view of economic learning obviously to permit “outdoor” application to real existing actors.

Bateson defines learning at least at three levels. We try to give an economic re-interpretation of his framework. Bateson defines learning at least at three levels. We try to give an economic re-interpretation of his framework. Bateson defines learning at least at three levels. We try to give an economic re-interpretation of his framework.

0–type learning – an economic action is repeated independently of a given stimulus. The hindrance may be cognitive or due to a lack of resources needed to afford the costs of changing behaviour.

1–type learning – the economic agent is able to adapt behaviour according to stimuli coming from the changing contexts (or by internal motivation) by choosing an action from within a given set of possible solutions. In this case, a competence may be improved, or a new one may be acquired from the set of available options defined by the existing economic organisation.

2–type learning – the agent adapts by changing the way he chooses the suitable action. Choice of an appropriate action implies a shift to a different set of possible responses.

Level 2 learning implies a further specification of the social element of learning. The functional relations between individual competencies naturally bridge the individual and the collective level of learning. In this respect LAWSON, 1999, who provided an extension of the competence approach to regional studies, affirmed that competencies are often localised and embedded in given territories. Much in accordance with this view, knowledge, at the system level, can be defined as the variety of competencies of individual units co-ordinated in the economic system. In fact, such connections represent the main information channels through which learning stimuli are transmitted to obtain (or not) a general reciprocal adaptation. The mix of competition and collaboration is responsible for this process and a common standard in communication codes given by some tacit knowledge is its prerequisite. Obviously, adaptation is then more specifically determined by a larger variety of economic factors.

There is a logical difference between organisational learning as conceived by the competence-based approach and CL proposed here. The former focuses on firms while the latter is centred at the milieu level. In the former, two main processes are distinguished: the internalisation of new knowledge and its new articulation in firm organisation by a new set of routines. The milieu displays a similar process of internalising new competencies (also by developing them internally) but there is no organised set of routines. Rather, we find a set of transactions and other relationships based on collaboration which connect specific firms and their competencies. As a consequence, the division of labour is a fundamental concept for understanding the connections between competencies.
COLLECTIVE LEARNING AND THE COGNITIVE DIVISION OF LABOUR

For the sake of simplicity, we take the firm as the basic unit of individual learning. This is not an average representative firm but a firm belonging to a varied population, performing one or more of the many activities defined in the local system. The role of co-ordination is emphasised by applying the concept of division of labour and knowledge. MASKELL, 2001, affirms that the firm’s advantage of clustering is deepening of the knowledge base that it enables and NOOTEBOOM, 1992, 2001 highlights that some "external economy of cognitive scope" exists. As the units making up the economic systems perform different tasks, they own a specific know-how for goods or services they produce. This is given by the technologies implied in the production process as well as by the knowledge necessary to purchase the inputs of production and follow customer needs. This is why we agree with EGIDI, 1994, on the fact that the division of labour is also a division of knowledge. In clusters of firms, milieux and other local systems there is a kind of homomorphism between the pattern of division of labour and that of the division of knowledge in the sense that every unit concentrates at best on its tasks and improves its competencies. Every firm is responsible for developing its knowledge at least in two directions: firstly it makes an effort to update communication standards or what NOOTEBOOM, 2000, calls "achieve a sufficient alignment of mental categories", which means being informed about changing conventions, technological standards and other required codes and common knowledge enabling it to maintain a proper ability to evaluate situations. Secondly, the firm invests in developing specific competencies to enhance its own competitive advantage, which is often a specific investment. The direction of the second kind of knowledge investment is evaluated by each firm (using the shared information) trying to cope with the competitive pressure. The common knowledge helps to reduce the risks of this investment, but in order to further reduce the risk of more innovative projects, firms also often engage in more formal collaborative relationships with customers, suppliers and even competitors.

These efforts are co-ordinated by a set of transactions within the system which often have their final outcome in a small number of products for the external market. The structure of transactions carry most information, however other information channels exist such as spin-offs, the labour market, agencies and informal communication by everyday encounters between people. Contrary to standard economics, prices are not the only pieces of information reconciling the different types of knowledge. Transactions carry multidimensional information concerning all aspects of the production process. This is why standardised codes of communication embedded in common values and shared experiences are needed to permit efficient spread of information (general proximity).
The concept of CL proposed here denotes the emerging *milieu* capability of (re)connecting relationships, shaping in this way the relational organisation of the system. As a consequence, the relational endowment presupposes specific relational competencies subject to learning themselves. From this viewpoint, CL can be interpreted both as a process of knowledge modification and as a change in the pattern of division of cognitive labour among the operating units. In fact, we can distinguish at least two situations: new competencies may arise which are framed in the existing organisational pattern, or a new relational pattern is needed to exploit the advantages of some new competencies. This denotes two intensities of CL. On the one hand, the improvement of a particular competence limited to a restricted number of actors – who interact functionally with other production units – may be considered a system’s learning. Some knowledge may be the privilege of a minor part of the system and nonetheless be useful to the entire system. On the other hand, a reconnection of firms may be needed to exploit the advantages of a new competence developed by some firm. The latter is a deeper form of modification in the division of cognitive labour and it also induces a change in the industrial organisation.

The economic analysis of learning in local systems may therefore be based on sets of competencies and on the pattern of division of labour. As previously done for general learning, CL can also be organised in logical levels.

**0-type learning** – No change of competencies. The system is not learning, maybe it perfectly fits its context, or some economic or social and economic rigidities may be responsible for the lack of adaptation.

**1-type learning** – The system undergoes some changes of competencies. They may improve or increase in variety but they co-ordinate according to the existing scheme of division of labour. The existing governance structure allows the change in competencies to fit the new context without the need for new connections or a different form of distribution of competencies.

**2-type learning** – In order to provide the best exploitation of newly emerging competencies, the co-ordination scheme that characterises the division of labour changes to allow for a different system organisation.

*Figure 1 about here*

Consequently, we can represent, as in figure 1, two dimensions of learning: individual firm’s and milieu’s as a whole. At the same time, we can also distinguish two intensities: first
and second order. Here, we describe CL at the *milieu* level and we consider in particular how to study the second order learning involving reconnections.

**STRUCTURAL FACTORS IN COLLECTIVE LEARNING**

The existing organisation of competencies represents an important factor shaping the available options of CL process. The relative concentration or dispersion of production, the hierarchical or horizontal pattern of transactions, the ratio of dependent subcontractors vs. independent producers and the number of final producers with market power strongly affect the information channels and the available strategic options of any firm.

As underlined by NOOTEBOOM, 2000, the co-ordination design is based on competence alignment, i.e. on the solution of synchronisation problems depending on different firms’ absorptive capacity intensities, on information and knowledge spillover affordability, on opportunistic behaviours, loyalty and trust. Nevertheless, transaction costs concerning specific investments and the problem of hold-up are important and also concern investments in new competencies. In fact, some form of organisation may not support knowledge-specific investments. In these cases, a key role is played by institutional actors that are responsible for granting the viability of the system’s organisational change to support CL. What, however, is the collective action that may affect CL and even support changes in the form of co-ordination of a *milieu*? The proposed framework for studying CL takes into account analysis of the socio-economic factors embedding the organisation of the whole productive process. This is a well-known story in both regional and industrial studies. For instance, LANGLOIS and ROBERTSON, 1995, assert that «the learning ability of the (local system) will depend on technical and institutional factors, as well as on the learning abilities of the firms it composes, considered both individually and as a system» (p.33). Industrial districts and *milieux innovateurs* are systems of organised co-operation characterised by specific governance structures assuring the coherence of co-ordination. According to RICHARDSON, 1998, co-ordination may be conscious or unconscious, and it can be expressed by a set of strictly complementary activities performed simultaneously. The co-ordination and governance structures define the ability of the system to adapt to environmental changes, at the same time maintaining the territorial identity of the local system.

Institutions contribute to regulating the division of labour: contractual schemes, formal institutions (like associations) and informal institutions (such as some cultural features, conventions and systems of meaning) play a central role in definition of the division of labour and in the shape of communication channels which improve or inhibit firms’ absorptive capability to improve their competencies.
Informal institutions may affect CL by privileging certain forms of co-ordination and discouraging others (or imposing transaction costs on them). The study of these institutions is difficult and is best performed by anthropologists and sociologists. In general, their form is very important for fostering reputational mechanisms as well as developing trust among partners.

Formal agencies may play a more visible role, interacting with other actors and participating in learning processes. In fact, in the case-studies we underlined the role of associative organisations producing services for firms. We consider two ways for these organisations to link with other actors in a CL process:

1) By getting into the play with specific competencies not available in the system and by supplying them to firms;
2) By playing the role of connections or information channels which represent part of a structure of relationships.

In the former case (1), institutions develop competencies of various kinds, which connect functionally to other firms’ knowledge and therefore enlarge the know-how endowment of the system. Institutions can perform specific tasks by producing private or public services.

In the latter case (2), they assume the role of relationships between competencies and in our case we found that:

a) They channel information;
b) They translate academic codified knowledge into practical and accessible know-how;
c) They act as a collective agent able to represent local interests in relation to local, national and European governments;
d) They promote forms of co-ordination geared to overcoming certain difficulties, that is to say they promote reconnections among competencies;
e) They promote the enlargement of production networks towards low labour cost foreign countries by establishing reliable information channels.

In the following section we propose two parallel case studies of Italian milieux, which exemplify the CL framework presented here. The main emphasis of the application is to show how the variables of the competence-based approach can be identified in practice and how strategy differentiation copes with the cognitive division of labour. At the same time the role of institutions in fostering such dynamics will be highlighted.
THE EVOLVING CONNECTIONS AND DISTRIBUTION OF COMPETENCIES IN TWO MILIEUX: THE CADORE EYEWEAR AND MONTEBELLUNA SPORTS SHOE SYSTEMS

It is plausible that for a long time the evolution of Italian local productive systems has taken the form of 1-type learning level by maintaining some traditional forms of co-ordination compatible with technological innovation. This learning process was a good strategy in a stable macroeconomic context whereas nowadays with a rapidly changing environment it can constrain the evolutionary capability of local systems (GAMBAROTTO and MAGGIONI, 1997). The current international economic context is seriously challenging many local Italian industrial systems and innovation and learning are considered the main sources of competitiveness and the only viable solution to the problem. An important aspect, often downplayed in the literature, is that learning and innovation are not confined to the technical sector: in order to cope with the uncertain environment, some basic innovations concern competencies in organisation, distribution and managing connections with other firms. This kind of knowledge may be more demanding compared to the know-how which is more easily available on the market. However, a relevant part of that knowledge is an untradable asset embedded in local socio-cultural characteristics. Usually, shared knowledge is considered a factor fostering the co-ordination of complementarities but we have to remember that it can also discourage novelties because of organisational lock-in.

In order to capture firms’ organisational changes, we have collected data by different information sources, i.e. by open interviews with privileged actors, via some specific questions within the questionnaire and via official statistics (Istat). As long as the questionnaire concerns, we have submitted it to 90 out of the 700 active firms in the Cadore eyewear system and 57 out of the 350 firms in the Montebelluna sports shoe system.

From data emerges that the eyewear milieu is experiencing a process of concentration of industry (table1). This system evolved in the 1970s out of a few original firms producing spectacle frames and grew by multiplying the number of companies up to the 1990s. One of the success factors was entry into the sunglasses market and joint ventures with some Italian fashion trademarks. The main factor currently underlying the crisis in the market is that, on the one hand, the market is very unstable because of the uncertainty and increased volatility of fashion, and on the other hand, East-Asian producers are very competitive on costs. Moreover, in this market most of the added value lies in final distribution. The four main companies of the milieu have therefore decided to foster relationships with stylists and invest in distribution chains in order to relax the pressure on costs resulting from the international wholesale market. This move has crowded out the small producers of the same system which, being unable to cope with the new international prices at the wholesale level, have
tried to specialise in some niches. At the same time they have found themselves obliged to start working as subcontractors of finished products for the four major companies in order to reduce the incidence of fixed costs. Only minor delocalisation of production or external outsourcing occurs because the rapidity of change in product design implies a close relationship between partners. The result is a tendency towards verticalisation of the milieu, considerable pressure to innovate and stringent selection of less competitive firms (which has reduced the number of active companies by 1/3).

The sports shoe milieu was facing less aggressive price competition because most of the competitors reside in the same system and companies are highly specialised in a number of rich niches. Some multinational companies settled some departments in this area in order to exploit agglomeration economies in terms of know-how and innovative capacity. Moreover, in the last thirty years these companies have invested heavily in marketing capacities. What has happened in the last five years is that some of the less successful companies have decided to overcome their low performance by establishing production subsidiaries in Eastern Europe (mainly in Romania), copying the strategies of multinationals.

This move has caused a chain reaction of imitation by most firms since 1998. The result has been a process of total reorganisation where the majority of production is now located abroad in a number of replicated district-like systems and only design, sampling, administration, marketing and distribution activities remain in the sport shoe milieu. The paradox is that the total number of employees has actually increased but many small specialised subcontractor companies have been pushed out of business or have moved to other markets. Here again, a concentration of industry has occurred, but the milieu’s relationships have remained horizontal compared to the eyewear milieu.

In the latter milieu the most important acquisition of competencies is of the institutional type and concerns trading. At the same time the leadership concentration process has had an impact on the technical competencies that are a crucial endowment for SME in order to prevent the four main firms outsourcing abroad: 53% of interviewed firms (with more than 4 employees) declared they needed to invest in new technical competencies.

In the sport shoe milieu, the basic learning process concerns trans-national logistics (institutional) or marketing for firms because of production delocalisation. The spatial reorganisation of the milieu has produced a radical modification of competence allocation, concentrating technical abilities in the new cluster area. This fact emerges clearly from our analysis given that new technical competencies are not needed for 80% of interviewed firms.

In both systems considerable emphasis is placed on fast prototyping in order to reduce production time lags in relation to market information. However, technical innovation is still

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1 80% of motorbike shoes, 75% of skiboots, 65% of after-ski boots and 50% of mountaineering shoes
important in the *eyewear milieu* in order to keep prices high by improving products, allowing some normative protection of local products (by developing standards) and coping with the sophisticated technologies of Japanese manufacturers. This innovation is in part obtained by bigger firms, in part delegated to smaller subcontractors and in part obtained with the help of agencies resulting from local collective action. In the *sport shoe milieu* innovation is still important but the industrial organisation is less structured and firms’ attitudes are more individualistic.

**THE DIFFERENTIATION PROCESS OF THE LOCAL RELATIONAL SYSTEMS**

The basic ingredients of the analysis are the variables listed in the legend and collected via the questionnaires which were processed according to “correspondence analysis”. Firms were clustered into four classes with respect to their type of production (firms may produce at the same time in different steps of the production process). The resulting taxonomy (table 1) emerged as providing the simplest and clearest description of the system's interacting actors. Given the impossibility of producing an analytical representation of the system’s relational structure, we gave priority to an analysis of trends and directions of change for the observed variables.

In both *milieux* categories “final and components producers” exist, and subcontractors differ in their degree of trading dependence – higher and increasing dependence in the *eyewear milieu*, lower and more diversified in the *sport shoe milieu*. They also differ as regards the nature of mixed production firms: they basically produce complete final goods in the *eyewear milieu* (semi-final) while they are more frequently producing intermediate goods in the *sport shoe milieu*. Mixed productions in both cases are geared to exploiting some market niches and at the same time lowering the incidence of fixed costs by complementary productions. Both differences between semi-final/intermediate and subcontractors are indicative of the different verticalisation degree of the systems. The other actors are agencies already listed.

**Table 1 about here**

The “correspondence analysis” brings out some relational features that are crucial for the CL process. They emerge from the two axes singled out by the statistical technique: on the horizontal axis we have the proxy of perceptions’ alignment, i.e. the cognitive dimension needed to co-ordinate individual decision plans. It represents the intensity of proximity in terms of world production are manufactured in this system.
factors in innovation (Prx) which includes geographical, technical and organisational proximity as well as proximity based on trust relationship and by complementarity of know-how. On the left side of this axis, we find firms that adapt passively while, on the right, firms act for suitable co-ordination solutions.

On the vertical axis the division of labour is described by the kind of collaboration which led to innovation (PT and PS). The observation of learning behaviours of different firms’ subpopulations allows us to empirically investigate the “social organisation of cognitive distance of firms”. On the positive side of the vertical axis, firms require competence complementarity because of innovation adoption while on the negative one, firms make cooperative agreements independently of innovations.

Figure 2 and 3 + legend about here

The eyewear system vertical restructuring

Four clusters of variables neatly emerge from the correspondence analysis (Figure 2).

- The competencies exploitation area includes the most solid final companies, which connect with a plurality of actors. They exploit the main services of local and external agencies (labour training, certification, test laboratories, new technologies etc.) for their innovation adoption (variables PT and PS). They also benefit from semi-final firms’ innovation and development of new competencies. In fact, proximity factors are still important for “larger final” companies, and this confirms the relevance of agglomeration externalities even when they grow dimensionally. The acquisition of competencies is mainly of the technical and organisational kind (ΔC=EO). Such firms also reduce subcontracting, which highlights how verticalisation of the industrial structure is also reducing the number of actors at the bottom of the production chain: this is confirmed by the reduction of active smaller firms by about 20% in the last five years.

- Closer to the first cluster lies the short connections area where firms rely more on informal but highly productive ties as regards innovation and the development of new competencies. The latter are mainly economic-organisational (EO) and specific technical competencies (ST). Here we note the most intense registration or acquisition of patents and a strategy geared to increasing specialisation. Proximity factors are still of medium intensity. They outsource and renegotiate contracts to control costs more actively. Interactions with local firms are important to innovation, but these relationships may be enlarged outside the system. FT firms (mixed production) characterise this area, which provides the best results in terms of sales, even though this
element is shared with the whole of the right side of the graph. These firms enjoy a limited independent market and work also as subcontractors of finished eyewear for the bigger companies. The vertical connection to “final” firms allows for a displacement of benefits induced by the intense endogenous technical learning towards the top of the system.

- On the left, we find a high concentration of missing answers that characterise the localistic involution area. A higher concentration of micro-firms, subcontractors of specific activities, displaying a reduction in sales, are placed in this cluster. These are non-autonomous firms, which attribute low importance to proximity and make no investment in new competencies. This passive attitude may be explained by their lack of autonomy due to insufficient size in terms of invested capital and to the threshold effect required to obtain some gain from efforts made to acquire new competencies. These firms base their living on the subcontracting of very simple work and remain totally dependent on larger companies’ preference to remain flexible. The large number of missing answers is due to the fact that the issues analysed here lie beyond their perceived economic problems.

- The fourth cluster contains most of the specific and functional firms. Here proximity variables are a crucial element, in particular those of a technical and organisational nature. Moreover, such companies make an effort to maintain solid ties with suppliers. In fact, service companies and specialised component makers are interested in developing deeper and wider relationships to get the information they need to cope with changes. They can exploit the endogenous learning dynamics and are interested in relationships with local firms for product innovation. They share with the ‘short connections cluster’ a preferential relationship with a local service agency (Eurobic) and its programmes of e-trade and internationalisation of small firms.

The analysis reveals that CL 2-type characterised by a co-ordination change of competencies (perception alignment) is captured by proximity variables. It stems mainly from the behaviour of firms belonging to cluster 1 and 2 and from local institutions (service agencies). Firms of cluster 4 connect to the other firm groups by technological improvement of competencies but their relational connections do not vary much. Finally, firms in cluster 3, in accordance with their subcontractor status, do not vary their competencies set autonomously: they adapt their production routines when required. The outcome in terms of CL depends also on the connection between firms and local agencies: via this relationship the milieu organisation produces the quality system and improves the R&D function. Many firms (cluster 1, 2 and 4) are supported by local institutions to gain new know-how and to innovate in the economic-organisational and technical fields. Others (cluster 3) demand simply traditional administrative services. Given the vertical organisation, most of these efforts are devoted to the benefit of the few bigger firms that
look for a perception alignment with suppliers to maintain/improve their market position. The small firms’ co-ordination is mainly technological and based on strong proximity ties in order to survive or to reinforce their role in the production chain.

*The sports shoe system of Montebelluna and its spatial reorganisation*

Given that our milieu analysis is restricted to the firms remaining in the original territorial area, we focus on internal relationships excluding external relationships with delocalised production units. In this way we observe only part of the CL process. Data display a positive correlation between the intensity of proximity factors and the performance of firms so that we can state that agglomeration economies still exist for the competence subset localised in the area.

Contrary to the *eyewear milieu*, contacts with agencies do not emerge as a distinguishing factor. In fact, only the internet site for e-trading and quality certification are significantly distant from the axes intersection point. Moreover, the questionnaire was administered only to local resisting firms and therefore the importance of the services provided by business associations in their offices in Romania was not tested.

Three main clusters stem from data processing (Figure 3):

- The first one – in the first quarter - is that of *backward reconnection*. Firms, mostly of the "final" kind, exploit technical and organisational proximity but engage in a process of reconnection to different (often foreign) suppliers. Here some patents are registered or acquired and some new competencies are developed. Agencies come into play exclusively as e-trading and for quality certification (commonly to the first area). Firms belonging to this sector often enjoy a rise in sales. In figure 2 we can see that collaboration among these firms is positively correlated with proximity factors: however they do not reveal very strong relationships probably because they count less than cost reduction strategies (delocalisation). Collaboration with competitors, production specialisation and business association are not distinguishing factors here.

- The second one – in the second quarter – has been labelled *short networks resistance* because it counts on strong relational factors as a surviving strategy. Spatial proximity is, however, the least important. The current restructuring of the system, due to the massive delocalisation, induces a change in the relationships with suppliers geared to reducing subcontracting and renegotiating contracts. The firms represented in this area are the intermediate firms, which produce specific parts and accessories for sports shoes without diversifying production in other markets. They mainly try to intensify collaboration with other companies to innovate and to exploit specialist work resisting in the system. Their sales tend to remain stable and this means that some opportunities
for specialised production, basing their competitiveness on proximity factors, still exist.

- Finally, the last sector is the **diversification and exit** area which includes firms that do not rely on proximity factors and do not invest to acquire new technical and organisational competencies. Due to delocalisation, these firms lose contractors and try to enter new markets in order to exploit their competencies (which have sunk costs) in other productions. In order to do this, however, they choose to invest in relational competencies. In this area professional training provided by local agencies assumes a certain relevance.

In this milieu CL depends on co-ordination between a group of firms that maintain strong local relationships (cluster 2), firms adopting a partial delocalisation strategy (cluster 1), and firms that exit from the milieu’s production specialisation looking for new production connections (cluster 3). The net effect of these different firm learning processes is a new division of labour characterised by specialisation in some production phases and a diversification of the local economy. The main problem in terms of perception alignment is synchronisation between local and distant firms, so that learning capabilities mainly concern logistics. In this milieu institutions play a marginal role for CL production because firms behave in a more individualistic way.

**FURTHER CONSIDERATIONS ON INSTITUTIONS AS COMPETENCE HOLDERS AND INFORMATION CHANNELS**

It emerged from the survey that trade relationships are the most important in transmitting information, stimulating innovation and providing the inputs for developing new competencies. However, trade channels are not responsible for providing all information. Moreover, firms do not have all the competencies needed to tackle all the ins and outs of the economic environment. The alertness of entrepreneurs is facilitated and stimulated by many other institutions. Trade-fairs and the diffusion of the specialist press are important factors for reciprocal stimulation and spread of information. What is relevant for this study is the role that local associative institutions and agencies can play in spreading information and getting into the play with specific competencies which are institutional in nature.\[^{15}\]

Moreover, agencies can get into the network of economic interactions with some specific competencies by selling their services. In general the contractual scheme is the club form, where some public goods are provided for associated firms. Even in this case the relevant competencies are mainly of the institutional and technical kind. This counterbalances a lack of spontaneous investment in some areas involving a connection between technical know-how and institutional abilities. This is the case with certification of both products and
processes, tests, production of specific standards and norms, and the transcoding of codified know-how from universities and research centres to practical and applicable knowledge for small firms. Such underinvestment is due to the high sunk costs of such activities to single companies, which is particularly evident in the case of SMEs. A second kind of institutional competence provided by agencies is to organise interactions among firms and interactions of firms with the external market. This kind of competence helps to improve the efficiency of inner system trading and exploit favourable market niches. Agencies may compensate this underinvestment in competencies if the collective action which constitutes them is successful and they demonstrate that they are efficient and effective (and not rent seekers).

The most remarkable processes of learning in the eyewear milieu concerned institutional competencies and, specifically, commercial know-how and the establishment of distribution chains. The second important process of learning concerned the treatment of new materials (titanium and surface treatment of frames). Finally, the learning field where institutions like Certottica have been more directly involved concerned the establishment of standards and norms, including certification procedures and testing. Moreover, agencies in the eyewear milieu are indicated as more important than general suppliers and other local firms in stimulating innovation.

In the sport shoe milieu, learning also involves the use of new materials and techniques of fast prototype production, but it has been mainly geared to institutional competencies like the management of international logistics to organise delocalised production.

The contribution of agencies is usually undervalued by firms, which display some difficulty in appreciating the services they use. In the eyewear sector, where more investments have been made by agencies, their services have been acknowledged more clearly. Some firms (15.6% of the sample) affirmed that agencies were important in providing technical and institutional competencies. Most of them acknowledged their role in certification, in helping to find new markets and in the reorganisation of production (connected with certification).

POLICY IMPLICATIONS AND CONCLUSION

The two case studies reveal that CL has worked through competence reconnection among firms and some institutional actors in supporting change. Given that the CL concept is strongly grounded in the endowment of relational assets, we have considered as most suitable a statistical tool purposely designed to evaluate economic and information connections between firms and between firms and institutions.

The evidence from the two case studies shows that the adoption of strategies able to fit a changing economic environment stems from the ability to reconnect new competencies into a
more effective division of labour. If, on the one hand, innovation is crucial for maintaining or improving the competitiveness of local milieux, on the other, co-ordination is required to reorganise firms’ competence adjustments and to guarantee system performance. However, CL can be difficult to attain when firms mainly pursue individualistic aims. To modify the relational attitude of firms, local policies can be introduced, especially policies addressing the learning capability. To foster the latter, local institutions can play a crucial role because they act both as relational resources and as specific competence holders. Both these characteristics have to be enacted for better system performance. First of all, institutions have to sustain specific investments in technological and organisational competencies, implementing projects geared to R&D, management, and marketing functions. These interventions could be focused on the improvement of individual firm efficiency and thus on modification of their competence asset. However, this is a necessary but not sufficient condition for CL development. The connecting capability of firms also has to be fostered by policy interventions. Institutions may help information circulation within the milieu, even by transcoding external codified information into the local communication standard. This is the case of some special projects addressed to promoting, setting or fostering connection with universities, scientific parks and European institutions. However, they best match the demand of some specific firms and not the entire population of firms. Consequently, their action is not neutral in relation to the milieu evolutionary pattern.
REFERENCES


### Table 1: Fundamental categories of firms by production

<table>
<thead>
<tr>
<th>Kind of firm</th>
<th>Glasses Milieu</th>
<th>Sport-shoe Milieu</th>
</tr>
</thead>
<tbody>
<tr>
<td>FT Mixed production firms</td>
<td>- independent final production</td>
<td>- independent final production</td>
</tr>
<tr>
<td>SI Mixed production firms</td>
<td>- supplier of final prod. to the 4 bigs</td>
<td>- independent final production</td>
</tr>
<tr>
<td>D Subcontractors and &quot;last ring of chain&quot;</td>
<td>Intermediate productions and sub-contr. to a few customers (&quot;D1&quot;)</td>
<td>Intermediate productions and sub-contr. many customers (&quot;D2&quot;)</td>
</tr>
<tr>
<td>C Independent producers of components and services</td>
<td>Production of specific components and services to the final market(^\text{16})</td>
<td>Production of specific components and services to the final market</td>
</tr>
</tbody>
</table>

### Fig.1 The levels of collective learning

<table>
<thead>
<tr>
<th>Observing level</th>
<th>System</th>
<th>Individ</th>
<th>Learning level</th>
</tr>
</thead>
<tbody>
<tr>
<td>Both competencies and their coordination are static</td>
<td>Improvement of existing competencies without any change in the division of labour schemes</td>
<td>Change in the scheme of the division of labour in order to best exploit new competencies</td>
<td></td>
</tr>
<tr>
<td>Repetition of the same competencies</td>
<td>Improvement of competencies</td>
<td>Change in the ability to adapt competencies; Ability to reconnect to other actors to exploit the new acquired competencies</td>
<td></td>
</tr>
</tbody>
</table>

Type “0” | Type “1” | Type “2”
CORRESPONDENCES ANALYSIS: VARIABLES

Δsales – change in sales (↓ = fall; = stable; ↑ = rise)

entry - entry in some sector / entry-M – entry in new market

patents – patents: recording or purchasing

PT: product innovation factors (- = missing)
  Of – collaboration with other firms (loc=local; ex=external)
  In – collaboration with institutions (loc=local; ex=external)

PS: process innovation factors (- = missing)
  Of - collaboration with other firms (loc=local; ex=external)
  In - collaboration with institutions (loc=local; ex=external)

CR: solutions to fit costs to market conditions
  S – rise in specialization, dismissing of unprofitable activities
  O - outsourcing

Prx : factor intensity in the choice of suppliers (1 = weak; 2 = medium; 3 = strong)
  a – ease of cooperation and trust
  b – common technical approach
  c – common organizational approach
  d – complementary knowledge
  e – geographical proximity

ΔSP: recently introduced innovations have led your fitm to:
  1 – eliminate some suppliers
  2 – change some suppliers
  3 – find some supplementary suppliers
  4 – modify the relationships with existing suppliers

CLB: collaboration with competitors

ΔC: perceived need of new competencies

ΔC: acquisition of new competencies  (EO = eco-org.al; TO= tech-org.al; TS= tech. specific)

Contacts with local institutions:
  BA– business associations
  CC – CCIAA – Chamber of Commerce
  CO – Certottica in Montebelluna: BM – Boots museum
  EB – EuroBIC
  LAG – Leader II programme in Montebelluna: TT - Treviso Technology

Use of local institution’s services:
  QC – quality certification
  PT – professional training
  COU – Certottica in Montebelluna: IT - Internet trading
Fig. 2: Glasses Milieu: Correspondence analysis

"localistic involution" area: dependence and low competencies dynamics

"competencies exploitation" area: wide and formal connections to exploit available system competencies, collective

"short connections" area: informal but dynamical, endogenous competencies building

"specific functional" area: thick connections, wide and differentiated search for new competencies

Fig. 3: Sport Shoe Milieu: Correspondence analysis

"short networks resistance" area: by strong proximity relationships

"backward reconnection" area: re-connecting on wide networks, innovation and exploitation of agencies

"diversification and exit" area: get institutional competencies to exploit technical knowledge in another market

2 We refer to papers by KEEBLE, LAWSON, MOORE, WILKINSON published in this review in 1999.

3 Please note that we are not exploring the distinction between tacit and codified knowledge which is a further distinction less appropriate here.

4 We obviously refer to the economy based on production. The production and exchange of abstract knowledge are phenomena with an economic value with specific costs and which produce consistent incomes. They are nonetheless generally includable in the rent category.

5 According to Bateson more levels exist, but they are difficult to use in our context.

6 The set may contain a large variety of alternative solutions.

7 What is fundamental is that they do not hide or restrict their competencies, and that the price they ask for them is not hindering co-ordination. There are a number of incentives in local systems which have the function of achieving this result.

8 Luxottica, Safilo, DeRigo and Marcolin.

9 Niches, however, are not abundant in this sector.

10 Their owners often went back to work for bigger firms which sent them abroad to direct foreign companies.

11 55% of those interviewed have diversified production and 28.1% are working for a different market. Only 5.3% do it because of their specialisation. For 19.3% of firms this is a recent move due to the evolving situation described.

12 Firms could provide two answers to the question concerning what they are producing out of 5 pre-defined answers – from final production to subcontracting. This resulted in some 14-16 different typologies. They were then grouped into four categories.

13 Missing answers are also included in the graph as they can reveal information.

14 We did not include institutional competencies in the questionnaire.

15 In the eyewear milieu we selected four associative institutions: the Centro Servizi per l’Occhialeria (CSO – service centre for spectacle manufacturers), an organisation connected with artisan associations; Certottica, set up by ANFAO, the association of spectacle manufacturers, and by the industrial business association; the GAL (local action group) of the “Leader 2” programme, linked to the Chamber of Commerce; the BIC Dolomites of Feltre (business innovation centre). In the sports shoe milieu, the absence of European programmes has reduced the availability of institutions. We selected the Museo dello Scarpone (Boot Museum) and Tecnologia e Design. Business associations also directly perform some tasks. The European Social Fund for professional training has promoted the organisation of technical and foreign language courses by most of these actors, helping to keep structures active on a continuous basis.

16 In the GM we included also superficial treatment companies, the producers of clips, screws, bars, lens, etc., who can have both a local and international market and therefore are not in a subordinate position compared to firms trading final products.