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**“Regional structural change and small firms’  
adaptabilities: Evidence from Italian firm-level data.”**

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# **Regional structural change and small firms' adaptabilities: Evidence from Italian firm-level data.**

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**Abstract:** *The paper analyzes both internal (to the firm) and external (geographical) determinants and obstacles to small firms' relational and organizational adaptability in mature Italian industries. While presenting a review of the literature accounting for the two dominant typologies of adaptation in Italian mature industries, the chapter emphasizes the lack of systematic analysis on the influences of negative agglomeration externalities on both typologies of small firms' adaptability. The empirical section distinguishes between district and non-district firms and controls for internal and external determinant to firms adaptabilities. Some interesting results follows regarding the influences played by Italian industrial districts.*

## **Keywords**

Regional Structural Change, Firms Behaviour, Cognitive Anchoring.

## **Jel Classification Code**

R11, D21, D22.

## **1. Introduction**

Rapid globalization and change in technological paradigms that revolutionise the process and organisation of production, such as Information and Communication Technologies (ICT), induce rapid change in the geography of industries across regions in industrialized countries. While it is not surprising that some regions decline and other emerge, we are still far from understanding the complex interaction of the determinants that make one region more or less fit in the face of the rapid globalization of production and technological change. Such an understanding is extremely relevant to design industrial policies. This paper aims to shed some light on both internal (to the firm) and external (geographical) determinants and obstacles to small firms' relational and organizational adaptability.

At the regional level we observe continuous changes in the economic structure (Cook and Healey, 1995 Ch. 3). Firms in "core" regions have delocalized their labor intensive activities to "peripheral" regions (see e.g. Dei Ottati, 2009 and Lavezzi *et al*, 2009). Concomitantly, some of these regions have managed to specialize in knowledge intensive activities, in services and manufacturing. Indeed, this process is the result of both changes in the population of firms and changes within firms, where the cost of production factors is only one of the variables that influence firms' decision in several dimensions such as location, organisation, product specification, and technology. The variables which are reported to influence the performances of

firms within regions are much more numerous, and often impose trade offs among the different dimensions. For instance, choices between labor costs and proximity to customers; transportation and inventory costs; access to knowledge sources, skilled labour, and cheap labour; commodification of existing products and necessity to shorten product design and time-to-market.

The changing economic structure of some regions, however, cannot be reduced to the result of firm strategy alone. Path dependence and transitional obstacles due to the inertia of formal and informal local institutions play a major role in regional structural change and in the geographical distribution of economic activities (Martin and Sunley, 2006).

In this paper we focus on those mature and declining regions where low and medium-tech productions, like goods with low income elasticity, still represent a significant share of the total manufacturing activities, although they have suffered a continuous fall in employment over recent years, both in relative and absolute terms. Despite the strong push of the EU structural funds and policies to promote sectors with a greater capacity to generate added value (hi-tech sectors), mature and low-tech industries still account for about half of the value added of Western Europe manufactures (Farshi et alii, 2009). This resilience<sup>1</sup> has to be explained by the fact that regional structural change is driven by a combination of selection processes – where the long-term economic development of a region is mostly driven by the Schumpeterian idea of creative destruction with the exit of traditional low value added activities offset by new entries in hi-tech and knowledge-based sectors – and of adaptation strategies of the incumbent firms in the traditional sectors. The two processes, however, have been analyzed asymmetrically: while the entry processes shows explicit theoretical linkages with the regional dimensions by looking at the influences of the local context on entrepreneurship (e.g. in “Regional Innovation System” and “hi-tech industrial clusters” contexts), the adaptation capabilities of incumbent firms are mostly analyzed separately from the regional/contextual dimension. This is the case, for instance, of the recent literature on firms’ dynamic capabilities, where the learning dynamics of large firms have been analyzed and theorized independently from the impact of the geographical/contextual dimension (Teece et alii, 1997; Helfat et alii, 2007). Notwithstanding some relevant exceptions – like the attempt of Leoncini e Montresor (2008) to consider together firm-level and region-level factors in shaping firms dynamics capabilities – it is still an open question whether and to which extent geographical specific issues – like those conceptualized in the hypothesis of “local overembeddedness”, “regional path dependence” and “regional lock-in” (Grabher, 1993; Uzzi, 1997; Isaksen, 2003; Sornn-Friese and Sorensen, 2003; Wolter, 2005; Martin and Sunley, 2006; Zucchella, 2006) – play a role in the restructuring contexts of mature industrial landscapes. The claim of this literature, is that the habit of using proximity within local productive systems – as an instrument of coordination, cooperation, communication and transfer of knowledge between firms – and the ‘mixité’ or embeddedness

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<sup>1</sup> The concept of (regional) “resilience” has been recently proposed as an analytical tool in economic geography (Simmie and Martin, 2009; Pike, Dawley and Tomaney, 2010). However, given the lack of a direct individualistic foundation (i.e. explicit linkages between different environments and their underlying micro behaviours), and the overlap with better specified similar concepts in the evolutionary economics literature (Hassink, 2010), I will use this concept only metaphorically.

(Granovetter, 1985) between the economic and the social layers, produces negative constraints on the promptness to adapt organizational and relational behaviours.

Since both firm-level and region-level factors play a crucial role in shaping particularly the adaptability of small firms, this paper will consider together the two forces.

In the next section we decompose the often uncritically invoked concept of local overembeddedness by focusing on two particular aspects of firm's adaptation to competitive pressure: i.e. *relational* and *organizational* adaptability. *Relational adaptability* concerns the restructuring of market and non market relations within and outside the local production system, while *organizational adaptability* concerns the 'organizational and ICT innovations nexus', i.e. the introduction of new practices, forms of delayering, decentralization and higher performance organisational systems, in turn induced by the internationalization processes. Sections 3 and 4 collect some example of respectively internalization processes (relational adaptations) and organizational change from the very scattered – and mainly in Italian – case-studies, evidencing how they are two main changes occurring in regions that become more competitive and reported as absent in locked-in regions. In section 5 we test the internal (to the firm) and external (being or not embedded in mature industrial districts) determinants of small firms relational and organizational adaptabilities on the basis of new firm-level data. Section 6 concludes.

## **2. The role of the external environment on small firms' adaptability**

Due to the increasing (international) specialisation of the knowledge necessary in innovation activities, firms find it necessary to outsource part of the production, span the geographical boundaries of their production network, and collaborate in Research and Development (R&D) activities with firms that are situated outside their location (Cowan and Jonard, 2004). However, while for large firms the relocation of production seeking for competitive advantages and the collaborations with firms that are situated outside the local region is a well-established practice (Levitt, 1983), small firms face major constraints in accessing global resources (Pett, 2000), are historically more dependent on the local regional resources, and are socially more rooted in local production networks (Belussi and Sammarra, 2005), in particular when they are specialized in mature (low and medium-tech) sectors (Farshchi et alii, 2009). Adaptation to rapid and radical changes can thus imply a complete restructuring for small firms in traditional sectors.

Indeed, the typical organizational model of the large firm facilitates the outsourcing of activities between different geographical locations (Antonelli, 1999). In fact, large firms maintain a clear separation between planning and production, ideation and design, and the organization of the product and its production. Large firm main costs are concentrated in the first phases of conception, planning, testing, and product development (which are sunk costs) planned and managed almost independently from the production and distribution phases (Di Bernardo and Rullani, 1990). Once the technology has entered a stable paradigm, the relation between the different product component is modularised, and production phases are stabilized, the firm increase its efficiency by outsourcing and delocalising (e.g. Robertson and Langlois 1995,

Marengo and Dosi 2005, Ciarli et al 2008).<sup>2</sup> Such reorganisation of planning and production activities is made easier by the advent of ICT such as electronic data interchange (EDI), e-commerce, electronic market, online purchasing systems and supplier partnership management systems technology, which are able to improve and increase the management and the coordination of remote activities [CITATION]. The extent of ICT adoption and use is though very heterogeneous across sectors, as well as its impact on firm's competitiveness [see e.g. Ciarli and Rabellotti 2007 on textiles ADD CITATIONS]. We will come back on this aspect in more detail in section 4.

In small firms operating in mature sectors the high value added planning and design phases and the operating phases are strictly integrated (Becattini and Musotti, 2003). In particular, for small firms in traditional industrial districts the tacit knowledge used in the production phase and in the relation with formal and informal partners is a fundamental part of the added value produced within the district. It is often the very tacit and specific knowledge of the entrepreneur, nurtured by the district level knowledge, that makes the firm competitive (Belussi and Sammarra, 2005). Highly specific knowledge about the different phases of production and organisation (including relations with customers and suppliers) and the firm strategy are closely fettered. A combination which often retraces the story and the experience of the firm founder, who had started new entrepreneurial initiatives based on a solid system of knowledge acquired through *learning by doing* processes, *imitation* and *spin-off* from other local companies. The business strategy is then the result of emerging dynamics that derive from local practical experiences, relationships and intuitions. Therefore, the competitive advantage of small firms operating in traditional industrial districts is built on manufacturing competencies and localization rather than on commercial or strategic competencies. For this kind of firm, it is much more complex to separate its "head" and its "arms", since they are deeply integrated and the creation of the added value overlaps with the execution of the productive processes, as well as with the location in which these activities are conducted: the factory, and the local system. In this way the factory and the local context are not a simple productive location, but rather they become a permanent laboratory of testing and learning.

The advantages of such mixité between the individual, the firm, and the institutional levels in specialised local systems of production have been extensively studied and proposed as active industrial policies<sup>3</sup>. This same intricacy (or embeddedness) however can hamper the structural changes of mature regions (Martin and Sunley, 2006). Networks, ties and organizational structures within mature industrial regions can get locked-in because of 'path dependence', 'overembeddedness', 'rigid specialization' or 'regional lock-in', as claimed by many geographers and institutional scholars (Graber, 1993; Uzzi, 1997; Isaksen, 2003; Sornn-Friese and Sorensen, 2003; Maskell, 2005; Wolter, 2005; Martin and Sunley, 2006; Zucchella 2006). The fundamental concept stressed by this stream of literature is that the long-lasting use of proximity as an instrument of coordination, cooperation, communication, and transfer of knowledge between firms belonging to mature industrial districts, and the mixité between the local economic and

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<sup>2</sup> Delocalisation may follow different strategies, depending on the sector, country of origin, and sales market. These aspects are beyond the scope of this paper.

<sup>3</sup> Besides the already cited works see the collection of studies on industrial districts edited by Becattini *et alii*, 2009.

social layers can generate negative constraints of behavioral nature on the promptness to adapt to new productive and organizational practices made necessary by external changes.

It is often the case that the strong ties developed in local systems of production, make firms overly dependent on the capabilities of its partners (Grabher, 2003). When the partners' capabilities become obsolete due to technological change the firm should rewire its relations. This requires at least three conditions to take place. First, the information about the new technology and the partners using it has to reach the firm. This is not always the case for firms that are deeply embedded in local networks on which they fully rely. Second, the gains from the acquired technological change have to be larger than the increase in transaction costs – which is steeper the wider is the difference between the trust in the new market relation with no previous transactions and the trust in the old relation embedded in the repeated transactions and local institutions. Third, the firm has to abandon part of its behavioral routines and capabilities embedded in its existing relations (for example based on continuous user-supplier learning (Lundvall, 1998) or product/service customization [CITATION]).

In other words, firms deeply embedded in local systems of productions face different obstacles in changing their market relations, also due to the established non-market relations. Such obstacles can be of merely monetary nature or legal nature such as sunk costs and contracts, or can be obstacles of cognitive and behavioral nature. To make a new relationship efficient, the partners must adjust and develop their routines and capabilities, mutually adapting their internal organization, as well as a supporting institutional framework (e.g., trust), in a way that is specific to the relationship. This means that the firms have to invest in the new relationship, and this is likely to create tight limitations on the flexibility of their future actions. When terminating the relationship, these investments generally cannot be recaptured. While these adaptation costs can be considered physiological and common to every firm, when the firm is embedded in mature industrial districts the self-reinforcing action of two main behavioral mechanisms can enter the process and produce pathological situations that compromise the adaptation capability of small firms. In particular the habit of using proximity as a means of communication, monitoring, and transmission of knowledge, produce a form of *cognitive anchoring* on such relational and organizational models, which are, in turn, reinforced by the function of *filter* against varieties produced by the social, institutional and industrial specialized layers of the local environment (Acs *et alii*, 2004).<sup>4</sup> In the organizational literature the concept of *habit* has been mentioned as a cognitive foundation to explain inertia in organizational change (Grandori, 1995, pp. 117-120). The hypothesis of the existence, in mature industrial districts, of a reinforcement process of the phenomena of cognitive anchoring, in turn, descends from the filter's effect exerted by the local formal and informal institutional layers on information and knowledge varieties. Acs, *et al.* (2004), by conceptualizing the notion of knowledge filter, define the combination of factors preventing or constraining informational

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<sup>4</sup> The concept of cognitive anchoring used here is borrowed from psychology (e.g. Hill, 2000, pp 45-48). Many works have demonstrated its relevance for economics: at the experimental level, Kahneman and Tversky (1973) have demonstrated that individuals tend to base estimates and decisions on known 'anchors' or familiar positions, with an adjustment relative to this start point. Individuals, in other words, are better at relative thinking than absolute (or optimising) thinking, because established cognitive and behavioural anchors drive, when they do not hamper, new cognitive and behavioural processes.

and knowledge spillovers at the local level as a semi-permeable barrier limiting the efficient conversion of new and external knowledge into economic knowledge<sup>5</sup>.

As a consequence of *filtering*, even when incumbent firms in mature regions are endowed with the capacity to recognize, evaluate, absorb, and apply to commercial ends new relational and learning opportunities from external sources (i.e. when the first condition of information flow is verified), their reaction is limited by organizational forms and relational/contextual habits which hinder their space of selection. As a consequence of *habit*, even when firms recognize the efficiency advantages of changing partners (e.g. reduced input cost), they may resist and find shelter within their routines, or they may change market relations, without adapting the internal organisation of production. While the possibility that the two effects can reinforce themselves mutually in mature industrial districts leading into an evolutionary dead end might appear plausible, the utilization of concepts like 'regional lock-in' or 'overembeddedness' to explain problematic structural changes at the regional level is often invoked uncritically, and the implied behavioral constraints are rarely communicated or empirically tested. The existing exceptions consist on indirect explanations, where, e.g. Masciarelli, Laursen and Prencipe, (2009), look at the correlation between the level of social capital in a region and its internationalization of good and knowledge, finding that beyond a certain level of social capital, firms will become over-embedded in the region and the degree of internationalization will decrease from that point, or on simulations, e.g. Press (2008) which runs a simulation model to test when disintegrated flexible specialization clusters can be more adjustable than those with firm centered, quasi-integrated production networks.

In order to tests directly the impact of the long-lasting use of proximity on firms behavior and assess the existence of negative agglomeration externalities in Italian mature industrial districts we consider here the two following dependent variables: firm's *relational adaptability* and firm's *organizational adaptability*. We define relational adaptability as the ability to discontinue established inefficient market relations and to perceive and establish new favorable relationships. Organisational adaptability is defined as the ability to introduce new forms of delayering, decentralization and higher performance organisational systems connected with the adoption of ICT, in turn induced by the internationalization processes. The two dimensions of adaptability are strictly related as much as the organisation of production goes hand in hand with the decision to make or buy. Changes in the organisation may well require changes in market relations (establishing new relations when outsourcing and severing old ones when integrating parts of the production process), and non market relations. Similarly, the decision to change the organisation depends, among others, on the availability of trade partners, transaction costs, and the technology (process and product) (e.g. Richardson 1972). Before defining in section 5 how we measure these two variables, in the following two sections we summarise the main findings from the numerous and fragmented case-studies on the current critical phase of mature Italian industrial districts. While this is not intended as an exhaustive literature review, it illustrates the recent processes of 'district destructuralization' along the two main dimensions of firm adaptation to external changes: i) the 'internationalization

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<sup>5</sup> See Seri 2010 for a more extensive analysis of the behavioural and cognitive foundations of regional path dependency.

processes', i.e. how small and medium districts firms perceive international opportunities and de-localize production and learning processes in order to participate in international strategies, and in global value chains, illustrate patterns of *relational adaptability*; ii) the 'organizational and ICT innovations nexus', i.e. the introduction of new forms of layering, decentralization and higher performance organisational systems, in turn induced by the internationalization processes, illustrate patterns of *organizational adaptability*.

### **3. Relational adaptability**

The geographical disintegration of production processes in the last two decades has been made evident by the increasing global trade in intermediate inputs (Baldone, Sdogati and Tajoli, 2007). Particularly in mature industries the delocalization is strongly related to the outsourcing of unskilled labour-intensive activities to regions with low wages and non-regulated labour markets (Sorensen, 2008). Such activities are usually highly modular and standardized. In the case of the Italian traditional industrial districts, this outsourcing across international border can be distinguished in two phases. A first wave starting in the 1990s has seen manufacturers moving some of their labor-intensive stages and assembly operations to countries mainly in Central Europe (Arndt and Kierzkowski, 2001). As a result, Italian industrial districts specialized in traditional industries have changed profoundly (Corò and Grandinetti, 2001). A second wave of internationalization occurred over longer distances (principally in the far east) as a consequence of the gradual reduction of the differential in labor cost between Italy and Central and Eastern European countries (particularly after their entry in the European Union) [Bigarelli, 2003]. This second wave, however, was aimed as well at establishing a cooperation with hi-tech firms, to develop new knowledge, and forward-oriented networks, to explore new markets (Chiarveso et al., 2006). This second strategy depends on the ability of firms to establish new knowledge and commercial relations.

Here is where the 'path dependence', 'overembeddedness', 'rigid specialization', or 'regional lock-in' hypothesis is supposed to play a strong role. Some evidences on the role of *filtering* and *habit*, in determining whether small Italian firms are able to undertake such relational changes and successfully adapt their technology and organization can be found for example in Seri, Torrisi and Giarratana (2004). In their work they study the adoption of innovations in the "multisectorial" districts of Castelfidardo, in the center of Italy, and find that strong a priori aversions towards linkages external to the district have locked firms into existing technologies, thereby disadvantaging them in front of the advent of new international competitors. The authors explain the aversion towards external partners with the strong loyalty to the local territory based on cultural factors and trust in the 'local way of doing things'. At the same time trust towards external players was limited by different habits and difficult communication. Such inertia holds back both backward linkages (suppliers), joint ventures, and even simple forward linkages with commercial partners. With reference to the latter Rabellotti (2001) depicts the problem faced by Italian shoe producers in a global environment of changing commercial strategies. With reference to the former types of linkages, in a recent empirical study based on a large firm database Basile and Giunta (2005) show that between 1995 and 1997 43% of Italian industrial districts firms have undertaken no other form of internationalization than exporting, while only 1.7% of firms in the sample have established direct investments (FDI) abroad.



The low rate of internationalization in terms of FDI characterizes the Italian economy overall, in contrast with other advanced countries (Federico, 2003). Barba Navaretti and Castellani (2004) explain this evidence with the small size of firms and related difficulty to devote organizational, managerial and financial resources to transferring productive capacity to different and distant economic contexts. Others (Chiarvesio et al., 2005; Dunning, 1993) point out that, unlike export, FDI requires considerable and regular investment and involve sunk costs. However, these works do not control directly for differences in performance between firms belonging to industrial districts and non-districts firms. Furthermore, they focus more on size, financial, and other tangible limitations, and they do not test for informal and behavioural limitations such those described in the previous section. It could be even suggested that these works underestimate the overall involvement of SMEs in international activities, since they do not take in consideration other intermediate forms of internationalization (like franchising, licensing, joint venture or network organization in distribution and innovation acquisition). Some recent studies have tried to address these limitations by analyzing the degree of internationalization of industrial districts and the main determinants of FDI in district firms. Federico (2003) shows that industrial districts accounted for 46% of Italian manufacturing exports and only for 28% of FDI. Mariotti *et al.* (2004) show that differences in the internationalization processes of ID firms are influenced by the presence of large firms within the district and by the intensity of domestic rivalry, both increasing the likelihood that ID firms internationalize.

However, much of the literature refers to medium and large firms' strategies of internationalization. The possibility that small firms can individually undertake a strategy of development emancipating from their original role within the organization of the district is considered as a remote (and not relevant) hypothesis in the literature on the evolution of industrial districts. Infact much of the literature on the restructuring processes of industrial districts is mainly concerned with the central role of medium and large firms as re-organizers of the whole district structure (Balloni and Iacobucci, 2004; Iammarino, et al. 2009), or as "gatekeepers", i.e. firms that have strong connections outside the cluster and that do also contribute to the diffusion and recombination of external knowledge into the local context (Gambardella, 1993; Bell and Albu, 1999; Graf, 2007; Belussi et al., 2008; Rychen and Zimmermann, 2008). The small ID firms are considered as passive actors, only following and depending from the strategies adopted by larger firms (Giuliani, 2010). But escaping from this subordination is exactly how small firms grow. In their paper on the strategic adaptation of small firms, Schindehutte and Morris (2001), notes that when a small firm does succeed in growing, more often than not it is in a market other than the one it was intended to serve, with products and services not quite those with which it had set out, bought in large part by customers it did not even think of when starting, and used for a host of purposes besides the ones for which the products were designed. In this sense they suggest that fairly high degrees of adaptation are required for most small business to prosper.

Overall, the case studies suggests that ID firms experience more difficulties in spanning the boundary of the local network implementing processes of delocalization of the second wave (non-labour cost saving). There is much less evidence that allows to recognize the basic

mechanism by which the implied negative influence of districts environments is transmitted to firms behavior (in particular to small firms behavior), and no systematic empirical analysis aimed at this, to our knowledge. The small size of ID firms and the consequent difficulty to devote organizational, managerial, and financial resources to transferring productive capacity to different and distant economic contexts may not be considered the main determinants. For example, the chronic 'dwarfism' of ID firms can be ultimately traced back to the entrepreneur's cognitive anchoring to old habits such as: (i) the need to control personally the whole productive and administrative processes coupled with the resistance to delegate managerial competences; and (ii) the business tradition of face-to-face relations coupled with the difficulty to change cultural and behavioral references. These are all forms of cognitive anchoring which might be amplified in industrial districts (Seri, 2010). At the outset, relational changes are therefore strictly connected with learning processes in organizational change and innovation, which may find some obstacles in individual attitude, filtering, and habits, linked to the local environment.

#### **4. Organizational adaptability**

The internationalization that has characterised the second wave implies the adoption of firm strategies aimed at creating an organization capable of selecting and establishing worldwide linkages, collaboration agreements, and exchanges of knowledge and information. Such an organization, in turn, is strongly facilitated by the adoption of complementary ICT, and requires rewiring some of the channels traditionally used to acquire knowledge within the industrial district. The use of ICT increases the volume of data analysis and transactions within the firm and across firms. This in turn gives rise to modifications in the organization of the firm and calls for analytical and cognitive skills (e.g. marketing analysis and quality control data analysis capabilities). Moreover, the use of ICT may spur decentralization of authority and more flexible forms of division of labor such as teamwork, multi-tasking, job rotation, just-in-time, and quality circles. Workers have to deal with greater autonomy, responsibility and uncertainty. This requires the introduction of new practices that are important for interacting and communicating with colleagues, customers, and suppliers. To account for the multiple interactions among ICT, skills, and organizational change, Bresnahan (1999) has introduced the concept of organizational complementarity between ICT and highly skilled workers.

It is now well accepted in the literature that ICT have a positive effect on firm productivity only when accompanied by organisational changes (Atzeni and Carboni, 2004; Brynjolfsson and Hitt, 2003; Bugamelli and Pagano, 2001; Gambardella and Torrìsi, 2001; Paganetto et al., 2000). However, firm's features and localization affect this relation between organizational change and ICT. More in particular, Giuri et alii (2005) confirm the hypothesis of complementarity between ICT and organizational change, but find that the pattern of ICT adoption and organisational innovation changes significantly when controlling for different firm's features, particularly across different size classes. For instance, small firms' investment in organizational change is constrained by scale and complexity of operations, and investment in ICT is required to maintain their commercial relations with large firms, who increasingly rely on electronic transaction. Besides, they find that a large number of medium firms incur no or very limited process innovation. They explain this evidence with a 'substitution effect' of skills for

organizational change: in small firms relatively complex tasks are carried out by a few skilled external professionals who do not need to develop organizational routines to communicate with other people within the firm. Firms and professionals are co-localised, and exchanging information and knowledge only within the local environment produces a sort of filter towards external information which would be valuable for change. In this case, the micro foundation at the base of the production of this local collective 'filter' is the individual cognitive anchoring through the use of local professional consultant, which often has to be a friend of the entrepreneur. Other obstacles for organizational change that can be traced back to forms of cognitive anchoring can be seen in Leoni et alii (2006). In their empirical study of a large sample of Italian firms, they found that the attempt to introduce high performance work systems – like heightened employee autonomy and participation, increased employee training, and greater employee incentive, including incentive pay and job security – may even partially or completely 'revert' back toward more traditional forms of work, especially over the long term. Similarly, Belussi (2005) finds in three different Italian industrial districts that firms mainly adopt simple ICT without investing in structure technologies for the exchange of knowledge and information. According to the author such ICT "were regarded as not being useful supports for the exchange of intense communication, rich in terms of knowledge, which exists within the districts, where informal relations, and face to face contacts, are the glue of networking" [p. 264]. More recently Ciarli and Rabelotti (2007) analyse the determinants of adoption of ICT by firms in a quite old industrial district specialised in a mature high quality sector with a quite strong exporting tradition. When controlling for a number of firm specificities, they find that sector and agglomeration do play a curbing role on the pattern of ICT adoption. They show that the result is mainly related to communication technologies (rather than information technologies), as informal knowledge channels are still too relevant in firms' strategy.

For what concerns more specifically the relation between organization, internationalization and the use of ICT in small firms, a substantial number of European studies have found that the adoption of ICT increases with the size of firms and plants (Pilat, 2004) while the access to international markets makes the use of new information and communicational tools a necessary condition not only for large firms. However the dissemination of ICTs and new related organizational and working practices in small firms seems to be very uneven.

Giuri, Torrisi and Zinovyeva (2008), perform one of the few studies which explore the issue of complementarity between organizational change, the adoption of ICT and cognitive skills in a sample consisting primarily of small and medium firms. Their findings do not provide any evidence in favor of the hypothesis of complementarity between ICT and organizational change in small and medium firms. However they consider the adoption of complex ICT solutions typically designed for large firms, like Enterprise Resource Planning (ERP), Customer Relationship Management (CRM) and Supply Chain Management (SCM) systems. These solutions may require additional organizational costs that in a SME probably will not be offset by substantial improvements in division of labor and coordination. On the other side, Leoni et alii (2001), by performing a more fine-tuned study on the introduction of new work practices, find that their adoption is uneven between small and medium firms and can be affected by different variables. In particular, they find that good industrial relations and attention to the work environment generally facilitate the adoption of complementary organizational innovations and work practices across different sizes.

The hypothesis to be tested here, is whether the adoption of new organizational working practices in small firms pertaining to mature industrial districts is strongly curbed by its filtering and habits effects. In other words by using a “district” dummy indicating the *local connectedness* (Simmie and Martin, 2010) and *embeddedness* of a firm with the local productive network and social community of Italian mature industrial districts we aim to “capture the differential and uneven effects of places over the ability of firms to react, respond and cope with uncertain, volatile and rapid change” (Pike, Dawley and Tomaney, 2010 pag. 1). In the following sections the data and the models used to test the internal and external determinant and obstacles to firms’ relational and organizational adaptability are presented.

### 5. Data, methodology and results

In order to empirically test the internal and external determinants of firms’ relational and organizational adaptabilities we use data from an original firm-level survey conducted in 2003.<sup>6</sup> The survey covers the main sectors of two central Italian regions characterized by important mature industrial districts specialized in traditional ‘supplier dominated’ industries (Pavitt, 1984) (e.g. shoes, furniture, and textile), and ‘low-tech’ industries (installation and repairing of mechanical and electrical equipment and metal products). A stratified random sample of nearly 1000 firms with less than 250 employees was extracted from the universe of firms registered at the regional chamber of commerce, using size and industry as stratification variables. 363 firms returned a completed questionnaire (36% answer rate).

We focus the analysis on small firms (more than 5 and less than 50 employees) that produce final goods, which leaves us with 164 firms (Table 1). The distribution of sampled firms cannot be considered statistically representative of the whole Italian manufacturing sector. Firms with less than 10 employees account for 33% of the sample, and being the effective share of micro firms in Italy equal to 93%, they are underrepresented. As far as the industry distribution is concerned, the sample represents well the Marche region’s specialisation in those branches often labelled as ‘traditional’ or, according to Pavitt’s taxonomy, ‘supplier dominated’ industries, and in those branches, so to speak, ‘low and medium-tech’ (Table 1). The sample also reflects the interest of the project in those mono-specialized and mature industrial districts within the region<sup>7</sup> that are facing a quick decline in relative productivity and competitiveness due to the strong competition of new industrialising countries.

Table 1: Sample distribution by firm size and industry

|  | size by intervals | Total |
|--|-------------------|-------|
|  |                   |       |

<sup>6</sup> The data collection and the sampling procedure were carried out by Censis as a part of the project “SPRINTMacerata” sponsored by EU funds and carried out by Censis together with the University of Macerata. More information on the project can be found at the following link:  
[http://www.censis.it/20?relational\\_resource\\_146=4725&resource\\_144=4725&relational\\_resource\\_400=4725&relational\\_resource\\_404=4725&relational\\_resource\\_147=4725&relational\\_resource\\_406=4725&relational\\_resource\\_407=4725&relational\\_resource\\_408=4725&relational\\_resource\\_409=4725](http://www.censis.it/20?relational_resource_146=4725&resource_144=4725&relational_resource_400=4725&relational_resource_404=4725&relational_resource_147=4725&relational_resource_406=4725&relational_resource_407=4725&relational_resource_408=4725&relational_resource_409=4725).

<sup>7</sup> Between many others small local agglomerations of firms, within the regions under analysis we can find the shoes industrial districts of Civitanova Marche/Fermo, one of the major shoes industrial districts in Italy, the furniture industrial districts of Pesaro, the mechanical and musical instrument industrial districts of Castelfidardo/Recanati (Seri, 2004). The overall situation in all these districts is such to cause major social problems of unemployment.

|          |             | 5-9 empl. | 10-29<br>empl. | 30-50 empl. |     |
|----------|-------------|-----------|----------------|-------------|-----|
| INDUSTRY | Shoes       | 15        | 32             | 10          | 57  |
|          | Mechanics   | 14        | 16             | 4           | 34  |
|          | Electronics | 11        | 15             | 6           | 32  |
|          | Furniture   | 10        | 13             | 5           | 28  |
|          | Other       | 5         | 6              | 2           | 13  |
| Total    |             | 55        | 82             | 27          | 164 |

Based on the evidence collected with the survey we test which are the main determinants of firm's willingness to change its network of market relations (*relational adaptability*) and its organisation (*organisational adaptation*). Both relational adaptability and organisational adaptation are measured using the direct opinion of the interviewee. As extensively discussed in the previous sections we distinguish between internal and external determinants of firm's adaptation to exogenous changes. We use a set of firm level variables – such as size, age, and export – to control for firm specific internal determinants. In order to account for the role played by the external/contextual role on firm's adaptability we use a dummy variable (*Distr*) that distinguishes between firms localised inside and outside an industrial district. The area of the industrial districts is identified by the regional law. Table 2 summarize the definitions and some descriptive statistics of the variables used in our estimations.

**Table 2.** Descriptive Statistics

|                    |                                                                                       | N   | Minimum | Maximum | Mean   | Std. Deviation |
|--------------------|---------------------------------------------------------------------------------------|-----|---------|---------|--------|----------------|
| REL_AD             | Relational adaptability                                                               | 164 | 1       | 3       | 2.189  | 0.862          |
| ORG_CH             | Organizational change                                                                 | 164 | 0       | 1       | .713   | .453           |
| SIZE               | Number of employees                                                                   | 164 | 5       | 48      | 16.250 | 11.035         |
| FIRM_BIRTH         | Year of firm's foundation                                                             | 164 | 1.936   | 2.002   | 1.987  | .009           |
| AGE_ENTR           | Age of the entrepreneur                                                               | 164 | 21      | 71      | 47.770 | 11.331         |
| AGE_EMPL           | Share of employees with less than 40                                                  | 164 | 0       | 100     | 63.753 | 26.939         |
| GEN_INT            | Dummy indicating the adoption of "general use" ICTs (e-mail and internet access)      | 164 | 0       | 1       | .676   | .469           |
| EMPL_INT           | Share of total employees with access to internet                                      | 164 | .02     | .80     | .251   | .147           |
| EMPL_UNI           | Share of employees with an university degree                                          | 164 | .00     | 20.00   | 1.719  | 3.400          |
| EXP                | Export rate                                                                           | 164 | .00     | 10.00   | 1.680  | 2.764          |
| DISTR              | Dummy distinguishing between firms localised inside or outside an industrial district | 164 | 0       | 1       | .365   | .483           |
| Valid N (listwise) |                                                                                       | 164 |         |         |        |                |

### *Relational adaptability*

As discussed above, *relational adaptability* is defined as the ability to discontinue established inefficient market relations and to perceive and establish new favorable relations. The

distinction between adaptability and adaptation here concerns the methodology of observation and the limitation of the cross sectional data: adaptation can be observed and measured as a revealed process (i.e. an observed change in the firm's partners) while adaptability concerns a behavioral attitude of the firm (captured through the questionnaire).

To measure relational adaptability we use firm's response to a set of structured questions aimed at evaluating the entrepreneurial alertness for new partnerships opportunities and the willingness to substitute traditional proximity-based relationships with remote ones. The strategy of asking straightforward questions concerning relational adaptabilities during a period when much emphasis was given to the process of internalization of the small firms' value chain is a good indicator of the propensity of the entrepreneur to follow this process, as opposed to a more conservative behaviour, focused on incumbent local relationships. Firms were asked the following questions: (a) Have you ever considered in the last three years substituting a production or retail partners? (b) Do you think that moving production and retail partners or phases abroad will generate more benefits than costs to your firm? (c) Do you think it won't be a problem to renounce to easiness of communication and face to face relations? (d) Is it in your plans to move part of the productive and distribution chain out of the region? We then construct an ordered measure of relational adaptability that equals 1 (no adaptability) when the firms answers negatively to all questions, 2 (moderate adaptability) when the firms answers positively to at least 3 questions, and 3 (high adaptability) when the firm answers positively to all questions

We then estimate the following *ordered logit model*<sup>8</sup>:

$$RelAb = f(Distr, Size, Birth, Age, Exp, Genint, Empint, Univ, Ind).$$

*Distr* measures the membership and embeddedness of the firm to an industrial district as is our indicator of inertia in adaptation due to filtration and habit. In line with the geographical literature on regional lock-in, overembeddedness and strong reciprocity (Graber, 1993; Uzzi, 1997; Martin and Sunley, 2006; Zucchella 2006), the implications for a small firm to be part of a mature industrial district, are expected to be expressed as rigidities and aversion towards the introduction of relational and network innovation, i.e. low relational adaptability. *Size* indicates the number of employee, and should indicate a faster adaptability of larger firms as discussed above in section 2. However, being our sample composed only of firms between 5 and 50 employees the effect of larger firms here is excluded, and the impact of this variable on the "boundary spanning capability" of these firms more contrasting. *Birth* is the year of foundation of the firm, to account for the depth of its historical roots. Similarly *Age* indicates the age of the entrepreneur, which, as assessed in the studies on the impact of generational change on small firms management (see e.g. Cainelli and Zoboli, 2004) is expected to be negatively correlated with relational adaptabilities. For both age of the firm and of the entrepreneur the hypotheses of habits and cognitive anchoring suggest that older firms and entrepreneurs are more anchored to local habits than younger ones. *Exp* is the export rate of the firm to control for the

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<sup>8</sup> A discussion on the fitness of ordered logit model for this kind of data can be found for example in Long and Freese (2006) pp. 184-222.

main channel of firms internationalization. *GenInt* and *EmplInt* are two variables that proxy respectively for the adoption and use of ICT: the first one is a dummy and denotes that the firm has adopted “general-use” ICTs (e-mail and internet access), while the second one is the share of total employees with access to internet (measured as the rate between Internet workplaces and employees). Based on the discussion in Section 4 we expect ICT intensive firms to exploit the ICT facilities to establish long distance market and non-market relations. Firms that intend to extend the geographical boundaries of their networks beyond the local system need codified knowledge. This fact is in line with the intuition that ICT can be (to some extent) a substitute of face-to-face relations, or at least a necessary complement in the case of relationships not based on proximity (Harpaz, 2002). *Univ* is an indicator of human capital (share of employees with a university degree) and is expected to enhance the ability of firms to internationalise and rewind its relations (Crick, 2004; De Clercq *et alii*, 2003). Finally, *Ind* is a dummy variable controlling for sector specific differences.

Table 3 reports the Pearson’s correlation between the independent variables

**Table 3.** Correlations ...

|            | SIZE    | FIRM_<br>BIRTH | AGE_<br>ENTR | AGE_<br>EMPL | GEN_<br>INT | EMPL_<br>INT | EMPL_<br>UNI | DISTR_<br>BIN | EXP |
|------------|---------|----------------|--------------|--------------|-------------|--------------|--------------|---------------|-----|
| SIZE       | 1       |                |              |              |             |              |              |               |     |
| FIRM_BIRTH | -,254** | 1              |              |              |             |              |              |               |     |
| AGE_ENTR   | .139    | -.120          | 1            |              |             |              |              |               |     |
| AGE_EMPL   | -,174*  | .104           | .016         | 1            |             |              |              |               |     |
| GEN_INT    | .135    | .054           | .082         | .096         | 1           |              |              |               |     |
| EMPL_INT   | ,256**  | -.148          | .147         | .067         | .140        | 1            |              |               |     |
| EMPL_UNI   | ,330**  | .049           | ,203**       | .051         | ,216**      | .003         | 1            |               |     |
| DISTR_BIN  | .049    | -.043          | -.033        | -.077        | .065        | .083         | -.083        | 1             |     |
| EXP        | ,357**  | -,278**        | .008         | -,216**      | .073        | .145         | .146         | -.071         | 1   |

\*\*. Correlation is significant at the 0.01 level (2-tailed).

\*. Correlation is significant at the 0.05 level (2-tailed).

.....(comment to the table)

Table 2 reports the result of the estimation of the above equation, together with variables’s significance (in the last column). While interpretation of the coefficients in this model is difficult due to the nature of the link function, the signs of the coefficients for covariates and relative values of the coefficients for factor levels can give important insights into the effects of the predictors in the model. A positive coefficient indicates a positive effect on the probability that the firm falls in the category of high adaptability.

**Table 2.** Likelihood of having a high relational adaptability

|           |                 | coefficient | p value |
|-----------|-----------------|-------------|---------|
| Threshold | [REL_AD = 1.00] | 35.831      | .291    |
| dep. Var. | [REL_AD = 2.00] | 36.951      | .276    |

|           |                 |                |        |
|-----------|-----------------|----------------|--------|
| Ind. var. | SIZE            | -.029          | .087*  |
|           | FIRM_BIRTH      | 18.892         | .267   |
|           | AGE_ENTR        | -.037          | .012** |
|           | AGE_EMPL        | .004           | .512   |
|           | GEN_INT         | .402           | .243   |
|           | EMPL_INT        | 4.286          | .001** |
|           | EMPL_UNI        | .011           | .824   |
|           | EXP             | -.032          | .627   |
|           | DISTR_BIN       | -.274          | .403   |
|           | [INDUSTRY=1.00] | .093           | .878   |
|           | [INDUSTRY=2.00] | .007           | .991   |
|           | [INDUSTRY=3.00] | .170           | .794   |
|           | [INDUSTRY=4.00] | -.080          | .905   |
|           | [INDUSTRY=5.00] | 0 <sup>a</sup> | .      |

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Link function: Logit.

a. This parameter is set to zero because it is redundant (industry 5 is the reference sector).

The results of the estimation indicate that, *ceteris paribus*, the age of the entrepreneur is one of the variables that better explains a firm's relational adaptability: as age increases, the probability of being in one of the higher categories of relational adaptability decreases. In other words, older entrepreneur are more anchored to local established relationships and less prone to experiment new partnerships. Firm size is also a (barely) significant negative determinant of relational adaptability. Considering that the dataset includes only small firms (5 to 50 employees), within this range smaller firms are more likely to pursue a strategy of competition based almost exclusively on the selection of the cheapest supplier available in the market. In fact, it is often the case that the smaller firms run mainly commercial businesses consisting in seeking inputs purchased at the lower cost around the world for the local firms, and relegating their own manufactures only to marginal activities. Finally, as expected ICTs are a relevant technology to improve relational adaptability. However, it is not the mere adoption of a simple internet connection that plays a significant role; rather, it is the intensity of use, measured as the share of employees with internet access.

As far as concern the impact of the external environment to the adaptability of small firms, the hypothesis of lock-in for mature industrial districts put forward by economic geographer is not supported by this result (if anything, we obtain the opposite result, although this is not statistically significant). This means that, when we account for several firm indicators, the firms strongly rooted in mature industrial districts are not affected by phenomena of strong reciprocity and overembeddedness.

### *Organizational Adaptation*

The following set of estimate is aimed at quantifying the impact of some internal and external characteristic of the firm on the likelihood that such firm has introduced an organizational



change (*OrgCh*). This binary variable is generated by asking for organizational changes introduced during the last five years and related to the necessity to spare entrepreneurial resources by means of decentralization of entrepreneurial responsibilities, routinization and informatization of procedures and adoption of new-work-place-practices and functionalities (Robertson and Langlois, 1995).

In particular, the probability of a firm having introduced organizational changes is hypothesised to be the function of the following variables:

$$Prob (OrgCh=1)= f(Size,Birth,Distr,Age,Exp,Genint,Empint,Univ,Ind)$$

The main hypotheses here are the same as above. Moreover a negatively correlated effect of the district environment on the probability of the firms which are part of it to introduce organizational changes is expected. This hypothesis is connected with the one put forward by economic geographers and described above, and concern the existence, in industrial districts, of locally shared mental models, inter-organizational routines, and network effects which can act as obstacles for the introduction of small firms' organizational innovation. The defined regression analysis includes, thus, the same independent variables as the previous model, but in this case a bivariate logistic regression is estimated. Table 3 reports parameter estimates and significance:

Table 3. Likelihood of performing organizational changes

|             | B       | Sig.   |
|-------------|---------|--------|
| SIZE        | .098    | .007** |
| FIRM_BIRTH  | 16.510  | .516   |
| AGE_ENTR    | -.043   | .039*  |
| AGE_EMPL    | .003    | .684   |
| GEN_INT     | -.121   | .790   |
| EMPL_INT    | 2.094   | .189   |
| EMPL_UNI    | .701    | .006** |
| EXP         | .165    | .148   |
| DISTR_BIN   | -1.102  | .017*  |
| INDUSTRY    |         | .440   |
| INDUSTRY(1) | -.037   | .964   |
| INDUSTRY(2) | -.521   | .549   |
| INDUSTRY(3) | -1.204  | .190   |
| INDUSTRY(4) | -.662   | .466   |
| Constant    | -31.512 | .533   |

It is first possible to notice from these results how particular external environments can exert a strong effect on small firms' adaptabilities. In this case we can see that being part of a mature industrial district for a small firm means a lower probability to introduce a form of organizational innovation as described above. Reading this information together with the results of the previous analysis it is possible to assess that those small firms which are part of mature local systems of production have no particular problem in changing their suppliers and partners in the case it seems convenient to them, but they do not succeed in matching these

changes with the needed complementary internal organizational changes. It follows that often single small firms do not result fit – from an internal organizational point of view – to fully exploit the new partnerships opportunities disclosed by globalization, while exploiting just the cost advantages deriving from a new wider selection's possibility of supplier around the world.

Concerning the factors internal to the firms indicating a higher propensity to introduce organizational changes, we find that size is, as expected, a good indicator. Also the age of the entrepreneur and the share of employees with internet access, as in the previous analysis, can be used as predictor of the probability to introduce organizational change within the firm. Significant is also the variable indicating the share of employees with a university degree. This is in line with the managerial literature, indicating the complementarities between the employment of highly educated personnel and the introduction of organizational innovation (Bresnahan, Brynjolfsson and Hitt 2002; Vivarelli, Piga and Piva, 2004).

## **6. Conclusions**

This chapter have analyzed both internal (to the firm) and external (geographical) determinants and obstacles to small firms' relational and organizational adaptability. While presenting a review of the literature accounting for the two dominant typologies of adaptation in Italian mature industries, the chapter emphasizes the lack of systematic analysis on the influences of negative agglomeration externalities on both typologies of small firms' adaptability. The empirical section distinguishes between district and non-district firms and controls for internal and external determinant to firms adaptabilities. Some interesting results followed regarding the district influences. In particular we found that those small firms which are more embedded in local systems of production seem to be prompt to substitute external partners for local ones when these substitutions present costs advantages, while they tend to avoid the needed complementary investments in internal organizational changes. This has direct implication for the productivity of the firms and represent a fundamental – although quite neglected – step for a non-traumatic process of regional structural change.

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