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FIRMS' LINKAGE STRATEGIES AND INDUSTRIAL DISTRICT CHARACTERISTICS IN A LAGGING AREA: THE CASE OF SICILY

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Abstract - While the existing industrial districts are facing the competitive pressure arising in a more and more globalized world, some regions are still reluctant to apply an *industrial district* approach to their development process. This paper investigates potential explanations of such phenomenon by looking inside firm strategies relating to linkages and partnership decisions and modelling the main determinants for establishing both horizontal and vertical relationships which may be broadly connected with sectoral, market, locational and organizational features. A lagging region of Italy (Sicily) is taken as a case study for the analysis. The typical firm strategy is analysed with respect to two different types of district: the traditional or fully specialised one, which concentrates on a single industry, and the integrated district, based on the interdependence between firms belonging to different sectors. The main determinants of relationships are analysed in both cases in order to discover similarities or differences in the behavioural patterns. Also, an effort is made to relate firm behaviour to theoretical frameworks by confronting alternative paradigms that may explain the phenomena at hand. Theoretical hypotheses are tested through econometric methods applied to individual data collected from a survey that samples more than 80 firms belonging to 8 industrial areas. We conclude with some policy remarks concerning the improvement of endogenous development in manufacturing-lagging areas.

1. Introduction

The transition to industrialisation for lagging areas has always been a problematic issue. The explosion of industrial districts has certainly indicated a potential path for development but some regions still maintain some sort of aversion to following such a direction. In addition, globalisation imposes new pressures on existing and consolidated manufacturing districts and sets even higher standards for industrially-backward regions. Whether lagging regions must reproduce the same development pattern of more industrialised areas and the experience of industrial districts can be easily extended to such regions is still under debate.

This paper investigates a close but strictly related issue, connected with the type of configuration of a potential district in a lagging area. It is well known, traditionally, that industrial districts follow a characterisation which is not too far from the one originally envisaged by Marshall (1890). In most cases, the label of *industrial district* is attached to local agglomerations of SMEs, producing the same product in a relatively industrial zone inside a territory. Indeed, the district is usually identified by a double label referring to both location and industry or sub-industry which captures most of the production in the area. Researchers have started to analyse more diversified agglomerations which maintain an explicit manufacturing character. On the other hand, manufacturing agglomerations also exist inside the boundaries of metropolitan areas where scope economies and the search for varieties are predominant. In lagging areas, a relevant share of manufacturing is also strongly related to the primary sector and gives rise to different types of industrial configurations such as agro-industrial filières or rural districts.

In this context, a main issue which needs to be addressed is whether the traditional mono-industrial district or a more diversified agglomeration is the most appropriate configuration for lagging areas. A crucial point in this issue is the comparative role of innovation and firms' linkages in both situations and how both variables affect the overall performance of enterprises. Collective learning is usually considered the main vehicle through which innovation spills over the individual firm environment and becomes a truly external economy for an area. Linkage relationships are of paramount importance in the development of collective learning. On the other hand, in lagging areas, the quality of linkages is mostly what prevents individual firms from benefiting from external economies and from realising an adequate synergy among innovative ideas. The explanation of

linkage formation will then become a priority for both the analytical and the policy points of view. The paper will then look inside the firm strategies with respect to linkage and partnership decisions and model the main determinants for establishing both horizontal and vertical relationships. These determinants can be broadly connected with individual, sectoral, market, locational and organizational features. A lagging region of Italy (Sicily) is taken as a case study for the analysis. The typical firm strategy is investigated with respect to two different types of district: the fully specialised one, which concentrates on a single industry and what we called *integrated district*, which is characterised by the interdependence between firms belonging to different sectors. The performance and main determinants of relationships are analysed in both cases in order to discover similarities or differences in the behavioural patterns. The overall results show many common points between the *representative* firms of the two groups but also important differences that deserve further investigation in order to define the appropriate policy tools.

The structure of the paper is the following. Sections 2, 3 and 4 set up the conceptual framework and the literature background of the analysis by focusing on the innovation-linkage relationship in the use of collective learning and social capital paradigms. Section 4 also investigates the relevance of horizontal and vertical relationships on one side and backward vs. forward linkages on the other side in the analysis of the evolution of an industrial district. Section 5 illustrates the methodology used in the study together with sample design and defines the concept of integrated district in the context of a lagging area. Section 6 presents the specification of the empirical model and the econometric underpinning of the approach. Section 7 is devoted to a discussion of the estimation results. Final comments and policy insights are left to section 8.

2. Innovative behaviour, linkage and proximity: the importance of an extended concept of innovation.

Sicilian local manufacturing systems (LMSs) cannot be strictly regarded as high-tech *milieux*, though they do introduce product or process innovation. Therefore one of the main theoretical issues we face is that of defining a concept of innovation broad enough to offer sufficient support to our analysis and empirical evidence.

Regarding this, innovation should be better considered not only as a mere application of

technical progress but, to a wider extent, as a process or a consistent cycle involving interaction between tacit and articulated knowledge (Lawson and Lorenz, 1999).

A pre-condition for this process is the building of shared values, norms and technical understanding so that often diverse knowledge can be shared.

The analysis of innovation from this perspective forces recognition of influences which do not stop at the research, science and technology content of firms or production systems at given points in time, and necessitates an acknowledgement of the dynamic and evolving interplay between information, codifiable and tacit knowledge and competence (Amin and Wilkinson, 1999).

The specificity of tacit knowledge and competencies requires for externally derived information to be converted and interpreted if it is to be readable within internal knowledge and learning systems. The acquisition of radically new codifiable knowledge triggers the development of a new, or the modification of the existing, tacit knowledge, if competencies are to evolve effectively. The problems created by the absorption of change may be eased if the relevant tacit knowledge is shared by the creators and users of new knowledge, so that effective interpretative mechanisms can develop. The outcome is an increasing institutionalisation of the market for knowledge in the area. In this market, innovative firms provide a bridge for incorporating new (scientific or anyway external) knowledge into local tacit knowledge, learning processes and competencies (Antonelli, 1999).

The ability to share and utilise diversified knowledge is an important pre-condition for the enhancement of regional economic conditions and perspectives, not only in terms of technological standard, but also of collective or institutional thickness. In some cases, this emerges from a rich history of local interaction between users and producers of the technology or from the activity of local or external technology consultants. In other cases the critical factor may be the multidisciplinary culture of a local university combined with a history of spin-offs, so that knowledge becomes widely diffused among local producers.

A great deal of research has been done on regional networks and linkages, some with reference to consolidated theoretical concepts such as the *Marshallian industrial districts*, some with reference to more recent concepts like the *innovative milieu*¹ (Aydalot and Keeble, 1988; Camagni, 1991; Capello, 1999; Maillat et al., 1994; Ratti et al., 1997) and *network* (Camagni,

¹ Created by GREMI, Group de Recherche Européen sur les Milieux Innovateurs. "The hallmark of the innovative milieu is that the localised labour markets, inter-firm relationships and firm spin-outs enrich the local knowledge base and enable exploitation of localised collective learning capabilities to develop profitable new products and

1991; Batten et al., 1995)². There is anyway growing consent, among geographers and regional economists, about two spatially relevant conclusions (Sternberg, 1999).

The first conclusion is that recent restructuring in manufacturing in all regional economies of advanced industrialised countries can be interpreted as a manifestation of new and emerging network forms of production, which have been labelled *network paradigm* (Storper and Harrison, 1991, Amin and Thrift, 1992, Storper, 1995). From the viewpoint of economic geography, it is important to bear in mind that there is no agreement about whether these networks are intraregional (intra-local) rather than interregional (inter-local) or vice versa. Some researchers see an increasing importance of interregional (mainly international) linkages between innovative actors integrated into globalised networks. Many others, by contrast, present valuable arguments to support the hypothesis that globalisation is accompanied by regionalisation (Sabel, 1988; Becattini and Rullani, 1993; Storper, 1997; De Bernardy, 1999; Trigilia, 1999). This means that the regional (and local) level will gain importance not only because of the opportunity of reducing transaction costs - which, in this era of flexible production and vertical disintegration, normally rise - but also because of the overall advantages deriving from the clustering or re-agglomerating of economic activities, including an increasing frequency of linkages between innovative actors.

The second issue concerns the accumulation of knowledge, which is an element of regional potential that plays an increasingly crucial role in local development. It depends on, or is influenced by, three relevant processes:

a) the generation of new knowledge through various kinds of interaction in the local manufacturing system (existing knowledge is best communicated through personal contacts);

b) the erection of barriers to impede the diffusion of knowledge off the local manufacturing system³;

c) the learning process originated from external knowledge, which is an increasingly essential ingredient for the continued success of any innovative milieu (Camagni, 1991; Keeble and Wilkinson, 1999).

processes" (Camagni, 1991).

² More generally, these territorial clusters are anyway characterised by what Storper (1995) has termed *untraded interdependencies* which extend beyond the traditional customer/supplier and servicing relationships to embrace formal and informal collaborative and information networks, interactions through local labour markets, and shared conventions and rules for developing communications and interpreting knowledge.

All these processes are dependent on the specific local innovation system (Braczyk et al., 1997), composed mainly of firms and research institutions and defined as geographically distinctive, interlinked organisations (whether formal or informal) supporting and conducting innovations.

There is a diffused evidence that individual firms and their environment (the region) are characteristically interdependent: (innovative) regional economic development cannot thrive in the absence of (innovative) dynamic firms; on the other hand, economically successful (innovative) firms need a favourable regional environment in order to survive and grow. One element of this kind of favourable environment is the linkage between innovative actors - such as research institutions, manufacturing firms, service companies, financial institutions or politicians - located in the same region. Another element of this favourable regional environment is a positive aptitude to collective learning.

From a more general point of view, regional collective learning in fact involves “the creation and further development of common or shared knowledge among individuals making up a productive system which allows them to co-ordinate their actions in the resolution of the technological and organisational process they confront” (Keeble and Wilkinson, 1999). The creation and development of such a localised knowledge base can involve both conscious and unconscious mechanisms. An example of the former would be the research collaboration between local SMEs or between an SME and a local university. An example of the latter would be the movement of *embodied expertise* and know-how within the regional labour market, in the form of job-migration of researchers, managers and skilled workers or via entrepreneurial spin-off from existing local firms or organisations to create new technology-intensive firms.

Even where a collective capacity to compete, adapt and innovate has emerged, it is anyway important not to expect an island of unity and solidarity. Collective efficiency is in fact the outcome of an internal process in which some enterprises grow and others decline (Rabellotti and Schmitz, 1999).

Knowledge transmission and collective learning may be fostered by cultural, institutional and geographical proximity often in combination. Networks and dependencies arise within, between and outside firms and, although not traded (or even tradable), they may have significant effects on the

³ Bianchi (1989) noted that the continuous accumulation of knowledge could also lock firms into obsolete and increasingly non-competitive technological trajectories. In these circumstances, collective learning processes which function as “barriers to entry” to outsiders may be transformed into “barriers to exit” for insiders.

competitive performance of local manufacturing systems. Despite the pressures of globalisation and hyper-competition, local embeddedness and proximity appear therefore to be decisive factors in the competitive advantage of successful local economies (De Bernardy, 1999).

If a territory is regarded as an open system, the way in which change occurs depends on various exogenous and endogenous factors. Exogenous factors are always present and competition acts as an incentive for adaptation. While local firms may take advantage of external innovations, endogenous behaviour can also help local firms to improve their activities in global markets. At the same time, difficulties - or a positive orientation to the resolution of individual or common problems - may foster linkages between firms. Our evidence supports this hypothesis, showing that linkages intensify and play a relevant role in the enhancement of the districts examined⁴. In both cases, change does not necessarily involve the whole community but is activated by those individuals or groups who perceive both new opportunities and the necessity for changes in local productive capacities. But being involved in a learning process, of course, does not necessarily mean that agents perceive exactly where their behaviour and actions are leading.

Agents may develop various kinds of learning mechanisms through social and professional networks that enhance their efficiency. Of course, as individual interests are not the same, if shared or collective values are too weak, or limited to the personal rather than business relations, the possibility of developing co-operative processes may be strongly reduced.

The development of successful co-operation is therefore closely related to a collective identification process that requires constant changes in people's ideas and representations.

Learning by imitation and adaptation appears of particular importance in the maturation of LMSs, as enables them to develop new approaches, which are necessary to succeed in a globally competitive environment. At the same time, learning by creating also appears to be a well-developed path for SMEs located in a lagging regions. Traditionally, learning has been seen as a way to reduce costs and increase reliability and precision of production. Within a network of potential partners, firms now tend to choose the most competent and skilled partner for solving a particular problem, as each new problem involves co-operation with different temporary partners. In this sense, the impact of innovation on linkages and collective learning can be different according to the level of

⁴ As we will see below, this tendency appears stronger in integrated rather than in traditional districts.

specialisation/diversification of the industrial district⁵.

From a collective point of view, another relevant reason for inner heterogeneity of local systems is the different endowment of social capital. Putnam (1993) and Fukuyama (1995) tend to identify social capital with a particular culture, significantly oriented to co-operation and, from a historical perspective, path-dependent.

Trigilia (1999) tries to explain why social capital has become more important in the current organisation of the economy. The search for flexibility and quality production, in the context of a growing globalisation, enhanced the role of co-operation both among individuals and collective actors at a local level. According to this view, it is necessary to consider social capital as a network of social relations rather than a mere co-operative culture based on shared values. This view permits a better understanding of not only the positive effects of social capital for a self-sustained local economic development, but also the possible negative consequences in terms of rent-seeking, collusion, or even criminal economy (Granovetter, 1989; Portes, 1998). The negative consequences of *distortions* in social capital are particularly relevant in Southern Italy (Trigilia, 1998; Tullio e Quarella, 1999; Censis, 2000), where embedded factors of corruption have traditionally affected the efficiency of formal institutions - both administrative and political - and market economy. Hence, what above all should be emphasised is the relevance of political factors - of the “embedded autonomy” of political action - in favouring a positive (negative) role of social capital in local economic development, as shown by some cases of regional development in Europe or by some success stories in East Asia.

3. Private and public actors and the Sicilian experience

Economic growth and local attraction of external (whether extraregional or foreign) investment tend to concentrate where the external economies of specialisation are stronger (Storper, 1997)⁶. This will create difficulties in territories and local systems unable to face change, but will

⁵ In the traditional district heterogeneity is mainly a matter of difference between similar firms operating in the same sector, whereas in the integrated districts different firms belong to different, although variously dependent or integrated, sectors.

⁶ The literature on the contribution of foreign direct investment to the process of economic growth is extensively reviewed in Dunning (1974, 1993). In essence, the various theoretical perspectives on the multinational enterprise

enhance the economic performance of areas able to exploit all the possibilities their social capital offers, thus overcoming their development lag, even in the presence of a structural deficit in human and financial capital. Local potential will invariably be determined by business conditions, although it can clearly be aided by local business support mechanisms promoted by government, its agencies or local authorities⁷. These elements can yield both positive and negative effects on any given economy, as shown by the extensive debate on the costs and benefits of external investment attraction as a main component of national/regional development policy.

Italy has been open (and consistent) in its policy towards external investment over a long period of time and has been very active in investment promotion to foster industrial development in its Southern regions (including Sicily). Yet these policies have only partially fulfilled their objectives.

In timing, distribution and scale, external investment in Sicily can be attributed to two interdependent factors of globalisation, i.e. the countering of trade friction and the comparative advantages of local production. Although relevant in terms of financial resources, the sectoral focus has been relatively narrow (chemicals, plastics, energy) and with limited spin-off effects on the local environment. Only recently electronics, electrical equipment and integrated alimentary sectors tend to dominate the dynamic perspectives of regional manufacturing and trade, both in terms of investment, production and employment basis.

Industry in Sicily have pursued long term, proactive and supportive policies toward investment attraction and development, with the latter being predicated upon many assumptions about the nature of assisted development and resultant economic growth which are not reviewed in this study. Nevertheless, a relevant open question is whether large firms contribute to and draw on the local collective resources as much as small and medium enterprises. On this account, the evidence is mixed.

In recent years, a variety of enterprise support policies have appeared in Europe and Italy with a view to strengthening competitiveness of manufacturing firms - and particularly small and medium sized ones. In Sicily, as well as in the rest of Southern Italy, these policies have taken place

view it as a mechanism bringing to a host country a package of resources reflected in its competitive advantages over its peers, whether indigenous or foreign (Hood and Taggart, 1999).

⁷ Nowadays, one of the most important location-specific variables affecting the activities of external companies can be related to the availability of resources and capabilities that investing firms believe are necessary to upgrade and make best use of their own firm-specific competencies (Dunning, 1993). The importance of foreign-created pools of capabilities for generating competitive advantages in transnational companies is illustrated in Ivarsson (1999).

in substitution of the expired so-called *Intervento Straordinario*, a long-run structural development policy aimed at fostering industrialisation in Southern regions. In addition to national incentives, European Union (Community) had provided further financial resources to Sicilian producers, by means of, or together with, the Regional authorities. Such resources were aimed at supporting regional economic growth, offering indirect provisional protection from increasing intra-communitarian competition. Although such policies can be considered successful under many respects, they sometimes resulted in negative loops and trends, insofar as they yielded a negative impact on regional agro-industrial structure and social capital through adverse selection mechanisms⁸.

Many of current programs provide technical or financial assistance for individual firms on a one-to-one basis. Also, there has been a rise of interest in policies aimed at changing relationships among local firms and facilitating co-operative practices as a means of diffuse best practice. In the latter case, the attention was largely confined to the recognition of fast growing and resilient economies in industrial districts or local manufacturing systems.

As a matter of fact, Sicilian local manufacturing systems cannot be classified, from a rigorous legislative point of view, as proper industrial districts, as they lack (they do not reach the threshold parameters of) the fundamental requirements to fit the legislative definition⁹. Thus, due to their informal nature, Sicilian LMSs are missing the main opportunities offered by the current national legislation on districts. This does not mean, of course, that individual firms have no access to general legislation providing individual incentives: in this sense, recent provisions¹⁰ in favour of investment by industrial firms located in lagging areas encountered in Sicily remarkable success - annual funds being systematically exhausted. But the differential impact of such measures is rather difficult to evaluate, especially in terms of local development.

At the same time, in the last two years local authorities have begun to play a more active and supportive role in investment attraction, trying to determine the necessary preconditions or improving the existing ones.

Public intervention is therefore no longer focused only upon infrastructures, but also on other critical variables: *soft* factors like social behaviour, quality of public administration and bureaucracy, which add to traditional economic factors such as raw materials or labour skills. An active role is also

⁸ Past EC grants and provisions very often acted perversely, by supporting non-marketable productions or obsolete production processes.

⁹ Italian industrial districts are defined by the law n. 317/91.

played by intermediaries (public agencies for territorial development), especially in terms of *territorial marketing* when competition occurs, and private consultants, who act to enhance firms' possibilities of accessing the available incentives.

An important question to be raised in the next sections is whether success in incentive attraction and institutional "thickness" strongly relate to the type of industrial district. In principle, overall investment attraction capacity should be more strictly related to the degree of diversification of the existing entrepreneurial capacity in each area.

In Krugman's view (1991a, 1991b), the general processes responsible for the growth of industries can also be used to explain the spatial clustering of contemporary industries. Other scholars, largely inspired by Marshallian or Marxian ideas, have been attempting to give greater attention to historical specificity, such as in their use of notions of Fordism, and complexity of processes, such as in their use of the restructuring thesis. By taking largely into account the socially embedded character of local economic systems, this approach inspired, notably in Italy, a wide literature¹¹, focusing upon the social construction of knowledge, provides crucial insights into the historical and geographical specificity of the industrial districts.

But the traditional industrial districts literature provides only partial insights into the origins and development of the Sicilian LMSs, as it fails to consider the influence exerted by local institutional, social and cultural (whether formal or informal) structures in facilitating or constraining local economic development. As recent studies in the new industrial and economic geography have begun to show, the "thickness" and nature of such institutional *externalities* are fundamental to the emergence, trajectory and adaptability of industrial districts and regional economies (Martin and Sunley, 1996; Keeble et al., 1999).

However, we should note that, in comparison with some other industrial clusters, and especially European cases such as Emilia Romagna or Baden-Wurtemberg, Sicilian LMSs show few overt signs of institutional thickness in the form of "financial institutions, local chambers of commerce, training agencies, clerical bodies, unions, government agencies providing premises, land and infrastructure, business service organisations, marketing boards and so on" (Amin and Thrift, 1992, Pinch and Henry, 1999). Nevertheless, they do possess another form of this institutional

¹⁰ The main reference is to the law n. 488/92.

¹¹ Quoting all the relevant Italian literature on this issue is hardly possible; our best references are anyway Becattini (1987, 1989), Becattini and Rullani (1994), Bellandi and Russo (1994), Brusco (1983, 1989), Brusco e Paba

thickness in terms of a common industrial purpose and shared cultural norms and values. Thus, some of Sicilian LMSs compare to a milieu characterised by intensive, flexible working practices, reciprocity and trust, networking and informal collaboration, as well as relatively intense competition.

4. Traditional and integrated districts in lagging areas

Industrial districts have attracted the attention of many economists in the search for new models of industrial development. Several case studies have shown that clustering helps local enterprises to overcome local constraints and compete in distant markets. However, empirical studies also reveal shortcomings of the industrial district model. Rabellotti and Schmitz (1999) show that, within the districts, there is enormous heterogeneity by size and performance. Even though clustering firms feed on each other, there can be wide differences in their strategies, performance and growth potential.

Heterogeneity may be regarded as one of the main dynamic aspects of a growing industry. Under this respect, the traditional industrial district literature concentrates on the deepening division of labour between firms and, as a result, the differentiation of enterprises by process or product, only seldom by size or performance. The close proximity of firms within a particular industry provides opportunities for entrepreneurs to specialise and for the district as a whole to secure economies of scale (both static and dynamic) denied to isolated individual firms because of internal restrictions on growth. They can therefore afford to stay small¹² and concentrate their initiative and inventiveness on what they do best. By doing so they create, in turn, an environment that improves the competitive position of the locality). But industrial districts which are successful are unlikely to remain populated by small firms only. Reinvested profits should in fact lead to expansion and increasing differentiation by size and performance.

It can be questioned whether, in lagging areas, the evolution of industrial districts must necessarily go from specialisation to diversification. This is the main reason which led us to investigate the potential differences between mono-industrial and integrated districts in Sicily.

From the conceptual point of view, a mono-industrial district is an agglomeration of firms in a

(1996), Dei Ottati (1987, 1995), Garofoli (1991).

particular area where industrial production is a significant share of the total GDP of the area, and specialisation in a specific industry inside manufacturing is so strong that the district can be defined by attaching an industrial label to the area (i.e, textiles in Prato, pottery in Sassuolo, etc.). An essential characteristic of the traditional industrial district is that the labour local market usually excludes large conurbation. Large metropolitan areas have, indeed, a strong specialisation in services. Also, the average firm size is usually low in traditional districts and the local system usually excludes large external units, though such a requirement is not binding in most analyses. Alternatively, in the integrated district local firms are differently specialised and develop most basic relationships outside manufacturing. Both services and/or agriculture are particularly sizeable in a lagging area so that it cannot be said that manufacturing covers most of production with respect to both plants and jobs. In other terms, firms' agglomeration is more integrated in a productive chain and the manufacturing district is part of a larger *filière* of production. As a consequence of that, firms agglomeration can easily be accommodated inside a metropolitan area and the presence of large firms is not excluded a-priori since dominant buyers can be an active part in the configuration.

Lagging regions are by definition industrially-backward and of immediate concern by policy makers. The distribution of population in these regions is also polarised between large conurbation and very rural areas with a limited role for what has become known as *urbanised countryside* in the analysis of the evolution of North-eastern and Central Italy.

In addition, policy intervention has favoured in the past both public and private large size investments. Size and sectoral heterogeneity become, therefore, a peculiarity of industrial agglomerations in these regions. Heterogeneity may be regarded as strictly functional to the performance and development of the integrated districts, whereas homogeneity can be also become a remarkable obstacle to innovation in traditional mono-industrial districts.

Clearly, heterogeneity also develops within traditional districts as shown by the experience of leading industrial districts in Italy. This happens when firms start to specialise in single stages of production and share their localised knowledge when involved in input-output specific transactions. In lagging areas, however, traditional mono-industrial firms do not often perceive the enlargement of the market generated by the division of labour also because their marketing horizon is limited either by local demand or by traditional commercial networks.

¹² A small firm size is, in fact, one of the most relevant features of traditional districts in Italy, and in Sicily as well.

The main question is therefore whether homogenous or more heterogeneous districts display a better performance in lagging areas and whether linkages and innovative behaviour play a significant role in firms' performance in either type of district.

With respect to linkages, it should not be overlooked the role of production vs. consumption linkages. According to Hirschman (1958, 1977), backward production linkages, occurring between firms that provide inputs to other firms, are mostly relevant in fostering the industrialisation process¹³. We must then expect firms' performance to be related to the amount of local purchases in the area and/or with the amount of specific transactions of firms (originating from subcontracting or similar types of relationships). This consideration matches the idea that more advanced industrial agglomerations would display a higher density of vertical rather than horizontal linkages (Innocenti, 1998). It can be argued, however, that globalisation also increases the importance of consumption linkages at a larger scale and that horizontal linkages between local firms may be the strategic factor in penetrating new markets, acquire new knowledge or reducing costs in many areas of firm activity.

The previous considerations set up the agenda for the empirical work which will apply to the Sicilian case. The following hypotheses will be tested or discussed:

- 1) there exists a remarkable difference in terms of size variety and performance between firms in integrated versus traditional (mono-industrial) districts;
- 2) innovation potential and density of relationships are also higher in integrated than mono-industrial districts;
- 3) innovative and more linked firms perform better in all district configurations;
- 4) regardless of the type of district, innovative firms co-operate or collaborate more frequently than non-innovative firms;
- 5) the quality of co-operation is usually higher for firms in integrated districts and is related to the share of local purchases;
- 6) intraregional or local linkages are more important (both quantitatively and qualitatively) for innovative local actors and/or for firms in integrated districts compared with interregional or interlocal linkages¹⁴;
- 7) horizontal linkages between manufacturing firms are more widespread inside traditional

¹³ See, on this point, Mazzola and Bruni (2000).

¹⁴ As we will see, we regard this interpretation as plausible, though our data will not allow any formal testing of this hypothesis since they do not discriminate between intra-regional and interregional linkages

districts while vertical linkages tend to dominate in integrated districts.

A descriptive answer to these points is given in section 6 while more formal testing is performed in section 7.

5. Methodology and sample design

Recent surveys of Sicilian manufacturing sector (Mazzola and Asmundo, 1999; Musumeci, 1998; Banco di Sicilia, 2000; and Censis, 2000) brought about new evidence of the existence and the increasing economic and social relevance of local production systems in the region. From an economic point of view, the most interesting issues concern the way such systems perform, both under quantitative or qualitative respects.

Our study involved the construction of two different samples of SMEs which we labelled as *traditional* or *mono-industrial* and *integrated*. The distinction between the two groups is defined conceptually by looking at the main flow of input-output relationships inside each group. Also, the two samples, though originating from the same population (the Sicilian manufacturing base), were derived from a different sample design. The methodological differences may somewhat affect the final results but, we believe, not in a systematic fashion.

The first sample of SMEs operating in traditional districts was selected by following a selection procedure aimed at first defining the local productive systems by means of an objective criteria and later select a sample of firms in those industrial districts which met these criteria. According to the prevailing literature and the official statistical definitions of local labour systems (Istat, 1997), the Sicilian territory was divided first into 82 local labour markets. Among these, only four manufacturing local systems (MLSs) simultaneously fulfilled the following five criteria:

- a) specialisation index in manufacturing, expressed by the number of employees, higher by 30% than the regional average;
- b) density in manufacturing, calculated by the ratio of the number of plants over population, higher than the regional average;
- c) specialisation index in a specific industry inside the manufacturing sector higher by 30% than the regional average;

- d) percentage quota of employment in the industry of specialisation equal to at least 30% of total manufacturing employment;
- e) percentage quota of employment of small and medium enterprises in the specific industry equal to at least 50% of total employment in the industry.

Inside the group of the selected four local manufacturing systems, a stratified sample by district and firm size allowed us to identify 43 firms in the following areas and industries: Custonaci (marble), S. Stefano Camastra (pottery), Milazzo (metal products), Brolo (clothing).

The second sample derived from a larger sample extracted from the universe of all Sicilian manufacturing firms beyond ten employees. Among the 330 firms included in the larger sample, we selected those firms which belonged to similar group of products regardless of the characteristics of the local labour system and on the basis of a pure density criterion. Clearly, such manufacturing agglomerations, though concentrated in specific industries and in limited areas, are not eligible as *industrial districts* according to a traditional criterion since the overall relative size of the manufacturing sector is limited in the local labour systems in which these firms are located. We chose for these agglomeration a definition of *integrated districts*. Such definition was suited¹⁵ to five other systems, whose survey data were made available by Banco di Sicilia (2000), located in the local labour markets of Catania (in the packaging and telecommunication, electrical equipment, electronics industries), Marsala-Castelvetrano-Sciacca (in the fishing, frozen and canned fish industry), Marsala-Trapani-Salemi-Alcamo (in the wine and spirits industry), Palermo (in the telecommunication and paper, printing, publishing industries). It is quite evident that this sample contains manufacturing firms with strong interactions with primary and tertiary sectors which are located inside metropolitan local systems.

Descriptive statistics concerning the main variables are shown in table 1. It is instructive to look at the main characteristics of the two groups of firms, in order to offer an immediate answer to some of the hypotheses listed in section 4.

¹⁵ The choice of the areas was also based on information and evidence provided by Musumeci (1999) and Censis (2000).

Table 1 - Descriptive statistics for firms in traditional vs. integrated districts

	<i>Traditional Districts</i>	<i>Integrated Districts</i>
Age	19.9	27.0
Average sales	3,211.8	10,965.5
Sales growth	16.7	19.0
Success firms (sales) (°)	51.2	53.7
Average employment size	33.4	47.0
Success firms (employment) (°)	44.2	36.6
Innovative firms (°)	67.4	26.8
Percentage of skilled workers	15.0	18.1
Decentralised management (^)	4.1	19.5
Sales to Northern Italian and foreign markets (%)	55.6	29.4
Sales to foreign markets (%)	32.9	7.5
Own commercial network (°)	16.3	74.1
Local competition (°)	37.2	73.2
Medium and large firms competition (°)	46.5	65.9
Local purchases (%)	30.3	25.9
Dissatisfaction with physical infrastructures (°)	53.5	26.8
Distrust in institutions (bureaucracy) (°)	48.8	63.4
Crime concern (°)	11.8	19.5
Origin of service activities (^^)	15.3	13.7
Horizontal relationships (%)	44.2	51.2
Subcontracting firms (°)	48.8	12.2
Supply of subcontracting (%)	32.6	6.8
Subcontracting recipients (°)	53.5	26.8
Demand of subcontracting (%)	14.4	17.9
Percentage of first three customers	25.7	30.3
Number of firms	43	41
Number of industries	4	5
Number of areas	4	4

Note: (°): percentage number of firms over the total. Precise definition of some variables is given in section 6; (^): the index of decentralised management goes from 0 to 6 for traditional districts (average number of firm's activity shared with other individuals by the entrepreneur with and from 0 to 100% for integrated districts (percentage of firms in which the entrepreneur share the management with other individuals); ^^: the index is an average of the score obtained by the firm according to the location where its service inputs are provided (for each type of

service, the range is from 0 when the service is not provided at all to 4 when is provided abroad). We considered 11 different types of service input.

It is immediate that size differences do exist between the two groups, particularly with respect to sales. It is also possible to show that size dispersion is higher in the group of integrated districts, even when controlling for average size. Firms in integrated districts appear to have a human capital advantage and to face much more severe competition (both locally and from larger enterprises) than firms in traditional districts. There is, instead, less difference between the two groups with respect to the amount of local purchases and the extent of decentralisation¹⁶. The market attitude of the two groups is quite different: firms operating in mono-industrial districts do export more (both to the other regions of Italy and abroad) but do not use very often their own commercial network. Both group of firms do appear to suffer from negative local externalities but of different types: while the inefficiency of physical infrastructure and transportation networks limits firm's growth in mono-industrial districts, SMEs in integrated districts complain an excess of bureaucracy and manifest more crime concern.

In terms of stable relationships with other firms, there is a greater amount of horizontal relationships in integrated districts while the number of subcontractors and subcontracting recipients is higher in traditional districts. In both groups, structured vertical relationships emerge as not very diffused as a percentage of total sales and purchases. In any case, firms in integrated districts do appear to have more specific relationships with customers. Surprisingly, the number of innovative firms is much higher in traditional districts but this may be the consequence of a different perception of the innovation between the two groups of firms¹⁷. Most of all, there do not appear any relevant difference as far as success and performance are concerned. Both in terms of numbers and in terms of average growth integrated firms do not show any significant lead over firms in mono-industrial districts.

The general implication of descriptive statistics is that, though some structural differences do exist, they do not allow to conclude that firms of integrated districts are more inclined to grow and to absorb innovation and change than firms in traditional districts. However, descriptive statistics give only an average quantitative measure of structural differences. Indeed, there may be important qualitative aspects in the relationship between performance, linkages and innovation that need to be assessed. Also, the causal link between the three phenomena inside the two groups must be clearly

¹⁶ The indices in table 1 are not directly comparable but must be confronted with the most decentralised situations, being a value of 0 for traditional districts and a 100% quota for integrated districts.

understood and investigated, as done in the next section.

6. The empirical model

The previous descriptive analysis has shown that SMEs performance is not significantly different according to the type of district they belong (traditional or integrated). However, since the similarity in performance may be ascribed to different behavioural and structural causes it seems relevant to assess the comparative role of the different variables on firms' performance in the two cases. In particular, our focus is on the relative role of firms' innovativeness on one side and entrepreneurial ability to built horizontal and vertical linkages on the other side. Our research strategy moved then from a model explaining performance and later concentrated on the relationship between linkages and innovativeness.

From the theoretical point of view, we faced the initial problem of how to define firms' performance. Several indicators have been used in this regard such as sales variation, employment growth, productivity dynamics and economic or financial ratios derived from budget sheets. In some cases, scholars have used an appropriate mix of different indicators. The good performance may also be defined in a qualitative fashion by including all the positive signals that an entrepreneur receives from his activity which, in turn, affects his choice of staying in the market and develop new investments (Reid, 1991,1993; Bruni and Mazzola, 1997). In this second case, we define a latent and unobservable variable labelled as *good performance* and assume that only a realisation of this variable can be observed, related with profitability, sales growth or other indicators. The observable variable can also be in the form of a threshold variable, assuming values equal to 1 if , for instance, profitability or sales growth is beyond a certain number. In our case we chose sales growth as indicator of profitability and defined a dummy dependent variable equal to 1 if sales growth was beyond the 10% in a four year period of observation and equal to 0 otherwise.

Explanatory variables were grouped in five different groups related to individual characteristics, supply market features, firms' linkage or organisational structure, locational and

¹⁷ We consider as *innovative* only firms which introduced in the last four years both new product and new process innovations and/or experienced organisational changes during the same period.

institutional constraints, and financial availability¹⁸.

The individual characteristics considered in our analysis were:

- a) the *age* of the firm in the initial year of observation;
- b) firm's *size*, defined as the value of sales in the initial year of observation;
- c) firm's *innovativeness*, defined as a dummy variable equal to 1 if the firm had introduced complex innovation and 0 otherwise. In turn, complex innovation were defined as those which simultaneously modified product lines and process and/or which required a change in organisational structure;
- d) the *quality of the labour force*, defined as the percentage of white collar workers over total firm employment of the firm;
- e) an index of *management decentralisation*, based on the number of people involved in management or on the number of entrepreneurial functions carried out exclusively by the owner.

As for market variables, we focused on:

- f) *market openness*, defined as the percentage of sales going to non-Southern markets. Alternatively, the percentage of foreign exports was used with similar results;
- g) the *commercial network*, captured by a dummy variable equal to 1 when the firm uses its own personal commercial network as main distribution channel and equal to 0 otherwise;
- h) the perceived *competition by local firms*;
- i) the *competition by larger firms*.

Relational variables included in the empirical models were:

- j) the interest in *horizontal relationships*, defined as a dummy variable equal to 1 in the case in which the firm had established or was about to establish co-operation in at least two fields of activity;
- k) the *supply of subcontracting*, expressed as a percentage of total sales;
- l) the *demand of subcontracting*, expressed as a percentage of total purchases;
- m) the *specificity of transactions*, defined as the percentage of sales covered by the first three customers.

We also concentrated on five indicators of local externalities, such as:

¹⁸ On the several determinants of firm's performance, see, above all, Audretsch and Mata (1995).

- n) *local purchases*, as a percentage of total purchases;
- o) the *infrastructure standing*, defined as a dummy variable equal to 1 in case of perceived inadequacy in at least two different types of physical infrastructure;
- p) the *support of local institution* to firms' activity, defined as a dummy variable equal to 1 if the firm perceives bureaucracy as a strong constraint to its growth potential;
- q) the *location of service inputs*, expressed as an index increasing with the distance between firm's location and the point of service supply (i.e., the index is 0 when the firm makes no use of service inputs, has a low value when all services activities are internally supplied and reaches its maximum when all service inputs are acquired from abroad).
- r) *crime concern*, defined as a dummy variable equal to 1 if the firm manifested a crime concern and equal to 0 otherwise.

Finally, the group of financial variables contained:

- s) *public incentives*, defined as a dummy variable if the firm had received some sort of financial support from local, national or European institutions;
- t) *credit rationing*, defined as a dummy variable equal to 1 if the firm was actually rationed by banks in its demand for loans or was willing to pay a higher interest rate to obtain more credit.

Two separate models of *good performance* were analysed for the two group of firms belonging to traditional and integrated districts. In some cases, given slight differences in the questionnaires used in the field analysis, different but very closed indicators were used to define the same variables. In order to compare the results we must also acknowledge the potential bias included in some answers which was previously discussed in section 5.

We supplemented the model of the probability of *good performance* with other specifications explaining the probability of co-operation and the existence of structured linkages among the firms in each type of district. Here, too, we may define a latent variable labelled as co-operation and an observed realisation of this variable which assumes values equal to 1 if the firms co-operate and 0 if it does not. This was the empirical strategy adopted for horizontal relationship where we linked the dummy dependent variable to a set of explanatory variables, mostly overlapping with that previously considered with the exclusion of the group of relational variables. For structured vertical relationships, since we had available a quantitative measure, we constructed a model in which the percentage of (offered or received) subcontracting was regressed against the same set of

explanatory variables.

The original design of our analysis was to construct also an empirical model explaining innovation as a function of other variables, among which both performance and linkage variables. This hypothesis is indeed contained in most literature which stress the role of collective learning for performance and the importance of knowledge spillovers and transfers through the construction of networks among localised firms. Such a perspective was indeed abandoned after the observation of the results coming out from the two previous stages. Indeed, as it will be clear from the reading of section 7, the causal link in the Sicilian context seems to go from innovation to the construction of linkages to performance rather than from linkages to innovation to performance. Any effort to build empirical models which simultaneously derive as endogenous variables performance, linkages and innovation was prevented from the limited number of observations.

7. Estimation results

We proceeded to define the best model of *good performance* concerning the two types of districts through successive steps. Given the qualitative characteristic of the dependent variable labelled as *good performance* we estimated a univariate probit model of the probability of *good performance*. As for the explanatory variables, a preliminary analysis of the correlation coefficients excluded severe cases of partial correlation. Among the twenty variables used, we never found a correlation higher than 0.5. The highest correlation values occurred between *horizontal relationships* and *decentralised management* (-0.49) for the traditional districts and between *service location* and *market openness* (0.5) for the integrated districts. Correlation values between 0.4 and 0.5 were also found between other seven couples of variables. In traditional districts, it appear to be a positive correlation between *public incentives* and *innovation* (0.44) and between *size of the firm* and *market openness* (0.40). In integrated districts a positive correlation was found between *size* and *decentralised management* (0.42), *size* and *human capital* (0.42), *size* and *specificity* (0.45), *commercial network* and *supply of subcontracting* (0.46), whereas a negative correlation occurred between *age of the firm* and *competition by larger firms* (-0.44).

Given the results of the correlation analysis and the limited number of observations we first

estimated a univariate probit model for each separate group of variables defined in section 6. We included in the unrestricted final specification only variables which presented a coefficient with a *t*-statistic equal or higher than 1.00 in absolute value in the specification pertaining to each group. The restricted final specification was then obtained from the unrestricted one by considering only variables whose coefficients were significant at at least 10% significance level in a one-sided test.

We must notice that, except in one case, each group displayed at least one significant variable in the separate regressions. In table 2, we only show the best restricted final specifications for the two different types of districts. In our view, two pieces of evidence need to be immediately stressed, since they are common to both groups. First, the important role of *horizontal relationships* for performance in both traditional and integrated districts. The importance of relational variables is also enhanced by the significance of the variable indicating *specificity* in the integrated districts. Second, the weak *direct* effect of the *innovation* variable on performance. Though the innovation variable showed some significance when the separate regressions were run, it was nevertheless excluded from the final specification for both traditional and integrated district firms. Once again, such a result cannot be ascribed to a multicollinearity effect but, rather, to the fact that innovation contributes to performance only through other variables.

Turning to differences between the two groups, the local environment appears to be more important for firms belonging to traditional districts. The impact of local competition in mono-industrial districts is remarkable. Such an evidence, coupled with the one concerning co-operation previously offered confirms the widespread definition of the Marshallian industrial district as an appropriate mix of competition and co-operation (Becattini, 1987). Moreover, institutional factors maintain their importance as shown by the negative effect on performance of the variable related with the inefficiency of local institutions. Finally, firms in traditional districts seem to benefit from the use of a private own commercial network. In integrated districts, in addition to relational variables, other factors for success are the young age of the firm and the ability to penetrate more distant and foreign markets. Both variables signal a greater attention to the effect of globalisation in these districts.

Overall, the probit model explains a relevant number of successful (or unsuccessful) cases, close to 73% for the integrated districts and to 84% for traditional districts. It remains to show whether such result are confirmed if a different definition of the performance variable is used. No major changes were found by using employment growth as the indicator of performance. Of course,

more conclusive results should be assessed through the use of more refined indices (Mazzola and Bruni, 2000).

Tab.2 - Univariate probit model of the probability of good performance

Explanatory variables	District type	
	Traditional	Integrated
<i>Constant</i>	-1.0030 (-2.17)	-1.1034 (-1.69)
<i>Age</i>		-0.0123 (-1.51)
<i>Market openness</i>		0.0138 (1.78)
<i>Local competition</i>	0.9249 (1.80)	
<i>Own commercial network</i>	1.4516 (1.77)	
<i>Horizontal relationships</i>	2.2122 (3.76)	0.7035 (1.52)
<i>Specificity</i>		0.0283 (1.74)
<i>Institutional inefficiency (Bureaucracy)</i>	-1.1128 (-1.93)	
<i>Public incentives</i>	0,0025 (0,016)	
Log L	-16.30	-20.7830
χ^2	26.99	15.05
Correctly predicted cases	36/43 (83.7%)	30/41 (73.2%)

^a t-statistics are in parentheses. χ^2 is the log-likelihood ratio for the significance of the whole set of regressors. Degrees of freedom of this test are given by the number of parameters minus the constant.

We then moved to the second part of our study, aimed at investigating structural differences between the two groups of districts in the explanation of the linkage formation. Given that the impact on performance was confined to horizontal relationships, we constructed different models for horizontal *vis-à-vis* vertical linkages which are shown separately in tables 3 and 4. Table 3 summarises the results of a univariate probit estimation of the probability of horizontal relationships as explained by a set of explanatory variables similar to those defined in section 6. Since the procedure through which we derived the best restricted specification is the same as the one previously followed, we confine our comments to the main results. The role of *innovation* as a main determinant for the setting-up of co-operative relationships with competitors emerges quite neatly both in the mono-industrial and in the integrated districts. In the traditional district the role seems somewhat stronger but this effect is reduced when we introduce *public incentives* in the model. As said, there is a positive correlation between public incentives and innovation. Namely, public support has usually

favoured more innovative firms which, in turn, are the one who are more effectively involved in co-operative behaviour with competitors. Overall, in the traditional district the effect of individual variables (*age, decentralised management*) is higher than the impact of others, which makes the collaborative attitude of firms quite idiosyncratic. An interesting, and apparently counter-intuitive result is given by the positive effect of the *inefficiency of local institution* on the establishment of horizontal relationships. This behaviour displays a characterisation of co-operative behaviour among firms as a reaction to the distrust in institutions, a circumstance which we found recurrent in our analysis.

In integrated districts, the variables affecting *horizontal relationships* show much more variety. All the areas of firms activity are somewhat involved in co-operation, ranging from market aspects to the acquisition of inputs, from innovative activity to services. Expected signs are confirmed and, besides innovation, both *local purchases* and more distant *service activities* positively affect horizontal relationships. Given the importance of commercial partnerships, the existence of an own *commercial network* was found to be negatively related to the probability of establishing horizontal linkages. In conclusion, the behavioural explanation underlining the setting up of horizontal linkages seems truly multidimensional and demonstrates the higher position in the evolutionary scale reached by firms in integrated districts.

We investigated only partially the wide spectrum of input-output connections among firms by focusing on *subcontracting linkages*, which may be regarded as a form of structured *vertical relationships*. We must recall that, by definition, firms operating in integrated districts perform a significant quota of input-output relationships outside the manufacturing sector. Also, we already found that subcontracting relationship did not have any significant impact on performance, a circumstance that is probably a consequence of the limited quota devoted to subcontracting in both sales and purchasing transactions.

As said, firms in traditional districts appear to be more subcontracting suppliers rather than subcontracting users. But many firms in these areas are subcontractors of large units located outside the local system. The results in table 4 show that the firms which use a personal commercial network are less inclined to become subcontractors because this type of sale strategy is often connected with a modification of commercial policies. Also, competition by larger firms often prevents subcontracting while a bigger size favours the supply of subcontracting because large units often ask

for particular requirements that small enterprises are not able to fulfil. There does not appear a significant difference between traditional and integrated districts as far as the supply of subcontracting is concerned. In the latter group, however, there is a significant impact of local purchases which indirectly shows more integration among large units which acquire the product of subcontracting firms, subcontractors and small firms providing inputs to subcontractors.

Tab.3- Univariate probit model of the probability of horizontal relationships

Explanatory variables	District type	
	<i>Traditional</i>	<i>Integrated</i>
<i>Constant</i>	0.9325 (1.03)	-2.8895 (-1.40)
<i>Age</i>	-0.0410 (-1.43)	
<i>Innovation</i>	1.3638 (2.13)	0.9575 (1.43)
<i>Decentralised management</i>	-0.4446 (-3.28)	
<i>Own commercial network</i>		-1.5618 (-1.94)
<i>Local purchases</i>		0.0193 (1.67)
<i>Service location</i>		0.1759 (1.54)
<i>Infrastructure</i>		1.7214 (2.13)
<i>Institutional inefficiency (Bureaucracy)</i>	1.1125 (2.00)	
<i>Credit rationing</i>		2.1131 (3.00)
Log L	-19.0328	-216.04
χ^2	20.96	23.07
Correctly predicted cases	32/43 (74.4%)	221 (66,8%)

^a t-statistics are in parentheses. χ^2 is the log-likelihood ratio for the significance of the whole set of regressors. Degrees of freedom of this test are given by the number of parameters minus the constant.

Integrated districts appear to be more active as far as the demand of subcontracting is concerned. Here, too, the role of local purchases emerges, which means that firms in integrated districts are more able to create markets for intermediate goods with respect to the firms in traditional districts. This is a side effect of the fact that, unlike what happened in North-eastern and

Central Italy, mono-industrial districts in Sicily are still quite far from generating markets in intermediate stages of production. We must remind that the creation of a market for intermediate goods is advocated by Hirschman (1977) as a crucial requirement of the industrialisation take-off in a lagging area.

Tab.4. - Regression model of subcontracting linkages

Explanatory variables	Supply of subcontracting		Demand of subcontracting	
	<i>Traditional districts</i>	<i>Integrated districts</i>	<i>Traditional districts</i>	<i>Integrated districts</i>
<i>Constant</i>	56.5882 (3.51)	44.1058 (2.92)	4.4936 (0.33)	16.3308 (0.65)
<i>Size</i>	0.0032 (1.55)	0.0003 (1.47)		
<i>Innovation</i>			-9.5087 (-1.42)	
<i>Decentralised management</i>	-4.9065 (-1.59)		-3.1325 (-2.,27)	-0,3747 (-2,702)
<i>Market openness</i>			0.1135 (1.54)	
<i>Own commercial linkage</i>	-33.7614 (-2.13)	-20.0507 (-2.40)		-26.5675 (-2.01)
<i>Local competition</i>		-12.6168 (-1.79)		
<i>Competition by larger firms</i>	-16.3297 (-1.36)			
<i>Local purchases</i>		0.1436 (1.36)		0.2499 (1.37)
<i>Service location</i>		-1.3785 (-1.43)	1.7614 (2.09)	2.0881 (1.27)
<i>Infrastructure</i>			8.2920 (1.54)	
<i>Public incentives</i>			-11.2372 (-1.59)	-15.6633 (-1.48)
<i>Credit rationing</i>				-17.0113 (-1.58)
Number of observations	43	41	43	41
R ²	0.26	0.37	0.37	0.29
DW	1.67	1.85	1.96	2.08
F	3.41	4.18	3.54	2.89

^a Size is expressed in terms of total sales.

In both traditional and integrated districts the firms which purchase service activities from more distance are more likely to use subcontractors in their production process. This is probably an indication that some outsourcing is going on or that, more likely, the use of more advanced service activities modifies the organisational structure of firms and require some reconsideration of input-

output connections. A final point is that, while credit rationing has the expected sign, public incentives appear to induce less use of subcontractors by the firms, thus showing a perverse role.

Once again, though striking differences between the two groups do not seem to emerge, firms in integrated districts appear to show a more complex behaviour and appear to be able to exploit more effectively the advantages of the division of labour. However, the low goodness of fit of the models concerning subcontracting behaviour suggests further consideration of the pieces of evidence emerged in our analysis.

8. Conclusions and policy remarks

The evidence offered by this paper is undoubtedly mixed and not always in line with related theoretical backgrounds. However, some emerging points need to be underlined. We started by looking for potential structural differences in manufacturing agglomerations inside a lagging area somewhat related with the presence of heterogeneous firms. By comparing traditional mono-industrial and integrated districts we found some interesting results concerning the nexus between performance, innovation and linkages. As for performance, no striking difference emerges between the two groups of firms, both in terms of total growth and number of successful firms. No sectoral bias can be deemed as responsible for such result since the selected industries are quite diversified inside each group. The number of innovative firms is higher in traditional districts but this result may strongly depend on the role of public incentives. In this respect, it is hard to determine whether public incentives were channelled towards more solid and innovative firms or firms started to introduce innovation and to make organisational changes because of public incentives. Finally, the density of linkages is not remarkably different between integrated and traditional firms and in both contexts horizontal relationships seem to predominate.

When causality links are investigated, innovative behaviour seems to be a major determinant of the ability (or desire) to establish firm linkages. The impact of innovation on performance is only indirect, obtained through the action of firm relationships. In other terms, firm's innovative behaviour is determined by idiosyncratic reasons or by the availability of public support and this behaviour forces the entrepreneurs to co-operate. Therefore it affects performance through the synergetic role

of a dense network of relationship. We may say that the paper faces the nexus between innovation and linkages from a reversed angle with respect of the theory of collective learning which stresses the role of linkages among local actors in enhancing the innovation potential. This change of perspective may be the result of dealing with a lagging area, which has not yet evolved towards more modern industrial configurations. Nevertheless, the paper conclusions are in line with other theoretical frameworks (innovation milieu or collective learning theories) in stressing the favourable role of local transactions for firm success. Thus, there are valid reasons to support the hypothesis that collective learning is easier to develop between actors within a region than between actors in different regions (Sternberg, 1999).

However, region specific innovation policies are to be developed in order to support this kind of collective learning process. Hence, policies focusing largely on a strategy of assisting all innovative SMEs in a region through agencies providing assessment and making consulting services available to individual firms are unlikely to achieve the intended goal, especially when the region lacks typical attributes of industrial districts. Indeed, recent evidence (Censis, 2000) shows that public actors have assumed a follower attitude with respect to more private organisations (chambers of commerce, entrepreneurial associations and so on) in promoting development in industrial districts.

Therefore, it is advisable to increase the attempts on the part of local and regional policy makers to encourage innovative intraregional or local linkages between innovative actors, including SMEs and research institutions. SMEs must be the centre of that strategy, because they profit more from intraregional or local linkages than large firms do. These policies should concentrate on assisting firms to enlarge the spectrum of their existing horizontal relationships and to move more decisively to the establishment of vertical linkages in order to fully explore the advantages that heterogeneity can produce to knowledge accumulation.

References

- Amin A. and Thrift N. (1992) Neo-Marshallian nodes in global network, *International Journal of Urban & Regional Research* 16, 571-587
- Amin A. and Wilkinson F. (1999) Learning, proximity and industrial performance: an introduction, *Cambridge Journal of Economics* 23.2, 121-125
- Antonelli C. (1999) The evolution of the industrial organisation of the production of knowledge, *Cambridge Journal of Economics* 23.2, 243-260

- Asmundo A. (2000), Strutture produttive e domanda di lavoro in Sicilia, *Rivista economica del Mezzogiorno* 1
- Asmundo A. and Mazzola F. (1999) Il non distretto: modelli interpretativi ed evidenza empirica del processo di sviluppo dei sistemi locali manifatturieri in Sicilia, paper presented at the *XX Conferenza Italiana di Scienze Regionali*, Piacenza, October 5-7
- Audretsch D.B. and Mata J.(1995), The post-entry performance of firms:Introduction, *International Journal of Industrial Organization*, 13, 413-419.
- Aydalot P. and Keeble D. (Eds) (1988) *High Technology in Innovative Environments: The European Experience*, Routledge, London/New York
- Banco di Sicilia - Osservatorio sull'economia siciliana (2000), *Indagine strutturale sulle imprese manifatturiere siciliane*, Palermo
- Batten D., Casti J. and Thord R. (Eds) (1995), *Networks in Action*, Springer, Berlin
- Becattini G. (1987) (a cura di), *Mercato e forze locali: il distretto industriale*, Bologna, Il Mulino
- Becattini G. (1989), (a cura di), *Modelli locali di sviluppo*, Bologna, Il Mulino
- Becattini G. and Rullani E. (1993), Sistema locale e mercato globale, *Economia e politica industriale* 80, 25-48
- Bellandi M. and Russo M. (1994) (a cura di), *Distretti industriali e cambiamento economico locale*, Torino, Rosenberg & Sellier
- Bianchi P. (1989) Concorrenza dinamica, distretti industriali e interventi locali, in Gobbo F. (Ed) *Distretti e sistemi produttivi alle soglie degli anni Novanta*, Franco Angeli, Milano, 47-60
- Braczyk H.-J., Cooke P. and Heidenreich M. (Eds) (1997) *Regional Innovation Systems: The Role of Governances in a Globalized Economy*, UCL Press, London
- Bruni S. and Mazzola F. (1997), Relazioni tra imprese e successo imprenditoriale nel Mezzogiorno: una verifica econometrica, *L'Industria*, n. 4
- Brusco S., 1983, Flessibilità e solidità del sistema: l'esperienza emiliana, in Fuà G. and C.Zacchia (Eds.), *Industrializzazione senza fratture* Bologna, Il Mulino, 103-129.
- Brusco S. (1989)(a cura di), *Piccole imprese e distretti industriali*, Torino, Rosenberg e Sellier
- Brusco S. and Paba S. (1996), Per una storia dei distretti industriali italiani dal secondo dopoguerra agli anni novanta, in Barca F.(Ed.), *Storia del capitalismo italiano dal dopoguerra ad oggi*, Roma, Donzelli, 265-333
- Camagni R. (1991) Local "milieu", uncertainty and innovation networks: towards a new dynamic theory of economic space, in Camagni R. (Ed) *Innovation Networks: Spatial Perspectives*, pp. 121-142, Belhaven, London
- Capello R. (1999) Spatial transfer of knowledge in high technology milieux: learning versus collective learning processes, *Regional Studies* 33.4, 353-366
- Censis (2000), *Dai distretti industriali una ripresa possibile – IX Forum nazionale delle economie locali*, February 18, Montebelluna
- De Bernardy M. (1999) Reactive and proactive local territory: co-operation and community in Grenoble, *Regional Studies* 33.4, 343-352
- Dei Ottati G (1987), Il mercato comunitario, in Becattini G.(a cura di), *Mercato e forze locali: il distretto industriale*, Bologna, Il Mulino, 117-141
- Dei Ottati G. (1995), *Tra mercato e comunità: aspetti concettuali e ricerche empiriche sul distretto industriale*, Milano, F.Angeli
- Dunning J. K. (1974) *Economic Analysis and the Multinational Enterprise*, Allen & Unwin, London

- Dunning J. K. (1993) *Multinational Enterprises and the Global Economy*, Addison Wesley, London
- Fukuyama F. (1995) *Trust*, The Free Press, New York
- Garofoli G. (1991), *Modelli locali di sviluppo*, Milano, Franco Angeli
- Granovetter M. (1989), Nuova e vecchia sociologia economica: evoluzione storica e prospettive di ricerca, *Economia e politica industriale* 61, 135-163
- Hirschmann A. O. (1958), *The Strategy of Economic Development*, New Haven, Yale University Press
- Hirschmann A. O. (1977), A generalized linkage approach to development, with special reference to staples, *Economic Development and Cultural Change* 25, suppl., 67-98
- Hood N. and Taggart J. H. (1999) Subsidiary development in German and Japanese Manufacturing subsidiaries in the British Isles, *Regional Studies* 33.6, 513-528
- Innocenti A. (1998) Gerarchia e contratti. Il ruolo dei rapporti di subfornitura tra piccole imprese nell'evoluzione dei distretti industriali, *L'industria*, XIX, 2, 391-415
- Istat (1997), *I sistemi locali del lavoro 1991*, Argomenti n. 10, Roma
- Ivarsson I. (1999) Competitive industry clusters and inward TNC investments: the case of Sweden, *Regional Studies* 33.1, 37-49
- Keeble D., Lawson C., Moore B. and Wilkinson F. (1999) Collective learning processes, networking and "institutional thickness" in the Cambridge region, *Regional Studies* 33.4, 319-332
- Keeble D. and Wilkinson F. (1999) Collective learning and knowledge development in the evolution of regional clusters of high technology SMEs in Europe, *Regional Studies* 33.4, 295-303
- Krugman P. (1991a) Increasing returns and economic geography *Journal of Political Economy* 99, 483-499
- Krugman P. (1991b) History and industrial location: the case of the manufacturing belt *American Economic Review* 81, 80-83
- Lawson K. and Lorenz E. (1999) Collective learning, tacit knowledge and regional innovative capacity, *Regional Studies* 33.4, 305-318
- Lorenz E.H. (1992) Trust, community and co-operation: toward a theory of industrial districts, in Storper M. e Scott A. (Eds) *Pathways to Industrialization and Regional Development*, Routledge, London
- Marshall A. (1890), *Principles of Economics*, London. MacMillan.
- Martin R. and Sunley P. (1996) Paul Krugman's geographical economics and its implications for regional theory: a critical assessment, *Economic Geography* 77, 259-292
- Mazzola F. and Asmundo A. (1999) I sistemi locali manifatturieri in Sicilia, *Quaderni di ricerca*, Banco di Sicilia, Osservatorio sull'economia siciliana, Palermo
- Mazzola F. and Bruni S. (2000), The Role of Linkages in Firms' Performance: Evidence of Hirschman's hypothesis from Southern Italy, *Journal of Economic Behavior and Organization*, forthcoming
- Musumeci M. (1998) Il sistema produttivo in Sicilia. L'industria manifatturiera, *Rivista economica del Mezzogiorno* XIX, 4, 799-839
- Maillat D., Crevoisier O. and Lecoq B. (1994), Innovation networks and territorial dynamics: a tentative typology, in Johansson B., Karlsson C. and Westin L. (Eds) *Patterns of a Network Economy*, pp. 33-52, Springer, Berlin
- Pinch S. and Henry N. (1999) Paul Krugman's Geographical Economics, Industrial Clustering and

- the British Motor Sport Industry, *Regional Studies* 33.9, 815-827
- Portes A. (1998) Social capital: its origin and applications in modern sociology, *Annual Review of Sociology* 24, 1-24
- Putnam R.(1993) *Making Democracy Work: Civic Traditions in Modern Italy*, Princeton University Press, Princeton
- Rabellotti R. and Schmitz H. (1999) The internal heterogeneity of industrial districts in Italy, Brazil and Mexico, *Regional Studies* 33.2, 97-108
- Ratti R., Bramanti A. and Gordon R. (Eds) (1997), *The Dynamics of Innovative Regions*, Ashgate, Aldershot
- Reid G.C.(1991) Staying in business, *International Journal of Industrial Organization*,9, 545-556
- Reid G.C.(1993) *Small Business Enterprise. An Economic Analysis*, Routledge, London-New York
- Sabel C. (1988) Flexible specialisation and the re-emergence of regional economies, in Hirst P. and Zeitlin J. (Eds), *Reversing Industrial Decline*, Berg, Oxford, 17-70
- Sternberg R. (1999) Innovative linkage and proximity: empirical results from recent surveys of small and medium sized firms in German regions, *Regional Studies* 33.6, 529-540
- Storper M. and Harrison B. (1991) Flexibility, hierarchy and regional development: the changing structure of industrial production systems and their forms of governance in the 1990s, *Research Policy* 20, 407-22
- Storper M. (1995) The resurgence of regional economies, ten years later: the region as a nexus of untraded interdependencies, *European Urban and Regional Studies* 2, 191-221
- Storper M. (1997) *The Regional World: Territorial Development and in a Global Economy*, The Guildford Press, New York
- Triglia C. (1998) Il Sud in mezzo al guado, *Meridiana* 31, 89-98
- Triglia C. (1999) Capitale sociale e sviluppo locale, *Stato e mercato* 57, 419-440
- Tullio G. and Quarella (1999) Converggenza economica tra le regioni italiane: il ruolo della criminalità e della spesa pubblica 1960-93, *Rivista di Politica Economica*, III, March, 77-128