The borders of "industrial districts"

in an international competitive environment

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ABSTRACT

The paper analyses the geographical scope of the links, which integrate the small and medium size firms, tightly embedded in a local production system ("industrial district"), with other firms and organizations both in a local and in an interregional perspective. In particular the paper aims to indicate the evolution of these relationships in the framework of the new forms of industrial organisation brought by the new technologies and the increasing international integration.

In fact, many recent contributions to the theory of local development focus on the characteristics of the internal structure of the local production systems, while they do not explictly deal with the problem of defining the borders of these local production systems. However, an exact definition of the borders of a local production district seems to be required in a policy perspective, in order to identify the responsible institutions, the vertical and horizontal coordination mechanisms and even the strategies and the instruments of the policy to be adopted.

The paper first analyses the recent process of increasing international integration of the small and medium size firms and of the local production systems. Secondly, it compares different theoretical approaches to the analysis of the local production systems and it analyses the relationship between this latter concept and the concept of the territorial networks. Then, the paper presents the results of a recent empirical study on the relative performance of the local production systems in a large industrialized region (Lombardy, Italy). Finally, the paper concludes with the analysis of the implication of the network approach for the policies in the local production systems.

Keywords: borders, regionalization, local production systems, industrial districts, territorial networks, territorial competitiveness, regional industrial policies.

1. Introduction

The diffusion of industrial development at the interregional and international scale in Europe during the last decades points out a clear and sustained shift from few old industrialized regions to various new regions, due to the very different performance in terms of employment and output of the individuals regions and of the individuals countries.

Thus, the order between the European regions in terms of rate of industrialization has radically changed. Similarly, within the individual regions the most industrialized areas are not any more the largest urban centers but those areas, which once were typically rural.

The last two decades, with the advent of the "post-fordist" era and under the pressure of major technological revolutions, have also been characterized by profound changes in the forms of organization of firms and industries.

Thus, it is important to analyze the structural changes in the most industrialized regions, such as Lombardy and Nord Rhein Westfalen, in order to identify the feasibility of extending similar processes also in the less developed regions.

The vitality of systems of small firms strongly rooted in specific geographical areas has attracted the attention of scholars and policy makers, spawning an enormous variety of interpretations and contributions. In a closely related way, industrial economists have rediscovered the fundamental importance of the territorial dimension of productive and innovative activities, while regional economists have rediscovered and absorbed the suggestions coming from the developments in the economics of innovation and technological change.

The model of the "industrial districts" may have originally appeared as a curious and isolated exception with respect to the mainstream development paradigm. However, after almost four decades, it has demonstrated to be rather robust and capable to systematically overcome the crisis, which according to its critics should have led to its progressive decline and to an inevitable homologation to the traditional model of the large firm, which characterizes the areas of older industrialization.

"Industrial districts" have been identified in almost any country in Europe and have stimulated the development of a large number of studies. A major result of this research effort has been to gradually overcome the original approach, which was considering this as an, albeit virtuous, exception to the general paradigm, determined by very specific factors relevant in delimited areas and mainly having a non economic but rather social and cultural character (Cappellin 1998, Steiner 1998). In fact, economic literature, starting from the specific case of the "industrial districts", has identified factors and process, which have a general relevance and which are increasingly important in any sector and in any area of the modern industrial economies.

In this perspective, the development of networks of both large and small firms and the crucial role of knowledge as a strategic competitive factor make obsolete the traditional divide between the model of the small and medium size firms and the model of the large

firm, as well as the divide between the "high-tech" industries of a supposed "new economy" and the traditional industries of the "old economy".

An important question is that of originally redefining the most appropriate geographical framework for the design and the implementation of the industrial policies. Traditional instruments of national industrial policy, such as the financial incentives or the market regulation (Balloni *et al.* 1998), can not be efficiently managed at the local level. However, they are neither capable to effectively tackle the problems of the small and medium firms, which represent a large share of European industry, or the relationships between the process of industrial development and the labor market and the territorial environment, as these policy fields clearly require decentralized policy decisions. However, even the regional level may be too wide in order to effectively intervene on very different local contexts.

A new approach to regional industrial policies is emerging in Europe, leading to a widening of the traditional perspective of these policies, which have considered essentially measures aimed at the individual firms, toward a better integration with the labor market problems, the territorial and transport organization and even the reform of the institutional framework.

In fact, the problem of the governance of the local economic system is not only "what to do?", or the identification of the appropriate productions and technologies, but also the questions "where to do ?", or the choice of the most appropriate geographical framework of public intervention, and "with whom to do ?", or to define the role allowed to private and non public organizations.

In this paper, we discuss some recent important changes in the forms of industrial organization at the territorial level and some broad implications for regional industrial policies. Whilst the discussion refers to the case of the Lombardy region, we believe that the essence of the argument may have a wider generality, as it raises basic issues and problems that apply to a large of variety of circumstances.

Starting from this background, in this paper we discuss how the concept of industrial district may not be adequate to analyze and guide policy making in productive systems like Lombardy. We argue that it is extremely important to define precisely the concept of "production district" and of "local production system", which may be most appropriate with respect to the specific characteristics of the economy and of the territory of an already developed region and which may take into consideration the recent evolution of the relationships among the firms and of the production technologies in the international experience.

In particular, somewhat different concepts, like regional systems of innovation, milieux innovateurs, learning regions and the like, seem to converge in suggesting that the origins of the vitality of territorial-based systems of small and medium sized firms ultimately reside in the ability to develop dense networks of technical, economic, social and institutional relationships within and outside the region, capable of sustaining continuous process of learning, innovation and change over the long run.

We emphasize the need to overcome the localized approach of the "industrial districts", focused on the concept of geographical concentration and sectoral specialization,

towards a "territorial" approach, which aims at promoting a greater and better integration between the various production activities and the various actors, both within the individual region and with the other regions in an interregional and international framework.

The paper is organized as follows. In Section 2 we discuss some broad trends in the patterns of evolution of the prevailing forms of industrial organization, emphasizing the relevance of networks of large and small firms. In Section 3, the specific case of Lombardy is briefly presented. In Sections 4 and 5, we review various complementary conceptualizations of regionally embedded networks of small firms and on these bases we develop the concept of territorial networks. Section 6 introduces and discusses the implications for regional industrial policies, which originate from this conceptualization.

2. The evolution in the models of industrial organization

The model of industry that emerges at the thresholds of the 21st century is deeply different from the model of mass industrialization, on which the traditional economic theory is based. In a modern industrial economy, the model of industrial organization based on the concept of economies of scale has been replaced by a new organizational model based on an increasing integration, cooperation and competition between different firms that belong to the same ample sector of activity.

The speed of adoption of product innovations and the flexibility of integration with other local and foreign firms or organizations increasingly are the crucial factors of the competitiveness of the firms, even more than the continuous expansion of the production capacities, through the investments, or the containment of the production costs, through the imposition of lower wage levels.

The most dynamic regions are those where the negative impact on the employment levels determined by the inevitable closures and by the downsizing of the existing firms is compensated by the birth and the fast growth of many small and middle size firms, often in new sectors of activity.

Although the large and the small firms represent two alternative models of production organization, they must face a common competitive challenge and they follow complementary organization approaches. In fact, the process of search of a better flexibility by the large firms, that adopt a more decentralized structure, corresponds to the process of search by the small firms of forms of integration through networks, which may have a rather formalized and stable character.

Thus, the traditional paradigm of the large firm, which is usually adopted in the modern business studies or in the traditional neoclassical theory, differs under different aspects from the model of the networks of firms, as it is pointed out in table 1.

In fact, actors, who behave according to an entrepreneurial logic, have an increasing importance with respect to actors, which behave according to a managerial logic. Similarly, the flexibility of the complex relationships of financial partnership existing in

a network of different firms becomes more important than the stable top-down relationships based on financial control, as it is usual within a financial group.

Table 1: Two models of industry

Classical model	*Network model*
Manager	Entrepreneur
Stable financial control relationships in subsidiaries and	High variability of the financial participation both within the group between the different financial groups
Decrease of labor costs	Decrease of prices paid to subcontractors
Flexibility of labor and layoff of employees	Labor stability and loyalty and flexibility of subcontracting agreements
R&D investments in specific technological fields	Integration of different technologies and continuous investment in training
Incremental expansion of production capacity through investments in new production plants	Fast technological obsolescence and productivity increase through restructuring and downsizing
Maximization of sales and share in the national market	Downsizing and focus on specific segments of the international market
Exploitation of "scope economies" between different products	Focus on specific products and acquisition of complementary technologies
Increase of sales and firm size	"Spin-off" of new "ventures" for the development of new products
Growth of sales through exports	Internationalization of the firm and exchange of know-how
Greenfield investments in new countries and regions	Acquisition of and cooperation with local firms in new countries and regions

Within a network, the competitiveness is not insured by the decrease of the labor costs and by the flexibility or the decrease of the employees, as well as by the systematic decrease of the prices paid to the suppliers and by the high flexibility of the contractual relationships with these latter. That flexibility contrasts with the relatively stable

relationships, based on reciprocal trust and loyalty, with the workers, or at least with the most skilled workers, within each firm.

Technological progress is not insured only by incremental investments in R&D within a specific scientific field, as by the integration of different technologies of the various firms belonging to the network and by a major investment in the continuous training of the workers.

While individual firms seem to aim to an incremental expansion of production and to the increase of the productive capacities through the investments in new plants, within a network the crucial objective becomes to promote the speed of substitution of the existing production equipments, which are subject to an increasing rapid technological obsolescence. This implies the objective of reducing the internal production capacity of the firms through the downsizing and the outsourcing process.

The firms of a network aim at increasing their own size not through the continuous growth of the market share held in their respective fields of traditional production, but through the spin-off of new productions into new firms, linked through financial links.

Finally, while the individual firms aim to increase exports and to invest in the creation of new production plants in foreign countries, a network organization leads to assign a greater importance to the process of internationalization of the individual firm, the acquisitions of foreign firms and the various forms of cooperation with foreign firms, aiming at promoting the exchange of know-how.

Therefore, a thorough analysis of various mechanisms of crucial importance in the production organization of modern industry, such as:
- the mechanisms of financial control and the process of strategic decision,
- the mechanisms of decision of the labor demand and of the labor organization,
- the processes of production growth and the decisions of investment,
- the mechanisms related with the growth of productivity, the decrease of costs and the adoption of process innovations,
- the processes of adoption of product innovations or of product diversification,
- the processes of expansion at the international scale or of internationalization,
demonstrates that these mechanisms are very different, when the perspective of analysis is enlarged from the case of the individual firm, which vertically integrates the various phases of a given production process, to the case of a system or a network of firms, which are relatively autonomous among themselves.

Therefore, the increasing integration of the firms in sectorial or geographical clusters makes increasingly less adequate the methodologies of analysis, which aims at analyzing mechanisms exclusively according to a traditional micro-economic or business approach. Rather, it indicates the need of new methods of analysis capable to considering the mechanisms that operate at the level of an overall system of firms or that have a "meso-economic" or intersectoral character.

Moreover, it is not sure that the integration of the productions in a single large firm would involve an organization, which may be more efficient in static terms and especially more robust, flexible and competitive in the medium and long term with respect to the case of the local production systems or of the sectorial clusters, which are

usually made by about a thousand of small and intermediate firms and have an employment of ten thousand employees, in the same sector or in sectors, which are tightly integrated between themselves.

In particular, it is clear that the tools of regional or national industrial policy, that have been elaborated in order to operate on individual firms, like the various tools of financial incentive, result to be absolutely inadequate in the case of the networks or of the groups of many large and small firms. Certainly, they appear at least partial, if they are not integrated with other tools which aim at creating a system and operate on the mechanisms of relationship that tie the different firms between themselves in a local production system characterized by a strong internal integration.

Industrial policy should pass from a "distributive" logic, using financial incentives, to a logic of regulation/ deregulation. This also implies a shift from a "prescriptive" policy, that in a dirigist manner points out specific productions or technologies, to a "transactive" policy (Cappellin 1997), that acts on the transaction costs or on the relationships of integration between the individual firms and facilitates the various technological and organizational changes in a given geographical or sectorial system of firms.

3. The economic characteristics of local production systems in Lombardy

According to Becattini (1991), the district is the result of the combination of the specific socio-cultural characters of a community, of the historical-naturalistic characteristics of a geographical area and of the technical characteristics of the production process and it is the result of a process of dynamic integration (a virtuous circle) between the division of labor in the district and the widening of the market of its products.

In particular, the Marshallian industrial district would be made by a population of independent small and middle firms, mostly coincident with individual production phases, supported by a myriad of units supplying production services and of cottage and part-time workers, which are oriented by an open group of pure entrepreneurs through the market of the production orders.

Although there is not a single definition of industrial district in the very large number of empirical and theoretical, Italian and foreign, studies devoted to the analysis of this modern form of territorial organization of the firms, a wide consensus seems to exist on the following characteristics of an industrial district (Garofoli 1991, Brusco and Paba 1997, Steiner 1998):
- an high specialization in a specific product,
- a population of small and medium size firms,
- production processes decomposed in different phases with low optimal technical sizes,
- a presence of external economies for the individual firms, but internal in the local territory,
- the development of subcontracting agreements and of cooperative behaviors between the firms,
- an high mobility from employee to self-employment status and high birth and death rates of the firms,

- the development of a common production and organizational know-how embodied in the skills of the local labor force.

However, this traditional model of the "industrial district" seems to correspond to the experience of specific local production systems of Lombardy during the 60'ties, but it is absolutely inadequate to interpret the industrial structure of a developed regional economy, such as Lombardy actually is.

In fact, different "production systems" are clearly identifiable in Lombardy at the local or provincial scale, which are characterized by a rather different structure and which are strongly rooted in their respective territory.

However, these territorial production systems differ with respect to the traditional definition of the "industrial district", based on a model of "endogenous" development and strongly specialized in a specific sector, at least for the following characteristics:
- a great international openness not only in terms of exports, but also of international investments both from and toward abroad and in terms of international commercial, technological and technological agreements,
- a great and increasing sectoral diversification of productions and a tight integration of the various sectors and in particular of the manufacturing activities with the logistic and modern distribution sectors and with the technological and management consulting services,
- an enlargement of the local production know-how and a high diversity and complementarity of the technologies adopted by the individual firms within the same local production system.

These characteristics are the outcome of a continuous process of evolution of the form of the local production systems, that makes rapidly obsolete the traditional ideal representations of an "industrial district", which may be found in the economic literature.

In particular, during the 90'ties, a process of intense restructuring of the industrial system has occurred in Lombardy and – albeit with a high degree of abstraction - two phases may be identified.

After 1993, the industrial firms in Lombardy, favored by the devaluation of the lira, have consolidated their direct presence in the developed countries, which were the traditional market of their export, through direct investments and the acquisitions of foreign firms.

Instead, after 1998, the entry in the European Monetary Union and the increasing importance of cost competitiveness has forced firms to increase their efforts in the process of industrial restructuring. That has led to invest more in the adoption of process innovation within their production structures and also to increasingly decentralize the most traditional productions to low labor cost countries.

However, in the next future, the international competitiveness of Lombardy seems to require the capability to perform a "technological shift" and to introduce important product innovation, both through R&D investments and through an original integration

of various new technologies in the production of new products, even in the traditional industrial sectors of specialization.

4. New concepts in the development of local production systems

It is necessary to adapt the traditional model of the "industrial districts", which may have been appropriate to explain the industrialization process of the '60ties, to the actual specific characteristics of the "local production systems" in a developed industrial region, such as Lombardy.

The territorial production systems in many countries have evolved from the stage of the traditional mono-sectorial "industrial district", that is analogous to a simple localized cluster of similar firms, that work in the same productive sector, to the stage of "territorial networks", made by many specialized and complementary firms. Moreover, a trend appears leading to the creation of networks of local production systems, which may extend both within the same region and also among various regions even at the international scale.

That suggests the usefulness of various new theoretical concepts, which are tightly connected with that of "industrial districts", such as: the local production systems, the territorial clusters, the local innovation systems, the territorial networks, which may provide useful insights into the recent evolution of the networks of firms and their embeddedness in their respective local environment.

The "milieux innovateurs"

With respect to the concept of "industrial district," the concept of "milieu innovateur" is not focused only on the efficient and decentralized organization of the local productions, but it is focused on the role of the innovation processes, that could take different forms, like the processes of imitation and of development of specific technology or the ability of reallocation of the local resources from the sectors in decline to new emergent sectors, when the local production system is stricken by a crisis and by external shocks.

Two typical elements of a "milieu" are a "logic of interaction," that it is revealed by the creation of "innovation networks" and by an explicit cooperation between the different local, private, public and collective actors (Maillat 1995), and a "dynamic of collective learning", that implies the ability by the local actors of gradually modifying their behavior according to the change in the external environment and of activating the internal resources of the "milieu", in order to create solutions that are appropriate to a new situation.

The regional innovation systems (RIS)

This approach emphasizes the systemic dimension of the innovation process, which derives from the fact that a regional system of innovation is made by a plurality of actors, like large and small firms working in a production sector, where network

relationships exist or could be economically foreseen, institutes of research and of superior training, private laboratories of R&D, agencies of technological transfer, chambers of commerce, associations of enterprises, organizations of professional training, specific governmental agencies and appropriate offices of the public administrations. This sense of belonging represents the base of an "associative approach" or of an "associative governance", that leads to the creation of club, forum, consortia and different institutional schemes of partnership (Cooke 1998, Cooke and Morgan 1998).

A regional system of innovation could be defined like a system in which the firms and the other organizations are systematically engaged in an interactive learning through an institutional environment characterized by local embeddedness.

The concept of "regional system of innovation" (RIS) appears to be certainly broader than the traditional concept of "industrial district" and able, like also the concept of "milieu innovateur", to analyze different types of local production system.

In this perspective a tipology of RIS could be built (Cooke 1998). For instance a "localist RIS", like Tuscany, is characterized by few large firms both of local and of external origin, by a spectrum of activity of research or by a "research reach", which is not very broad. On the contrary, an "interactive RIS", like Catalunia and Baden Wuerttemberg, is characterized by a relative balance of large and small firms, both indigenous and external, while the spectrum of research activity includes diversified structures of regional research and the reliance on external innovations. Finally, a "globalized RIS", like California or North Rhein Westfalia or Midi Pyrénées, is characterized by the domination of global firms, often supported by a localized supply chain made by SMEs, which are rather dependent on the large companies.

In synthesis, innovation within a firm, which is integrated in a regional system of innovation, seems to be affected by four types of factors (Hassink 1999):
a) internal factors: qualification and working capabilities, research and development, strategies and attitudes, size, financial resources, sector of affiliation;
b) production environment: labor market, product markets and competition, suppliers, innovation capability of the other firms, autonomy or dependence of the firms;
c) infrastructures and public R&D policies: public research institutions, universities, technological policies, scientific research policies, regional policies, industrial policies;
d) innovation support system: agencies of technological transfer and of technical assistance, agencies of regional and local development, chambers of commerce, technological parks and technopolis.

The approach of the "proximity dynamics "

This approach introduces the notion of territorial proximity, given by the intersection/overlap of three different dimensions of proximity, which may be classified respectively under the name of "geographical proximity", of "organizational proximity" and of "institutional proximity" (Rallet and Torre 1998, Bellet *et al.*1993).

While organizational proximity deals with the links in terms of production organization, the geographical proximity deals with the links in terms of distance. The organizational

proximity is based upon on the logic of organizational membership and of intrinsic similarity of the actors. Instead, the geographical proximity refers to the natural and physical limits and it includes the effect of the transport infrastructures.

An industrial district combines in its definition these two components, since the firms that constitute an industrial district are tied up among themselves at the same time in terms of relationships of similarity or of membership and they are also located at a short functional distance.

Finally, the institutional proximity means the belief into representations, models and rules of thought and of action by the agents belonging to a common territory. It consists of the development of relationships of intentional nature, like the relationships of cooperation, of trust, of exchange of technological information, of partnership, that determines the strategy of the actors. It implies forms of collective action and the creation of institutions both formal and informal that perform an often fundamental role in the mechanisms of operation of the economic agents.

The interaction through the price mechanism is not the only one and it could be accompanied by a series of non-market interactions or by forms of reciprocal coordination, like the relationships of cooperation or the relationships of trust or of technological interaction.

The geographical proximity allows the development of knowledge interactions, whether this is accompanied by an appropriate organizational and institutional context. However, the experience accumulated in the international transfers of technology has demonstrated that the geographical distance is less important as an obstacle to the international cooperation that the organizational and technological distance. In fact, the cooperation is greater between firms with similar technology, even when they are localized in different regions, than between organizations of the same region which don't share the same problems and objectives.

The "learning regions"

According to this approach, "knowledge represents the fundamental resource in the contemporary economy and the process of learning represents the most important process" (Lundvall 1992, Lundvall and Johnson 1994).

This strategy is based on the belief that the opportunities of development and the exogenous risk factors, which have an objective character, don't determine automatic results but that, in order to be valorized or opposed, they require the development of the local technical, organizational and entrepreneurial abilities, which must be built through a process of learning and have a subjective character.

The objective of a "learning region" it is that of integrating the tacit or implicit traditional knowledge, which is bound to the local context, with the codified knowledge available at the world level, in order to stimulate the regional endogenous potential.

The creation of new knowledge implies an intense process of interaction (Nonaka and Konno 1998), which is characterized by transfers both of tacit knowledge and of explicit

knowledge and which requires face to face contacts and a physical proximity, like also contacts through the ICT on long distance.

The concept of learning region (Morgan 1997) is very similar to that of the regional innovation system and it indicates that the presence of a plurality of actors within the same local production system favors the diffusion and the accumulation of knowledge.

The knowledge networks are based on vertical customer-supplier relationships, which are a crucial tool for the development of incremental product innovations, and also on horizontal relationships, that could promote the development of the innovation process through the offer of information on technological opportunity and the process of imitation and of adaptation of success innovations adopted by other firms and organizations (Maillat and Kebir 1999).

The concept of regional system of innovation and of a learning region appears to be more general than that of "industrial district" and it is suitable both for the less developed regions and to more developed regions, which seem to have by now overcome the phase of a tight specialization. It bases himself on the concept of evolutionary learning and this makes it suitable to interpret the continuous changes in the internal structure, in the geographical dimension and in the relationships with the exterior of a local production system.

The "institutional thickness"

This approach bases itself on the idea that the economic development process is not the result of a completely endogenous dynamics of the economy, but that it rises from the interaction between the economic and the social system, considered in their different and also institutional aspects (Rullani 1998).

The "institutions", understood according to the approach of the "neo-institutional contractualism", represent the framework that the social and political action creates for ordering the individual behavior of the economic operators in more or less organized and coherent forms. Therefore, the institutions are not confined in the public sphere, but they emerge in the complex interaction between the individual subjects.

Therefore, the "institutional thickness" has a definite evolutionary character, since the institutional fabric is the result of a long and gradual process of learning or of "institutional learning". Moreover, this constant evolution and creation of the different organizations and institutions, that integrate and guide a local production system, corresponds to the dynamism of the organizational forms in the system of the private firms.

Typical examples of "institutions", that offer a new decisional infrastructure to the post-fordist economy, are the "collective actors", that perform a fundamental role in the implementation of the principle of self-organization. In fact, in the post-fordist stage, public regulation must be, at least partly, transformed in self-government of the (individual and collective) actors, by adopting on a wide scale what, in the institutionalist debate, is called the principle of subsidiarity (Rullani 1998, Cappellin 1997a).

5. The approach of territorial networks

The model of territorial networks is also tightly linked with the previous approaches to the analysis of a local production system. However, the territorial networks imply a greater formalization of those relationships between the firms, which were mainly informal and based on reciprocal personal knowledge and trust in the traditional "industrial districts" (Cappellin 1998). That requires the use of more binding or formal agreements between the local firms, as it is characteristic of the "just in time" and the "total quality" processes. In particular, this approach implies a greater sectoral diversification of the local economy and a tight integration among the various sectors.

A modern local production system is characterized by the specialization and the complementarity of the firms and it produces forms of vertical integration, like the filieres, that allow to the local production system to combine the continuous evolution of the know-how, that insures a time sustained competitive advantage, with an increasing more immediate access to the final market, where the value added is created.

In fact, a model of organization, like that of the "territorial network", is capable to promote a development and a continuous change of the knowledge available in the individuals local production systems, through the synergy between the internal technological specialized resources within the local firms and the external technological resources in other regions and countries.

The model of territorial networks highlights the tight integration between the organization of the economic relationships among the firms and the physical organization of the regional territory, which is characterized by an intense network of industrial settlements, such as the "industrial districts", and of small and medium size urban centers and by the complex relationships of these latter with the largest metropolitan areas, where the modern producer services are concentrated (Cappellin 1988 and 1997b).

The model of territorial networks also allows an extension of the geographical framework, in which the firms develop their subcontracting relationships, at the interregional and international level.

Therefore, the forms of the relationships between the firms and particularly the relationships of subcontracting and of financial integration continually evolve and they stretch both at the intersectoral level and at a wider geographical scale (Cappellin and Cersosimo 1998).

A network organization at the interregional scale allows an easier access to the information on the different outlet markets and on the evolution of the needs of the consumers in distant regions and countries. This information may be of explicit kind and easily available on long distance through the modern ICT or of implicit kind and available only through the direct or indirect presence in the specific place considered.

However, the characteristic of the territorial embeddedness does not appear in contradiction with an increasing external opening at interregional and international

scale. On the contrary it indicates a tight integration which exists between "endogenous" capabilities and external openness.

The concept of "territorial network" is characterized with respect to the traditional concept of "industrial district" or of production "cluster" for the shift from an approach of relative "selective closure", based on the territorial homogeneity, to an approach based on the concept of territorial integration. That leads to consider networks, which are strongly tied up to or "embedded" into the territory and which have a variable geometry and include different local actors and various external regions and countries (Cappellin and Batey 1997).

Thus, according to this approach a "local production system" seems to be characterized by the following different types of integration linkages:

- *technological integration,* pointed otu by the development of the local production know how, the sharing of knowledge and values promoted by learning processes on the job, the continuous education of the workers, the vocational education of young workers, joint investments in R&D by local firms and technological cooperation with external firms,
- *cooperation between the workers and the firms and integration of the local labor market,* related with the mobility of the workers between the firms of the same sector and also the capability to attract qualified workers from other regions and from other sectors,
- *production integration between the firms,* through subcontracting relationships between the firms which play a crucial role in promoting the diversification of local productions,
- *integration between the service sectors and the manufacturing firms*, related to the development of modern commercial distribution services, transport and logistic services and also qualified services in the certification of the quality of the productions and in the diffusion of modern technologies,
- *financial integration of the firms,* as it is indicated by the creation of groups made by several firms belonging to the same entrepreneurial family and by pro-active bank-industry relationships, which promote the creation of spin-off and the capability to attract external investments or the investments of local firms to other countries and regions,
- *territorial integration at the local level,* which requires an improvement in the infrastructure endowment and promotes an effective physical planning aiming to defend the quality of the territory
- *social and cultural integration*, which determines the existence of a local identity and the creation of the consensus within a wide spectrum of the local community on a shared developed strategy,
- *relationships of institutional integration,* which are related to the development of local administrative capabilities and the capability of local institution to interact with regional and national institutions in the implementation of strategic development projects,
- *territorial integration at the interregional and international level*, which leads to a greater openness in a interregional perspective, to the development of a local "foreign policy" or of a "territorial marketing" policy, which are crucial in attracting external investments and in promoting the internationalization of local firms.

6. Database, hypotheses and econometric estimation

Our aim here is to explain the differentials in the recent dynamics of manufacturing jobs within an open industrialised region: Lombardy (Italy), where areas of historical industrialisation co-exist with areas of recent manufacturing expansion and with negligibly industrialised areas; moreover, we wish to assess the significant geographical scale of explanatory factors.

The spatial reference, in terms of observation type, is the commune (NUTS4) for raw data, and the local labour market (aggregated from communes on the basis of commuting flows) for the analysis. The latter is by hypothesis a self-contained area: it encompasses proximity-related cumulative processes, thus reducing the risk of spatial autocorrelation but excluding a priori any sub-regional spillover effect.

In terms of unit number, the spatial reference includes 73 areas. Due to its size (over 30% of the regional population) and its metropolitan structural features the local system of Milan was excluded from the statistical analysis.

The dynamics of manufacturing jobs in Lombardy during 1991-1996 was negative (-7.9%); however, 22 local systems achieved growth (up to +16.4%) and another 22 managed to decline less than the regional average. As Figure 1 shows, the spatial distribution of these performances is not random: the worst performances concentrate in the Northern and Western sectors of the region, whereas growth occurs mostly in the East.

Observation of manufacturing jobs at the municipal scale showed that:
- communes are not homogeneous in manufacturing density within the same local system: indeed, within these areas a spatial division of labour emerges;
- manufacturing communes included in one local system tend to be adjacent to manufacturing communes included in other local systems, and form wide expanses of land;
- the above remarks hold also for analyses of individual industries: most are diffused all over Lombardy, each with several extended clusters of communes, often connected along long-distance axes;
- since local systems are identified on the basis of local commuting flows, they are local labour markets, whereas the geographical relational network of a firm goes beyond it for most other inputs and, of course, for outputs. Hence, local systems may prove to be too narrow an area to understand industrialisation and deindustrialisation patterns.

We formulated alternative hypotheses in order to test the explanatory power of different theories of industrial location and local development. They are organized according to an increasing order of complexity, for econometric estimation. The results presented in this draft of the paper are preliminary (June 2000). Updated results may be obtained from authors or at the following site:
http://www.economia.uniroma2.it/dei/oselr/cappellin.htm

Model 1- a descriptive approach, which is convenient to set the scene, refers to concentration/diffusion trends and geo-historical issues: very long-run, general cumulative forces are at work, with possible scale and cultural effects at what is an

aggregate level of explanation which we shall detail in the following concentration/diffusion trends and geo-historical issues: a descriptive and initial approach.

The hypothesis of concentration/diffusion trends translates into the identification of manufacturing jobs in 1991 (ADMAN91) as the main determinant of 1996 values. A coefficient greater than one would imply a scale effect in favour of larger, more industrialised areas.

The hypothesis of geo-historical permanent features can be tested by adding to initial manufacturing endowment three dichotomic indicators (dummies) of geographical (indeed historical and cultural) differentials: the West for historically industrial systems (DUWEST), the East for recently industrialised systems (DUEAST), the North for poorly-accessible and/or tourist systems (DUNORTH). The central part of the region, an area of transition, is the benchmark. Recently industrialised areas, unhindered by the obsolete technologies, labour practices and organisational routines typical of older industrial areas, should grow faster.

Model 2 - proceeding in the idea of non-local determinants of growth, two facets of this are on one side the idea that growth depends on scale and agglomeration economies, in terms both of sheer industrial scale and of settlement size, and on the other side the idea that development occurs in stages, of which manufacturing is just one, following agriculture but being ultimately superseded by services agglomeration economies and/or stages of development theories

We tested the hypothesis of urban agglomeration economies by adding to initial manufacturing endowment two dichotomic indicators (dummies) of the demographic size of the main commune in the area, according to whether it is large or small (DUCEN1 and DUCEN0). Mid-sized central communes (4000-40000 inhabitants) are the benchmark. They are expected to show the best environment for growth, since they overcame the minimum threshold for urbanisation economies to appear and are still below the threshold beyond which agglomeration diseconomies prevail.

The hypothesis of stages of development translates into the addition to initial manufacturing endowment of three dichotomic indicators (dummies) of service specialisation, coupled with high demographic density to exclude tourist areas (DUURBAN)), agricultural specialisation (DURURAL) and poorly accessible location (DUMOUNT). Again, the benchmark is the one expected to grow fastest, with a possible exception for rural areas if manufacturing is already superseding agriculture in the remaining rural systems.

Model 3 - - the view behind the insistence on "hard" location factors is that costs are an all-important element of competitiveness; thus, supply of input services (and their prices, reflecting also demand intensity) is crucial. The two most frequently cited local inputs are land and labour. Land availability is frequently cited by firms as an obstacle to growth and a driving force behind relocation. Labour supply, as proxied e.g. by young age cohorts, did not prove significant in our infra-regional analysis; in an advanced regional context, other features of labour seem to be more relevant (see below). A way to reduce input prices or to ensure supply of missing inputs is to make public subsidies available: they would soften constraints to growth.

The hypothesis of "hard" location factors (supply of input services influencing short-run costs) is first tested through the identification of indicators of land supply, proxied by the share of population active in agriculture (ATAGR91P). We expect a positive relationship with manufacturing employment although its negative overall performance might have decreased pressure on land. Two other usual indicators of physical congestion, population density and plant density, did not show a significant relationship to manufacturing performance.

A less conventional alternative is the use of dichotomic indicators (dummies) of the availability of public funds (policy areas): European Union designated areas for 1994-1999 structural funds under Objectives 2 and 5b (DUUEOB2 and DUUEOB5B), whereas Region Lombardy designated and funded industrial districts since 1993 according to a national law (DUDISTR). The availability of funds, reducing the cost of specific inputs, should have a positive impact on manufactuiring employment.

Model 4 - a further line of research stresses that, except for the short run, competition is on productivity rather than on costs, and productivity growth is a long run issue involving the supply of innovation sources (stocks), i.e. "soft" location factors such as entrepreneurship, human capital, or more generally "industrial atmosphere". First, the job-creation performance of new and small and medium-sized enterprises has drawn attention on the greater flexibility of these firms, hence on their ability and incentives to implement innovation (at least of the incremental type) and to adapt to changing market opportunities, if necessary substituting localization economies for the internal scale and scope economies of large firms. Further, the labour input is not homogeneous, and the segmentation criterion relevant for growth has been identified in its ability to learn and incorporate knowledge, just like physical capital incorporates technology. Finally, many soft inputs which cannot be directly obeserved or easily quantified are caught by the phrase "industrial atmosphere", as the result of an industrial tradition, under the assumption that knowledge is specific and comes from a process of accumulation characterised by increasing returns

The hypothesis of "soft" location factors translates into the identification of several indicators of human capital, industrial atmosphere, average firm size, weight of plant size classes and weight of employment in new firms. Human capital is proxied according to its strict definition, as the share of people holding university degrees (POLAU91P), which however has a strong urban and metropolitan bias; hence the expected positive sign might fail to materialise. Holders of high-school diplomas cannot be inserted, as they are collinear with holders of University degrees. People holding the certificate of compulsory education, representing the minimum accumulated investment in human capital, did not have a significant impact.

Industrial atmosphere is proxied by the share of people active in manufacturing industry (ATMAN91P), failing comparable data on earlier periods. It signals the existence of shared, often tacit, accumulated knowledge and should therefore have a positive impact on manufacturing employment.

Entrepreneurship is proxied in a variety of ways. Average manufacturing firm size (AIMAN91I) is often employed to point at the influence of large firms, but in the Italian and even Lombard context it rather discriminates between areas dominated by small or

by medium firms: thus, we expect a positive relationship; we note here that average service firm size, a proxy for service quality, was not significant. Weight of plant size classes is therefore a better indicator: we included micro-establishments (1-9 jobs: 00191A) and large establishments (500+ jobs: 50191A), leaving the intermediate range as a benchmark: we expect both to have a negative impact relative to the benchmark for obviously different reasons; it must be reported from other tests that the size classes with the best impact on performance (50-199) identify medium-sized firms. Finally, the quality of entrepreneurship is reflected in the relative number of jobs created with new firms in the 1980s (ADNUO91A): as entrepreneurship is a long-run feature, we would expect a positive impact on manufacturing also in the early 1990s.

Model 5 - a major theoretical development in the last quarter of the century has been the identification of local production systems as a relevant unit for analysis. An interpretation that found favour in the policy debate (e.g. in Italian national and regional laws enacted in the 1990s: see Figure 2) focuses on static, manufacturing-only issues, such as local manufacturing dominance, industrial specialisation, vitality of small and medium-sized entrepreneurship. Approaches developed by scholars rather stress issues of dynamics and of integration, such as production services, R&D and innovation, learning and human capital, institutional networks and logistic networks

The hypothesis of local production systems translates first of all into the identification of the indicators corresponding to the five official criteria for defining industrial districts in Italy, according to a Law enacted in 1991. These are industrial character (the weight of manufacturing employment on total employment: ADMAN91P), entrepreneurship (the number of plants relative to population: ULMAN91P), small size (share of jobs in plants hosting less than 200 employees), specialisation (a local industry share larger than at the national level) and concentration (a large share in a specialised industry). Each of these should have a positive impact on manufacturing employment. It has to be noted that the fist two are collinear between themselves and with the proxy for industrial atmosphere; also the latter two can be shown to be collinear. Given our negative view of micro-entrepreneurship, confirmed by the fact that the 1-199 range was not significant, we redefined the small size criterion in terms of the 10-199 range (AD01191A). Moreover, as specialisation-concentration indicators failed to be significant unless we resorted to individual industries, we chose to use the number of manufacturing specialisations of each area, as revealed by location quotients (ADSPE91X), in order to test whether multiple specialisation is better than concentrated specialisation for job growth. Focus on specialisation may mean a return to the idea that development is sectorally-determined (technology-driven) rather than locally-determined.

Other, dynamic theories about local production systems stress other elements: innovation, learning, institutions, networks, specialised suppliers, environment, which, as a first approximation, we were able to proxy with densities of jobs in several service or manufacturing activities, expecting positive signs. However, preliminary results are disappointing.

Model estimates

Statistical goodness of results is usually evaluated by three regression fit indicators. However, since the specification always includes initial manufacturing jobs, all of them have limited use[1]. Goodness of results, therefore, has to be evaluated with reference to the individual coefficients: from this viewpoint equations and specifications are not equally satisfying[2]. For each model and specification Table 1 indicates the parameter estimate and the value of test t for each independent variable.

Model 1

Territorial gaps in initial (1991) endowment of manufacturing jobs (Equation 1.2) reproduce themselves almost exactly in final (1996) endowments: although greater than unity the coefficient is unlikely to be significantly different from unity: no scale effect seems at work, as we expected. As general Lombardy-wide dynamics is negative, the constant term is negative as expected, but it shows a steeper downward trend (-14.2% vs -7.9%).

As expected, local economic cultures (Equation 1.2) are an important determinant of recent manufacturing performance: while the scale effect disappears completely and the expected performance of the benchmark is –3%, the expectation for Eastern areas is positive (+3%), whereas for the North and West is deep in the negative (-13%). The real content of these cultures remains open to investigation in the following.

Model 2

Urban agglomeration economies and diseconomies (Equation 2.1) seem to favour small centres, as even medium-sized ones (>40000 residents) seem subject to diseconomies and very small centres (<4000 residents) do not pass the threshold of urbanisation economies. However, the 6% differential performances relative to the benchmark should be taken with caution, since both coefficients are just below significance.

Stages of development theory (Equation 2.2) seem only weakly supported, since expected signs are correct but significance is just below the acceptance threshold. Just for information, urban areas suffer a 5.6% negative differential while rural areas enjoy a 4.1% positive differential. The scale effect is here a little stronger. The mountain dummy had to be excluded from the analysis to obtain these results.

Model 3

Flatland supply, as proxied by the agricultural activity rate (Equation 3.1), is a significant positive influence on manufacturing expansion, as expected, although elasticity is decidedly low. The scale effect is again a little stronger than usual.

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[1] Regression fit indicators for each specification are the coefficient of determination R^2, also adjusted (both varying between 0 and 1), and the test F, evaluating the global significance of a linear relationship. As a matter of fact, both the former two always exceed 0.997, and the test F shows that specifications were always significant at less than 0.1%.

[2] Tests on individual coefficients include the coherence between actual sign of the estimate and signs expected from theory, and the test t, measuring the significance of the sign and more generally parameter estimate stability. A sign estimate significant at less than 95% is marked by an asterisk, at less than 90% by two; we did not perform parameter stability tests other than test t.

Also public funds (Equation 3.2) provide significant results, but the sign is as expected only for industrial district (+4.3% w.r.t. the benchmark), whereas Objective2 and Objective5b areas show a negative effect (-16% and –6% w.r.t. the benchmark). What the regression shows is not so much (or not yet) the effects of public funds, but rather a synthetic indicator of structural strengths and weaknesses, yet to be identified.

Model 4

Defining human capital strictly (Equation 4.1), we obtain a positive impact of university degree holders, as expected, albeit with a very low elasticity. Despite being the most significant specification for it, however, we are marginally below the significance threshold of 10%. The scale effect is a little stronger than usual.

Industrial atmosphere (Equation 4.2) achieves one of the most solid results, again with a low elasticity. Some cumulative effects from localised learning processes must be at work in Lombardy. It is interesting to note that the scale effect is here reversed, although it does not differ significantly from unity.

Average manufacturing firm size (Equation 4.3) provides another solid influence, and the one with the highest elasticity (0.124): this stresses the relative weakness of micro-entrepreneurship. The aggregate scale effect is again reversed, and at its lowest, so that it might even differ significantly from unity.

The employment weight of plant sizes (Equation 4.4) goes as expected: both large firms and, even more, micro-firms seriously impair the growth potential of an area (this is the only specification with a constant term greater than zero). Entrepreneurship must go beyond the family scale to become an engine of growth.

New firm employment (Equation 4.5) also provides the expected positive impact: the entrepreneurial abilities at work in the 1980s are still active in the early 1990s.

Model 5

Unsurprisingly, industrial character (Equation 5.1) proved highly significant and accompanied by a reversed scale effect: the weight of manufacturing employment on total employment is collinear with the explanatory variable of Equation 4.2.

Also entrepreneurship, as measured by the number of plants relative to population (Equation 5.2), provides a positive impact, but this variable as well is collinear with the previous one. Here the scale effect almost disappears.

The weight of small and medium-sized enterprises (Equation 5.3) also clearly has the expected positive effect; it is important to note that this occurs after we redefined it as the 10-199 range in order to exclude family micro-firms, which otherwise made the indicator irrelevant.

The number of manufacturing specialisations (Equation 5.4) is the most solid influence of all, with the expected positive sign, albeit with a very low elasticity. Our hypothesis

that, contrary to current policy assumptions, multiple specialisation is better than concentrated specialisation for job growth is vindicated.

Results for the dynamic elements of Model 5 and for Model 6 shall be presented in the final version of this paper. At this stage, we may notice that models stressing the importance of entrepreneurship and of the static approach to industrial districts (but with our important modifications) do produce better results than models based on economies of scale or agglomeration economies.

7. Towards a new approach in regional industrial policy

In very general terms, the previous discussion suggests three broad areas as main objectives of a regional industrial policy:

- the development of the learning processes at the territorial scale, as indicated by the theories of the "milieux innovateurs", by the "regional systems of innovation" approach and by that of the "learning regions",

- the development of relationships of territorial embeddedness of the production activities, as pointed out by all above mentioned theories, from the traditional "industrial districts" theory to that of the territorial networks,

- the development of the "intermediate" institutions and of organizational tools of cooperation, which may be formalized and not only informal, between the different local firms and between these and the local and regional public administrations, like it has been underlined especially by the approach of the "institutional thickness", but it is also implicit in all other approaches.

Moreover, the recent approach of the "territorial network" suggests the need of adopting a systemic approach at the regional level, as the overall development of a region is not the simple summation of the development of the individuals local production systems, but it is also the result of their integration and synergy at regional general scale.

In turn, each of these objectives requires policies which focus much more – as compared to the previous experiences - on favouring the *integration,* the *openness* and the *formalization* of competencies and relationships both at the local and at the regional level.

Therefore, a modern local production system seems to be characterized by a strong interaction between the following three different dimensions of an economic local development process:

First, the challenge represented by the speed of the change stimulates the local actors to cooperate. Conversely, the cooperation between the local actors facilitates the processes of change.

Second, the speed of change of the local and regional economy determines the capability of the local production system to sustain the increasing international competition induced by a greater interregional and international openness of the local

economy. On the other hand, the openness of the local economy and the possibility of promote forms of cooperation at interregional and international scale facilitate the speed of change.

Finally, the cooperation at the local scale represents an important prerequisite for common actions at the interregional scale. While the challenge represented by the international competition leads the local actors to forms of cooperation.

Regional industrial policies in Lombardy should go beyond the tension between excessive centralism and the "do it yourself" approach of individual firms and local districts previously referred to. Rather, the promotion of joint programs among firms and local production systems aiming at strategic objectives relevant at the regional level should become the fundamental methodology of regional policy-making.
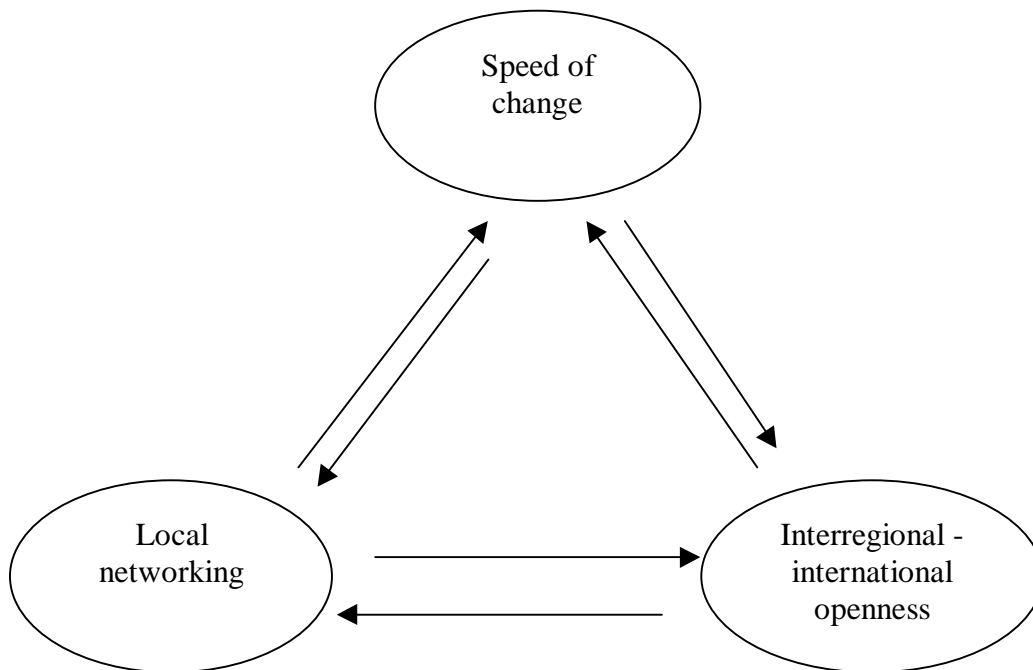
Figure 1 – Three factors of the competitiveness of a regional production system.

In this context, the Regional Administration should be primarily responsible for defining priorities, strategic programs and guidelines, resulting in few leading projects based on public-private partnerships.

Moreover, the Regional Administration should coordinate the already existing sectorial or functional interventions at the territorial level and the responsibilities of the different levels of local government, promoting the access to these initiatives for local actors and mobilizing leadership at the local level. On the other hand, individual "districts" or local production systems should elaborate strategic projects, which must go beyond narrow sectoral or local interests in order to become eligible for the Regional support.

Moreover, the definition of districts should not be pre-determined through the application of fixed and static statistical parameters. Rather, "districts" or local production systems ought to be able to define and identify themselves, by demonstrating

the actual existence of a well-defined set of common interests, strategic vision and implementation capabilities. Thus the definition of a "district» may (and perhaps should) very well be different as a function of the nature of specific programs.

A modern regional industrial policy should not adopt sectorial or functional approaches, but it should rather be characterized by a "territorial approach". This approach requires a tight integration of the various instruments of industrial policy, having a sectorial or functional character, such as research, internationalization, training, industrial sites, transports, etc., which consider the same territorial area or the same local production system.

A territorial approch to the regional industrial and innovation policy does not require the top-dow definition of the borders of the local production systems (industrial districts) and the elaboration within these borders of the traditional socio-economic development plans, in order to proceed to the distribution of national or regional financial resources, which have in fact *ex-ante* rigidly defined, without any consideration of the local capabilities to elaborate innovative projects and to implement them.

The process of shortening of space and time has determined an increasing openness of the local economies and new forms of economic integration of the firms and the other local actors, both within the individual local production systems and between the various areas at the interregional and international level.

These changes justify the transition from an approach based on the concept of the economies of concentration and of sectoral specialization, such as in the traditional industrial districts, to the concept of territorial and intersectoral integration, such as indicated by the network approach and the other new analytical approaches, which have been analysed above.

8. Conclusions

The network approach justifies the shift from a regional policy approach based on the enhancement of the economies of specialization and of the territorial concentration of the various sectors, such as in the traditional "industrial districts" approach.

This new approach should aim to promote the sectoral and territorial integration of the regional economy and to develop the networks at the local, at the interregional and at the international level. Thus the regional industrial policy should not necessarily focus the interventions on specific traditional "industrial districts", but rather adopt a territorial approach based on the enhancement of the territorial embeddedness.

That requires to define flexible and overlapping appropriate territorial subdivision of the regional territory, which may allow organize the various regional policies aiming to the accumulation of the human capital, the development of the technological innovation, the process of international integration, the adoption of modern logistic systems, the territorial and environmental quality and the improvement of the infrastructure networks

Acknowledgements

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TABLE 1. SPECIFICATIONS AND REGRESSION RESULTS

1.1) ln ADMAN96 = -0.142 +1.011 ln ADMAN91

    (t=)   (t=148)   Adj-R^2=0,997

1.2) ln ADMAN96 = -0.031 +1.001 ln ADMAN91 −0.096 DUWEST −0.094 DUNORTH +0.062 DUEAST

    (t=)   (t=173)   (t=4.49)   (t=3.56)   (t=2.77)   Adj-R^2=0,998

2.1) ln ADMAN96 = -0.099 +1.008 ln ADMAN91 −0.056 DUCEN1 −0.062 DUCEN0

    (t=)   (t=91.4)   (t=1.62)   (t=1.61)   Adj-R^2=0,997

2.2) ln ADMAN96 = -0.230 +1.021 ln ADMAN91 −0.056 DUURBAN +0.041 DURURAL (+ a_4 DUMOUNT)

    (t=)   (t=118)   (t=1.55)   (t=1.61)   Adj-R^2=0,997

3.1) ln ADMAN96 = -0.299 +1.018 ln ADMAN91 +0.031 ln ATAGR91P

    (t=)   (t=136)   (t=2.21)   Adj-R^2=0,997

3.2) ln ADMAN96 = -0.108 +1.005 ln ADMAN91 −0.159 DUUEOB2 −0.059 DUUEOB5B +0.043 DUDISTR

    (t=)   (t=140)   (t=2.50)   (t=2.15)   (t=2.58)   Adj-R^2=0,997

4.1) ln ADMAN96 = -0.061 +1.017 ln ADMAN91 +0.047 ln POLAU91P

    (t=)   (t=129)   (t=1.65)   Adj-R^2=0,997

4.2) ln ADMAN96 = -0.484 +0.995 ln ADMAN91 +0.096 ln ATMAN91P

    (t=)   (t=115)   (t=2.80)   Adj-R^2=0,997

4.3) ln ADMAN96 = -0.222 +0.989 ln ADMAN91 +0.124 ln AIMAN91I

    (t=)   (t=101)   (t=2.97)   Adj-R^2=0,997

4.4) ln ADMAN96 = 0.311 +1.013 ln ADMAN91 −0.079 ln AD00191A −0.015 ln AD50191A

    (t=)   (t=91.9)   (t=1.81)   (t=2.36)   Adj-R^2=0,997

4.5) ln ADMAN96 = -0.502 +1.013 ln ADMAN91 +0.058 ln ADNUO91A

    (t=)   (t=148)   (t=1.76)   Adj-R^2=0,997

5.1) ln ADMAN96 = -0.329 +0.992 ln ADMAN91 +0.072 ln ADMAN91P

    (t=)   (t=103)   (t=2.61)   Adj-R^2=0,997

5.2) ln ADMAN96 = -0.229 +1.003 ln ADMAN91 +0.056 ln ULMAN91P

    (t=)   (t=145)   (t=1.68)   Adj-R^2=0,997

5.3) ln ADMAN96 = -0.549 +1.005 ln ADMAN91 +0.073 ln AD01191A

    (t=)   (t=137)   (t=1.94)   Adj-R^2=0,997

5.4) ln ADMAN96 = -0.116 +0.998 ln ADMAN91 +0.029 ADSPE91X

    (t=)   (t=148)   (t=4.34)   Adj-R^2=0,997

Tasso di variazione degli addetti anni 1991 – 1996 – Sezione D

Var_addetti_sezD
> 50%
20% - 50%
(-20%) - 20%
(-50%) - (-20%)
< (-50%)

1:1800000
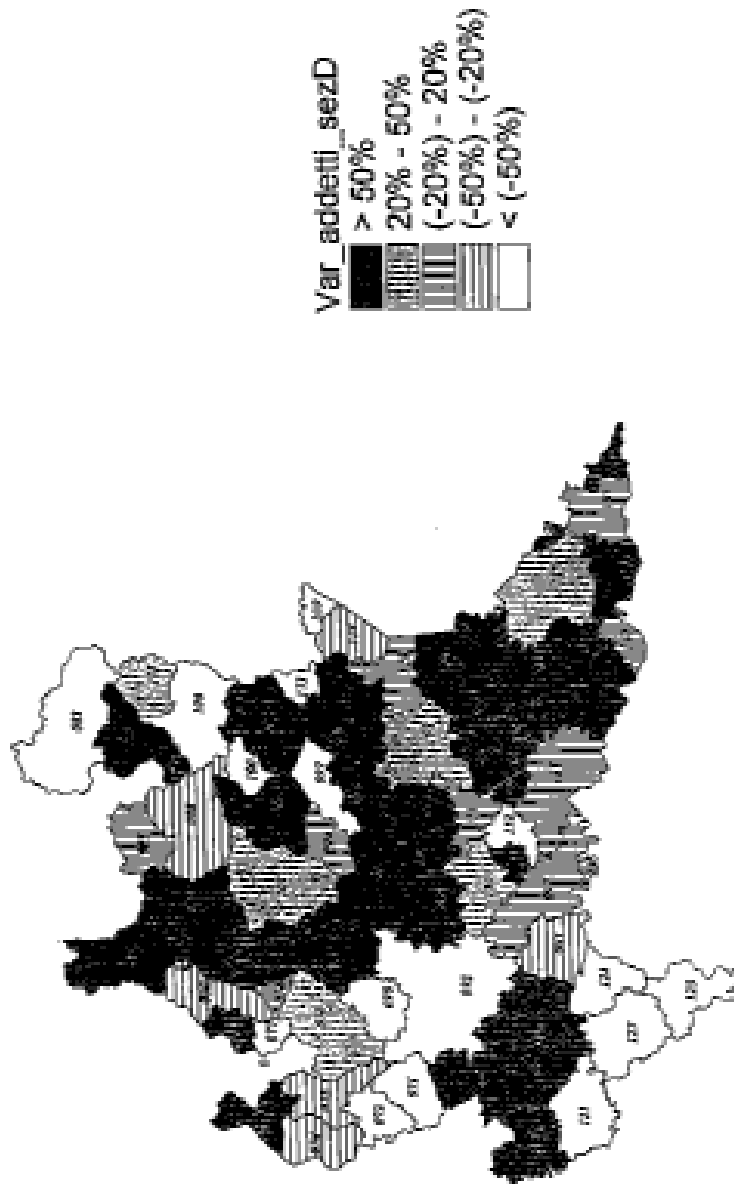
Lombardia. Mappa dei distretti industriali