FROM INDUSTRIAL DISTRICTS TO FIRMS NETWORKS: THE ITALIAN CASE

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Abstract: *The local source for competitiveness is vital to achieve static and dynamic economies of scale for firms; it is useful to interact with the aim of learning and innovating. The local system can create benefit by opening to international markets and it should be a good source of knowledge and technology. Nowadays, the concept of industrial district, usually characterized by the spatial proximity of the involved firms, may evolve into firms network; this may emphasize the advantages deriving from cooperation, without the need of spatial proximity. Firms networks may represent the evolution of industrial districts, where territoriality is overcome by the dissolution of borders. The importance of firms networks is increased since they intensify information exchange, continuous learning, stimulate economies of scale, allow economic development and give more market opportunities. Firms networks share different aims, resource, common interests and factors, like material and immaterial inputs and outputs. This new form of cooperation may allow to overcome physical distance and replicate knowledge and information. Firms networks may represent a success organizational forms that may give impetus to development in an economy. They are based on mutual trust between partners and are created over time to facilitate information circulation, knowledge dissemination and innovation. Trust reduces uncertainty and transaction cost and limits the opportunistic behaviour by free-rider agents. The aim of the paper is to assess the determinants for firms networks training in the Italian context using regional data. Particularly, the firms networks development needs key factors such as ICTs diffusion, high rate of social security, open capability, R&D activities. These factor constitute the basis for a new kind of capital, the so called "network capital". It consists of collaborative practices in a network as the result of cooperation in the ICTs era. Network capital may be considered as social capital evolution in a globalized context. The entrance in the knowledge economy era, in which technological advancement runs very quickly and the pace of innovation is intensified, significantly reduces the exploitation of competitive advantages. Industrial districts, therefore, should develop, improve and change their shape in a new competitive environment, where the globalization of markets cancels the boundaries of many firms that collaborate beyond national boundaries. The paper analyzes the firms networks determinant for Italian regions and the role of network capital as pre-condition for their development. The multidimensional scaling analysis it the chosen methodology that allows us to identify the relations among Italian regions in terms of proximity/distance with respect to considered determinants, and to provide a spatial representation of them.*

Keywords: Industrial districts; Firms networks; Network capital; Multidimensional scaling;

JEL classification: D71; L22; R23.

1. Introduction

In this paper we want to investigate the firm network as possible evolution of the industrial district, in which firms compete and cooperate in a global context and

territoriality is overcome by the annulment of the boundaries.
The concept of industrial district is quite complex for many economic and social aspects, closely correlated. In this aggregated form there is a population of small firms that orbit around a local production, in a specific geographical area in which agents interact. The notion of industrial district can be traced back to Alfred Marshall, who was the first that observed the phenomenon of concentration of production in the space and its persistence over time in 1891.
The district is characterized by temporal and geographical stability: the core of firms that belong to it, is concentrated in a certain area. The industrial district expands and grows in a stunning way until it occupies most urban centres or by conquering the peripheral areas. Thus, a fundamental characteristic that distinguishes the industrial districts is the spatial element, where firms carry out production activities with a strong tendency towards specialization. The competitive ability depends on area, on socio-cultural conditions and on tacit knowledge. The territory influences innovation processes. The spatial proximity certainly distinguishes the industrial district: it allows information dissemination as source of innovation, and the concentration of experts in a certain field, who work in a specific area, increasing the average level of productivity. The concentration of firms in a specific geographic area simplifies the dissemination of the exchange of information, the circulation of new ideas and it facilitates knowledge and innovation diffusion. The distinctive factors of an industrial district are different, such as the concentration of productive an R&D activities at the sectorial and regional level. Moreover, an industrial district is characterized by common environment at social and cultural level, by relations among economic agents, both in formal and informal networks. Economies of agglomeration are also crucial; their strength and effects depend on the interaction among actors operating in the area.
In the recent literature Cainelli and Iacobucci (2005) argue that the benefits of agglomeration are changing. The concentration of the local systems is leading to new agglomerative forces that operate in specific contexts. The authors, therefore, argue that the new economies of agglomeration are characterized by a lower cost to acquire information related to competitors or suppliers. These types of economies can be characterized by a greater ease to develop new knowledge in a particular context and this is expected to promote the growth and development for firms.

Globalization has led to substantial changes in the way of compete and communicate and it has led a new form of capital, the so called “network capital” (Simpson, 2005). It is a global development driver that may allow firms to create cooperative relationship even if there are located far from each other. Network capital has positive outcomes, such as providing income generation opportunities, avoiding criminal activities or the diffusion of intolerant social values. Network capital may also favourite the formation of a firms networks, able to create cooperative forms and share knowledge on a large scale. This may allow to generate new business in competitive markets even if firms are far from each other, to intensify information sharing, to stimulate continuous learning. This new cooperative structure allows a faster flow of information, a shared knowledge, and an efficient and rapid exchange of resources. Firms networks ensure, moreover, specialization, efficiency, and therefore, high levels of productivity (Porter, 2010), and the may be considered as an evolution of industrial districts without the need of spatial proximity.
The paper deals with the possible evolution of industrial districts into firms networks and analyze the role that network capital can play as key factor of this evolution (see par. 2). In the third section we present a data analysis using a multidimensional scaling methodology, in order to identify groups of Italian regions that show similar

characteristics with respect to the determinants of the network capital (see par. 3). In par. 4 conclusions are provided that summarize the results achieved by the statistical analysis.

2. The evolution of industrial districts: firms networks and network capital

Becattini (2007) is the greatest researcher in Italy in the field of industrial districts. He supposed that the territory is an hidden dimension of crucial importance since it includes a large number of places in a non-random way and it is the element that characterizes the production. The district, therefore, can be thought as a set of goods produced in a specific place. The socio-cultural context is intertwined with the productive phenomenon: in an area the living and working relations coexist in in a complementary manner.

There are three essential advantages interpreted as externalities for firms located in a district. The first one is a shared market for skilled workers with specific capabilities. The second advantage is the availability of obtaining non-negotiable input provided by local suppliers. The third advantage derives from a simple and easy transmission of new knowledge, ideas and information spillovers. This allow a better production function through improvements in technology, production and organization.

The agglomeration is supported by factors such as the presence of specific inputs at the local level, the presence of knowledge spillovers and it is encouraged by the job offers with a high degree of training in the local area. The spatial proximity is an advantage for firms, given the reduction of transaction costs and the presence of agglomerations of firms in the area. It facilitates the creation of benefits such as internal economies of scale, which allow inputs to be easily accessible; furthermore, cost of subcontracting associated with them are reduced when they are produced in the considered area.

The training and the creation of the district, according to Becattini, happens if there are favourable socio-cultural features that drive agents to cooperate, and their development takes place if there is the presence of local, naturalistic and geography favourable conditions. Districts are entities characterized by some socio-economic factors: the presence of active small and medium firms; the presence of a community of people and the presence of external economies of agglomeration although internal to the district; regional stability; industrial atmosphere which has strong influences on professionalism and specialization of workers involved in cooperation; natural area circumscribed and historically determined; specialization of products and sectors in each area; the wrapped relations among firms and the presence of high predisposition to technological innovation and predisposition to optimization. District, therefore, is a local development and industrial organization model, based on the union of small and medium-sized firms that are located in geographically defined areas. In this contest, in which social interactions are located, the so called social capital plays and important role: cognitive resources, standards and information that are expressed in the trust, which leads to the achievement of objectives that are difficult to reach. Social capital in the industrial districts generates economic advantages and allows leaner and faster circulation of information.

Each local system is also created through the integration of codified knowledge, that is more explicit, and tacit knowledge, that is contextualized and more difficult to learn, but it is crucial since the two types of knowledge are mutually reinforcing in the socio-economic process of their production, in which all types of knowledge coexist and circulate. The fluid knowledge circulation occurs since tacit knowledge, not coded and non conventional, once entered into the system and once codified, can be easily transmitted. The local community of firms operating in the area and then in the district,

is the main vehicle of a common values system that involve different levels, such as work, reciprocity relationships, dissemination of new knowledge and elements of evolution and change.
Nowadays, there is a new phase of economy: the Information Age, and its functional structure is the network society (Van Bavel, Punie, Tuomi, 2004). Network capital may therefore become an important asset for economic and human development. Cooperation among firms is an accelerator of development process, and the investment in network capital is essential for new models of collaboration in the globalized society (Wellman, 2001). Network capital can be considered a combination of different features. It derives from a cooperation via electronic network and promotes the practice of collaboration. Such cooperation includes sharing of information and it produces team work among firms, the creation of common rules and the achievement of shared aims. Network capital is produced by contributions and wilful actions and it may be actionable in the firms, although they are localized far from each other. Network capital may be fundamental for the knowledge generation, and this is an added for intensive processes related to scientific setting, R&D investment, cooperation and development. In a firms network, the kind of capital may play a role analogous to whom social capital plays in a industrial district (se also Colantonio et al., 2012).
In this context, the firms network may represent the evolution of the districts. The transformations on structure and organization for firms are a specific need. Industrial districts, therefore, may develop, improve and change their form in a new competitive environment, where the market globalization annuls the boundaries of many companies that collaborate beyond regional territory. Firms are thus operating in dynamic scenarios.
Soda and Zaheer (2009) argue that networks are composed of several elements: the "nodes" that indicate the entrepreneurs involved in the network, and the "links" that represent the relationships that are created among them; the entrepreneurs cooperate and use shared rules.
The nodes can also be interpreted as network systems and can be constituted by different entities. They are legally autonomous units, such as the case of consortia and professional associations and they are entities internal to firms, such as offices, and they represent individuals. The nodes, independent entities, interact with others to exchange energies and values. Firms networks, therefore, are a set of nodes and relationships that connect and coordinate firms located in a large area, giving them the opportunity to reach a increasing global development. The networks are stable forms of coordination among firms, they have common goals and are located in an intermediate position between the market and the hierarchy. The objectives of the firms networks are: working together even if firms are located far from each other; sharing resources and expertise; reaching a common goal.

3. Data, methodology and results

To reach our purpose, which consists in identifying the key factors (socioeconomic development, R&D resources, security and ICTs diffusion) that could facilitate the formation of firms nodes and the development of firms networks in the Italian regions, we use a multidimensional scaling analysis. Multidimensional scaling is a useful tool through which it is possible to produce a graphical representation of a pattern of objects, in this case the 20 Italian regions, based on the degree of similarity/dissimilarity between them. The goal is to provide a representative map that best approximates the distances observed among Italian regions, concerning the presence of factors that determine development through network capital. This statistical method attempts to build a configuration of the various entities, merged in a small number of dimensions (two in our case).

This is done by defining relations between regions in terms of proximity/distance with respect to the considered indicators.

The resulting positioning map has the property to partition the regions into homogeneous groups, so as that the degree of association between two regions is maximal if they belong to the same group and minimal otherwise.

We considered a matrix of 20 regions and 12 indicators, representing four sets of variables: those related to economic development, R&D, security and ICTs diffusion (see Table 1). Data refer to the period 2010-2012. Data were normalized within each considered variable, in order to avoid possible distortions due to different ranges and magnitudes. The model's goodness of fit was assessed via the *RSQ* (0,986), that indicates the proportion of variability explained by the corresponding dissimilarity distances, and the *Stress Index* (0,053).

As a general rule, results are found to be robust when the size *k* achieves an *Stress Index* value lower than 0,15. A two-dimensional model was judged to be acceptable according to the values of the previous indexes.

The correlations between dimensions and variables for the selected period (see Table 1) was useful for naming the axes. The resulting two-dimensional images are shown in Figure 2. The horizontal axis represents the variables concerning economic development; the vertical one is mainly related to security.

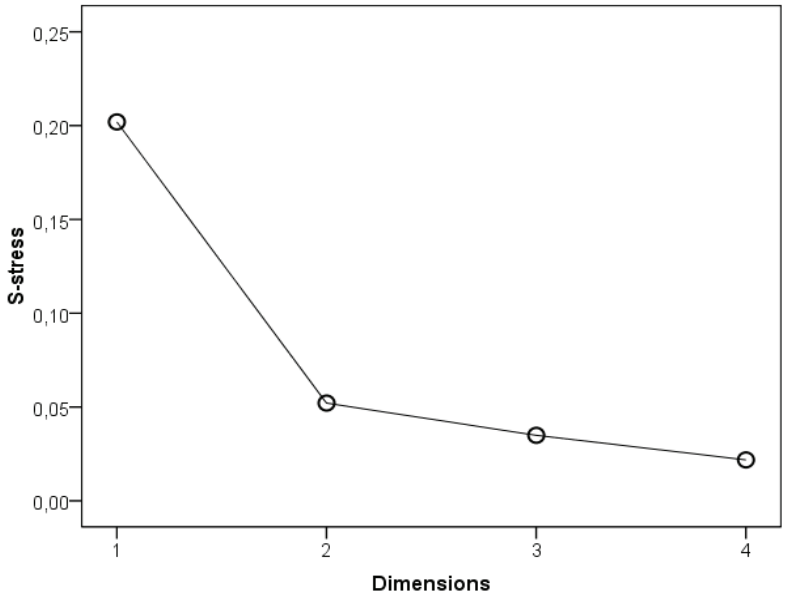

Figure 1: *S-stress* dimensions diagram
Source: Our elaborations on *Istat* data

Table 1: Correlations between variables and dimensions (r > |0,5|)

Variables	**Dimension 1**	**Dimension 2**
GDP per capita	0,90	
Industry labour productivity	0,86	
Export capabilities	0,75	
Innovative capabilities	0,82	
Graduates in sciences	0,68	-0,53
Employed in R&D	0,97	
Illegal work rate	-0,91	
Petty crime index in cities		-0,70
Racquet index	-0,68	-0,53
Level of Internet use in firms	0,91	
Web site diffusion in firms	0,84	
PC diffusion in firms		0,79

Source: Our elaborations on *Istat* data

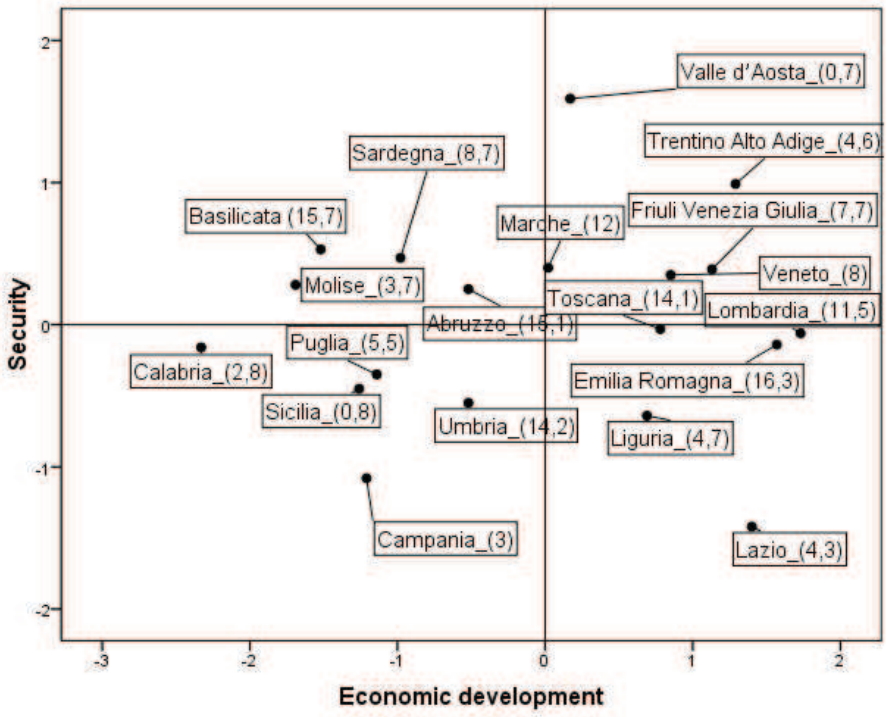

Figure 2: Cluster of 20 Italian regions in a two dimensional space
Source: Our elaborations on *Istat* data

In this chart the Italian regions and the numbers of the firms nodes are represented. On the right of the chart there are the northern Italian regions characterized by an advanced socioeconomic development. This regions have high levels of labour productivity, openness towards international markets, greater opportunity to innovate and better infrastructure. In the centre of the chart there are central Italian regions, with levels of economic development close to average values of the sample; southern Italian regions are located on the left part of the chart, in which there are lower level of economic development. In the lower area of the chart there are regions with lower level of security.
From the chart appears that only in few of disadvantaged regions of southern Italy there are an high number of nodes of firms. This could be a factor to improve the competitiveness of enterprises in the territories that no encourage it. We note however that, apart from a few outlier cases, north and central regions have a high number of nodes, probably due to the presence of higher levels of network capital and its determinants. These relations, intentionally formalized, seem also to be typical of those regional economies characterized by small firms, without official R&D activities, highly specialized in international export, with a great added value.

4. Conclusions

In the current social and economic context, globalization has introduced a new way of collaborating among firms. The industrial districts have been a very efficient cooperative form for a long time. Firms that are part of the industrial districts are located in neighbouring areas. The spatial proximity, allows information dissemination, that are a source of innovation, and the concentration of experts in a certain field, who work in a

specific area, increasing the total level of productivity.
Over the past years, substantial changes have been in the way of communicating and cooperating. This happened thanks to the ICTs advent and globalization. Firms networks have been generated as evolution of Industrial districts, even though firms are located far from each other. In firms networks the capital structure changes and it becomes “network capital” which may be thought as a determinant of development at global level. Network capital could become an important asset for economic and human development**.** It can be considered a combination of different features. Network capital derives from a cooperation via ICTs and promotes cooperation.
Firms in the networks operate in dynamic scenarios, characterized by a number of factors such as integrated markets and innovation. The flow of knowledge exchange takes place on a global scale and firms of the networks exchange information and create lasting relationships. In this paper we have identified a number of variables that may promote the formation of nodes of firms and it is important to emphasize that the presence of high network capital supports the creation of firms networks. The multidimensional scaling method showed how the most dynamic regions in Italy have the highest economic development level and usually the highest number of nodes (with the exception of some outliers). Many other aspects of firm networks training and development should be investigated in further analysis.

References

Becattini, G. (2007) *Il calabrone Italia. Ricerche e ragionamenti sulla peculiarità economica italiana*, Il Mulino, Bologna.
Cainelli, G. and Iacobucci, D. (2005) "I gruppi di impresa e le nuove forme organizzative del capitalismo locale italiano", *L’industria*, XXVI, No. 2, April-June.
Colantonio, E., Crociata, A., and Perrucci A. (2012) “From social capital to network capital: some evidence for Europe”, *Global & Local Economic Review*, 16, pp. 57-72.
Marshall, A. (1891) *Principles of Economics*, 2nd edition, Macmillian, London.
Porter, M.E. (2010), *Microeconomics of competitiveness*, Faculty Workshop, December 13, Harvard Business School Press, Boston, Mimeo.
Simpson, L. (2005) "Community Informatics and Sustainability: Why Social Capital Matters", *The Journal of Community Informatics*, Vol.1, pp. 102-119.
Soda, G. and Zaheer, A. (2009) "The evolution of network structure: where do structural hole came from?", *Administrative Science Quarterly*, Vol. 45, No.1, pp. 1-94.
Van Bavel, R., Punie, Y., and Tuomi, I., (2004) *ICT-enable Changes in Social Capital*. The IPTS Report 85.
Wellman, B., (2001) Living Networked in a Wired World: The Persistence and Transformation of Community*. Report to the Law Commission of Canada,* Wellman Associates, Toronto, Canada. (p. 120)