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The Crisis of Company Networks and Tools for its Prediction

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Abstract

Purpose – The present scientific research proposes to investigate the theme of the crisis of the company with particular reference to those belonging to networks and, in this connection, seeks to identify some tools for predicting it. In this direction a useful tool for understanding a network's state of health of its relations with stakeholders would appear to be network analysis. Methodology/approach – The research, qualitative in nature, was developed through the study of national and international literature. Findings – The research presents much theoretical evidence of what the study of business network might provide. Originality/value – This approach will consider some empirical evidence in the field of business networks.

Keywords: business network, crisis, network analysis, industrial district model

1. Introduction

The evolutionary dynamic of the district model is characterised by alternating positive and negative phases which are associated respectively with moments of growth, and moments of crisis or difficulty. In both cases, the reticular model can undergo changes which allow the *network* (Johnson, 2009) to deconstruct itself, or rather to regenerate itself without losing any elements which make it an organic whole. In this scenario, one may ask if it is possible to predict or prevent crises of district industries, starting with an analysis of the causes of systemic imbalances.

A first response seems to originate in the doctrine which finds in the balance sheet (Caratozzolo, 2006; Giunta & Pisani, 2008; Viganò, 2007; Lacchini, 1994; Onida, 1974; Zanda, 2007) and in the analysis of the balance sheet (Caramiello, 1993; Ferrero, Dezzani, Pisoni & Puddu, 1994), the traditional tools for predicting company crises (Coda, 1983; Sciarelli, 1995). Both instruments imply a static analysis assessing the financial and economic structure of the company at a given moment in time.

In the case of networks and, specifically, industrial districts, prediction of crises must be set about through a morphological analysis. This approach affects certain elements which have assumed a well-defined role in the management of the network, and, in a general way, of the member companies: they are intangible elements that can provide a significant competitive advantage over the long-term.

Help seems to come from the theory of networks itself, which suggests that a morphological analysis of networks aimed at understanding their vulnerability leads in this direction (Albert, Jeong & Barabasi, 2000; Barabasi, 2002). Thus, there are two linked alternative solutions for preventing reticular crises. On the one hand, there is the possibility of focusing on the vulnerabilities of the network model; on the other, the possibility of using innovative analytical tools such as Network Analysis.

From this perspective, the current paper proposes to investigate the phenomenon of the company crisis, with particular reference to the district model.

From there the analysis of the tools for preventing a crisis will be interpreted through the prism of the network vulnerability concept by way of introducing the Network Analysis model.

This is an instrument that can be used to investigate the morphology of districts and, broadly speaking, networks, and in this way identifying certain indicators useful in assessing both the compactness of the network, and the relational typologies which exist between its member companies.

2. Literature Review: The Genesis of the Company Crisis

The etymology of the term crisis is derived from the Greek word *krisis* which means both choice, decision or judgement; and fight, argument, or lawsuit. This leads one to reflect on company performance and what shapes and determines its operating processes.

Through the analysis of the economic and business profiles of the company crisis (Bastia, 1996; Brugger, 1984; Gabrovec Mei, 1984; Slatter, 1994; Zimmerman, 1994) it is possible to outline the causes and errors which bring about each failure within each business system.

The first to objectively consider the concept of the company crisis was Guatri (1986) who identified a series of internal and external elements of the company: inefficiency, over-capacity, rigidity, product decay, lack of planning and financial imbalance. The author states that the company crisis is preceded by a premonitory period of decline during which the pathology of negative events begins to become apparent. Regarding this it is necessary to distinguish the concept of decline from that of crisis: the first refers to negative *performance* by the company; the second represents a degeneration from this prior condition. During the decline phase the value of the business and cash flow both decrease systematically and irreversibly. The state of crisis, instead, is marked by serious instability due to capital reduction and persistent loss of revenue; as well as by fiscal imbalances, substantial economic losses, the loss of access to credit, and financial dislocation (Lacchini, 1998).

According to Capaldo (1997) fiscal and economic crises can be differentiated: the first is due to the company's inability to procure the finances necessary to operate; the second stems from various imbalances such as those related to demand for goods and services, and production costs.

There are two types of approaches to the crisis: subjective and objective. The first concerns the company's human capital. Both *management* and the ownership play leading roles in the life of the business. In this sense the principal objective of company *management* is to revive the company by making a correction corresponding to the gravity of the problem: in the most serious cases this could be liquidation, or the cessation of business activity (Sirleo, 2009).

The subjective approach to the problem of the company crisis is carried out, or rather completed, by means of an objective analysis. The crisis is a process of decline, of loss of value and profitability: This situation negatively affects cash flow leading to both a drop in revenue and a loss of *stakeholder* confidence.

There are many studies (Kash, 1998; Preble, 1997) in the extant literature which take up this issue.

For example, Guatri (1995) recognizes four phases which lead to the company crisis: incubation is the phase marked by the first signs of decay and economic-financial imbalance in the company; saturation coincides with the loss of income and the decline in the value of the business' capital; the repercussions of cash flow losses and the consequent decline in *stakeholder* confidence; the eruption of the company crisis coincides with its inability to meet its obligations.

The factors which indicate a state of serious instability in the company are the following: the important economic and capital losses over the course of time; severe fluctuations and imbalances in cash flow; the loss of credit worthiness due to the decline in *stakeholder* confidence; the inability to meet payment obligations on time; capital imbalance measured in terms of the *stock* of capital available to guarantee payment of debt.

From a subjective point of view, in order for management to succeed in preventing the crisis, it is necessary for the governing body to identify the business pathologies by analysing the business, its complexity, its operational risks and its competitiveness. From the objective point of view, instead, the following typologies of company crises are recognized (Guatri, 1986): the crisis of inefficiency; the crisis of over-capacity/rigidity; the crisis of product decline; the crisis of the lack of planning and innovation; the crisis of final imbalance.

The crisis of inefficiency originates in producing output not "in line" with that of *competitors*. This inefficiency can affect every area of the company even if productivity is the most affected. For example, cost levels higher than competitors' can stem from different factors, such as obsolete equipment and tools, inadequate productive capacity or lack of commitment on the part of the labour force; the use of out of date technologies. The crisis of overcapacity/rigidity originates in the following situations:

- the overcapacity of the sector causes a severe reduction in demand for the company. In other words, there is an excess of productive capacity with respect to the size of the market;
- the loss of market share results in a severe reduction of demand for the company. The ideal solution for this could lie in a process of cost adjustment;
- the business revenues have not met expectations and the business has made major fixed investments.

At the sector level, the crisis is exacerbated by overcapacity linked to particular circumstances, for example efforts to achieve economies of scale, reduction of consumer demand due to changes in preferences, new import flows, choices made based on incorrect forecasts of future demand, and managerial policies which are flawed and not

responsive to the demands of the market. An example of a case of rigidity is the increase of costs which the company cannot match with a corresponding increase in prices.

The crisis of product decay originates from the reduction of positive margins between prices and costs, necessary to cover fixed costs, production costs, and guarantee earnings.

Measurement of this phenomenon in terms of product income is made by discovering the following margins (Sostero & Farrarese, 2000):

- the gross margin of contribution represents the economic output the product contributes to covering fixed costs and obtaining business profit;
- the semi-gross contribution identifies the income earned by a product using resources earmarked for that specific purpose, without considering general resources.

The crisis of lack of programming and innovation derives from the inability to business plan in light of environmental changes. Examples of this are the inability to plan business activities directed toward increasing sources of income, and the inability to involve *management* and personnel in the execution of administrative tasks. The identification of clear objectives and the effective planning can be useful tools in motivating personnel. In the case of lack of innovation, the company should develop new ideas, identifying new markets and new productive processes.

The lack of fiscal balance can be due to the following situations: serious deficiency of proprietary resources greater than resources held through debt instruments; prevalence of short-term debt compared to other debt categories; imbalances between durable investments and available financial resources; insufficient or non-existence of liquidity reserves; scant ability of the business to negotiate credit terms; difficulty in meeting deadlines, late payments (suppliers, mortgages, social security contributions, payroll).

Fiscal imbalance generates economic losses because of the increase in the financial burden due to excessive indebtedness. Fiscal imbalance can, moreover come from other factors such as inefficiency, rigidity, product decay, and deficiency of planning and innovation, which can contribute to gradually weakening the financial state of the business. Financial imbalances are related to patrimonial ones deriving from an imbalance between proprietary capital and other aspects of the financial situation.

3. Research Methodology to Manage the Crisis in Industrial Districts Model

The process of transformation of the Italian industrial system, because of the international crisis (Darling, 2003), has altered the strategy of many district companies which have begun to direct their energies toward innovation (Gollin, 2008), focusing on improving qualifications of human capital, strengthening brands, and export sales. The experience of districts in crisis (Pyke, Beccattini, Sengenberger, 1991; Osservatorio Nazionale dei Distretti Italiani, 2011) demonstrates that the factors which determine the successful emergence from difficulties have been the following: the reduction in the number of marginal companies in the productive process with the consequent polarization of sales; the presence of a company *leader;* the presence of specialised *partners*; the requalification of human capital (Epifani, 2003), the certifying of quality, including green quality; public financing. The district models in crisis tend to be composed of small companies: they do not have a company capable of guaranteeing the strategic potentials which can sustain collective competition. In this sense, the importance of the propulsive or driving function of the *leader* company (Kase, Sàez-Martinez & Riquelme, 2005) as the guiding entity for all the companies of the district is made clear.

Moreover, the models in decline are marked by the internalization of their productive phases which tends to reduce their flexibility in responding to the demands of the market. More decisive for the district growth process seems to be the search for new market niches abroad: internationalization favours positive returns for a district.

There is a Quality of Life Index of Italian districts (QLI) elaborated by an italian organization called “Confartiginato” which identifies the conditions necessary for district development. The index includes 11 salient indicators: entrepreneurial density; the labour market; fiscal pressure; unfair competition in the market; bureacracy; credit; the time frame of civil justice; legality and conflict; utilities and local public services; the social capital in the territory; and infrastructure. The ranking drawn up for 2011 by Confarigianato puts the district of Porphyry and the Pietra Trentina in first place with an index score of 700; while he places the district of Sicilian Mechanics in last place with an index score of 434.

Apart from the type of business activity involved, it is shown that the principal anti-crisis actions adopted by some italian districts were as follows: the re-certification and innovation of the production chain (Cafaggi, 2005; Nambisan & Sawhney, 2008); the strengthening of research and development activities; the adoption of quality

and environmental certifications; development of human resources; support of social, health and security initiatives; development of *ad hoc* communication for the markets.

In this direction, on the whole, the areas of strength in the districts studied were specialised small and medium sized companies, the cohesiveness of associations of companies willing to collaborate on many fronts (Yami, Castaldo & Battista Dagnino & Le Roy, 2010); and the establishment of the company in the territory of reference. Further points of strength were found in specialised human capital, in the specificity of the productive system with respect to the local area; in the presence of associations (consortia for example) supporting the district; in the propensity to export, and to all processes of internationalisation; and in social programs.

The areas of weakness were found mainly to consist in the absence of a *leader* company charged with promoting district renewal: such a company, endowed with strategic potential and strength, assumes the function of supporting the processes initiated by the association of companies, with the goal of realising common objectives. From this point, emerge the difficulties the district companies have in implementing adequate policies both of research and development, and marketing. These elements seem to recall the configuration of the scale free network model investigated in the literature as part of the analysis of network morphology.

In this direction, the structural properties of the network (Rogers & Kincaid, 1981) are to be found in its topology, resilience and vulnerability. Reticular topology has the following characteristics: network nodes emerge spontaneously; nodes and *links* can disappear; nodes can take on different functions and dimensions; nodes age.

This means that district companies arise spontaneously in the territory and establish relations depending on their various production specializations (Burt, 1980). Under the influence of district management each company can assume different functions. Resilience derives from the resistance of the network to effects of various breakdowns or external attacks. The topological scale free network model is set up with one single large hub and of many small hubs: all connectors share in the success of achieving objectives. Such a network is invulnerable to breakdowns; but it is vulnerable to attacks: breakdowns are small malfunctions of the network that cause damage less important than that caused by external attacks. The latter are serious network malfunctions that can weigh on its crisis condition. Smaller nodes are those that feel the effects of these attacks the most.

In other words, the adoption by the district of the model described just now indicates the presence of a leader company and of many small companies. The malfunctions correspond to the decline and crisis phase which occurs in the network. The function of the leader company is to safeguard all the network members during possible crisis moments.

The vulnerability of the network depends on interconnectivity, or rather on the connections active between the aggregate nodes: an increase in connections reduces vulnerability and vice versa. This happens in the same way in the district model.

The industrial district in crisis presents a modified scale free network model: the attack or the state of imbalance strikes the small district companies; no single company is considered a large *hub*. The district model process of emergence from the state of crisis, is led by a *leader* company that together with the small companies pursue a common objective.

Even if every district has a different topological model, depending on the number of aggregated companies (Barabasi, 2002), on the functions they perform, and the territory in which they operate, their vulnerability decreases with the increase of fiduciary (Fukuyama, 1995; Lane, Bachman, 1998) and collaborative relationships between companies: in such circumstances, a limited number of connections need not result in disaster for the network. Furthermore, such a situation confirms the configuration of the district network as cohesive and interconnected, endowed with innovative capacities thanks to the presence of a leader company (Schein, 1985).

4. Research Findings: Traditional Instruments for Predicting a Crisis

In light of considerations presented to this point, the crisis phenomenon (Slatter, 1994) must be viewed from different analytical perspectives when it arises in a company network (Thorelli, 1986): the imbalance can affect single companies belonging to it, or the entire network viewed as a single unit.

In the first case, the crisis of one or more member companies, for reasons discussed earlier, can expand beyond a critical point (Gladwell, 2000), and assail the entire collection of entities. The critical point, like the needle of a scale, separates the epidemic from a non-epidemic phenomenon: the tendency of the crisis to spread or disappear depends on the mode of contact between companies, based the various types of relations between them. At this point, one can understand from the morphology of the network what are possible critical moments and phenomena of imbalance: for example, it requires only a few companies with multiple relationships crucial (Hakansson & Snehota, 1989) to the productive process to contribute significantly to the transmission of the crisis to all the other

companies. In any case, the spread of the crisis among the network companies depends on the reticular model in operation. Three elements define the critical point. The contagiousness: this element depends on the company's importance in the network. In fact, if the crisis strikes entities that produce key components the state of imbalance could spread to all member companies. Small changes: these can have enormous consequences and unexpectedly precipitate the expansion of the crisis to all the companies of the network based on the principle of geometric progression. Change is not gradual but punctuated, occurring at a given moment.

The network crisis, considered as a whole, happens at a systemic level. The causes are of different natures. Internal causes. They can depend on the state of crisis of the associated companies; on the unwillingness of members to go forward with initiatives and communal projects, or on the reduced quality of, or rather confidence in, the relationships between the various entities; still more, on disagreement between them, and on the shortsightedness of choices made which are not in keeping with a policy of value creation. External causes. They depend, principally, on factors related to the market and territory in which the network operates.

The tools for predicting the company crisis can be classified according to the particular point of view of the research being done. According to business doctrine, the predictive tools of the company crisis derive from the analysis of the balance sheet, and from financial and economic indicators (Epstein & Jermakowicz, 2008). In this way both the data summarised in the balance sheet, and the indices arranged based on how they have been interpreted allow, the interested parties to understand the company's state of health, either *standing alone*, or with respect to the sector and/or similar companies.

With greater precision, the analysis of data from indicators leads to an understanding of a possibly critical business situation related to the balance sheet, income and financial structure of the business. In the first case data is considered regarding the composition of funds and their uses, and the balance sheet; in the second case total sales, net capital, the ROE, ROI, ROS; in the third case one can refer to indicators of available capital, liquidity, and level of indebtedness (Caramiello, 1993).

Instead, in professional practice one of the methods used to study a business's state of health is that of Altman (Altman, 1968): Also called e *z-score*, it is based on a linear relationship that uses relative weights for each of the five balance sheet variables in order to predict a future business insolvency. The formula for calculating the *z-score* is the following:

$$Z = 1{,}2\ X1 + 1{,}4\ X2 + 3{,}3X3 + 0{,}6X4 + 0{,}99X5 \quad (1)$$

where:

Z is the general indicator for the state of health of the business;

X1 is the net circulating capital divided by total assets;

X2 is undistributed profit divided by total assets;

X3 is gross profit before financial obligations and taxes, divided by total assets;

X4 is the market value of capital divided by total liabilities;

X5 are sales times total assets.

Based on the value of the z-score the probability of failure can be high, medium high, medium and low.

5. Research Findings: Network Analysis as Innovative Instruments to Prevent the Crisis

In professional practice Network Analysis (Battersly, 1971; Carrington, Scott, Wassermann, 2005; Carley, 2001; Johnson, 2009) is assuming a role always less marginal: it can be used both to evaluate the network based on its intellectual capital, and as a tool for predicting a network crisis using a *set* of indicators. Network Analysis is a quantitative analytical tool which assigns a value to the network by quantifying its relationships in terms of confidence, propensity to collaborate, link structure, and reputation. The functions performed by this powerful tool can be summarised as follows:

1. the descriptive function. It describes the network through certain properties. For example indicators of the network's centrality and density represent some of the variables which explain its morphological configuration;
2. the assessment function. In principle a business is a system to be studied as a unit. A set of business systems should be assessed with particular emphasis on the relational capital of the network;
3. the control function. An account of the network made using analytical indicators allows one to understand its form, and even its vulnerability to a state of crisis or a systemic imbalance.

In other words *Network Analysis* can be used to study the reticular phenomenon by means of a quantitative structural analysis of the relational capital of the network. In the theory of company networks (Boari & Lipparini, 2000; Rullani, 1989) the use of *Network Analysis* is useful for the analysis of the nature and structure of the relationships established between parts of the network (nodes or companies): it seeks to discern its extention, dynamism, and effects on its interacting parts.

As a general rule the application of Network Analysis anticipates the following phases (D'Alessio, 2008): the detection of sampling techniques; the identification of the nature of the data and the tools of collection; the description and analysis of the data; the comprehensive assessment of the network.

The process begins with the defining of the object sample for analysis. The size or extension of the sample (network) determines the cost, in terms of resources and time, required to interpret it. Subsequently, it is possible to define the sample type: of particular interest is the ego-centric and avalanche mode sampling (Goodman, 1961). In the first case, a plot of relationships is constructed, starting from a node (company) or a set of nodes (multiple companies) called "*ego*", which have relations with other nodes (alter). In the second case, the sample seems to be continuously integrated with new nodes (companies).

The identification of available data is then classified as primary or secondary: the first category contributes to a greater degree to the results of the analysis, since it derives from direct investigation of the nodes (companies). Viewed in this way exploiting primary data means uncovering the nature, existence, direction, intensity, and depth at the foundation of the network's endowment of relationships.

The tool for gathering primary data is usually the interview using a questionnaire (Wassweman & Faust, 1994). Moreover, there are other techniques such as for example projection methods, the *focus group*, and observation of the natural environment which should not be overlooked.

The description of network data is enhanced by sociograms, graphs and matrices: tools well suited to describing the properties of a network system.

Sociograms display graphic representations of developed networks with bi or tri-dimensional *software*. The graphs show the graphic structure composed of points (also called nodes or vertices) and segments (also called lines or curves) by which all or some of the points of the network are connected. Note that there are different forms of graphs useful in describing the structure and function of networks. Matrices are tables organised in lines and columns containing pertinent and descriptive information concerning the network (Serra, 2001).

The several phases in the analysis of the data permit the interpretation of the structure and dynamic of the network system, revealing its compactness, or rather its vulnerability: in other words, its morphological properties are explained.

At the end of the assessment of the network relationships, the properties under discussion can be classified according to two types: general and strictly morphological.

The general properties of the network are its nature, existence, direction, intensity, frequency and the depth of its relationships. The strictly morphological properties, instead, are seen in the density, centrality, accessibility, size and connectivity of the network.

Starting with general properties, the nature of relations determines the type of bond to investigate. In general, relationships can be distinguished as familial and friendly, as property, as government, as exchange, as dependence, and as trust.

Existence demonstrates the survival or absence of relations between network nodes (companies).

Direction defines the relationship between two parts: this is unidirectional when directed from the first part to the second or vice versa, and bi-directional when directed both ways.

Intensity can be cardinal or ordinal. The first refers to the unit of measurement such as, for example, sales volume; the second depends on the subjective perception of the individuals who have the relationship. In general, intensity determines whether the bonds are strong or weak: one of its descriptive techniques is requesting the assignment of a positive or negative mark regarding the existence of the relation under investigation.

Frequency shows the repetition of the relational phenomenon over time, or rather the number of contacts within a defined period.

Depth refers to the bond between two points: it increases when they can be activated independently of other bonds; it decreases when relations depend (indirect) on the activation of others.

By referring to the strictly morphological property of the network, we can define its compactness.

The first measure of compactness is density, which identifies the degree of interconnection of the involved parts (nodes or companies): it is expressed by the ratio of the number of existing relationships and the number of possible relationships. In other words, density shows the cohesiveness of a network through the proximity of the nodes and the presence of direct, reciprocal and frequent bonds.

Centrality interprets the structure of the network, that is relational, displaying the existence of one or more central nodes (vertex, band, or centripetal structure of the system) (Chiesi, 1999) of the network.

According to some studies (Freeman, 1979), centrality is differentiated on the basis of degree, interposition and proximity: the centrality of company can depend on the number of bonds established with other companies (an indicator of degree); by the strategic strength of the company in establishing relationships with other companies, controlling the flow of information (indicator of interposition); or by the proximity of a company to others (proximity indicator).

Accessibility shows the number of nodes (companies) belonging to the network, which can be contacted by any part of it. In this way one can distinguish the *non participant* nodes, that is those which are detached, from the *participant* nodes, those connected to all parts.

The size, or extension, of the network depends on its breadth, or rather on the number of individuals (companies) that comprise it; and on it heterogeneity, that is the number of nodes (companies) which belong to it and are collected in homogeneous groupings.

Finally, connectivity identifies the number of nodes (individuals or companies) and of arcs (relationships) that allow the network to be connected: the connection increases with the decrease in the number of nodes and/or arcs which, insofar as they lead out of the network, cause its fragmentation.

One can observe that both the graphs and the indices are calculated using software such as Ucinet, Gradap, Netminer, Negopy, Structure (Borgatti, Everett & Freeman, 2002). To every property corresponds an indicator which along with the above described graphic representations requires an adequate interpretation. This reasoning leads to the last phase of the process, which is essential for making a judgement concerning the morphological configuration of the network. The results of the analysis can be interpreted with different purposes in mind: morphological, of control, and evaluative. As to the morphological purpose, the results of the analysis permit the expression of a judgement on the compactness of the network, its boundaries, and its vulnerability.

For the purpose of control the analysis provides knowledge of the network's vulnerability comparing data obtained over time and/or with those obtained from other investigations of similar networks. In other words, Network Analysis can be a tool for implementing a network planning and control system. As far as the evaluative purpose, the morphological indicators can be summarised by means of an empirical value able to measure the relational capital of the network founded primarily on the fiduciary *asset*: this could be represented with a coefficient q derived by re-elaborating certain fundamental principles of the economic-business doctrine. For example, the comprehensive balance sheet method identifies the value of economic-business capital (W) adding to adjusted net assets (K'), the value of non calculable intangible goods (IG) in the following formula (Zanda, Lacchini, Oricchio, 1993):

$$W = K' + IG \tag{2}$$

Adjusting the formula to clearly refer to the company network, we have

$$Wr = K'r + IG.r \tag{3}$$

where:

Wr is the value of network economic capital;

K'r are the adjusted net assets of the network;

IG.r are the non calculable intangible assets of the network.

Further clarifying the formula we have:

$$Wr = K'r + IGcu.r + IGcs.r + IGcr.r \tag{4}$$

where:

Wr is the value of the economic capital of the network;

K'r are the adjusted net assets of the network;

IGcu. represents the human capital of the network;

IGcs.r represents the structural capital of the network;

IGcr.r represents the relational capital of the network.

Hypothesizing that the value of non calculable intangible goods represents the value of relational capital, it is possible to adjust the formula as follows:

$$Wr = (K'r + IGcu.r + IGcs.r)IGcr.r \quad (5)$$

Moreover, network relational capital appears to be summarised by the coefficient q as follows:

$$Wr = (K'r + IGcu.r + IGcs.r)*q \quad (6)$$

This coefficient needs to be valued by interpreting the network indicators beforehand.

6. Conclusions

The company crisis phenomenon occurs in the reticular model along two alternative paths: it happens to single associated companies; and it takes place at the network level attacking its structure.

In one way or another, morphological analysis of the network permits the investigation of the associated structural properties in terms of topology, resilience and vulnerability: the more a network is cohesive and interconnected, the more positive results it will achieve.

In this sense, the model of district organisation, as a flexible and interconnected network, has responded to the financial-economic crisis through the innovation and renewal of its structure as well as operational policies and procedures.

In practice, at least in the area of industrial districts, a general tendency seems to have emerged to assign the role of renewal and driving force of the network to a company endowed with greater strength and potential: the presence of a leading company in the industrial district affords some protection to the network against possible imbalances. In this sense, the considerable strengths (economic, financial and proprietary) of the leader company are placed at the service of all members from the perspective of seeking to achieve a common objective.

These considerations lend themselves well to defining an emerging district model as a monocentric system founded on collaboration among companies: it contrasts with the conventional polycentric model reflecting a model of network *governance* analogous to that of a symphonic orchestra, where the director directs and coordinates the musicians in order to raise the quality of the musical production to a performance level standard.

In such a setting, the company network, that is the industrial district, can be studied with a method of quantitative analysis: Network Analysis.

This tool permits company networks to be studied by identifying primary and secondary data relating to the network, the analysis of such data and the network's morphological properties. The economic and business interpretation of obtained results is carried out using apposite *software.*

Depending on the goal being pursued, the data collected from a *set* of indicators of synthesis (properties) can be arranged in order to quantify the value of the network in terms of relational capital: its value increases with the growth of fiduciary and collaborative relationships.

This phenomenon appears to be more evident in the industrial district to the extent that companies are grouped in a clearly circumscribed territory and collaborate in achieving productive specialization.

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References

Albert, R., Jeong, H., & Barabasi, A. L. (2000). Attack and Error Tolerance of Complex Network. *Nature, 406.*

Altman, E. I. (1968). Financial ratios, discrimant analysis and the prediction of corporate bankruptcy. *Journal of Finance, 23 settembre.*

Barabasi, A. L. (2002). *Linked. The New Science of Networks*. Cambridge, Massachussetts: Perseus Publishing.

Bastia, P. (1996). *Pianificazione e controllo dei risanamenti aziendali*. Torino: Giappichelli.

Battersly, A. (1971). *Network analysis for planning and scheduling*. London and Basingstoke: MacMillan and Co. Ltd..

Boari, C., & Lipparini, A. (2000). Networks within industrial districts: organizing knowledge creation and transfer by means of moderate hierarchies. *Journal of Management and Governance, 3*(4).

Borgatti, S. P., Everett, M. G., & Freeman, L. C. (2002). *Ucinet for Windows: software for social network analysis*. Harvard, MA: Analytic Technologies.

Brugger, G. (1984). Gli interventi professionali nelle crisi di impresa. *Finanza Marketing e Produzione, 2*.

Burt, R. S. (1980). Innovation as a structural interest: rethinking the impact of network position on innovation adoption. *Social Network, 2*, 327-355. http://dx.doi.org/10.1016/0378-8733(80)90002-7

Cafaggi, F. (2005). *Corporate Governance, Networks e Innovazione*. Padova: Cedam.

Capaldo, P. (1997). Crisi d'impresa e suo risanamento. *Banche e Banchieri, 316*.

Caramiello, C. (1993). *Indici di bilancio: strumenti per l'analisi della gestione aziendale*. Milano: Giuffrè.

Caratozzolo, M. (2006). *Il bilancio d'esercizio*. Milano: Giuffrè.

Carley, K. M. (2001). *Dynamic network analysis, in Dynamic Social Network Modeling and Analysis*. Workshop Summary and Paper, Washington: The National Academies Press.

Carrington, P. J., Scott, J., & Wasserman, S. (2005). *Models and methods in social network analysis*. New York: Cambridge University Press. http://dx.doi.org/10.1017/CBO9780511811395

Chiesi, A. M. (1999). *L'analisi dei reticoli*. Milano: Franco Angeli.

Coda, V. (1983). Crisi e risanamenti aziendali. *Sviluppo e Organizzazione, 75*.

D'Alessio, R. (2008). *Le coalizioni aziendali. Caratteri del fenomeno e forme relazionali*. Torino: Giappichelli.

Darling, J. R. (1994). Crisis Management in International Business: Keys to Effective Decision Making. *Leadership & Organization Development Journal, 15*(8), 3-8. http://dx.doi.org/10.1108/01437739410073047

Epifani, S. (2003). *Business community: Gestire il Capitale Intellettuale nella net economy*. Milano: Franco Angeli.

Epstein, B. J., & Jermakowicz, E. K. (2008). *IFRS. Interpretation and application of international financial reporting standards*. New York: Wiley.

Ferrero, G., Dezzani, F., Pisoni, P., & Puddu, L. (1994). *Le analisi di bilancio, indici e flussi*. Milano: Giuffrè.

Freeman, L. C. (1979). Centrality in Social Networks: Conceptual Clarification. *Social Networks, 1*.

Fukuyama, F. (1995). *Trust.* New York: Free Press.

Gabrovec Mei, O. (1984). La diagnosi della crisi di impresa. *Rivista dei Dottori Commercialisti, 3*.

Giunta, F., & Pisani, M. (2008). *Il bilancio*. Milano: Apogeo Editore.

Gladwell, M. (2000). *The Tipping Point*. Boston: Little, Brown & C.

Gollin, M. A. (2008). *Driving Innovation. Intellectual Property Strategies for a Dynamic World*. *New Intellectual Property Strategies for a Dynamic World*. New York: Cambridge University Press. http://dx.doi.org/10.1017/CBO9780511805394

Goodman, L. (1961). Snowball Sampling. *American Journal of Sociology, 78*, 148-170.

Guatri, L. (1986). *Crisi e risanamento delle imprese*. Milano: Giuffrè.

Guatri, L. (1995). *Turnaround. Declino, crisi e ritorno al valore*. Milano: Egea.

Hakansson, H., & Snehota, I. (1989). *Developing relationship in business networks.* London: Routledge.

Johnson, J. D. (2009). *Managing knowledge networks*. New York: Cambridge University Press. http://dx.doi.org/10.1017/CBO9780511810565

Kase, K., Sàez-Martinez, F. J., & Riqueline, H. (2005). *Transformational CEOs. Leadership and Management Success in Japan*. Cheltenham: Edward Elgar.

Kash, T. J., & Darling, J. R. (1998). Crisis management: prevention, diagnosis and intervention. *Leadership & Organization Development Journal, 19*(4), 179-186. http://dx.doi.org/10.1108/01437739810217151

Lacchini, M. (1994). *Modelli teorico contabili e principi di redazione del bilancio. Riflessioni economico-aziendali sull'innovato codice civile*. Torino: Giappichelli.

Lacchini, M. (1998). *La valutazione del capitale nelle procedure concorsuali*. Padova: Cedam.

Lane, C., & Bachmann, R. (1998). *Trust In and Between Organizations.* Oxford: Oxford University Press.

Nambisan, S., & Sawhney, M. (2008). *The global brain. Creare innovazione nel mercato aperto*. Milano: Wharton School Publishing.

Onida, P. (1974). *Il bilancio d'esercizio nelle imprese*. Milano: Giuffrè.

Osservatorio Nazionale dei Distretti Italiani. (2011). *II Rapporto dell'Osservatorio Nazionale dei Distretti Italiani*. Retrieved from http://www.osservatoriodistretti.org.

Preble, J. F. (1997). Integrating the Crisis Management Perspective into the Strategic Management Process. *Journal of Management Studies, 34*(5), 769-791. http://dx.doi.org/10.1111/1467-6486.00071

Pyke, F., Becattini, G., & Sengenberger, W. (1991). *Distretti industriali e cooperazione tra imprese in Italia*. Firenze: Banca Toscana.

Rogers, E. M., & Kincaid, L. (1981). *Communication Network. Toward a new paradigm for research*. New York: Free Press.

Rullani, E. (1989). Economia delle reti: i linguaggi come mezzi di produzione. *Economia e Politica Industriale, 64*.

Schein, E. (1985). *Organizational Culture and Leadership*. San Francisco: Josey-Bass.

Sciarelli, S. (1995). *La crisi d'impresa. Il percorso gestionale di risanamento nelle piccole e medie imprese.* Padova: Cedam.

Serra, R. (2001). *Logiche di rete. Dalla teoria all'intervento sociale*. Milano: Franco Angeli.

Sirleo, G. (2009). *La crisi d'impresa e i piani di ristrutturazione. Profili economico-aziendali*. Roma: Ararne.

Slatter, S. (1994). *Corporate recovery. A guide to turnaround management.* London: Penguin Books.

Sostero, U., & Farrarese, P. (2000). *Analisi di bilancio, strutture formali, indicatori e rendiconto finanziario*. Milano: Giuffrè.

Thorelli, H. B. (1986). Networks: between markets and hierarchies. *Strategic management journal*, 7.

Viganò, E. (2007). *Contenuto e finalità del bilancio*. Padova: Cedam.

Wassweman, S., & Faust, K. (1994). *Social Network Analysis*. Cambridge: Cambridge University Press.

Yami, S., Castaldo, S., Battista Dagnino, G., & Le Roy, F. (2010). *Coopetition: winnig strategies for the 21st century*. Cheltenham, UK: Edward Elgar.

Zanda, G. (2007). *Il bilancio delle società. Lineamenti teorici e modelli di redazione*. Torino: Giappichelli.

Zanda, G., Lacchini, M., & Oricchio, G. (1993). *La valutazione del capitale umano. Modelli qualitativi e quantitativi di logica aziendale*. Torino: Giappichelli.

Zimmerman, V. (1994). *Turnaround experience: real world lesson in revitalizing corporations*. New York: McGraw Hill.