

Markets, hierarchies, networks, districts: A cybernetic approach

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IDs are regional hyper-networks that survived the socioeconomic evolution of modern capitalism. They also promise to succeed in the coming post-Fordist development. Italian experience has shown that industrial districts are highly important, perform successfully, and are increasing their survival rates. Beyond definition problems, they are multi-dimensional, complex, and adaptive systems. They can be replicated elsewhere and, regardless of the contingent triggering factors, can grow and change their early imprinting features. Cybernetics offers a sound theoretical basis for understanding the key concepts and redirecting industrial policy interventions.

Keywords: Complexity, cybernetics, flexibility, hierarchy, identity, industrial district, industrial policy, Italy, market, network, organization



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paradigm to many social, technological and economic aspects of European society.

1. Introduction

As the millennium draws to a close, many concepts taken for granted are changing or dissolving in the field of management and economics. The superiority of large-sized organizations, the continuing standardization of world supply and demand, the separa-

tion of economic and social life, and the predictability of future developments are now regarded as old illusory beliefs, which can at most persist in some old fashioned academic department. The debate about industrial districts (IDs) belongs to that general scientific revolution which more or less consciously we are going through. Although it emerges sporadically here and in other papers in this special issue, the history of the debate or the history of IDs themselves would be too long and complex to be treated extensively. The more districts are placed under scientific investigation, the more it appears they are a complex phenomenon, with a great variety of structures and evolutionary patterns. Moreover, their rigorous study involves many different skills, ranging from economics to sociology, social psychology, anthropology, history, geography, and technology, just to name the most important ones. Therefore, the goals of this paper are circumscribed to discuss five issues.

The first one (Sections 2, 3, 4) is to place the "object" ID into the debate on alternative forms of economic governance, that is, between hierarchies, markets and networks. In this regard, we argue that, far from being marginal and temporary, networks are the dominant forms, and that three kinds may be discerned, depending on the logical type being considered. At the first level, we find individual firms; at the second, firm networks; and at the third, hyper-networks (networks of firm networks). IDs belong to the latter, and their geographical specificity would suggest their being called regional hyper-networks. The second goal (Sections 5.1 and 5.2) is to explore the problems of precise definition, illustrating the current Italian proposal and discussing what kind of empirical consequences it has. IDs become a subset of local production systems, excluding some other interesting cases, such as metropolitan areas, science parks, etc. Some data as to their size and role in Italy are also provided. The more than 2 million employees and 15 million people involved are really huge numbers, and this may explain the interest IDs have aroused in Italy.

The third goal (Section 5.3) is to describe some evolutionary patterns of Italian districts, showing the geographical and industrial turnover they went through over 50 years. Moreover, it is argued that triggering conditions do not bear so much on economically and socially acceptable development, as was traditionally claimed in the literature. Both issues suggest that IDs are not so unrepeatable and country-specific. Social and economic conditions may be prepared and stimulated elsewhere, even though adapting to specific conditions. From a new and prejudice-free viewpoint, the creation and start-up of a large company in a developing country (or region) appears at least as costly and profitable as that of a firm network. Conversely, the latter alternative is likely to be more socially desirable and non-disruptive. Moreover, in some sectors the latter is also more competitive, as the case for IDs show. These arguments lead us (Section 5.5) to consider IDs as a promising form of industrial organization – undergoing further evolution, of course – and not as a relic of a pre-industrial economy.

The fourth goal (Section 5.4) is to stress the role that district identity plays in district competitiveness. A strong district identity fosters trust and cooperative behaviors, which reduce transaction costs and favor knowledge transfer. According to the view of complex adapting systems, industrial policy must be more locally rather than centrally planned, and managed primarily by associations of district members. Interventions must be directed towards supporting district identity and communication, rather than implementing specific actions. The fifth goal (Section 6) concerns arguing that cybernetics, and second-order cybernetics in particular, provides a sound, rich theoretical framework for explaining the nature and development of IDs. Such concepts as variety, closure, self-organization, identity, recursivity, and positive feedback loop are a solid heritage of cybernetics and at the same time key-concepts for understanding IDs.

2. Markets: main features

Industrial economics and management studies have both traditionally paid attention to competition rather than cooperation between firms. Excepted for the case of trusts and cartels in oligopolistic markets,¹ industrial economics focused on perfect or imperfect com-

petition between price-takers, which make decisions to maximize their profits [69,70,74,126]. The theory of games supports modern microeconomics in studying cooperative relations between firms, but it is not yet very helpful because, except for some special cases, the solutions of games remain undetermined [73,118]. The same theoretical framework holds: firms are still viewed as production functions, whose profits must be maximized; economic agents are perfectly rational;² information is non-ambiguous, equally distributed and free;³ relations between firms and economic agents are mediated only by price and quantity.⁴ In short, firms are computers whose goal is maximizing profits in their production functions and that communicate with each other only through prices. Similarly, economic agents are computers that maximize their subjective expected utility functions and that communicate with each other only through prices. For any change in price or quantity, new decisions are made and new computations (applications of the algorithm of maxi-minimization) are fulfilled. Therefore, *relations between firms and agents are reduced to spot product-money exchanges*. Firms are isolated systems that do not really interact, but communicate only through price competition and computation.

From their origins in the early 1960s until their consolidation in the mid 1980s, management studies also focused on competition as opposed to cooperation, although in a completely different theoretical framework. Rooted mainly in organizational sociology and business administration, and only partially in industrial economics, management studies do not use such concepts as profit maximization of production functions, expected utility theory, perfect rationality, payoff matrix, etc. In short, they do not share the same ground as microeconomics. To some extent, depending on any approach and more or less explicitly [36,37], management studies [1,4–6,75,84,85,93,95,96,116,124] are based on behavioral [79–81,109–112] and evolutionary [66,67,87] perspectives. Key-concepts are: evolution and uncertainty rather than equilibrium and certainty; satisfaction as opposed to maximization; multi-goal as opposed to profit as the

²In recent versions, bounded rationality and uncertainty are considered as two sides of the same coin, and treated with stochastic models. However, this solution distorts Simon's view of bounded rationality and the nature of probability [37].

³Some of these hypotheses are removed in recent works, but, in order to avoid undetermined solutions, many further restrictive assumptions are done.

⁴See previous footnote.

¹Monopoly, the other traditional issue in industrial economics, excludes cooperation by definition.

unique goal; multi-criteria as opposed to uni-criterion of assessment; firms as multi-faceted complex systems as opposed to production functions; and prices as one of many media among firms and agents. Even in such a different and richer theoretical framework, until the mid 1980s firms were considered isolated systems, oriented only towards competition. Although modes of interaction were not limited to price/quantity competition, they are directed all the same towards rivalry, and do not configure long term relationships.

3. Hierarchies: main features

Besides the differences between economics and management perspectives, both share the view of the market as an arena of competition between isolated hierarchies [65]. Economics deals with inter-firm “networks” only as forms of collusive or non-collusive oligopolies, now discussed essentially as parts of game theory [73,118]. The problem is that this approach is scarcely interesting because of the tremendous oversimplifications made by neo-classical economics [29, 36]. Moreover, with few exceptions, determined solutions can be obtained only for collusive oligopolies, leaving undetermined all other competitive and mixed competitive-cooperative cases. Lastly, the oligopolistic inter-firm interaction is limited to price, quantity and, rarely, to R&D or advertising expenditures. In management tradition, the basic view is not very different, because environment is given, objectified and independent from the organization.

“The environment of an organization is faceless, atomistic and beyond the influence or control of the organization. Whatever happens to the task environment of the organization stems from forces outside the organization itself. Even if it is sometimes admitted that “political networking” with competitors, for example, may provide a way of exerting influence over some part of the environment, the basic assumption is still that the environment cannot be controlled. Consequently opportunities do exist in the environment, and they are there to be identified and exploited. They cannot be created or enacted; rather, the organization can exploit them by adapting itself to its environment. It is implied that a dividing line exists between the organization and its environment. The environment exists, even without the organization” [65, p. 189].

This is simply the view of the market as isolated islands (hierarchies), juxtaposed with that of organizations interacting recursively through multi-dimensional and multi-level connections. In the latter case, the focus is shifted from the good exchanged to the relationship established. Organizations discover and understand the world and themselves through the interaction, not before. In the language of decision theory, organizations define and evaluate the set of alternatives and their outcomes through the interaction process, not in advance [35]. Even the organizational and inter-organizational identity is defined in the process of communication and interactions [34].

4. Networks: main features

Although in organizational sociology the study of networks and inter-organizational relationships has a long history [9,32,107], in management and economics, the attention starts from the mid 1980s. Indeed, Porter [96] and Williamson [129–131] devote attention to what they respectively call strategic alliances and hybrid forms (Fig. 1), but these were relegated to special, marginal and, above all, unstable cases [98]. However, in subsequent years, empirical evidence showed that stable relations between firms were more widespread than had been expected, and moreover were growing in numbers and forms. As often happens in social sciences, theory follows fact. So the large attention now paid to strategic alliances [25, 64] and network relations between firms [71,72,117] is largely due to its increasing spread in management practice. To such fostering, industrial districts have also made significant contributions [10,63,88,90,97, 100–102].

A network is a set of connected elements and, depending on the nature of elements and the connect-

TRADITIONAL VIEW OF ALTERNATIVE FORMS OF GOVERNANCE



Fig. 1.

ing relations, we may have artificial, physical, biological, and social networks. In the latter case, connecting relations may be parental, economic, friendship, decisional, or informative [127]. Elements may be individuals, groups, firms or networks themselves. The emphasis that the network perspective put on connection between elements constitutes a substantial shift from the approach of isolated systems, either in the market or in the hierarchy alternative [71,72,99,117]. When we deal with firm networks, it becomes clear that nearly stable relationships are the most relevant aspect, and that the holistic view – that of looking at the network as a whole – is at least the dual dimension of the micro view: that of looking at any separate network member. Both dimensions cannot be taken separately any more. The island perspective disappears.

Beyond the many ways networks can be studied [27, 49,128], according to the theory of logical types [13, 53] we must distinguish three different types of networks (Fig. 2):

1. Networks whose elements are individuals or small groups of individuals gathered in a single organization. This is the first network level, coinciding with single organizations (firms), because they can be viewed as networks of workers and managers, taken individually or in groups;
2. Networks whose elements are organizations (firms): this is the field of inter-organizational relationships or firm networks. Trusts, cartels, associations, consortia, etc. are examples of this second network level;
3. Networks whose elements are firm networks: in this case networks of firms, like holdings, strategic alliance groups, multinationals, etc., are connected to one other. This third network level can also be called hyper-network. IDs are hyper-networks built on a regional (local) base.

Here the third network level is concerned, but what in this analytical perspective is noteworthy is that IDs are referred and viewed as a special case in network field, rather than as an independent and separated object of inquiry. IDs appear as local network webs, developed by different causes and ages, and in diverse places. The underlying of that basic nature is important for two reasons. First, it becomes clear that many second-level concepts and theories hold also for IDs. Between them there is primarily trust, which is a crucial coordination mechanism within networks and districts, respect to role played by price and authority [38]. Second, some analytical tools employed to study firm

THE THREE LEVELS OF ANALYSIS

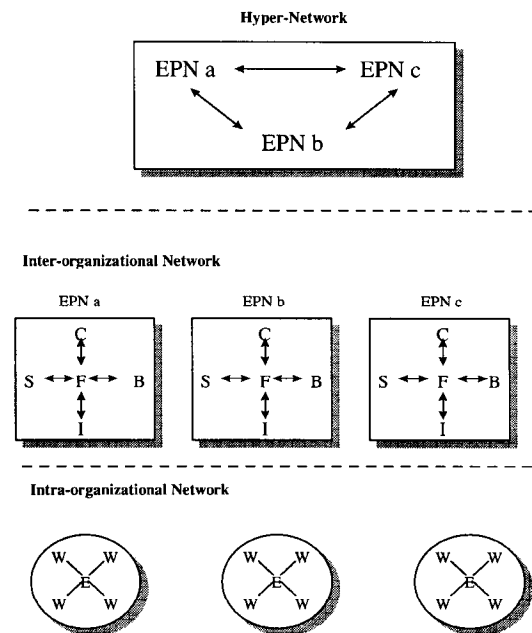


Fig. 2. W = Workers; E = Entrepreneurs; S = Sellers; B = Buyers; C = Competitors; F = Firms; EPN = Entreprenurial Personal Network.

networks can be used also for districts, i.e., density or centrality ratios, size and structural equivalence, etc. With few exceptions [55,76,115] both aspects have been rather neglected until now, and their rediscovery represents a research program for the future.

5. Industrial districts: regional hyper-networks

IDs are regional hyper-networks [31,50], that is, they are networks of inter-organizational (institutional and economic) networks in a defined territory (Fig. 3). Under constraints (rules, norms) and supports (finance and information) provided by local government institutions (region, province, municipality, and others), public, private, and mixed inter-organizational networks interact recursively in many different ways. IDs are multi-dimensional (economic, social, cognitive, and symbolic) systems. The peer group represents networks of small firms, which are similar and do not suffer any reciprocal dominance. Often, these peer groups are created (through spin-off processes or imitation) or fostered by some leading firm, which becomes the focal firm of the enlarged network. Both create and interact with organizations which may be individual institu-

ID AS A HYPER-NETWORK

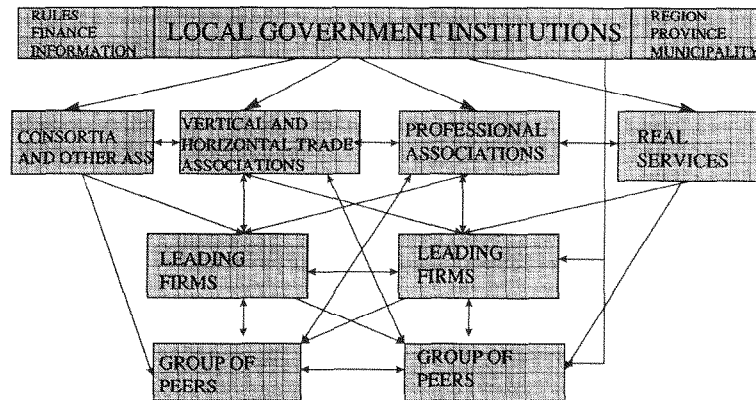


Fig. 3.

tions or networks themselves. Examples of institutions are regional (local) agencies supplying financial aid or real services, such as information, marketing services, etc. Often, these institutions are owned and founded by public organizations and firms. Sometimes, public institutions are already mixed organizations, like consortia or professional associations. Other institutional networks are vertical (i.e., packaging producers) or horizontal (i.e., SMEs located in a specific area) associations. As can be understood through these short, simple examples, the number and kinds of links between district members and networks are very high, and determine district density.

The extent to which public and governmental institutions interact and try to guide the district depends on the country, the region, the local history and culture, and on the life cycle stage of the district [52,114,123]. However, the study on how these variables interact and influence district structure and evolution is only beginning. Indeed, although over the past 25 years a vast literature on this topic has developed (especially in Italy), many questions are still open to debate. Because of the national statistical institutions' delay in recording data on IDs, the lack of information is particularly serious in extensive research, as compared with the richness of case studies concerning single or groups of districts. This is also reflected in a multitude of different languages and methodologies, which make it rather difficult to compare scientific results. There is a number of different districts [91,92], and classification is still a long way off. The variety of IDs also makes it difficult to narrowly define the object beyond orthodox [14–17,22] or generic [11,12,119,120] definitions.

Here, we try to better specify the object, based on our concept of the hyper-network, toward which, although with slightly different languages, other authors [2,103] have recently been converging.

5.1. Problems of definition

IDs belong to the class of local production systems [59,60], which are characterized by a certain concentration of economic activities in a restricted area. However, to say that a local production system is an ID, four conditions must be fulfilled in terms of district density, industrial concentration, industrial specialization, and average firm size. District density means that local firm networks must have sufficiently stable relationships, exchanging goods, services, labor, or information. Orthodox approaches accept only good exchanges, thus excluding non-manufacturing local systems. The density condition also excludes local production systems based on financial, natural, or tax advantages, which do not imply the formation of local firm networks. This exclusion is meaningful because it refers to many science parks and similar special areas. Currently, there are no clear parameters to be used as a threshold for district density. In Italy, the criterion is being affirmed of using labor exchanges between any sort of organization (including self-employment) in a given area. In other words, a parameter is constructed to measure labor mobility in self-contained areas, which are called local work systems.

That parameter also measures local concentration, with a size corresponding to approximately a municipality of about 20–50 thousand inhabitants. By se-

Table 1

Consistency of industrial districts (ID) compared to local work systems (LWS) and to manufacturing local work systems (MLWS)

Geographic areas	LWS 91		MLWS 91		ID 91		% Compared			
	A		B		C		C/A		C/B	
	LWS	Employees	MLWS	Employees	ID	Employees	To the LWS 91		To the MLWS 91	
							% of	% of	% of	% of
North-West	140	2,096,636	96	1,937,426	59	922,140	42.1%	44.0%	61.5%	47.6%
North-East	143	1,378,683	80	1,017,308	65	835,521	45.5%	60.6%	81.3%	82.1%
Center	136	928,079	73	544,655	60	405,613	44.1%	43.7%	82.2%	74.5%
South	365	824,151	30	157,602	15	58,970	4.1%	7.2%	50.0%	37.4%
Italy	784	5,227,549	279	3,656,991	199	2,222,244	25.4%	42.5%	71.3%	60.8%

Source: ISTAT, 1995.

lecting out the non-manufacturing areas, we obtain the manufacturing local work areas. It must be quite clear what the consequences are of choosing labor, instead of goods, as the media (links) by which to measure district density. On the one hand, the crucial role played by work in all economic issues is emphasized. Moreover, information and skills are largely exchanged through worker turnover and mobility between firms. On the other hand, a firm network based only on that criterion cannot address any exchange of goods or services among members. It may be said that that it is a sort of unintentional and passive link, but a very peculiar one. Indeed, it crowds out nearly all current literature on inter-organizational networks and strategic alliances.

Manufacturing local work systems are not yet IDs. They are required to have one dominant sector, that is, to be specialized in one industry. Italy's statistical institution defines industrial national specialization ratios, with which those of the manufacturing local work systems are to be compared. The highest one marks the latter as dominated by that specific industry. This methodological choice, which is aligned with neo-Marshallian orthodoxy [16,17] has many consequences [44,105,106]. A single specialization is hidden by the meaningful presence of something else: i.e., ceramic tiles were developed by the district to include the industry of machines for ceramic technology, the packaging machines industry, and the varnishing industry. The second consequence is that the computation of the dominance of a district's industry also depends on the national size and distribution of each industry. This can lead to paradoxical situation of districts clearly marked and dominated by one industry, but classified for another one. Lastly, and obvi-

ously, the more aggregated is the industrial classification used, the more numerous districts are recorded.

To be an ID, an industry-dominated manufacturing local work system must be characterized by SMEs. While districts are usually characterized by their very small size (fewer than 50 employees per firm), this condition excludes such local concentrations of large firms as the metropolitan area: i.e., Milan is not an ID. Of course, as regards the problem of the level of aggregation in industrial classification, even in this case raising the threshold of average size, the number of districts increases. To conclude, restrictive conditions make IDs a sub-set of local production systems and of local work systems, excluding many known and interesting local economic systems, such as science parks, metropolitan areas, etc.

5.2. Size and role in Italy

A general outline (Table 1) shows 784 local work systems, employing more than 5.2 million people, and a sub-set of 199 IDs, with more than 2.2 million employees. This means that 45% of manufacturing employment in Italy works in IDs. Only 7% of IDs are located in the South, as compared to 63% in the North (Table 2), while 35% have textile and clothing and 20% furniture and fixtures as their dominant industry. Hence, IDs in Italy are a northern phenomenon, concentrated in traditional industries. However we must be cautious in concluding that IDs develop in non-hi-tech industries. First, some districts are in hi-tech industries, like packaging machines, tool machines, and biomedical. Secondly, the maturity of a sector has nothing to do with the maturity of technology. Clothes and footwear can be designed with computerized systems and cut using laser technologies, while hi-tech sectors

Table 2

Industrial districts per specialization of economic sector and geographical regions. Seventh General Census 1991

Regions	A	B	C	D	E	F	G	H	I	Total
Piedmont	5		3	5			1	2		16
Lombardy	19		3	12	1	4		3		42
Tren.-A. Ad.	1		1	2						4
Veneto	15	3	10	5					1	34
Friuli-V. Giu.			2	1						3
Liguria								1		1
Emilia-Rom.	4	1	5	6			1	7		24
Tuscany	6	4	4	1			2	1	1	19
Umbria	2		2				1			5
Marche	11	14	6					1	2	34
Lazio			1				1			2
Abruzzo	3	2	1							6
Campania	1	2	1							4
Puglia	2	1								3
Calabria								2		2
Italy	69	27	39	32	1	4	6	17	4	199
North-West	24		6	17	1	4	1	6	1	59
North-East	20	4	18	14			1	7	3	65
Center	19	18	13	1			4	2		60
South	6	5	2					2		15

Source: ISTAT, Annual report 1995.

A = Textile and clothing; B = Leather and footwear; C = Furniture and fixtures; D = Mechanics; E = Petrochemicals, rubber and plastics; F = Paper and printing; G = Food; H = Mus. installation, toys and jewellery.

usually include assemblers, which are more similar to traditional trade rather than to hi-tech industry.

In Italy, IDs involve a population of more than 15 million people, characterized by strong social identity [11,12,34,119–121] and less labor conflict [11,18,39,40,42,46,119]. Around 1/3 of total SME employment is located in IDs, and therefore in the field of SMEs, it is fundamental to distinguish between those that are relatively isolated, those that are well networked, and those that are rooted in some district. Their nature and development change radically and their survival rate increases dramatically between the first and the third type. IDs are estimated to account for 40% of Italian exporting and 20% of its GNP [54]. Moreover, during the Italian recession of 1990–95, 50% of district firms increased their sales [54]. Other positive indications come from recent research performed by Signorini [108] on 500 small wool textile firms, comparing the economic and finance results of district and non-district firms. Findings show a marked superiority of the former over the latter.

5.3. Triggering factors and evolution of Italian IDs

Italian IDs evolved dramatically over 40 years, in terms of quantity, quality and geographical distribution and survival rates [44].⁵ IDs rose from 149 in 1951 to 166 in 1971, and to 238 in 1991 (Fig. 4), accounting respectively for 360,000, 1,000,000 and 1,700,000 employees. However, behind that growth lies an important qualitative change, because districts before 1951 were really signs of pre-industrialization, being more an aggregation of artisans than hyper-networks. In fact, the lack of inter-firm exchanges, sectors of specialization, and technologies employed show weak competitiveness. This is also confirmed by the low survival rates (Table 3) of early districts, compared with those of new ones. Moreover, it is meaningful that (Table 4), while Italian manufacturing employment decreased by

⁵Slightly different thresholds were used for the same parameters previously discussed. In 1991 they recorded 238 districts with 1,700,000 employees, as compared to 199 with 2,200,000 employees. Despite this lag in data, their research is interesting because, by applying the same methodology retrospectively, they also estimated past district distribution.



Fig. 4.

Table 3
Survival, mortality and natality rates in Italian IDs

	Survival (%)	Mortality (%)	Natality (%)
1951–1961	40.94	59.06	26.85
1961–1971	65.35	34.65	99.01
1971–1981	83.73	16.27	41.57
1981–1991	83.65	16.35	30.77

Source: [44].

Table 4
Variation of district employment in Italy

	A (%)	B (%)	C (%)	D (%)
1951–1961	34.93	-34.26	69.69	70.36
1961–1971	17.33	-31.85	81.80	67.28
1971–1981	25.78	-13.00	34.37	47.16
1981–1991	-3.27	-12.43	25.64	9.94

A = variation in surviving districts; B = variation due to districts' death; C = variation due to districts' birth; D = total variation.

Source: [44].

10.36% during 1981–1991, district manufacturing employment increased [44, p. 289]. Further confirmation comes from the age distribution in 1991 districts (Table 5), which shows that only 16% were born before 1951 and 24% before 1961. Moreover, 26% were born during the 1980s, testifying to the high vitality of this organizational form of regional development.

Table 5

Age distribution of Italian IDs in 1991

Birth date	Number	%
Before 1951	37	16
Fifties	20	8
Sixties	69	29
Seventies	50	21
Eighties	62	26
Total	238	100

Source: [44]

A further line of distinction can be drawn between old and new districts by examining their triggering conditions, which also have seen radical change over the past 50 years. The following elements have remained important and constant:

1. Small scale economies followed by small scale investment [63,77,100,101];
2. Local know-how and know-why [24,25];
3. Double labour market, divided between highly protected labour contracts in large and/or public companies and low guaranteed labor contracts in SMEs [39,40,42,44,46];
4. Strong local identity and social texture [34].

Beyond these common factors, some elements are peculiar to the three different stages of evolution. In the earliest one, from the Second World War to the late 1950s, post-war demand growth, devaluation and consequent export impetus, the crisis of backward agriculture and of the military industry (which both freed up large masses of workers), and the urbanization of the countryside were the specific major triggering factors. During the 1960s, and especially in the 1970s, these were replaced by the crisis of large companies, and by fiscal and labor contract advantages for SMEs, along with substantially tolerated tax evasion, which was held to be an implicit form of financial aid and incentive to small business, as well as a boon to employment. The 1980s, and probably the 1990s as well, saw the spread of entrepreneurship and intentional response to environmental complexity through flexible productions and labor contracts, and network-like forms of organizations seem to be the main new triggering factors.

What is also remarkable is that, regardless of the kinds of triggering factors, if districts develop strongly, they leave "perverse" factors behind and tend to converge towards a "healthy" structure. Most districts in the Emilia Romagna and Veneto regions, which came into being during the 1970s and 1980s by exploiting illegal work and tax practices, no longer maintain any

trace of such imprinting [46,113]. They show even higher wage rates [108] and unionization, and there are reasons to believe that their tax evasion is at least no worse than the average for Italian industry. Even the role of local know-how becomes less important, because as the district evolves, new skills can be acquired and developed laterally to the original technology and knowledge, as happened in ceramic tiles [97], or by better imitating an innovation, as occurred in sky shoes [54]. The substantial indifference that district evolution has to triggering factors is one of the most interesting results of recent research on IDs, which can be meaningfully used for future industrial policies in developing countries where some of the general triggering conditions can be found. The indication seems to be not to pay too much attention to what the triggers are like, because even though they might not have been socially or economically very desirable, the healthy evolution of districts that may ensue can rapidly cancel out those initial defects.

5.4. District identity and policy

The creation of a firm network determines that of an associated identity. If the network is a spot network, there is no identity, and actually the concept of spot network sounds rather meaningless, because it resembles more the concept of market. If the network is unstable, its identity is also unstable and weak. If the network is stable, its identity clearly emerges and can be recognized. Since network stability is directly expressed in terms of recursivity, it further explains why cybernetics, and particularly second order cybernetics, enters into play. This relevance of cybernetic principles is also confirmed by the role of feedback between many antecedents and consequences of identity. For example, the sense of membership is either a cause or an effect of the strength of identity, and therefore it is a classic case of positive feedback. One can decide to enter the system because s/he perceives a high degree of similar or complementary needs, that is, through an identification process. At the same time, one can receive – and help create or reinforce – a collective identity because s/he has entered the system. The higher the identity, the higher the identification; and vice versa. The higher the identity, the stronger the closure; and vice versa. These are all positive feedback processes, which give cybernetics and recursivity a role as crucial theoretical tools.

A district identity can be defined [32] as a *set of mutual understandings among district members, re-*

POSITIVE FEEDBACK PROCESSES IN HYPER-NETWORK IDENTITY

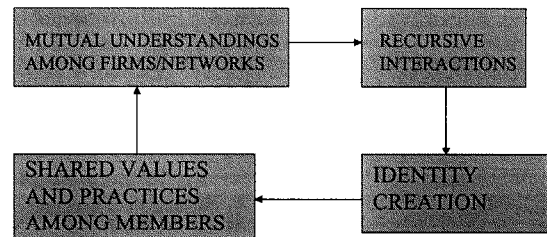


Fig. 5.

garding the central, enduring, and distinctive characteristics of the area. Since different industries can be located in the same area, a district identity refers to those firms which, more or less directly, work in the field of the dominant characterizing industry. The question becomes more complex when we also consider institutional networks, which usually deal with many geographically close industrial districts. In fact, sometimes they are interconnected and partially overlapped, either industrially or institutionally. Recursivity and positive feedback processes (Fig. 5) are also central issues in the creation and development of a district identity, as well as for the other two levels. Forces pressing for the creation of an inter-organizational and hyper-network identity reinforce, through the strength of identity and identification processes, the density and multiplicity of inter-organizational relationships. The latter further develop shared practices and meanings, as well as the growth and spread of tacit knowledge, which concretely operate by reinforcing the adoption of specific codes (norms, standards), trust, and cultural values. The latter further support and consolidate network and district identity.

In the level of organizational identity managers can choose to reinforce identity through substantive and symbolic management: in the same way, at the district level, we can think of institutions which support and facilitate the development of district identity. These meta-organizers [2] can be public or private, corresponding to associations, consortia, local government institutions, and various forms of inter-organizational alliances, which can influence some of the forces discussed earlier for identity creation and development. Their role could be partially analogous to that of firm management, even if their authority is weaker and solutions must be reached mainly through compromise. In the field of substantive management many things

can be done to increase the orientation towards cooperation between district members: strategic, commercial, or technological alliances can be financially incentivized and/or technically supported, etc. Labor laws can favor local market stability as well as manager flows inside the district, inhibiting their exit. Local environmental norms can privilege incumbent firms, while support to study centres can reduce external threats. These are only a few possible initiatives which can be implemented.

On the side of symbolic management, one of the most important actions – one that is being carried out just now in Italy – is the definition of a legal status of the district. Of course, this is not only symbolic, because it precludes a number of other policy actions and manoeuvres by central government, but it is also a sign of and boon to public and international reputation. Many other actions in terms of visibility and citizenship behavior can be thought of. What we wish to point out here is the importance that such actions could have for district identity and, consequently, for district competitiveness, because of the causal relations between identity and competitiveness discussed earlier. It may be further stressed that “district managers” are usually less aware of the relevance of this field of intervention, and no local policy recommendations have been made in this respect [23,26,43]. Actually, district industrial policies have until now suffered the same problems and failures as those of the traditional broader policy, because they were based on the old view of controlling open systems. As for the other two network levels, a “cultural revolution” in management is needed, in order to understand that social systems are self-organizing systems, and hence they cannot be controlled, but at most guided and oriented. Management techniques and industrial policies must be updated to this new understanding of social systems, and reoriented towards raising their self-regulating and self-organizing capacities. This does not mean the disappearance of meta-institutions and policies tout-court, but it implies significant change in their nature and actions.

5.5. *Relics or promises?*

Until 15 years ago, when the international literature [94] also discovered IDs, they were considered as sign of a pre-industrial economy. This view was supported and criticized by many different institutions, which expressed contradictory opinions even internally. One institution was that of academicians, who

were mainly convinced, through the mainstream of industrial economics, that large size was the most efficient and modern way to produce, because of scale economies and monopolistic power. These opinions were actively upheld by opinion-makers coming from large companies. Empirical facts seemed to bear this out, showing large companies and multinationals increasing size and profitability. Unexpected help in this perspective came from unions and parties of the left, which were convinced by the same arguments as industrial economists, and by the explicit opinion and practices of Lenin and centrally planned countries. They were considering fordism as the progressive form of production, common to capitalism and socialism, with the only difference being in the private or public ownership of means of production. Moreover, and more meaningfully and pragmatically, unions and parties of the left looked to large companies as the largest grounds of their strength and consensus. Hence, “great industrialism” was unifying both oligopolies and left-wing parties.⁶ Under that perspective, IDs must be viewed as relics of the past, rather than promises of the future [3,68].

Indeed, both sides included another, opposing view. In the scientific field, some theorists looked at IDs as a form of industrial organization close to that of perfect competition, and therefore to be defended against monopolistic power, which represents an inefficient form, in terms of welfare economics. On the other hand, for different, political, reasons a significant portion of left-wing parties were against monopolistic power, regarded as a defender of old regimes and a source of lobbies hindering progress and civil rights. In Italy as well, the Christian Democrat party broke into two factions, one for – and influenced by – large companies, and another linked to local (territorial) power and small business. Strangely enough, IDs developed in areas administered either by Christian Democrats or by Communist-Socialist parties [11,12,41,45,47,51,119,122]. Likely, a key factor in such a development was a tradition of social cohesion (identity) and reciprocal trust, along with contingent circumstances which constituted the specific triggers. We believe it is no accident that the territory of “Third Italy” shares the strongest Italian tradition of cooperative organizations.

With respect to the above scenario, many things have changed over the past 25 years, in both political and scientific fields, as many data have confirmed. In the

⁶This brief overview refers mainly to the Italian case, where the debate on IDs has been longest and most intensive.

former field, data show that unionism and wages are at levels no lower than in areas dominated by large companies [44,46,113]. Even the quality of working life has not worsened. Under some empirical aspects, data have shown that in all highly industrialized countries, SMEs still persist as a huge and non-marginal phenomenon, showing good performances [56,77,89]. At the same time, many large companies perform quite badly and manifest hierarchical failures: lack of worker motivation, long and rigid decision-making processes, lack of variety and coordination, problems between departments and countries, slowness of the innovation process. Moreover, many of them have deverticalized and are trying to build networking processes. Lastly, the scientific world has started to recognize that:

1. Environmental (natural and social) externalities play a relevant role in competitiveness;
2. Environmental complexity is ever increasing, forcing hierarchies to break up;
3. SMEs must be distinguished from relatively isolated and networked enterprises, which perform better;
4. SMEs are often geographically networked as well, creating local production systems;
5. Economic relationships and performances are strongly embedded in and influenced by social and historical characteristics;
6. Human resources are becoming the most strategic factor of competitiveness;
7. Learning, as well as tacit and explicit knowledge, play a crucial role in production processes and competitiveness.

All these features mark the basic profile of what is called post-fordism, and, according to Rullani [104], can be positively called network capitalism [30]. It is not difficult to see that IDs possess all these requisites, and therefore to explain their persisting competitiveness. For the great industrialists, they could not exist, like the flight of the hornet for early physicists. Looking at the historical debate, they have been taken for dead many times, but they are still in play, of course through a territorial and industrial turnover. Probably, globalization processes are threatening the evolution of IDs, and will determine a way for a new selection and turnover in the meantime, but the general model seems to be the same. To conclude, the phenomenon of IDs is not a backward one, decreasing with economic growth, but on the contrary is a sign of vitality and competitiveness. Districts changed their nature during the post-war years: from relics of a pre-

industrial economy to promises of new industrial organization of capitalism. What is disputable is whether the links to territory-specificity and to a single production cycle hinder the full development of network capitalism or whether spatial and daily proximity are necessary requisites for the formation of trust and identity. In other words, while the development of information technology seems to dissolve any geographical boundary, aspects of social psychology suggest that face-to-face relationships and spatial proximity are to remain highly important for human communication and for trust formation in particular. One may wonder whether the same factors are required for knowledge transfer and development as well. If the answer were yes, than even globalization process would not constitute an extinction factor for IDs, but merely an evolutionary one.

6. A cybernetic view

The main concepts we used in explaining networks and districts belong to cybernetics. This is no accident, because the deep theoretical roots of inter-organizational design are there.⁷ The first is Ashby's law of requisite variety, which is the key concept for understanding the network evolution of capitalism and district competitiveness. That law [8] argues that in order to survive, a system must have a degree of internal variety equal to that of its environment. Since variety is used as a measure of complexity, this principle predicts that a surviving system will have at least the same complexity as its environment. This explains the rapid spread of growing environmental complexity of capitalism, in terms of technology, market, product, labor and social differentiation, and network-like forms of industrial organization. In fact, these forms are more complex (flexible and differentiated) than bureaucracies, large size and Fordist systems. Districts, being flexible regional hyper-networks, match quite well such a requisite variety for current competitiveness.

The second concept is that of organizational (system) closure [9,57,58,82,83,125,132,133], which lies at the core of second-order cybernetics. Beyond the

⁷Although Beer [19–21] is the only organization scholar who has been deeply aware of and has explicitly referred to cybernetics, nearly all prestigious scholars in organization design [75,84,86,116] have more or less explicitly addressed cybernetics. Beside sociologists [61,78], who employed cybernetics in social macro-systems, Zeleny [132,133] uses cybernetic concepts in a more strict way to analyze social systems and organizations.

problems arising from a too extreme and direct application to social systems [33], these are characterized by a certain degree of closure. The old view of social systems as open systems whose behavior is determined by the environment and whose control can be acquired through analysis of its input-output data is replaced by a view where social systems are largely autonomous from the environment, which feeds, guides, and disturbs the system, but cannot determine its behavior.⁸ Networks, and districts in particular, match that view quite well: one of their main competitive advantages is that of being independent (“autarchical”), because of their high internal variety. Moreover, as discussed above, they can enjoy a low level of cheating and opportunism, which are limited by trust and a sense of membership. These characteristics also become competitive factors for clients, which when coming into the district may find all they need in just one trip. Therefore, exchanges within the district are privileged with respect to those on the outside, increasing the degree of closure and providing impetus to self-organizing processes. Another confirmation of the importance of organizational closure in dealing with IDs is part of their definition methodology. The first step in identifying IDs is recognizing local work systems, which are areas with very high labor mobility. This means self-contained areas of work exchange, addressing the supposed existence of significant boundaries dividing each area from the outside. In other words, it shows a high degree of organizational closure and self-organization.

The third concept is that of recursivity, which is central to cybernetics [8,57,125]. Eigenvalues, fixed points, self-organization, and attractors are seen as the result of recursive functions. On the organizational side, we argued that a social network can be defined and recognized only if relationships between its elements are sufficiently stable. In empirical and formal terms, such stability means that there must be recursive interactions between network elements – be they individuals (first level), organizations (second level), or networks (third level). In other words, the function describing the network must be a recursive one. It has also been argued that system (network) identity and trust originate from recursive (repetitive) interactions between members. Identity emerges when people interact recursively, because they have mutual understanding and reciprocal recognition. The

⁸This view does not contradict Ashby’s law of requisite variety, because the latter states merely that surviving systems must reach the same degree of environmental variety, but does not prescribe how they go about this.

sense of membership then develops. Even trust grows through recursive interactions, because it is fostered and strengthened by past and future (expected) interactions, that is, by recursivity.

The fourth concept is that of positive feedback loop, which is fundamental to first- and second-order cybernetics [8,57,58,125]: two systems or factors reinforce their effect through a recursive interaction. The result is a reciprocal dynamic increase. This differs from the early concept of negative feedback, referring to a stable system which denies moves from its starting point. While physiology is the kingdom of negative feedback effects, social psychology is that of positive feedback effects. Beyond the fact that capitalism itself is based on a positive feedback loop, because people invest in more profitable organizations and the greater the investments the more likely they will be profitable,⁹ main examples of the latter in our field are the relationships between:

1. Network trust and identity, because the more people trust one another, the more they reinforce their sense of membership, and therefore the more they strengthen their group (network) identity. At the same time, the more they perceive themselves as a group (network), the more they trust one another;
2. Network identity and self-organization, because the stronger the former is, the higher is the degree of self-organization, that is, the more people seek to work within the same group (network). Consequently, the environment becomes less important and network (group, system) boundaries become harder and clearer;
3. Network and environmental variety, because the growth of environmental variety determines the corresponding growth of network (organizational) variety but, as the latter itself is part of the former, the increase in organizational variety fosters (means) an increase in environmental variety.

7. Conclusions

Although many questions still challenge researchers, after 25 years of study some sound ideas may be stated.

⁹This is nothing more than the old Marxist money-good-money* accumulation process, which leads to economic concentration, crisis and radical change. This process also leads to increasing exploitation of natural resources, and hence the issue of sustainability reveals the conflict between ecological negative feedback loops and capitalistic positive feedback loops.

Often taken for dead, IDs have survived and, through transformations, have performed successfully. Their main features well match those related to firm networks, which are supposed to be the next evolutionary stage of capitalism. Contradicting organizational economics, rather than being temporary and marginal forms of industrial organization, IDs and firm networks are acquiring larger roles. They may constitute a good evolutionary pattern for industrialized and industrializing countries. They also highlight the strong links between social, economic and technical aspects, claiming a holistic approach. Cybernetics may offer many useful concepts for understanding these complex dynamic adapting systems, renewing the dramatic increase of management and organization studies in issues related to IDs. However, much work remains to be done in order to collect extensive and comparable data, to understand micro-interactions between district members, to explain evolutionary patterns, and to outline new approaches to industrial policy.

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