

The Italian system of innovation: the gradual transition from a weak “mission-oriented” system to a regionalised learning system

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Introduction

The various studies conducted in the past on the performance of the Italian innovation system have almost inevitably underlined the weakness of the Italian R&D systems. Its main salient feature is the poorly performing, insufficiently developed, and scarcely organised block of activities related to Scientific and Technological Research (STR).

The failure of the Italian system in promoting basic science and technology development in high-tech sectors is not just “institutional” and it does not involve only the public sphere. In fact, it cannot be limited to the issue of the structural inefficacy of the Italian complex of public institutions delegated to support STR programmes (Universities, centralised authorities at ministerial level, and government funded public centres). On the contrary, it involves also the business sector, namely, the private system of R&D in-house laboratories.

Although Italy was a late industrialised country, it did not make any serious effort to overcome its backwardness by establishing new modern institutional forms at the frontier of the most advanced research¹ (either within the public system of basic research or in any high-tech sector.)

As an inevitable result, Italy is still very backward in high-tech sectors. It failed during the past in the development of any sustainable capability in high-tech sectors such as aerospace, nuclear energy, computer technologies and superconductors, telecommunication and bio-technologies. These are advanced sectors which require a

¹ This is in striking contrast to what occurred, for instance, in the nineteenth century, in Germany (Keck, 1993), with the financing of higher education, and vocational training, or in the twentieth century, outside the university system with the foundation in 1911 of the net of research institutes partially financed by private firms: the Kaiser-Wilhelm-Society (later on renamed Max-Planck Society). And again, the Italian experience in the institutional setting of public research (the Italian CNR) is far from the case of France (Chesnais, 1993), where the centralised activities of the co-ordination of French science took place through a “mission oriented” initiative: a centrally well managed CNRS, where the very large firms belonging to the oligopolistic core of French business became the State partner in innovation activity.

strong coherence of the various actors of the “national innovation system” (Nelson, 1993). The Italian system lacked a high level of government support, technology transferring institutions, top frontier universities and institutions in basic science, and leading Schumpeterian entrepreneurs that are able to launch new products on the market place. Home-based firms in high-tech sectors are now on the margin of the international scene (Piccaluga, 1996). During the restructuring times of 1980s and 1990s, many closed down, or were acquired by foreign multinationals. In high-tech sectors, the Italian contribution to the global development is marginal, and the international competitiveness of the few existing firms is declining (Guerrieri and Sasson, 1990; Amendola and Perrucci, 1995).

The dualistic structure of the Italian innovation system

As discussed by many authors, Italy is characterised by the presence of two innovation systems. One has been discussed above, and it is related to the R&D core in high-tech sectors², the second is represented by various local networks of small firms, grown on a local base, and strongly exporting.

The R&D core system and the organisation of public research

² The weakness of the Italian system of R&D does not only depend on the scarce amount of resources that are involved in this activity (Istat reported in 1999 a net value of about 23,000 billion lira of which 13,000 billion lira spent by public source). The Italian system has been much criticised (De Benedetti, 1990; Malerba, 1993), also for numerous other crucial factors: a) the number of oligopolistic firms is too restricted, and too many barriers for growth are encountered by small business, b) Italian firms have a limited level of internalisation, c) demand conditions are neutral as regards new technology (there is a poor use of public procurements), d) the mechanisms of co-operation among industry-university-and R&D labs has proved until now quite unsuccessful, e) there is poor co-ordination between the various levels of public interventions (where technology policies are planned, activated and performed), f) public institutions that are appointed to play an active role in R&D activity are poorly managed (scientific researchers are not exposed to the right incentives), g) advanced basic research performed in universities and public research are not evaluated with international standard parameters and receive poor social recognition. As a result, numerous talented scientists and engineers prefer to work outside Italy (so the country suffers a serious brain drain).

Even after the reform of the 1990s, the public research system is very fragmented (nearly 50 centres with about 24,000 employees). It is organised by eight Ministries, of which the most important is the Ministry of University and Scientific Research, a newly set up institution, created at the beginning of the 1990s, in order to enforce the rate of Italian expenditures in R&D. The two biggest public organisations remain the Italian CNR, with about 6,400 employees (and about 289 centres), and Enea with nearly 3,600 employees (Tab. 1). About 100,000 people are employed in Italian universities, half of which are administrative staff. Because of organisational failures and limited resources, as we have seen in the previous sections, this system has been quite weak in the generation of endogenous capabilities³. In Italy there is insufficient osmosis between academic research and the world of industry and services (Colombo, 1990). This situation is perhaps changing now (Gambardella and Malerba, 1999), because at political level there is more awareness of the importance of knowledge as a strategic factor for economic development (Avveduto, 1995). Italian researchers and scientists participate frequently in numerous EU programmes, like SCIENCE, ESPRIT, RACE, BRITE, EUREKA, (Gambardella and Garcia-Fontés, 1994; Geuna, 1995; Silvani, 1998).

The industrial district model and its innovation performance

Despite their low rating in R&D indicators, small firms and large networks located within industrial districts (and local production systems) are often very innovative, especially if we consider the issue of the conceptualisation of new products. These firms are often recognised as international leaders (like Benetton for clothing, Nordica for ski boots, Marazzi for ceramic tiles, Natuzzi for leather sofas⁴). The dominance of the industrial district model is particularly visible in Italy in two main areas. The first is the one related to many traditional sectors, like clothing, silk, wool, leather products, footwear, furniture, chairs, leather sofas, spectacle frames, gold jewellery, sportswear (including ski boots), stockings, tiles and household products: cutlery, taps, and sanitary pottery. The second refers to some niches of industrial machinery (for instance: machine tools, textile apparatus, medical instrumentation, and packaging machinery).

³ It must be said that, in the past, the system of public research has also experimented few points of excellence. For instance, the Nobel Prize awarded to Natta for his research work conducted in collaboration between the chemical firm Montecatini and the Polytechnic Institute in Milan. Or the Nobel for biology, assigned to Rita Levi Montalcini, at the CNR laboratory in Rome. Nor must we forget the international leadership during the 1930s in advanced nuclear physics held by Fermi's school: the "boys of via Panisperna" in Rome. The problem is that they were just isolated cases.

⁴ Cfr: Belussi (1992), Pilotti (2000), Marchi (1999), and Belussi (1999a).

Tab. 1 The Organisation of scientific and technological research in Italy: the public system: Organisations and employment in 1997

| | |
|---|--|
| The Council of Ministers | CIPE Central Statistical Office (2163) Institute for wild fauna (48) |
| MURST (Ministry for University and Scientific Research) | CNR – National Council for research (6419) INFN- Nuclear physics institute (1679) IENGF Electrotechnics institute Galileo Ferraris (40) INGV geophysics institute (152) OGS oceanography institute (118) INFM physics of materials institute (98) INAF astrophysics institute (733) INOA optics institute (140) INDAM Severi theoretical mathematics institute (6) Vitelli institute for papyrology (8) SNZ Anton Dohrn zoology institute (95) ASI Italian Space Agency (105) INMR mountain technology (-) CRSA agriculture research institute (980) INEA agriculture economics institute (96) ISMEA market studies on agriculture (-) INRAN nutrition institute (123) ENSE seeds selection institute (-) |
| MIPAF (Ministry for agriculture) | |
| MICA (Ministry of industry and trade) | ENEA New technology, energy and environment institute (3617) SSI Experimental station for industry institute (310) |
| Health Ministry | ISS Health institute (1341) ISPESL labour studies institute (1121) New experimental institute for animal prophylaxis (10) Scientific analyses institute (14) |
| Labour Market Ministry | ISFOL Training institute (80) IISM Social medicine institute (31) |
| Treasury and Economic Planning Ministry | ISAE Economic Analysis institute (147) |
| Environment Ministry | ICRAM marine technology institute (150) ANPA Environment protection institute (294) |
| Defence Ministry | CISAM Military applications institute (148) MARITELERADAR institute (48) INSEAN naval architecture institute (128) |
| TOTAL SYSTEM PUBLIC RESEARCH | (24.000)* |
| MURST | 60 Universities (101.000)** |
| UNIVERSITY | (organised in 1500 Departments) |

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*(of which 6,000 researchers)

** (47,000 teachers and researchers; 54,000 administrative staff)

Source: Linee per il riordino del sistema nazionale della ricerca scientifica e tecnologica. Relazione alle Camere del Ministro dell'Università e della Ricerca Scientifica e Tecnologica –Murst (Rome, 31st July 1997).

In the first cluster, the strength of the innovative performance of the Italian firms lies essentially in the firm's design capability (this includes the ability to integrate innovative parts and components into products). In the latter, Italian firms are sophisticated specialised suppliers able to provide specific applications to quite demanding customers (large multinationals, health institutions, mass-production producers) in a segment of the market characterised by high quality performance. Italian firms are also renowned for their organisational flexibility and the early adoption of just-in-time procedures. During time, to sustain the increase of labour costs, Italian firms have intensified the adoption of innovation in process machinery (Belussi, 1988; Istat, 1995). Also in relatively low-tech sectors, the accumulation of firm-specific competencies, and firms learning capabilities, have implied a transformation of these firms into quite modern organisations, very different from the stereotype firm, specialised in traditional activities, still existing in many developing and backward countries.

Small and medium size firms operating in Italian traditional industries have often been described as "highly dynamic atomistic learning networks" ... "characterised by advanced capabilities of absorbing, adapting, improving, and tailoring new technologies (developed externally) to specific market needs... "innovation originates not from formal R&D, but from informal learning by doing, by using and interacting". In this group of firms, engineering skills, product know-how, and understanding customers' requirements, are the major sources of incremental innovations and product customisation (Malerba, 1993, p. 234). This description is quite correct, but it leaves out three main elements.

Firstly, small firms typically do not compete alone in international markets, they are grouped in the so-called "industrial districts", or in "local production systems", where they form quite stable nets of co-operation (Becattini, 1987; 1989; Sforzi, 1995; Belussi and Arcangeli, 1998).

Secondly, one could infer that innovation activity performed by these firms is marginal, not deliberate, and a rare phenomenon. On the contrary, these localised systems of firm networks in relation with their products and processes, not only produce incremental innovation (Bellandi, 1992; 1993), but also radical changes (what is marginal or radical must, clearly, be related to the type of the product and sector we are referring to). Moreover, often innovations are not just acquired from outside (Becattini and Rullani, 1996). They are developed *locally*, combining various resources and competencies of existing local specialised firms and suppliers (Belussi and Gottardi, 2000).

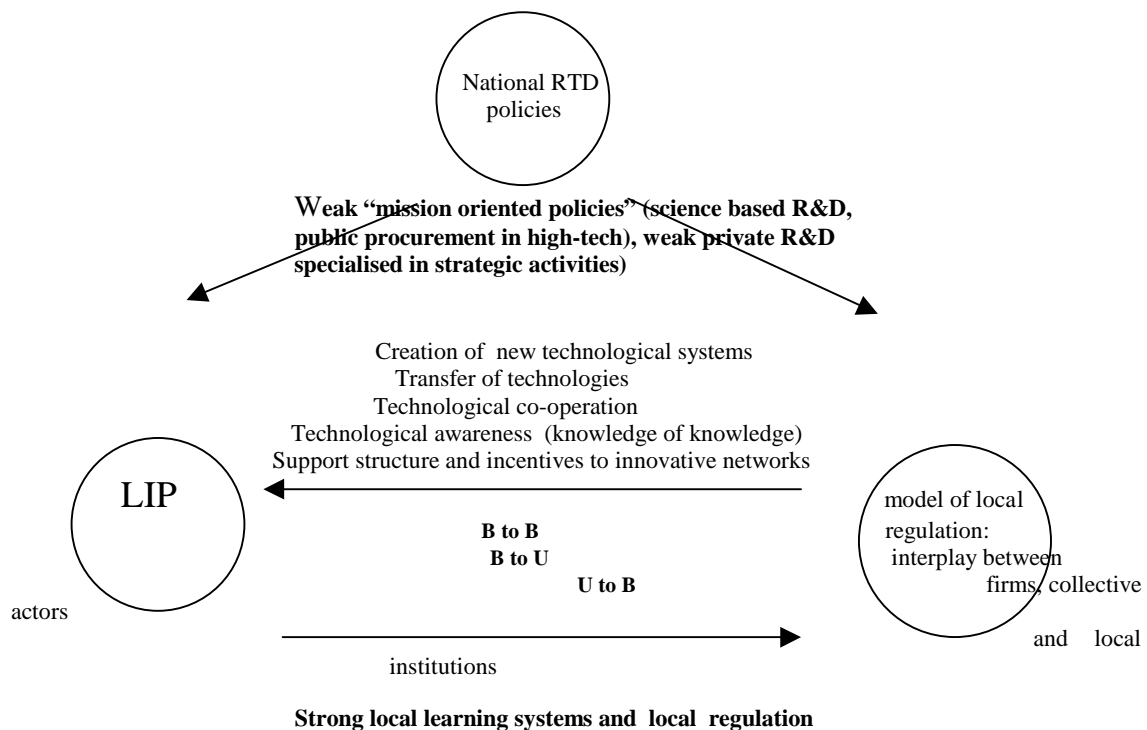
A third point of disagreement lies in the evaluation of the policies that have guided these systems to reach a high level of international competitiveness. One can for instance assume the relevant case of Benetton⁵ (similar to that of many others). Can we really say that Italian innovation-diffusion policies have been influential?

A picture of the Italian innovation system is sketched in Fig. 1. For reasons too complex to deal with, top-down diffusion policies at the central level have always been very weak. On the

5 Cf. Belussi and Festa, 1990; Belussi, 1992.

contrary, local innovation policies were developed in interaction with the institutional framework existing at local level. This was a clear-cut tendency, since the beginning of the 1970s, when, at local level, we find the first cases of regional legislation in favour of small firms. And, again, during the 1980s, under the pivotal efforts of the local associations of entrepreneurs, some initiatives take place, sometimes in conjunction with local private and public institutions (Chambers of Commerce, Regions and local authorities, etc.).

Fig. 1 **The Italian innovation system**



B= business

U= universities and research centres

For France or Germany, it is generally asserted that the *régie* of the State in innovation and technology policies was quite effective (Nelson, 1993). In the case of Italy, most of the legislation adopted was fragmented, submitted to a very inefficient state bureaucracy, and political patronage⁶. Differently from what is claimed by Malerba (p. 241-2), policies launched by the central government aimed at fostering the adoption of new capital equipment (and policies for developing local technological infrastructures) did not have much impact on the whole structure of Italian districts⁷. The important feature of the Italian system is not a well-developed set of interventions regarding innovation-diffusion policies, organised by the central state, to overcome “market failures” with the allocation of public funds (Gerybadze, 1992). Its central characteristic, as depicted in Fig. 1, is the fact that, direct and indirect, innovation policies were supported by the slowly emerging model of local regulation, where firms, collective actors and institutions worked together⁸. The following sections will deal respectively with these three main lines of discussion.

A picture of the technological dynamics of industrial districts in the presence of synergies and network externalities

In this section we will try, at a very abstract level, to describe the feature of the innovative model of the typical Italian districts/local production systems, where geographical proximity matters (Bellet, 1993). Because traditional indicators of innovative activity (R&D and patents) score very low, external observers may infer the existence of scarce activities devoted by firms to technical change.

⁶ State *grand commis* were not very autonomous in their decision processes, which were always influenced by political favouritism (which meant the use of public money to support electoral clientele). From the end of the second world War to the 1970s the Italian government has provided subsidies to large firms, very often owned by the state. Thus the central administration was the regulator and the state-owned firm the regulated agent (Bianchi, 1995).

⁷ Let us take the case, for instance of the laws supporting the acquisition of new technologies embodied in machinery (L. 696), or innovative projects (L.36, , and L.399). It has been calculated by Bartolozzi and Garibaldo (1995, p. 218) that during the 1980s, nearly half of the funds provided for the so-called “diffusion policies” was absorbed by the limited group of the largest Italian firms. Moreover, the specific law for industrial districts voted in 1991 (L.317), remained inapplicable for two years, because of the absence of the alleged statistical criteria of the definition of an industrial district. When they were finally announced, they appeared quite controversial. At the end, the law was abrogated, and the statistical definition of the industrial districts/local system was entirely delegated to the administrative offices of the individual regions.

⁸ On this issue, at the theoretical level see North (1990) and Johnson (1992); in relation with the local regulation see Leoni and Mazzini (1993), and Messina, Riccamboni and Solari (1999).

In order to understand the increasing return mechanism at work, we will contrast the standard innovation model with the prevailing district/local production system model of innovation generation and diffusion (Belussi and Gottardi, 2000). A complex frame may be envisaged, with localised network externalities created by agents' interactions (Tab. 2).

Tab. 2 The industrial district model of innovation

| | |
|--|--|
| Standard model | Interactive chain-linked model, without elevated levels of intramural R&D activities |
| University R&D laboratory Innovations/patent | <p>Innovations are developed in firms by Schumpeterian entrepreneurs. Innovations and improvements are embodied in the design of new products and new machinery (Universities do not play a major role)</p> <p>The engineering departments of firms are the source of continuous improvements (incremental innovations) in firms</p> <p>New solutions are also suggested by sophisticated and technically demanding clients: client-suppliers (interacting learning)</p> <p>Vicarious learning in firms is decisive (new technical information is acquired through exhibitions, fairs, and technical meetings organised by the local associations); the district is characterised by a high density of information channels.</p> <p>Tacit knowledge is developed in firms, where an accumulation of know-how occurs (learning by doing activities). Tacit knowledge is mainly practical knowledge, possessed by technicians and qualified blue collar workers. Tacit knowledge is embodied in the firm routines and expertise. Tacit knowledge spill over: a) when knowledgeable individuals found new entrepreneurial initiatives (new firm start-ups by scission), b) with the inter-firm mobility of technical personnel, c) through contacts among professional people.</p> <p>Technical schools founded by local government or by entrepreneurial associations are the main source of codified knowledge. New external scientific knowledge produced by Italian and foreign universities is here tested in advance (innovation watcher), simplified and adapted to the linguistic codes used by local firms, and socialised through the organisation of technical courses, addressed to the re-training of personnel of firms located in the district area. Many teachers and alumni come from the best firms of the district: so this facilitates the absorption of external knowledge and the up-grading of knowledge among firms.</p> |

| | |
|--|---|
| Knowledge as artefact | Accumulated knowledge |
| All knowledge is abstract and codified | Knowledge is partially tacit and uncodifiable |
| Knowledge is a free good | Knowledge is localised and embedded in people and organisations. Formation of contextual knowledge. Knowledge is costly to transfer outside the local industrial structure. |

The creation of new knowledge appears to be the output of localised agents' interactions. However, this is more the result of search strategies and random interactions, rather than a planned and deliberated effort in which R&D activities are involved as described in the standard model (Gibbons and Johnston, 1974). Dynamic feed backs and positive interactions are created along the productive *filière* and the various networks existing in each district/local production system, where firms co-operate in the manufacturing of the various components and sub-components. The generation of new knowledge (innovation) occurs through numerous sources: design and engineering activity, learning processes (Arrow, 1962) coming from the production departments, interactions with clients and suppliers, re-use and re-working of existing external knowledge (Arora and Gambardella, 1994). In Tab. 2, we have sketched a localised model of innovation, which re-elaborates the seminal contribution of Kline and Rosenberg (1986). We have defined it an “interactive chain-linked model”. The “interactive” chain-linked model envisages the innovative process as a circular process, with feedback and information links between market needs, design, production and search processes⁹. It recognises that, to create innovation, many forces are at work: design and product development departments, production engineering departments, machinery producers, and customer suggestions¹⁰. While standard economics treats the creation of new knowledge as a “one-shot” process (Arrow, 1994), in industrial districts it is a type of continuous process. From time to time, the existing pool of knowledge is re-used, and re-combined with new knowledge, for contingent problem-solving goals, or for implementing new entrepreneurial ideas. Our model points out the importance of innovation as a collective and historical process of accumulation of know-how.

The standard model can be accurate for measuring the innovative process in high-technology sectors, but it fails to represent the innovative process in medium or low-technological sectors.

Firms belonging to industrial districts are often not only innovative leaders but also fast adopters. Which are the economic incentives to accelerate the process of adoption of innovations? Let us discuss first the case where the innovation is freely available on the market. The original innovation, during its diffusion within industrial districts and local

⁹ This is in line with the results of the research conducted by Cooke in a large sample of small firms located in many European regions (1997), where customers and suppliers scored as the highest main sources of innovation. As discussed by Maskell (1998), small firms very often receive technological information not from their R&S departments but from “markets”; that means: consultants, subcontractors, marketing representatives, exhibitions, commercial organisations, etc.

¹⁰ On this topic see also the fundamental work of von Hippel (1988).

systems, is typically improved, and it changes considerably (in the cost of adoption, or in performance, or, again in other intrinsic important characteristics). The higher is the population of potential adopters, the higher is the generation of variety (Di Bernardo, 1991), and the higher is the probability that some modifications are introduced along the diffusion cycle. This appears to be a first advantage that firms enjoy in districts. A second advantage is the existence of an ample range of firms endowed with differentiated capabilities and resources. This preserves the versatility of the local structure. A third advantage is the inter-firm linkages with the suppliers of machinery localised very often in close proximity. Porter (1990) has also noted this element. For Porter, an important element of the competitiveness of the Italian district model stems from the co-location of innovative process-technology suppliers. A fourth advantage relies on informal channels of information and knowledge sharing and transmission. They may be considered a collective sunk investment in immaterial capital, as emphasised by Arrow (1967).

In some cases, within the Italian districts/local production systems, innovation diffusion is also a “sponsored” process. In order to control cost, compatibility and standardisation, final firms typically press their subcontractors to adopt the more advanced models of new machinery just launched on the market. In any case, spatial proximity activates imitative behaviours (“learning by watching”). The dense net of social relationships acts as a means for accelerating the natural rate of adoption and for absorbing the inevitable spillover of knowledge. Leakage occurs through the mobility of human capital or through the information revealed to suppliers or sub-contractors. But what are the economic consequences of the inner mechanism that undermines the protection of innovation? Is this type of “market failure” undermining the innovative efforts of firms? If innovation (and invention) is less protected, innovative firms have only a single chance to maintain their technological leadership (Robertson and Langlois, 1995). They must accelerate their rate of introduction of technical change. As in other cases discussed by the literature on innovation economics, competition is managed moving down along the learning curve or maintaining the lead time (Levin et al. 1987). Among rival firms the “innovative” pressures become stronger. This accelerates the rate of adoption of technical change and, as a consequence, the international competitiveness of firms.

While intra-district diffusion may be accelerated, extra-district diffusion remains blocked by the existence of elements of tacit knowledge and by cultural barriers.

Thus, bandwagon effects and production network externalities emerge, thanks to market-driven or voluntary co-ordinated strategies of quick adoption.

Another advantage, perhaps minor, may be seen in the cost of capital. The agglomeration of activities and the high turbulence of firm entry and exit facilitates the development of a flourishing market for second-hand machinery. This can reduce entry barriers, and increase market contestability. In the end, the presence of increasing returns does not lead to a monopolistic competition, as presupposed in Krugman models of local agglomeration, but to a pure model of perfect competition, where we see high rates of new firm start-ups (the founders of which are very often skilled senior blue-collar workers of existing firms), and exit. Within

the Italian districts/local production systems, the market shares of the dominant firms are continuously attacked by new competitors and fragmented.

This last factor favours social mobility and the entrepreneurialisation of subordinate employment work. When a phase of restructuring starts, induced by a sudden change in market conditions, the district is characterised by a rapid change of its firm population with turbulent entry and exit.

The formation of an endogenous growth mechanism¹¹

Some characteristics of the diffusion of technical change and know-how within the Italian local production systems can clarify the process that has been frequently described as the endogenous growth mechanism of districts. Empirical studies indicate many factors that have contributed to their consolidation.

The “laws” of motion of districts been discussed by Marshallian theorists mainly in terms of external economies, “industrial atmosphere” and reduction of transaction costs. In the same way, this tends to differentiate the “Northeast” approach (Rullani, Di Bernardo, Pilotti, Gottardi, Belussi, Biggero, Corò, and Anastasia) from the “pure” Marshallian School of Florence (Becattini, Dei Ottati, and Bellandi). Elsewhere (Belussi, 1996; 1999b), we have emphasised the dynamical aspects related to the various learning models existing within the local production systems, focusing on three main factors which influence the local development patterns¹².

- A. Firstly, the processes of inter firm “cognitive” division of labour, which is related to the intra-district division of innovative labour (where only few agents, and sometimes large firms belonging to the local context, are truly Schumpeterian). On the contrary, when Bellandi (1989; 1992; and 1993) speaks of the diffused innovative capacity of industrial districts, he has in mind only the important, but not strategic aspects of learning by doing and by using.
- B. Secondly, the related specialisation of knowledge, which guides the mode of resource co-ordination of the local systems, whose knowledge connections are very often external to the local system. So, in many cases, local production systems are not self-sufficient “knowledge communities” (on this issue see also Loasby (1998) who manifests a more traditionally Marshallian perspective), but they are able to build up innovation using the international circuit of knowledge (Lombardi, 1994; 2000).
- C. Thirdly, we must focus our attention on the process of accumulation of embedded “contextual knowledge” among local agents. In our interpretation the process of

¹¹ The next two sections are mainly based on Belussi and Pilotti (2000).

¹² On this topic see also Antonelli (1986 and 1994).

accumulation of contextual knowledge refers to technical capabilities and know-how that stem from both tacit (difficult to transfer) knowledge and the absorption of available codified knowledge (Cowan and Foray, 1997). This gives rise to the growth, during time, of “knowledgeable” agents (individuals, firms and institutions) and, relating to this, to a stock of “contextual knowledge”. It is important to stress that, contrary to what Marshall thought, “contextual knowledge” is not “in the air”, (external observers crossing the systems do not have access to it) but is ingrained in knowledgeable agents. So, we must assume also that it is difficult to transfer, or to imitate. Within the Italian local production systems it has been spread out mainly in two ways: a) thanks to a diffused social system of births of new firms, founded by the employees of the most technologically dynamic firms, and b) within the matrix of the inter-firm relations of subcontracting. The existence of this form of social capital, which we have called “contextual knowledge”, bears important consequences for the economic analysis. In turn, it is precisely the existence of this distinctive character of embedded capital that brings about the competitiveness of the major number of the Italian local production systems and that contributes to explain the phenomenon of the territorial agglomeration of local development in Italy. Contextual, or “situated” knowledge, is not simply to be copied from outside. Spatial differences are not washed away by the formation of global markets. Agents, therefore, possess specific long-lasting competencies that influence their level of competitiveness.

A recursive sequence of a cumulative growth-inducing mechanism can be described, and the various stages of growth of a typical local production system can be modelled.

1. Typically each system starts with a small group of firms endowed with some artisan skills. There appears, at the beginning, the distinctive competence (Carlsson and Eliasson, 1994) that can be mobilised by local productive forces. Initially, firms are characterised by being “phase-enterprises”. The governance of the local production cycle is highly decentralised among small entrepreneurs. Cost competitiveness (and self-exploitation by self-employed small entrepreneurs) is typically the principal attribute of the start-up. Once the local system is able to capture a specific segment of demand, the growth-mechanism starts.
2. The first earnings are invested in the modernisation of production processes. This tends to maintain at the minimum level all the production costs (the predominant small size allows for a significant reduction in internal organisational costs, as You, 1995 has discussed). So, the shares of the national or international market initially acquired tend to expand. Demand growth increases the returns from the further division of labour among firms that has now been made possible. Specialisation increases economies of scale and may induce the generation of new knowledge (with the introduction of

incremental innovations¹³). In turn, this renders the local production system more competitive. The proximity of agents forms an integrated system where interactions are fluid. Over time many channels (both informal and institutionalised) are created through which information and knowledge circulate quickly within the productive matrix of subcontracting and specialised firms.

3. The capability of combining “dispersed pieces of knowledge” (Hayek, 1945), within these channels, is intensified when the proximity of agents allows for repeated interactions. Here starts the evolutionary pattern of diversification among the various local production systems, depending on the type of learning they are able to develop. In one case, it may be a simple type of learning by doing or using, that mainly influences costs. In another, a more complex form of learning might be envisaged, that has an intrinsic technological content, via the interactions built with suppliers, providers of machinery, technical consultants, demanding clients, and suppliers of intermediate components, that may radically change the product or its performance. Using their absorptive capability, firms change and continuously improve their performance in products and processes (Cohen and Levinthal, 1989; Cohen and Levinthal, 1990). If the cumulated effect of changes is radical, the competitiveness of the local systems may be affected and its (national or international) market shares will grow again.
4. A higher volume of production allows a greater division of labour among enterprises¹⁴, and the sequence recursively starts over.

In order to grow, industrial districts require favourable economic conditions, as for instance in Italy in the post-war period, when the Common Market was created. Then the industrial district model could take-off. Knowledge creation and propagation (Vicari, 1998) occurred as a consequence of the development of local firms.

The evolutionary path of growth that originates within the districts started with the growth of a restricted number of firms: the founders of the district. In these firms knowledge and technical skills became consolidated, and contextual knowledge was created. Contextual knowledge was created which can be defined also as a cognitive form of social capital, historically accumulated in the local production systems model, and interpreted as a sunk investment. Knowledge propagation was achieved via the entrepreneurialisation of technical and professional people within the founder firms. Their level of professionalism allowed them to leave their employer and become small independent entrepreneurs. The industrial structure expanded through a process of firms scission. Subsequently, new waves of spin-offs occurred, populating the district with small innovative producers.

The fact that the development of these idiosyncratic local production systems is territorial-

¹³ On this aspect see for instance: Georghiou et al. (1986), Dosi et al. (1988), and Edquist (1997).

¹⁴ See the arguments put forward by Rullani (1993) “If the small specialised enterprise belongs to a quite large system, the relevant scope economies ... should be measured according to the size of the value-chain of the whole territorial system. In other words, what is important for the generation of value and competitive advantages, is not the size of the enterprise, but ... the level of the efficiency of the local system.” (p. 35).

specific bears some important consequences. This strategic (but immaterial) resource is not *ubiquitous*: it is essentially territorial-specific¹⁵. Only agents operating in the local production system have access to it, and they may further enlarge and exploit it. This process, thus, is highly path-dependent, and built up upon a nucleus of original local skills and competencies.

“Contextual knowledge” is clearly local, and it is bound to the spatial boundaries of each specific production system. As a whole, therefore, it will never be completely “globalised”. Over long-distance (which is relational as well spatial), frictions dominate¹⁶. While some codified elements of contextual knowledge are more at “risk”, because with time codified knowledge tends to be diffused and spread around through different sources (Belussi and Pilotti, 2001), the tacit part of it will remain ingrained in the local agents, in their “organisational memory” (Grassi and Paoli, 2001), in their mental models (Denzau and North, 1994) and cognitive systems (Belussi and Pilotti, 2001). So, differently to what Nonaka claimed, the conversion of tacit knowledge into “external” knowledge is far more difficult. It follows that, on the whole, the contextual knowledge of the various districts will never go over the local production system walls. Thus, if some knowledge flows may reach the global circuit or direct competitors, being externalised, contextual and local knowledge, defined as a stock variable, will never be completely externalised.

The verification of this thesis can clearly only be indirect. Indeed, the areas of specialisation on which, for instance, Italian industrial districts have competed, have not changed very much over the last two decades (Quadrio Curzio and Fortis, 2000).

During this time, Italian districts have proved to be quite stable structures, and not footloose organisations. They have indeed deepened their roots in their territory. The process of globalisation has passed over them: yet during the 1980s local production systems were already global in their market outlets. At the end of the 1990s, recent empirical research shows the deepening of a globalisation process through the activation of international supply chains of subcontracting (Belussi, Gottardi, and Rullani, 2000). Even in recent times they are characterised by still quite high export flows ¹⁷ (typically 40-50% of total firms sales), and some remarkable peaks.¹⁸

¹⁵ A similar concept is expressed by Antonelli (1999a and b), Maskell and Malmberg, (1999) who have emphasised the increased importance of “embedded tacit knowledge” for industrial competitiveness of districts.

¹⁶ A similar perspective is also developed in Breschi and Malerba (1997).

¹⁷ Considering the 50 product groups “made in Italy” localised in LPS (Montedison, 1998), we observe that these groups are responsible for a huge positive balance of trade (in 1995: 148.015 billion lire, which surpassed the total net balance of 67,550 billion lire; 1996: about 125,000 on a total of 39,000). Export flows were in 1995 154,294 billion lire and in 1996 (first nine months) 104,318. For 21 products typically manufactured in LPS, the Italian firms are first placed and Italy has the best international trade balance, and for other 8, Italy ranks as the second or third exporting country.

¹⁸ See, for instance, the packaging machinery district in Bologna (Capecchi, 1990; Belussi, 1999c), where about 95 % of the total output is exported, or the Montebelluna district specialised in ski boots (Pilotti, 1998), which supplies 75% of the international markets.

An empirical taxonomy of local production systems based on the mechanism of knowledge development

Looking back on the extraordinary commercial success of the Italian industrial district model, it should be said that too much attention (and speculation) has been made on terms like flexibility, small firms, etc. In the view of the author of this paper, in the creation of this type of industrial structure the most important factor was the formation of high levels of “contextual knowledge”.

The presence of tacit knowledge is generally ignored in a large part of studies of the discipline of industrial studies. We believe that a proper understanding of the tacit elements of knowledge is decisive in the understanding of industrial dynamics.

The approach presented, with some variations, is similar to one employed by Nonaka, and by the stream of studies started off after Nonaka’s contribution (Nonaka, 1993; Nonaka and Takeuchi, 1995; and Nonaka, Umemoto, and Senoo, 1996).

1. The first cluster represents systems where tacit knowledge among agents predominates. Tacit knowledge is mainly embodied in the skills of the labour force and in craft production.

The evolution of the systems can be described mainly as a horizontal expansion of a given stock of knowledge, historically accumulated in particular localities by accident. Although this was the situation of many local production systems at the stage of their formation, this ideal type of district is still a living model of firm organisation developed essentially around the sharing of tacit knowledge among agents.

It is true that some forms of learning by doing and learning by using can be found, but in this case learning is bound by the absence of the creation of new knowledge. A type of instructive learning is still prevalent; and learning activities mainly have occurred (and are occurring) through a process of socialisation of skills. No relevant innovations can be detached if we exclude, naturally, the acquisition of new machinery from external suppliers.

The number of these local production systems within the Italian economy is low nowadays. Notably, we find these characteristics in local production systems specialised in traditional skill-intensive industry sectors, like clothing and knitting (the area of Carpi), in traditional footwear districts, Naples or Casarano (in the area of Bari), and in sectors of artistic production, the most famous of which is certainly the glass making district in Murano, an island near Venice¹⁹.

2 The second category describes those systems where the specialisation of the local manufacturing structure has gone further, and it has activated a process of absorption of external knowledge, and a recombination of a different sort of knowledge coming from internal

¹⁹ For the analysis of the Carpi district see Bigarelli (2000); for Casarano see D’Ercole (1992); for the footwear district of Naples (Amin, 1988).

or external networks and agents. As empirical research has proved, in these systems tacit knowledge is still relevant but also codification knowledge is well developed. The stock of knowledge of these systems sees a balance between tacit and codified knowledge. In this cluster, the sources of innovation are more formalised: innovation activity mainly occurs in engineering departments and through local interactions with suppliers, sophisticated clients, local experts, consultants, suppliers of machinery, and local institutions. Product innovation is frequent. Here many actors contribute to the absorption and socialisation of knowledge, like training schools, universities or special services (supplied by the local authorities) for small firms (real services to firms).

This cluster is represented by a vast array of niche specialisation:

- a) many mechanical engineering sectors (water taps fittings in Varese²⁰; packaging machinery in Bologna²¹; the “stainless steel” valley of Conegliano, near Treviso, specialised in small electric household appliances²²; the heating-thermal-mechanic sector of heating appliances near Verona²³);
- b) sectors related to the second transformation of plastic and other metals²⁴ (plastic frames for eyeglasses in Cadore, near Belluno; jewellery in Vicenza, Arezzo and Valenza Po, near Alessandria; tiles in Sassuolo; marble in Valpolicella, near Verona),
- c) furniture sectors (leather upholstery producers²⁵ in the district of Matera-Altamura-Santeramo, in the South of Italy; the chair sector of Manzano²⁶, near Udine; the furniture sector of Livenza²⁷, near Venice),
- d) textile, leather and other fashion-related sectors (Prato²⁸ and Biella²⁹ for wool, Como for silk³⁰; Castel Goffredo for women's stockings; Arzignano near Vicenza³¹ and Santa Croce near Florence for leather; Treviso for knitwear³²; sophisticated women's footwear on the Riviera del Brenta, near Venice,³³).

3. In the third cluster the dominant feature is the prevalence of codified knowledge (however, as in all local systems, tacit knowledge is still important). From an evolutionary point of view (Witt, 1992; 1993; 2000) this cluster represents the last stage of growth. Firms localised

20 Cf. Bozzi and Bramanti (1994), Bramanti and Senn (1994).

21 Cf. Belussi (1999c).

22 Soli (1998).

23 Belussi (1979).

24 Cf. Moussanet and Paolozzi (1992). For Sassuolo see Marchi (1999).

25 Cf. Belussi (1999a).

26 Cf. Grandinetti (1999), Tamisari (2000).

27 Cf. Guerra (1998)

28 Cf. Dei Ottati (1995 and 1996).

29 Cf. Lucchini and Martini (1992).

30 Cf. Papadia (1992).

31 Cf. Dutch and Pezzi (2000).

32 Cf. Belussi (1992).

33 Cf. Belussi (2000).

here are technologically dynamic, in many firms the research activity is formalised in the R&D department. Firms frequently patent, and original innovations have sustained the competitiveness of leading firms. This portrait does not suit all firms that populate the local system, but is related only to a small group of innovating firms. However, they feed the local system absorbing knowledge from outside, combining new pieces of knowledge, and transferring to the net of their subcontracting and specialised suppliers. During time the knowledge creation process has enlarged the local stock of knowledge. Using the Nonaka model, in this cluster the socialisation process of tacit knowledge is related to high-tech competence and skills. The system produces a stream of innovations and original knowledge, which also feed the global circuits. Here we assume the presence of systematic radical innovations. The trade balance of knowledge sees the industrial districts as exporters of knowledge incorporated in goods or disembodied. Anyway, flows of acquisition and flows in which knowledge is exported are common. The clustering of innovations and the total amount of knowledge embedded in local firms allow us to define these local systems as technological districts. In Italy we do not find many high-tech systems, such as in the US and the UK (Silicon Valley, Route 128, Cambridge area, etc). Some recognised examples are the Montebelluna area³⁴, near Treviso, specialised in ski-boots production, and the biomedical system of Mirandola³⁵, near Modena.

Does the success of Italian local production systems depend on local innovation policies or on a partially spontaneous market-driven process of collective learning?

The fact that the setting of R&D or technology policies must not be separated from learning activities (and from the social propagation of new routines, as argued by Lundvall and Borras, 1997; 1998) is now a common view. But when was this clearly implemented in new policies? Some general remarks about the Italian case deserve to be addressed now.

Firstly, in the Italian case the general philosophy with which RTD policies are transformed into innovation policies is more related to the weakness of the core R&D system than to any consciously planned action. For instance, the Enea institute for atomic energy, after the victory of the referendum against the use of nuclear energy, was obliged to find a new mission, so the then leading President Umberto Colombo found no obstacles to redirect the targeting of research and policy actions towards the issue of innovation diffusion. However, it is difficult to judge the overall efficacy of the Enea efforts. For instance, the main Enea project for the diffusion of ICT technologies in the Prato district took place during the 1980s and resulted in a quasi failure: it was too advanced for that type of local firms, and firms did not want to share much information with competitors. It was necessary to wait twenty years to find advanced experimental applications of new technologies in the district, thanks to a guided

³⁴ Cf. Albertini and Pilotti (1996), and Corò, Gurisatti and Rossi (1998).

³⁵ Cf. Biggero (2000).

project for the building of an electronic market place by the local association of entrepreneurs³⁶. In addition, in the case of Italy R&D activities were rarely addressed to specific policies (let us take the outstanding case of forward-looking standard policies of the European adoption of GSM, or the environmentally friendly standard policies of Germany). So Italy lacked an articulated set of inter-connected tools, and policy devices that, starting from existing technological systems (Carlsson et al. 1996), could be articulated also at local level in order to improve their performance, to solve existing bottlenecks or weakness, or to create entire new technological systems (Justman and Teubal, 1995).

Secondly, the emergence of regionalised learning systems occurred quite separately from any reform in RTD policies. It was the result of an atomistic institutional change of local regulation rather than a deliberate introduction of new ideas and policy instruments (Bellon, 1994; Freeman, 1992).

Thirdly, the model of local regulation we have described can be interpreted as a reasonable match between resources, objectives, and appropriate tools, rather than as the maximisation of a well-defined set of objective functions. So, Italian local policies were implemented as a series of experiments, which local government agencies and collective actors undertook in order to solve local needs³⁷. So, innovation policy emerged at local level within intermediary institutions that were neither business enterprises nor government agencies, but which formed an integral part of the local/regional system of innovation³⁸.

In the framework that we have represented for the Italian case, the system worked mainly with a bottom-up strategy, loosely (or not at all) linked with national RTD policies. A mobilisation of “local” knowledge and collective learning took place, where local policies, generally speaking, have only played an important, but not an exclusive, role. In the case of Italy, the influence of policy in determining the performance of local production systems has been mainly indirect. This is not to say that on the local level policy actors have not taken any action. What must be stressed here is that they have not tried to substitute the spontaneous work of the market³⁹ (with *ad hoc* “market failure” measures of strong direct “intervention”). They have “accompanied” the market, with the slow but constant growth of local productive systems (Tolomelli, 1992), by choosing, from time to time, a type of intervention that was regulatory, or adjunctive, but not a substitute to the way in which market was allocating the

³⁶ Personal communication with A. Balestri, Club dei Distretti director.

³⁷ This process is very similar to the one described by Teubal (1997). The importance of local innovation policies has been reassessed, also recently, by OECD (1999), that has summarised also some useful criteria for dealing with the creation of local clusters. Local innovation policies cannot be conceptualised in *a vacuum*. Receiving systems are different and so, also the incentives to the indigenous capabilities, might result in distinct and differentiated outcomes.

³⁸ It is interesting to observe an analogous emphasis on the role of intermediary organisations associated with the study of the Japanese case and with the proposal of a conceptual framework of regional industrial policies to advance firm competitiveness (Best and Forrant, 1996).

³⁹ At the theoretical level the approach chosen was analogous to the one described by Aoki et al. (1997) for the Japanese case.

productive resources. So, at least in part, institutional inefficiency or institutional failure was avoided (Wolf, 1993). The model of local innovation system worked at local/regional level as a regionalised learning system where some local innovation policies (diffusion policies) were activated to transfer technologies, to enforce technological cooperation, and to provide support and incentive innovative networks (Fig. 1). However, they were inserted in a very dynamic model of local regulation, where there was an interaction between firms, collective agents, and institutions.

The operations of Italian institutions⁴⁰ and the focus of local policy was typically set in a context in which they were supporting the firms' technological dynamics, through:

- a) specific regional legislation (such as easier credit for small firms),
- b) the encouragement of co-operation among firms (directly involved in the creation of positive externalities), and sometimes,
- c) by providing quasi-public goods directly to the industrial environment, a policy known as *servizi reali alle imprese* (real services to firms).

In a recent survey, Freschi (1994) has described, using a comparative methodology, the adoption of local policies in the regions of Tuscany, Emilia Romagna and Veneto. In the Emilia case the policy of *servizi reali alle imprese* was usually chosen (i.e., the creation of these centres was organised by Ervet, an independent institution for regional policy), while this type of intervention was rare in Tuscany and totally absent in Veneto. In other words, the three most important regions of the Third Italy model, containing many "industrial districts" and "local production systems", have been doing things quite differently (Bartolozzi, 1993). The planning of industrial sites has been very systematically pursued in Emilia Romagna (Brusco, 1993; Bartolozzi and Garibaldi, 1995), while, in Veneto, intervention has concentrated on providing credit facilities for small firms. In Lombardy the policy of building up sector-specific infrastructures for the assistance of small and medium firms was pursued during the 1980s, following the model of Steinbeis Stiftung Foundation of Baden-Württemberg (Sironi, 1995). In the South, intervention through the planning of industrial sites has been largely unsuccessful. In many regions other alternatives have been explored.

The existence of a local regulative model in Italy does not imply just one unified set of interventions and innovation strategies. On one hand, a more "interventionist" approach emerged in Emilia Romagna (dominated politically by left-wing parties) with a local policy dominated by the activity of public local institutions, providing real services to firms. On the other hand, in the Veneto region (dominated by Christian-Democrat party and by a "free market"

40 The way in which we will use the word institutions has here at least two meanings. First, we refer to institutions as collective actors (autonomous or public bodies) and local authorities, which have provided economically valuable public goods (mobilisation of knowledge through specific training, promotion of learning opportunities, promotion of credit consortia for the socialisation of business risk, reinforcement of local identity and languages, preservation and accumulation of collective knowledge). Second, we refer to the emergence of a spontaneous order of rules, and informal regulations, that allow a certain type of interaction among the agents operating in the local context (co-operative behaviours, codes of conduct, knowledge sharing practices, social pacts, etc.).

ideology), a different model was selected, where public resources were directed mainly to sustain the credit of small firms, through consortia. In turn, this has favoured large firms, providing credit for small subcontracting nets. Moreover, the role of public administration in organising innovation policies has been quite absent⁴¹. Within the Veneto region, the main actors that developed local innovation policies were mainly private or collective organisations (Chambers of Commerce and entrepreneurial associations).

Emilia Romagna policy-makers directly promoted some institutions for tackling the innovation, supporting the market dynamics. Very similar functions were developed in Veneto by private collective bodies or by associative entities. Recently the policy adopted by Emilia Romagna, as described by Amin (1999), was that of “agenda setting”, of stimulating new ideas on local development (enforcing the linkages with R&D centres, forming new venture capital, developing new projects for young entrepreneurship, promoting export projects, developing information networks). So, during time, Emilia Romagna has shifted towards more inter-sectoral initiatives (Russo et al., 2000). There is contradictory evidence on the causal relationship between the policies adopted by institutions and local performance. But this clearly does not undermine the efficacy of the Emilia model for local policy (Cooke, 1994). However, the essential lesson from the Italian case is that the real influence and importance of these policies rests in the provision of “real services” to firms has probably been exaggerated (Nomisma, 1991). In Italy a wide array of local intermediate institutions⁴² like trade associations, chambers of commerce and professional associations have worked in a less planned task, playing the role of learning laboratories for their respective firms and members.

On the other hand, the positive impact of vocational training, based on local institutions for the development of collective learning, has been largely underestimated. The presence of these institutions, specialised in the sector that dominates the local industrial structure, is scattered over much of Italy. Where they exist, they have supported the propagation of practical and codified technical knowledge among skilled workers and potential new entrepreneurs through both teaching and experimentation with new types of machinery. For example, consider the role played by the technical institute Aldini Valeriani in Bologna in the development of the local packaging machinery district or the technical school Galileo Ferraris in Turin in the development of mechanical competencies for the automotive *filière* (AA. VV., 1980).

For instance, in the case of the Riviera del Brenta, one of the oldest Italian industrial districts, specialised in the production of women’s shoes and located in the Veneto region, near Venice, a co-evolution of growth and institutions may be seen. The district started in 1989, with the foundation of Voltan, one of the first entrepreneurs to introduce within the shoe sector, the new methods of montage already experimented in US and Germany (he learned them after a period of immigration in the US). Along with the development of the district, we may observe

41 The policy of the Veneto region changed during the mid 1990s, when specific legislation fostering innovation was promoted, and the constitution of a net of scientific parks was created (Nest, 1999).

42 The Italian model is “spontaneous” and is quite different from other cases like that of the Welsh Development Agency, where just one large organisation is in charge of all development initiatives (Morgan, 1995).

the constitution of many specific “district institutions”, which have been created during time: a type of problem-solving institutions that have played the role of enforcing innovation diffusion among local firms and fostering the local collective mechanism of learning (Tab. 3).

These institutions were: training centres for the development of critical technological competencies and skills, centres for the organisation of commercial missions, institutions devolved to organise the interests of local entrepreneurs (Acrib), and to provide them with *ad hoc* services (for instance on the evolution of market demand in various countries, and a data bank on the reliability of national and international clients, based on insolvent payments). In the last years, the collective agents operating in the district (Local trade unions, Acrib, on behalf of the national association of entrepreneurs, and many public institutions and local municipalities) signed an agreement (*patto territoriale*), which designs a series of measures needed for the further development of the local system.

Tab. 3 The evolution of institutions in the one of the oldest Italian districts specialised in the production of women’s shoes in the period 1989-2000

| The institutional set up of the Riviera del Brenta industrial district |
|---|
| 1923 Foundation of the design school O.T. Fava 1955 First exhibition of shoes produced in Riviera del Brenta organised by a group of small local entrepreneurs. 1962 Birth of the local Association of Entrepreneurs Acrib. 1976 Foundation of the Consorzio Maestri Calzaturieri 1986 Foundation of Centro Veneto Calzaturiero 1999 Patto territoriale (collective agreement between trade unions, entrepreneurial associations and municipalities for actions of local policies) |

Sources: Fontana (1998) and Belussi (2000)

It is important to note that these institutions, or the regulative forms of the local economy (resulting from the “cultural evolution” of individuals and economic agents interacting in a specific context), were created during the phase of major development of the district. It was not a typical intervention of policy that occurs before the take-off of the district to limit the effects of market failure. In other words, this reflects a clear mechanism of co-evolution between markets and institutions.

The local institutional set up of the Manzano district, in Friuli Venezia Giulia, (Grandinetti, 1999) may be represented in the same way, with three local (private-public) institutions that have governed the accumulation of local firms' capability and contextual knowledge within the district. These were: the training school IPSIA, the CATAS centre of services, and the Promosedia organisation, for the organisation of International exhibitions of chairs.

In the experience of Italian local policies, either more market-led policies (Veneto and Friuli Venezia Giulia) or policy-driven policies (Emilia Romagna) worked. But this arrangement was

supported by a coherent regulative setting of institutions, collective actors and firms.

The Italian success of many industrial districts or local systems can be viewed as a “social experiment”, where the spontaneous working of the market has been channelled, and promoted, by the role of institutions.

So, pure market outcomes have been regulated by institutional (extra-economic) factors, and the market has limited co-ordination failures.

Competition as “a discovery process“ remains the driving force behind the operation of the Italian local system. And this has occurred in markets through dynamic entrepreneurs. So there are no general recipes for local innovation policies that can be applied in less developed countries to transfer the “beauty” of the Italian model based on competitive local production systems. Policy and institutions cannot substitute the market (in Arrow’s sense). And what has been successful, under certain conditions in one context, may not work in others, because the institutional arrangements might be quite different and they may produce a totally different outcome. The essential claim of this article is that institutions can set the rules, channel and mobilise knowledge, increase the transferability of knowledge from one individual to another, but they cannot recreate or develop “markets” if they lack productive capability.

Conclusions

In this chapter we have tried schematically to present the Italian transition from a model of RTD policies toward a model of innovation policies as a gradual shift and a spontaneous “adjustment” of an institutional failure in the development of a strong, centrally governed, core R&D system, public and/or privately financed in high-tech sectors. The development of an institutional frame of local regulations went in accordance with the strengthening of Italy in the dynamics of its industrial districts and local systems, and its international leadership in traditional sectors (“made in Italy” sectors). In these sectors Italy may show the presence of a quite advanced, both national and local system of innovation (where firms are often characterised for being innovators, with - relatively to these specific sectors- an elevated technological intensity).

In Italy, local institutions have played an important role in the establishment of a model of local innovation policies, and in the implementation of general rules incorporated in the local context. This has favoured creative co-operation among firms and has generated the spontaneous aggregation of firms into systems. Another important aspect has been the accumulation and mobilisation of knowledge, a process in which both markets and institutions have played a crucial role.

But is the Italian case a clear demonstration that good innovation policies must only be articulated at local level? Innovation policy, both at national and local level, needs to be properly evaluated and inserted in the institutional setting of each specific context, and within the institutional features of each innovation system. Here it must be said that Italy failed at

central level to orchestrate with efficacy a complete set of innovation policies. However, the Italian case must not be interpreted an ideal model. Innovation policies, at national and local (regional) level must be evaluated, in relation to the state-of-art of the specific economic and institutional system to which they are addressed⁴³ (Lundvall and Borras, 1997). The fact that at local level the Italian system was able to create a quite successful bottom-up approach, in which a localised process of innovation took place, especially within specific industrial districts or local production systems, does not undermine the importance of a “good set” of national (or super-national) innovation policies. Clearly the Italian system in specific sectors performed quite well in innovation diffusion issues. But perhaps it would have benefited very much also from good “traditional” R&D/innovation policies organised at central level for the promotion of a selective cluster of R&D intensive sectors (Teubal, 1996).

43 The need for “diffusion oriented policies” and “made-to-measure” interventions for learning is of course not a new finding, but in an evolutionary perspective it includes no intervention at all, or the development of precise measures to contrast “institutional” or “organisational” failures, which can affect the performances of the productive systems as seriously as market failures - as discussed by Aichholzer and Schienstock (1994), Carlsson and Jacobsson (1996), Metcalfe and Georghiou (1998). So, new strategies must be formulated, defined, and implemented and information about their efficacy must be collected.

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