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TOWARDS A FRAMEWORK FOR THE EVALUATION OF POLICIES OF CLUSTER UPGRADING AND INNOVATION (*)

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I. — INTRODUCTION

Nowadays, in industrialized and industrially emerging countries and regions, policies and strategies for local development and cluster upgrading explicitly incorporate the idea of innovation as a systemic process, embedded in specific socio-cultural and institutional contexts and intermingled with international challenges, opportunities, and strategies. The analyses of the systemic contexts (places, times, and rules of interaction) in which the innovation processes take place have fed a large and growing body of literature. This is exemplified by the widespread reference to systemic units of combined public actions and private strategies, such as the *milieux innovateurs*, the local innovative networks, the dynamic industrial districts, the innovative clusters or local innovative systems, the regional innovation systems, the clusters and the governance of international value chains.

As the innovative process takes place in a systemic context, the risk of inconsistencies increases if policies are not based on an appropriate systemic

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unit of analysis and intervention. However such a frame is not easy to get, for at least two reasons. The first is general and comes directly from the evolutionary systemic nature of the phenomena to which policies are targeted. Unexpected novelties or ruptures may lie under a thick web of feed-backs and business and social relations. The second is related more specifically to phases of quick change and transition in the systems themselves. This complexity explains why the actors playing strategic roles within the systems need to be embedded in fabric of relations of the system itself, in order to understand and to be understood and followed by the local producers; on the other hand, too much closeness generates collusion, inertia and myopia. As a consequence, the assessment and evaluation of these policies is as important as puzzling. It is important because it not only adds to the accountability of policy-makers against collusion and inertia, but also combines with context sensitive step-wise policies. It is puzzling because it is very difficult to figure out what could be the state of the system with different sets of policies undertaken by the same policy-makers or by different ones.

We propose here some reflections and exemplifications on a quite delimited set of conditions and contexts, *i.e.* those of industrial districts (Italian, in particular), characterized by SMEs clusters facing contemporary globalization challenges, as defined in section 2. Sections 3 to 5 introduce other conceptual bases, with particular regard, first, to innovation policies aimed at supporting functional upgrading of districts and clusters soaked in changing international *filières* and value chains; and, second, to the meaning of evaluation of industrial policies when a systemic perspective is considered. On such premises sections 6 and 7 illustrate a couple of exemplifications on the features of appropriate evaluation methods. Section 8 concludes with notes on a systemic approach in the evaluation of policies for local development and cluster upgrading.

II. — GLOBALIZATION AND SMES CLUSTERS: A VIEW BASED ON ITALIAN DISTRICTS EXPERIENCES

The last phase of globalization has posed big challenges to industrial districts in older industrialized countries, whilst offering opportunities for growing new industries in old and new localities of industry, some of them related to emerging economies. The current burst of a planetary crisis of finance, industry and trade will probably modify the scenario, but it is too early as we write (March 2009) to understand how much and in what directions. Here we rather keep on reflecting on some important factors emerged in the phase *ante* crisis, and maintain that they will still play a role when international relations will stabilize again.

A number of studies have proven the peculiar capacity of some traditional industrial districts, for example in Italy, to internationalize through various individual business actions and relations. As these studies have shown: i) international subcontracting (sometimes started at first as temporary exports) is not difficult to set up for district entrepreneurs who are used to manage links external to the firm; ii) relations with foreign suppliers are favored by a varie-

ty of contractual and personal relationships, as for instance when district entrepreneurs that choose to live abroad intervene directly or indirectly in the activities of their partners; iii) active foreign direct investments (FDI) controlled by larger district firms can take a district form when for instance FDI are concentrated in a particular territory and the leading district firm induces other district firms to invest in the same territory; and iv) some district firms may also take part in the governance of international value chains as when they produce locally an intermediate product that is sent in a foreign country to be transformed and sold by a foreign partner into the final market.

The aggregate result of such individual actions is difficult to grasp (1). We can see it as the combination of three components related to the territorial configuration of a particular activity (or set of activities). The first component is quantitative: the size of the economic activity may increase or decrease in a place where it was originally localized without any change elsewhere; or it may increase or decrease in the original place with a related decrease or increase in another place. The second component concerns local value chain relations: in the place where the activity decreases it may be replaced by other types of activities more or less related to the first one; or where the activity increases, other types of activities more or less related may close down or start up. The third component concerns cluster and district relations: the moved activity may have been embedded in a network of industrial and social relations promoting local productivity, learning and creativity in the original place, or may have kept instead a footloose relation with it; and the moved (or the replacing) activity may embed in such a type of network in the new place, or it may be localized there just for generic spatial advantages (transport costs, cheap labor and land, tax rebates, polluting rights, etc.). Of course many intermediate cases could be contemplated.

Coming back to aggregate results, we would say that:

a) an embedded activity which moves and becomes foot-loose is « de-localized »; while an embedded or foot-loose activity, which moves and is embedded in the new place, is « re-localized »;

b) a cluster where an embedded activity is replaced by a foot-loose activity is functionally down-graded in its systemic content;

c) a cluster where a foot-loose activity is replaced by an embedded activity is functionally up-graded in its systemic content;

d) local decline is characterized by quantitative shrinking and by functional down-grading in one (or more) not compensated by up-grading in other clusters in the same locality;

e) local development is characterized by quantitative expansion and by functional up-grading in local clusters (and marginal down-grading processes if any).

(1) See for example Abernathy *et al.* (2006), Belussi and Sammara (2009), Gereffi *et al.* (2005); Humphrey and Schmitz (2004), Longhi (2005), Porter and Ketels (2009).

Positive aggregate results, like re-localization, functional up-grading, and local development need the insertion of individual business international actions in a consistent framework of private and public strategies and investments, supported by and feeding-back positively into the inner local structure of social relations. This framework presents (at least) two sides. On one part, without revamped sources of inner local productivity and creativity, international investments and relations do not lend positive solutions to clusters and localities hit by globalization challenges, more probably making the problems worse. On the other part, without appropriate international strategies, the value produced by inner productivity may be predated by multinational agents, or spill over too easily to global markets. Both local and international strategies should lie on peculiar drivers of local competitive advantage on international markets and, of course, they change under the influence of many conditions and tendencies.

Considering for example the case of those many Italian industrial districts characterized by SMEs clusters producing highly differentiated goods for the person and for the house, revamped sources of inner local productivity and creativity resides nowadays in upgraded capacities of teams of district firms to produce and sell products of medium-to-high quality, with highly personalized and craft content, increasing the investments not only in craft, industrial and R&D capacities, but also in quality, environmental and ethic certificates, and generally in all the instruments promoting association with taste for beauty, good quality of life, love for well done craft jobs, creativity, etc. (Becattini 2004; Cooke and Lazzarotti, 2007). On the other part, international strategies appropriate to local up-grading reside in enhanced capacities of teams of district firms to join: a) international production fragmentation with the preservation of both local high value added manufacturing capacity, and control of more standardized or less specific complementary products and operations realized in foreign localities and clusters; and b) international trade and distribution channels with common platforms characterized by rich catalogues of high quality complementary or diversified products.

The internationalization capacities should combine, through international management skills, the peculiar factors of inner productivity, creativity and innovative potential with foreign resources and opportunities. Recent contributions and cases suggest that an effective combination needs appropriate forms of international relations, for example specific to the type of entrepreneurial and craft skills and attitudes characterizing successful SMEs clusters and districts (Bellandi and Caloffi 2008a). These latter are characterized essentially by individual energy, creativity and simple internal managerial structures, interacting in teams of independent specialized firms, with the help of shared trust bases, of cognitive proximity, and of various types of specific public goods providing indivisible assets and rules. Going abroad with a networked structure is consistent with the use of such peculiar features together with the deployment of rich pools of resources; keeping contact with home resources through networked relations reduces the temptation of lonely or predatory strategies, whereby for example single entrepreneurs buy cheap and undersell home competitors also by means of phony brands and misleading advertising; getting in touch with foreign partners who have or may learn to have similar networked structures and skills helps the building of collaboration

and joint infrastructural, production, and trade projects on a basis of organizational and institutional similarity.

All this has suggested, also beyond the cases of Italian industrial districts, that appropriate international strategies, helping the up-grading and development of SMEs clusters and their home localities, should take the form of re-localization management supported by international cross-cluster and trans-local collaborative relations (Bellandi and Caloffi, 2008a; De Propriis, 2008). On the other hand, coming back to the revamping of inner bases of local productivity and creativity, it may be recalled that the constitution and maintenance of some among such bases demand high levels of urban infrastructure (Trullen and Boix, 2001). The local scale and urban quality of an industrial district are rarely adequate to this purpose. A regional (sometimes a national) milieu hosting dynamic regional cities and districts can offer a solution, if the collaboration among networks of firms, research centers, knowledge services, high level trade facilities, and pro-active local and regional policy-makers find the way to develop and interact (Cooke, 2005). This means that networked projects, cross-cluster and trans-local relations at a regional level are also an important part of the recipe for inner levers and drivers.

The vision of local and cluster upgrading through regional and international cross-cluster and trans-local relations and structures, in face of globalization challenges and opportunities, sets the stage for the following reflections on some aspects of policies for local development and cluster upgrading, and their evaluation.

III. — INNOVATION POLICIES AS SUPPORT TO LOCAL UPGRADING

Public policies and governance processes supporting the revamping of local productivity and creativity extend necessarily to various aspects. One of this is the local capacity to incorporate and promote innovation processes. We take again, as a field for exemplifying our reflections, the case of SMEs clusters characterizing various types of localities of industry, where competitive advantage is driven by networked and clustered business and social resources and activities. This is potentially conducive to fruitful intersections with the development and working of innovative systems.

An innovative system, as observed by Lane and Maxfield (1996), is the result of *social* processes of interaction repeated over time, through which specific agents, leveraging their knowledge and competencies, launch and implement streams of relations with other agents in order to compare, manipulate, combine and re-combine (pieces of) existing knowledge and artifacts, or create new ones, at the same time adapting/modifying their own set of knowledge and competencies.

Let us consider, for example, the case of a firm that produces precision lasers (low power diode lasers), normally used in the sphere of medicine, for the manufacture of devices used in the treatment of painful muscular symptoms and in tissue stimulation. This firm is part of a system within which a series of

relations exists between the developers of the laser source (research centers, universities and firms), the inventors and developers of the instruments used to channel the source into specific devices, and of the devices themselves (research centers, universities and firms), the developers and manufacturers of the specific components of these devices (other firms), the experimenters of the instrument (medical research institutes, hospitals, clinics) and those performing its validation (hospitals, and medical clinics). Some of these relations demand a high degree of territorial and cognitive proximity between the agents, evolving within specific clusters, more or less rooted in specific territories (Hendry *et al.*, 2000). Let us assume now that in this optoelectronics centered net a significant part of the relations (as well as a significant proportion of the agents) be rooted in a local territory, which is also a repository of manufacturing traditions, knowledge and specific competencies. The localized part of the net may be seen as an optoelectronics cluster with local systemic features, a local production system.

Policies spanning a region (2) can support both the development of such a cluster, and together the emergence of cross-fertilization patterns of growth with other clusters of the region. Two main levels of strategy may be identified. The first one is the creation of (or contribution to) public goods with features which are specific to the innovative processes and to the reproduction of knowledge and competencies crucial for the cluster and local context: investment in specific (specialized and applied) research centers, funding of existing research projects, bridging organizations between the world of industry and that of research, incubators for new enterprises having related technological/sectoral/territorial targets. The need of public intervention increases with the size of the intervention, the presence of coordination and normative problems, the risks and time scale involved. Public resources add to private funds coming from the local systems within which much of the design process takes place.

The second level concerns the processes of cross-fertilization between clusters incorporating potentially complementary features. The public intervention here is targeted to pull the application of certain technologies or organizational solutions, generated or developed within specific local and business contexts, to other technological/sectoral contexts of the region. And it intersects more or less deliberately the revamping of specific sources of inner local productivity and creativity. For example, in the case recalled previously, the target could be the application of the optoelectronics technologies to other traditional industries (or contexts of economic activity) rooted in the region which are hit by globalization challenges (3).

- (2) Here « region » means both a delimited regional milieu hosting a set of localities and clusters showing common languages and traditions, and the lower territorial level of regulatory power influencing the coordination and distribution of key public resources among that set of localities and clusters.
- (3) In the case of the Tuscany Region, in Italy, which is home of an important optoelectronics cluster, specific public funds has been allocated to experimenting the potential of the application of laser technologies to the restoration of cultural assets, to the manufacturing of textiles and to other industries in the region.

This kind of intervention is not simply aimed at the diffusion of specific innovations within the regional borders, but at the embeddedness of the same innovations into local systems and clusters included within the regional milieu but different from those in which the new solutions were developed. Embedding is fostered by appropriate relations amongst key actors of the systems involved: actors having different competencies but sharing a common language, capable of mobilizing networks of relations at the local and regional scale. Presumably not all the relations will lead to success, but the intervention is nevertheless aimed at the creation of channels of interaction previously non-existent, which the various agents may take in and develop or not. Once applied to other contexts, the initial solutions (the new technologies, the organizational solutions...) can give rise to new streams of innovation.

IV. — POLICIES FOR ACTIVE DISTRICT AND CLUSTER INTERNATIONALIZATION

Let us come now to active district and cluster internationalization in the form of re-localization management supported by international cross-cluster and trans-local collaborative relations. Various types of specific public support have a direct role here.

Firstly, even if the twinning among localities of industry (and relative clusters) often results just from random scouting, trials and errors, public support is crucial nonetheless in funding some early steps of the process, giving institutional protection and representation to sets of smaller firms, and providing coordination in order to concentrate efforts on more promising opportunities of relation (4).

Secondly, local and supra-local policy facilitates the creation of a set of learning structures, business incentives and life facilities for the circulation, among the localities, of « Argonauts » who feel at home in different localities, and know how to communicate with those who, on the different sides, have just one homeland (Saxenian and Sabel 2009). They favor the translation of specific pools of knowledge and their incorporation in innovation capabilities.

Thirdly, and related to the previous point, especially in developing areas, district-like relations are sometimes potentially feasible, but not yet fully emerged. If one of those areas is targeted by a developed cluster – say from an Italian industrial district – for investments in complementary activities, then public support helps district business agents to implant in the targeted area the

- (4) Promising prospects for twinning are related to general economic and social foundations, in particular: a) some productive activities distributed between the (potentially) twinned contexts (cluster/locality) are (partially and potentially) complementary, and each of them is embedded in its context in such a way as to promote productivity, learning and creativity; and b) the twinned contexts have similarities in terms of institutional and organizational structures and approaches, and they are such as to help the building of reciprocal understanding and trust on specific projects (segmented virtual proximity): see Bellandi and Caloffi (2008).

knowledge of technical and trade standards necessary for specialization among local firms, and of rules for improving job conditions and the participation of workers to strategies of quality and innovation (Mehrotra and Biggeri, 2007).

Fourthly, trans-local collaboration for investments and re-location needs not only the presence of appropriate local forces in both parts, but also the definition of relations and agreements that have a prospect of equity and reciprocal empowerment. If the partners are not able to reach an understanding on such bases then the re-location fails as such (Sugden *et al.*, 2005) (5).

Fifthly, only few larger district firms may have the internal capacity to learn, adopt and monitor systems for managing relations at a trans-local scale. They can play as bridging business actors (De Propris, 2008). However, in order to limit the growth of monopolistic positions within the clusters involved, and to help a wider direct engagement of smaller but dynamic firms, public support has to be directed to collective platforms (communication facilities, technical and trade standards, and complementary skills) complementary to the limited international management resources of the smaller firms (Sabel, 2004).

Finally, and again related to the previous point, as always when adaptation in systemic conditions and high uncertainty is involved, the knowledge and the resources to bet on the development of the process, if any, tend to be concentrated in a small set of entrepreneurs and innovators, from either private or public ranks. But if the consensus of the larger local communities, and in particular if complementary investments of other local business agents are needed, then networks of business and social relations between the internationalization actors and a larger group of local cluster and district agents have to be preserved. Public agencies should provide participatory methods, public seed funds, and third party assurance, which make easier this interaction (Meyer-Stamer, 2004; Enright and Ffowcs-Williams 2001).

V. — PERSPECTIVES ON METHODS OF EVALUATION OF INDUSTRIAL POLICIES

We come now and in what follows to some reflections and exemplifications on the evaluation of policies which target, more or less explicitly, objectives like those recalled in the previous two sections. Evaluation has been seen originally as an *ex post* component which gives some measure of the results achieved by policies. In fact it is much more, and within a systemic approach it becomes a necessary though complex component.

- (5) It is still possible for strong districts and clusters – say Italian ones with respect to clusters in areas of developing countries – to build internal joint action for constituting manufacturing and trade enclaves in developing areas, and accessing cheap factors of production and growing markets. Indeed, this is a replica of MNE strategies. It can work, but MNEs are more skilled at controlling opportunities and risks in this field.

Let us take innovation policy as an example. In traditional models, innovation is something happening within the boundaries of the firm, where the results of basic research activities are applied and transformed, by means of relatively unexplored mechanisms, into new products or services. Here public funds are supposed to be granted to the enterprises (in the form of tax allowances, capital accounts, etc.) for the development of their internal R&D capacities, the acquisition of basic research results incorporated within patents or other artefacts, the development of services useful for the introduction of the new products on the market. In this context, the evaluation of public policies is focussed on the additionality of the support measure, and in particular on the measurement of the effects achieved by the beneficiaries (be they quantified, for instance, in terms of new products introduced on the market, sales or patent applications) thanks to the existence of the public intervention. A large body of literature has focused on the exploration and the measurement of the additionality effect. Among them, the quasi-experimental approaches try to improve the identification of counterfactual samples of « non-treated » enterprises, and their comparison with the « treated » enterprises benefiting from the public funds.

The methodologies developed under these approaches are not fully suitable for evaluating policies targeting systemic character as those aiming at promoting local and regional clusters. On one hand, it is quite obvious that the results of a system-based policy such as the promotion of industry-research linkages (*e.g.* through various kind of innovative networks or community of practices) within a specific locality cannot be captured by the simple observation of a possible increase in sales or patent applications made by the single enterprises. On the other hand, the identification of the counterfactual can be particularly challenging, the additionality of the support measure being difficult to evaluate through the comparison with a theoretical regional system showing the same static and dynamic properties as the « real » one, but for the public intervention under observation.

The most innovative experiences in policy evaluation undertaken by some European countries such as Sweden (Klofsten *et al.*, 1999), Finland (Rajahonka e Valtakari, 2005), Austria (Priedl *et al.*, 2008), and Germany (Eickelpasch e Fritsch, 2005), emphasize the growing necessity of integrating the evaluation of the impact of public intervention on the different components of the system (single enterprises, universities and research centres, etc.), with the analysis of the innovative system as a whole. This requires a careful combination of languages and tools of different study's fields: the evaluation of public policies, the analysis of innovation and development processes, and the analysis of the international fragmentation of production chains. The evaluation is made more complex by the necessity of considering the specificities of the different policy tools, as the promotion of joint university-industry research projects, networks of innovators, venture capitalists, start-up and spin-offs of innovative enterprises.

The following directions of methodological development may be considered :

a) the identification and testing of methods and tools for the quantitative and qualitative measurement of some systemic outcomes and impacts, such as the networking effects (Russo and Rossi, 2008), the development of sustainable

university-industry relations (Barnes *et al.*, 2002; Siegel *et al.*, 2003), and the interactive learning effects (Kuhlmann, 1998);

b) the contextualization of the results of the policy intervention in the framework of the broader regional innovation system (Lengrand, 2006), with particular regard to: i) the analysis of possible changes in the relations between beneficiaries and non-beneficiaries of the public intervention; ii) the effects in terms of the strengthening/weakening of the crucial relations of the system; iii) the possible impacts in terms of changes in the functions performed by the system actors;

c) the evaluation of the involvement of the various local and regional stakeholders, as stressed by a set of approaches developed during the last decade: the *participatory evaluation* (Diez, 2001), *fourth-generation evaluation* (Guba e Lincoln, 1989), *utilisation-focused evaluation* (Patton, 1997), *learning evaluation* (Autio, 1998) or *empowerment evaluation* (Kuhlmann, 1998).

Finally, the evaluation needs to evolve from an activity implemented at a particular point in time to a process strongly integrated within the policy cycle. On one side, the results of the evaluation activities provide valuable inputs for the management of a specific intervention (ongoing monitoring and evaluation) or the design of new policies. On the other side, in order to set the stage for the development of sustainable policy making activities, the design of the policy intervention is accompanied by the design of the evaluation activities.

Next two sections illustrate the systemic challenge to evaluation policies with two types of examples which relate to the fields of conditions and policies defined in the first part of the paper, that is the support to local and cluster upgrading through regional and international cross-cluster and trans-local relations and structures. The first exemplification concerns local and regional innovation; the second concerns international relations.

VI. — EVALUATING REGIONAL POLICIES FOR INNOVATION SYSTEMS: AN EXAMPLE FROM TUSCANY

Policies on networks of innovators have been implemented recently by the regional government of Tuscany (Italy), in the form of a set of programs financed by European funds, and managed by the same Tuscany Region in the period 2000-2006 (Bellandi and Caloffi, 2010) (6). They are aimed at supporting innovative projects implemented by networks of heterogeneous economic

(6) What is illustrated here is extracted from Bellandi and Caloffi (2010), which is the result of DSS-TEC project funded under the DEPURE – INTERREGIIC RFO and implemented during the period March 2007 – June 2008, and Bellandi and Caloffi (2008b) realized within the DISTRICT program initiatives – INTERREG-IIIIC RFO and implemented during the period April 2006 – September 2007. See also Lazerretti *et al.* (2007).

actors (7). The specific programs encouraged networking among actors belonging to the worlds of industry, research and services for the purpose of projecting joint R&D or innovation diffusion actions. More specifically public intervention was aimed on the one hand at supporting the innovative potential of clusters and local systems of the region (introducing technological/sectoral targets consistent with their specializations), and on the other at favoring the emergence of relations among the same systems (8). The whole set of projects – considered here as a network of networks – involve 908 agents, classified as follows: i) innovation centers, business development service centers, technology parks and similar infrastructures; ii) departments of universities and units of research centers; iii) chambers of commerce, business associations and other kinds of local/regional association; iv) enterprises; v) other (various public bodies).

A fairly significant element is that a high share of the relations that take place within the total network has a local dimension (approximately 37 % of the total relations, within the same « Provincia », *i.e.* a county). Therefore, the web of relations we are observing has specific territorial roots. The links between the various local systems take place thanks to the activity of applied research centers or universities, innovation centers and trade associations, which entertain relations with a number of agents operating in different technological/sectoral and/or territorial contexts. The generally limited size of the firms involved in these programs does not favor their role as trans-local bridging actors (9).

Beyond the representation of the network as a whole, significantly stable (in the time span under consideration) relations emerge. They involve a sub-set of agents that exchange information, competencies and build strategies along non-episodic timescales. Here we can presume to find the actors that are capable of generating, producing and reproducing rules of interaction, competencies and strategies that are the basis of the system. Hence we consider their sub-network

- (7) The database includes a set of interventions implemented within the DOCUP-SPD 2000-2006 and the RPIA-ITT programme (Regional Programme of Innovative Actions « Innovazione Tecnologica in Toscana » 2001-2004, funded within the ERDF Innovative Actions framework), implemented by the Tuscan regional government during the programming period 2000-2006. As documented by the studies of Eickelpasch and Fritsch (2005), these types of initiative, eliciting the growth of self-organised co-operation networks in research and development, have been promoted in several European regions.
- (8) The database includes all the projects funded in the period under consideration, *i.e.* 122 projects implemented by 122 networks of innovators. A social network analysis has been applied to the dataset (Wasserman and Faust, 1994; de Nooy *et al.*, 2005). The various agents are connected through co-membership relations in innovation projects. In particular, it is assumed here that two agents are directly connected when they participate in the same innovative project. The web of agents participating in two different innovative projects may be also indirectly connected by the activity of agents operating within both projects.
- (9) The enterprises show a degree of local containment of the relations which is above the average (41 % against 37 % of the total network).

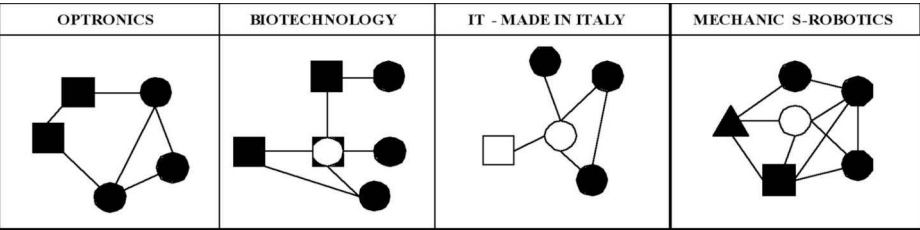
as a projection of a web of relations, supporting integration between innovation's actors variously embedded in the territories of the regional milieu.

Within such sub-network of significant relations it is possible to identify some « islands », that are parts of the sub-network which shows a relatively high degree of self-containment. The main islands have sectoral/technological features: optoelectronics, biotechnologies, mechanics-robotics and traditional industries (10). The analysis of the whole set of relations developing around the four islands (or sectoral/technological sub-networks), is directed at identifying what type of structure of relations characterizes these islands. More specifically: do they display a structure and an organization of the relations that can be considered useful for the exploration, exploitation and dissemination of innovations within and between the clusters and localities of the region milieu ?

Within the islands the density of local relations is obviously more elevated than in the average of the general network, simply because the islands have specific territorial roots within the industrial clusters of the region. The structure of the relations that characterize the four islands is nevertheless different. Given the large number of nodes and relations involved, a clear visualization of these four technological sub-networks proves difficult; figure 1 above synthesizes the typical architecture of their central relations, *i.e.* the relations among the most central actors.

The optoelectronics sub-network, composed of 178 agents localized mainly within the regional capital (Florence), has universities and research centers at its core, and a set of enterprises linked to such core, while other kinds of agents play a less central role. The firms involved (not only SMEs) are highly innovative. Some of them are university spin-offs, others have been founded by former graduates from the Faculty of Engineering of the University of Florence.

FIGURE 1 : Architecture of the central relations of the sub-networks considered



Key: Black boxes are universities and research centres; Black circles are firms; White boxes are service centres; White circles are business associations; Black triangles are incubators; Black box with a white circles are other public organizations. Black lines are direct relations.

(10) As regards the « traditional industries », we refer to the definition adopted in the various funding specifications: textiles/clothing, footwear, marble, furniture and light (instrumental) mechanics. The public funding was aimed at promoting IT technology within these sectors.

Most of them have long-term connections both with universities and research Institutes of the CNR (National Research Council) which are located in the Florence area. While the dyadic relationship between research and production seems here quite strong, the « third dimension » represented by innovative services (such as incubators, technology parks or similar infrastructures) which could support innovation diffusion processes at the local and regional level appears to be weak at the moment.

The biotech sub-network is fragmented in three components, with specific local roots and around different fields of biotech applications (green biotech for the largest component, and white biotech for the other two components). The central architecture of the main component is displayed. At the core is a particular kind of bridging actor such as public/private agencies for the protection of the environment, which are often inserted between the dyadic relation linking research centres and universities. However, the relational architecture seems to be too weak to have a real impact on the activity of the cluster agents: it is participated only by a small amount of biotech agents and it develops outside of the main centre of biotech production. This web should be carefully monitored in order to understand its diffusive potential for enterprises operating within specific niches of the green biotech.

The relational architecture that most clearly characterizes the fragmented body of the traditional industries' island is centered on the relation between SMEs, trade associations and innovation centers. The sub-networks are clearly centered on the traditional and well-known industrial districts of the region. Here the service centers have a specific sectoral target and are often the result of a collective action aimed at creating local innovation support infrastructures (Brusco, 1994). The (scarce) relations among the different district sub-networks are managed by local governments, business associations or (generic) service centers. Universities or research centers are almost completely absent from the group of the more central actors.

The mechanics-robotics sub-networks, rooted within a specific territorial area of the region (the Pisa urban area, with its important universities, and some adjacent localities), reveals a balanced relational architecture, connecting the worlds of industry, of innovation and business services, and of research. Here SMEs (often high-tech SME) play a central role, being well connected to the other types of actors and frequently positioned at important crossroads of relations. Relations involving SMEs extend also at the regional level. The core of the technological competencies (and part of the productive competencies) is centered on an urban area which hosts an important part of a high tech cluster.

The architectures here illustrated come from the combination of two spaces, one formed by relations among agents autonomous (*i.e.* not strictly dependent) from the regional programs referred above; the other formed by the projects presented for funding and financed by such programs. Of course a full evaluation of the results of the programs would ask a verification of a positive influence on innovation capabilities and performances embedded in the clusters and localities of the regional milieu and in the relations among them. We

will come back to this point in the final section. What we try to assert here is preliminary. That is, the analysis of the architectures shown in the programs gives suggestions on possibilities of policies' success, insofar as the description of the same architectures is complemented by an understanding both of the original state of the system (which maps directly on the first space), and of the type of innovation focused relations which would be necessary for supporting upgrading and development in the regional territories (which should map on the second space).

For example, referring to what observed before, the form of relations within traditional industries reflects quite directly a state of the system which is characteristic of innovation in many Italian industrial districts: innovation with a low intensity of direct investments in scientific knowledge through R&D. However, in face of current globalization challenges, it can be argued that the traditional bases should be complemented by a significant inflow of scientific knowledge in ways consistent with embeddedness, mobilization and upgrading of the professional capacities and entrepreneurial attitudes of the district producers. A clearly successful regional innovation policy, throughout its funding programs, should have promoted the constitution of stable networks between SMEs, business services, and research units. We have seen instead that the sign of the existence of such networks, among those funded by the regional programs, are quite weak. Symmetrical remarks could be done as regards to the optoelectronic island. While the seemingly satisfactory robustness of networks in the mechanics-robotics island is related also to the existence of stronger high tech clusters in the core area (11). In this case the programs have mirrored well a good conformation of relations, and the evaluation should move on the verification of what has been done, thanks to public funding and promotion, in terms of innovation (capabilities and performances), which could have not been done without.

VII. — EVALUATING POLICIES FOR CROSS-CLUSTERS AND TRANS-LOCAL INTERNATIONAL RELATIONS: AN E.U. EXAMPLE

Local and cluster upgrading through international cross-cluster and trans-local relations and structures, in face of globalization challenges and opportunities, is something which has been conceptualized quite recently. Therefore it is not yet easy to find apposite policies and evaluate them. However there is an old and diffused tradition of public action, provided by various regional, national, and international agencies, to help international trade (in particular exports), cultural and research exchanges connected to business field, international industrial good practices' exchanges, technological and organizational aid to developing,

(11) It is a « Technological district » (Bonaccorsi e Nesci, 2006) as defined by the regional policies.

backward, or transition areas. Within these traditions and experiences, signs of cross-cluster and trans-local actions can be found. We do not go after a systematic account of such signs here. It is presented just an example which helps to illustrate the detection of international cross-cluster and trans-local actions amid traditional international business and cooperation policies.

The example is taken from an European Union INTERREG 3C project, called DISTRICT (Developing Industrial Strategies Through Innovative Clusters and Technologies). It has funded trans-regional collaboration under E.U. « Knowledge Economy and Technological Innovation » targets, in the period 2005-07, with 4M€ funding. The project has involved 50 public bodies from four European regions: Tuscany (Italy, Lead Partner); West Midlands (UK); Saxony (Germany); Västra Götaland (Sweden). The substantive aim assigned to the DISTRICT project was to help improving « innovation strategies and policies for specific measures created for regions whose economies have traditionally been based on industry », providing « its partners a continuous cooperation framework to exchange information and best practices, and jointly develop innovative methodologies for improved regional strategies, strategic planning and pilot actions » (www.district-rfo.org). Under the DISTRICT frame, 11 sub-projects have been selected and funded along three thematic components: a) connecting clusters and business networks to innovation, within the global context; b) SME's innovation projects, in collaboration with Universities and Research and Transfer Centers; c) innovation in Financial Engineering, seed venture capital, start-ups and spin-offs.

The analysis of sub-projects' reports makes evident that a good part of the activities undertaken falls under the traditional categories of exchange of information and good practices. However some sub-projects or parts of single sub-subprojects go beyond that, suggesting attempts for creating relationship-specific assets, expanding mutual learning, combining complementary capabilities, establishing superior governance structures and lowering transactions costs (District, 2008). For example a sub-project (INTECHTEX), claiming as its objective to develop different strategies for new technologies, products and markets in the sector of technical textile, has involved various types of clusters (in agriculture, building, automotive, clothing) in the common use of some basic technologies. The sub-project has promoted the development of various partnerships around new technical textile processes and products and the constitution of a joint venture between two European firms. More generally the regional public partners (universities, public business centers, local authorities) have contributed, with their business associates, to the constitution of a specialized international (mainly cross-cluster) data-base for partner searching within technical textiles fields of demand and supply. An evaluation of policies for local upgrading through international collective actions should look after such types of results. But before and under the results, the evaluation should have, as in the previous section, a structural side concerning the architecture of collaborative relations spanning the various types recalled in section 4.

VIII. — SOME CONCLUSIONS ON APPROPRIATE EVALUATION METHODS IN A SYSTEMIC PERSPECTIVE

In section 5 we have argued that the international debate on policy evaluation is shifting the focus on the integration of such activity within a *learning-based* approach to policy making. This methodological evolution comes not only from the accumulation of theoretical reflections within the disciplines of policy evaluation, but also from the specific needs of the new policies. The applications discussed in this paper concern two types of policies of local industrial development. They contribute in particular public support to processes of district and cluster upgrading, through regional and international cross-cluster and trans-local relations and structures, in face of globalization challenges and opportunities.

The exemplifications have shown one feature of the new policies and of the related evaluation methods. They do not target individual firms, but instead networks of various types of business, institutional, and research agents. The ways in which these networks are constituted and managed, and the architectures they take, impinge directly on the dynamic capabilities of districts and clusters. They are systems composed of networks, and may appropriately interact with larger innovation systems and international value chains by means of sub-sets of their networks. The analysis of such architectural features, and of how they are possibly influenced by public programs and actions, is part and parcel of the evaluation job. Focusing on dynamic capabilities, and not only on specific business performances at the end of specific public programs, is also necessary because districts and clusters, being complex social systems, have roundabout, step-wise, and partly surprising ways to show results from new embedded capabilities.

Furthermore this suggests that the evaluation job is a process which should intermingle not only with the policy process but also with the action of at least some of the operative networks directly involved. In the previous exemplifications we did not go in depth on this second suggestion, even if the cases illustrated could have allowed some direct illustration too. In fact all this could not have been contained in a single paper (12). Finally, we would say that local and cluster upgrading in the flux of globalization asks, perhaps not peculiarly but evidently, upgraded policies and policy evaluation methods.

(12) We would just refer here to the evaluation activity illustrated in Lazzeretti *et al.* (2007).

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