

Competitive Advantages and Metropolitan Growth: The Case of the Turin Manufacturing System

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The most recent initiatives of cluster strategy analysis and implementation to revitalize Turin metropolitan region are illustrated in this paper. Theoretical and methodological, analytical and political assumptions interweave inextricably. First, the problem of regional competitive advantage and the underlying logics of interpretation are established as the expression of the structural dynamics that involve the contemporary economy. The quantitative and qualitative methodologies that were used to outline the existence of clusterized business systems in the Turin region are then examined by breaking down the Turin manufacturing system into eight clusters of three different types: a) strategic, b) innovative, c) traditional. Starting from the clusters identified, the logics of interpretation of the Turin system is grasped and, as a consequence, the strategies of political intervention. The problems of implementation of an industrial policy are then examined, centered on the creation of 'Cluster Observatories', the reorganization of the local economic and urban planning offices, and the establishment of a special agency for industrial policy.

Keywords: Clusters, local competitiveness, urban regeneration strategies, technological innovation, local development agencies, networks, value systems.

This article aims to illustrate the most recent initiatives of cluster strategy analysis and implementation to revitalize a historic production system, that of the Turin metropolitan region. Traditionally, it has been highly specialized in automobile production, but in recent decades it has been going through complex and contradictory upheavals, visible through the drastic fall in employment, in the decentralization of substantial manufacturing functions, in the technological and organizational rationalization of the fabric of enterprise, yet also in significant signs of functional diversification.

In this paper, theoretical and methodological, analytical and political assumptions interweave inextricably. None of the strategic solutions can in fact be separated from the observed reality. In turn, the definition of a hypothesis of political intervention (in this case, a cluster implementation strategy) is necessarily dependent on the interpretation of the structural dynamics of the economy in the closing decades of this millennium.

For these reasons, the paper is divided into a number of distinct but sequential parts. From them, it is thus possible to see the hypotheses that have inspired the strategy of cluster implementation and the methods followed in recent years by local institutions. First of all, the problem of regional competitive advantage and

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the underlying logics of interpretation is established as the expression of the structural dynamics that involve the contemporary economy, keystones of which will be re-proposed here in a very summarized fashion.

The quantitative and qualitative methodologies that were used to outline the existence of clusterized business systems in the Turin region will then be examined. For each of these, an attempt will be made to define their fundamental operating logics and the (real or latent) relations that exist within them. More particularly, the Turin manufacturing system has been broken down into eight clusters of three different types: a) strategic, b) innovative, c) traditional. Starting from the clusters identified, we will then try to grasp the logics of interpretation of the Turin system and, as a consequence, the strategies of political intervention. This section will illustrate a 'star of competitiveness' based on four distinct yet connected strategies of industrial revitalization: a) technological innovation, b) skill formation, c) commercialization, and d) urban planning. The underlying rationale is that of a network strategy aimed at shaping collaborative (as well as competitive) relations among a broad spectrum of the actors present in the system, with the intention of 'overcoming' the domination of automobile production, while at the same time remaining in line with the technological and cultural heritage that stems from it. Finally, in the last part, the problems of implementation of an industrial policy strategy will be examined, centered on the creation of 'cluster Observatories', the reorganization of the local economic and urban planning offices and the establishment of a special agency for industrial policy.

REGIONAL COMPETITIVENESS IN THE ERA OF GLOBALIZATION

What most shocks the observer of current economic events is that the foundation on which the developed economies have lived in the postwar period, a golden age, no longer exists. It has now been two decades that the signs of economic recovery—when they are felt—appear in a framework of persistent unemployment, of stagnant real wages and increasing inequalities of profit levels between companies. In other words, in the 1980s and the 1990s, the macroeconomic indicators no longer reflect the development paths of the postwar period.

There is a strong sense that a watershed has been reached, and the perception of having lost old certainties is clear. At first, we experienced years of confusion, but precisely because of this there was incessant research for new answers and solutions. It is, in any case, true that in recent years, something has appeared on the horizon and that new glimmers of interpretation have finally been seen.

To understand better, we can assume a few key elements in a rapid sequence. They are certainly not comprehensive of an intimately complex question, just as each of these would require broader examination:

1. The growing internationalization of production has the effect of inducing a sort of rising ubiquity of production factors. At a first glance, the consequence

is the erosion of the production capacity of many national and regional economies. This is a decades-old awareness, that economists learned from the fundamental work on 'resource base theory' by E. Penrose (1959), who was perhaps the first to spread the idea that, as competitive advantage is based on scarce and heterogeneous capacities, a successful regional or national economy must possess capacities that others do not have (and therefore rare ones) and that can be exploited within a broader scenario.

If it is true that one cannot talk of competitive advantage in a world where virtually everyone knows how to do the same things in roughly the same times and at the same costs. Yet contemporary history teaches us that some resources are instead localized. It is easy to think of work, for example, which remains an essentially immobile factor.

There is, however, another factor that is increasingly decisive in the contemporary economy and is also characterized by great immobility: this is the capacity to produce knowledge. It is a well-known reality that many companies operating in high labor cost countries, have responded to growing ubiquity and the relative reduction in the cost of production factors, generating entrepreneurial revenue through the *creation of knowledge*. Above all in the industrialized countries with high production costs (especially labor), the gradual passage towards the *knowledge economy* can be interpreted firstly as the outcome of the process of globalization of factors and markets. In these regions, the problem of competitiveness depends increasingly on the capacity to create, accumulate and utilize knowledge more rapidly than competitors. It is the creation of knowledge (deliberate, strongly path-dependent on company and local practices and routines) and not product knowledge (transferable in codified form) that represents the great new locational factor, the source of competitive advantage in the contemporary globalized economy.

2. It is a fact that the globalization process is accompanied by a rather rapid growth in international investment and product flows. Nonetheless, limiting ourselves to this statement would not take us far, and would give a poor picture of reality. What perhaps disconcerts economists most when looking at the emerging world economy is instead the growing degree to which the different regions and countries manufacture different products, through processes and instruments that are themselves very different. It is a statistical fact that international product specialization has grown consistently in recent years, above all in the economies of the industrialized world (a phenomenon that, at first sight, is surprising in an era when the use of communication and computers encourages as never before the diffusion and imitation of technology). This means that the growing specialization of the national and regional economies is no longer dependent on economies of scale in production—and thus on competitiveness/price ratio, but on the nature of the products put on the market, on the knowhows to make these products, on the type of needs that they satisfy, and on the capacity to make the products themselves evolve continuously while preserving their originality.

3. It goes without saying that in these conditions, the possibility of a regional economy to launch itself successfully on the international markets lies, on the one hand, on the identity of the product—i.e., on what differentiates it from competing ones—and on the other, on the fact that the solution of the problem of competitive advantage is no longer found in the exogenous search for the best technology and production methods available. If a solution exists, it has to be sought inside the region itself, in other words in the capacity for coordination between producers, consumers, institutions and other local actors.

The challenge is thus of an organizational nature, involving the actors and their rationale of action and communication. This is an aspect whose importance is on a par with that of the inability of traditional (and still dominant) economic theory's inability to incorporate the actors' rationale of action, as this cannot be grasped by separating the economic dimension from other dimensions, which are historically and territorially specific.

4. What has been upheld so far has its own litmus test. Globalization (the formation of global company networks) weakens the economic sovereignty of the nation states and thus strengthens regional specialization in competitive activities. In their turn, the regions bind themselves to the global economy by promoting their own specializations. This explains the diffusion of political strategies and choices (often neomercantile) aimed at promoting and strengthening the systems (or clusters) present, i.e., the groups of actors and activities connected to each other and therefore generators of economic value.

These considerations would have a very abstract sense if not clearly confirmed by observing the success stories that have to a certain degree thrown into disarray the map of our industrial world. Limiting observation to the experience of areas with a long manufacturing tradition, it can be seen that, in effect, numerous regions (in Europe, for instance, Wales, the Ruhr, Westphalia, Baden Wurttemberg, the Lyon area and Catalonia, to note the most well known) have renovated their production structures in recent years successfully.

These cases differ greatly from each other, and this would be enough to support the thesis of how unjustified it would be in our complex world to put forward a unitary 'model' to be transferred elsewhere. It is, however, legitimate to assume some *generic reasons* for this success, which in terms of method can, in fact, help us find a thread of hope. Once again, we shall limit ourselves to a brief (and certainly incomplete) review.

To clear the field of over-easy determinisms, it can be seen how the regeneration of the production structures has never been achieved by trying to attract what are conventionally defined as hightech industries (biotechnology, semiconductors, aeronautics, software, etc.). Obviously, this does not mean that a technology policy has not been pursued. However, it has been directed (and this is the significant aspect) to the use and 'regeneration' of technological resources historically embedded in the region's economy.

The regeneration of the economy of the region did not occur through the promotion of unlikely activities (see, for example, Hudson, 1994), but by pursuing the relaunch of manufacturing. If all these successful regions already had an *integrated industrial structure* of varying degrees of complexity, the solutions were sought in the respect (as well as the support and regeneration) of these production realities, promoting both *specialization and functional differentiation* (Rehfeld, 1995). Overturning the question, it can be upheld that the successful cases were those in which a fairly broad range of jobs in a limited number of sectors was present (or latent): in practice, a clusterized economic structure. In other words, this means the presence of *partial production systems* within which relatively stable organizational bonds are established.

In all of them, *network strategies* of financial and technological assistance aimed at encouraging interaction between actors—between companies, between companies and institutions, between different institutions—have been pursued (and implemented). The creation of so-called *social capital* (Putnam, 1993) expresses forms of intervention to support the formation of small enterprises and the preparation for conditions of the *learning economy* (Lundvall and Johnson, 1994), characterized by collaboration and interaction at the regional level between enterprise and the science base, whether public or private.

To conclude, all of these regions had relatively strong, interventionist institutions capable of stimulating the formation of interest groups that did not limit themselves to pursuing specific goals, but had a shared normative framework, a common political agenda (Haas, 1992). It is obvious that this institutional thickness is achieved more easily at the regional (and metropolitan) level, as this is the most appropriate scale for strategies of coordination and the mobilization of the resources present. In other words, these successful cases imply a sort of ‘regionalization of regional policy’.

In summary, if a lesson can be drawn from all of this, it is that economic regeneration, on the one hand, has not been reduced to a set of restricted economic factors (which are, in any case, essential), but by major involvement of institutional, cultural and social factors. Solid theoretical foundations can be found for this, both in the ‘new institutional sociology’ with its emphasis on embeddedness (Granovetter, 1985; Hodgson, 1993) and in the neoSchumpeterian school, according to which innovation, as an evolutionary phenomenon, is based on an interactive process and takes form from institutional routines and social conventions (Doeringer and Terkla, 1990; Dosi, 1988; Freeman, 1994; Lundvall, 1992).

On the other hand, the fact exists that economic regeneration has to transcend any hypothesis of ‘generic’ industrial policy in order to give priority to, in contrast, selective strategic solutions aimed at pursuing the strengthening of interindustrial cooperation in a system of actors (clusters, in the broad sense). These together possess capacities to spend on the international level, drawing advantage (again together) from existing or produceable environmental conditions. In terms of method, this marks the passage *from a sectorial policy to a systems policy*, as the instrument which best enables the identification of the relative points of strength and weakness

of the production structure and, starting from this, to prefigure the means of intervention capable of making the most of the externalities of co-localization (Cooke and Morgan, 1993; Foss, 1996).

THE EMPIRICAL PATH AND THE REAL CLUSTERS

The image of Turin is largely codified as a company town, the historical site of the Italian automobile industry and one of Europe's most specialized and industrialized centers. At the same time, Turin is perhaps this century's most typical expression of the Fordist-Tayloristic organizational and social logic, whose leading actor is Fiat, Italy's biggest private company.

Recent industrial history has now begun to explain the profound transformations that have occurred in the Turin system following the massive introduction of both organizational and technological innovation (Conti and Enrietti, 1995; Volpato, 1996). In the last two decades, the city's production and social situation has undergone significant changes which can be traced back to three essential factors: 1) economies of scope have replaced economies of scale in determining and consolidating the keys to success of the production system; 2) at the same time, the organizational routines of Turin companies, whether large or small-to-medium size, have been the basis of the consolidation of a strategic system of value that is the explicit expression of the deeply embedded automobile production sector. This includes, alongside the system of vehicle components suppliers, a solid fabric of car designers and engineers, and a significant group of machine tool manufacturers, with points of excellence in robotics and industrial automation; 3) finally, the massive introduction of process innovations has induced numerous traditional companies to shift towards more efficient production combinations without, however, questioning the networks of transactions and 'loyal' relationships with the major dominant corporation.

At the peak of these processes, it is the consolidated opinion that the structural features of the Turin economy have been confirmed by facts: the system is still characterized by a strongly 'integrated' and 'concentrated' entrepreneurial and industrial structure, although revealing trends towards growing sectorial diversification.

These brief considerations say a lot about the fact that reality is much more complex than what might appear at first glance from looking at the usual statistical indicators. And the same applies for policies: the conventional options no longer offer credible medium and long term solutions. On the contrary, innovative, strategic solutions are demanded. The problem is to reassess and give full significance to the *strategic-subjective dimension* of the companies and the *localized processes* of interaction between enterprise and environment. In this way, and respecting the options outlined above, the geographically specific and nonreproducible environmental conditions come to the forefront in reflection on regional competitiveness in the era of globalization.

It is in this light that the concept of cluster (meaning by this the spatially concentrated part of a production network, with both links to the global markets and founded on an endogenous enhancement potential) appears initially as the theoretical and planning tool capable of expressing the transition from sector (and company) analysis to analysis of the system.

As we go on to the empirical discussion, this sector/system dialectic assumes meanings in which theoretical questions and procedural objectives interweave. More particularly, it gives sense to the dialectic between quantitative and qualitative methods, with the result of orienting research work in two closely connected directions. On the one hand, quantitative analysis, aimed at identifying the dynamic sectors in the Turin region, as the suppositions for the identification of the manufacturing clusters. On the other hand, qualitative analysis, aimed at full understanding of meaning and functioning of the clusters identified. In this second stage, the introduction of the concept of the value system, which brings together the organizational values and functions of the environment, makes it possible to go beyond mere functional and technological relations, introducing into the analysis the elements of complexity that escape the previous level.

On this basis, it is thus possible to break down the research work conducted by the teams¹ into two stages: the first, on quantitative bases, of a macroscopic nature, and the second of a microscopic type on qualitative bases.

Macroscopic Analysis

This statistical analysis can be broken down into three main aspects.

Data selection. The analysis is based on data from industry surveys conducted by the *Istituto Italiano di Statistica* (ISTAT) in 1981 and 1991, as well as the industrial demographic database of the *Istituto Nazionale Previdenza Sociale* (INPS), containing declarations made by companies about their own activities, useful for studies of industrial demography, as well as on ISTAT data on the structure of exports by sector. On the one hand, this allowed the possibility of working with the actual population of enterprises present in the local Turin system, and not on samples. On the other, it allowed us to go as far in the break down as the third figure in the ATECO 91 code of the sectors that make up the Turin production system.

The area of inquiry. The area observed was subdivided spatially as follows: the city of Turin; the inner belt, containing 41 towns; and the outer belt, containing 24 towns. In particular, the criterion of the 'functional area' was selected for the definition of the inner belt. In recent years, the concept of 'homogeneity' regarding a function expressed by an area which then serves to identify it, has recently been reintroduced for quite operational purposes by ISTAT. Specifically, the place where the majority of the population's daily life occurs was identified as the elementary system, i.e., the *local labor* within which the exchange of goods, information and services occurs between individuals and human groups, including the places in which these activities are performed.

Breakdown and tools of analysis. In concrete terms, the analysis is based on a set of statistical indicators, from the simplest ones (like percentage variations) to others of a more complex nature, such as localization quotients and shift-share analysis.

From analysis of the manufacturing industry sectors in Turin, nine sectors appear particularly dynamic from the point of view of at least two of the following three criteria: employment dynamic, company dynamic and export dynamic (Table 1).

The figures given in Table 1 refer to the local system as a whole and, therefore, the situation of the city of Turin varies considerably with that of the surrounding

Table 1: Dynamic sectors in the Turin economy, 1981–1991.

<i>Sector</i>	<i>Number of employees</i>	<i>% change 1981–1991</i>
Industrial process monitoring equipment	1,500	+218.3
Machines for special uses	10,556	+43.6
Office equipment	1,080	+92.2
Electronic tubes and valves	4,370	+58.3
Vehicle parts and components	20,170	+2.69
Aircraft and spacecraft	10,650	+32.2
Printing and related services	7,352	-9.4
Manufacture of paper and cardboard articles	2,522	-16.6 ²
Telecommunications equipment	4,225	+8.3

belt. One exception is for the sector of 'Industrial process control equipment', where there have been important relocation processes from the city to outlying towns.

Using the INPS database, related sectors were then assembled around these dynamic sectors (i.e., those part of the same trade category or where there are presumed strong functional links). This leads to the identification of five groups of activities that effectively outline several clusters: 1—vehicle production, 2—production of machine tools, 3—telecommunications, 4—aerospace, 5—printing and publishing.

Microscopic Analysis

While this statistical analysis provided some fundamental quantitative checks, it also demonstrated obvious limits in identifying certain clusters difficult to pinpoint statistically (design and engineering, environmental protection, ballpoint pens), and in understanding the organization of the identified clusters. For these reasons, a set of qualitative analysis methods had to be developed in order to comprehend the complexity of a local system like that of Turin.

The analysis breaks down into three main phases: a) a number of key collaborations were set up with privileged observers, i.e., scholars and experts with indepth knowledge of the individual sectors and, at the same time, the capacity to direct this knowledge in keeping with the purposes of this research; b) economic actors were sought which operate in the various segments of the filie're and, thus, in the cluster. To make a greater distinction from the methodologies that characterize the macroscopic part of the research, the sample of companies analyzed is not of a stochastic nature, but emerges from a reading of the manufacturing world conducted through qualitative filters. This field research adopted a questionnaire submitted to about 300 companies belonging to the eight clusters and two support systems; c) an interpretation and organization of the information acquired was conducted. This led to identifying the dynamics, individuality and strong and weak points of each cluster. The information concerning the functional relations between the cluster actors enabled certain structural aspects to be derived by cross-referencing several dimensions: the intensity of relations between the various components of the cluster; the substance and embeddedness of certain specific activities in the Turin area, and their competitive capacity. This is just the first step in giving intelligibility to structural forms and problems of the clusters, highlighting, for example, weak or missing links in its organization or, vice versa, elements of strength.

The image of Turin's manufacturing industry that emerges from this analysis shows three groups of clusters: 1) The *strategic clusters* (vehicles, machine tools, design and engineering) would seem to be well embedded in the local Turin system, as they base their competitiveness on traditionally embedded knowledge and know-how. These are sectors whose de-location would provoke a profound identity crisis in local production; 2) The *innovative clusters* (security systems and aerospace) stand out because of their highly specialized nature of work and the constant innovation of both product and process on which their international competitiveness is based. These are clusters whose well-consolidated presence in the Turin area should be related to certain local resources, such as precision engineering and electronic circuit design; 3) The *traditional clusters* (printing and publishing, ballpoint pens) have their origins in a series of historical conditions, acquired skills and informal relations between them, rather than in any particularly innovative capacity or system of fertile relations with Turin's manufacturing base.

The telecommunications cluster is a case on its own. Though considered strategic, it has been undergoing a profound crisis that has put its very identity at risk. In fact, what seemed up until the early nineties one of the most dynamic sectors of the Turin economy, thanks also to the presence of Telecom Italia, has seen the failure of a number of companies and the sale of others to firms outside the area. With the sole exceptions of Urmet and Cselc (the Telecom research center), production and especially research and development have virtually disappeared, transforming the cluster which, more than any others, could have become an international pole of research and innovation into a random aggregation of knowledge that is close to dissipating. The attempt to revitalize this knowledge cannot be isolated from a broader

policy regarding the electronics industry that takes into special account the Olivetti situation which, although outside the local Turin system, cannot but influence electronics in the Turin area itself.

The two support systems of Engineering and Industrial Electronics deserve rather different considerations. As has been said earlier regarding engineering (especially precision engineering and die production and design) this constitutes an important local pool of know-how where strategic clusters for the Turin economy are embedded and positions itself as the main recipient of possible support initiatives.

The question of electronics appears fundamentally more complicated. Given the lack of an electronic components industry and basic research not only in Turin but in Italy generally, electronics cannot be an autonomous cluster but must limit itself to an array of consolidated clusters (such as electronics for cars or industrial automation), or the basis for niche applications. In general, electronics continues to be an important support for the Turin clusters, particularly as regards the production of printed circuits and connected services.

Finally, a further step was the breakdown of the clusters' dynamics so as to individually highlight the different components of competitiveness and related conditions of embeddedness (or conditions of milieu).

VALUE SYSTEMS AND NETWORK POLICIES

This way of thinking makes a definitive break with many consolidated categories that have dominated the foundations and policies of regional development for many years. That the traditional principles of regional development had been in irreversible crisis for some time is well known. It is sufficient to note the fact that the most recent European Community strategies have focused on two new and crucial concepts, that have been assumed (and made official) together: competitiveness and cohesion (CEC, 1994).

If for decades Community policy was directed more at curing the symptoms of regional problems (such as unemployment) rather than the causes (such as low innovation potential) (Dunford, 1994), more recent strategies have tended to provide a practical expression of network logics (innovation networking and social capital), officially recognizing the need to link supply side strategies with the local demand side conditions. Admitting the errors of the past (when the saga of regional subsidies ended up by encouraging infrastructural policies), the most recent best practice guidelines aim to (Morgan, 1997): i) stimulate processes of collective learning; ii) prepare a sufficient stock of social capital; and iii) fight institutional inertia.

It is now recognized that those keys to success in the global economy that can be summarized in the key concept of local development can be traced back increasingly to intangible factors: technological and organizational learning is now the acknowledged expression of values, conventions and tacit knowledge (Asheim and Isaksen, 1997; Doeringer and Terkla, 1990). This awareness is not found only in Community

programs or in the elegant logical schemes of the 'new' ethic of regional development. Faced with the crisis of Fordist and Keynesian structures, innovative capacity is no longer embodied in machinery, but in the result of positive externalities and localized, collective learning that transcend individual (or company) technical abilities. These new logics of regional development, based on the construction and consolidation of network relations within a defined institutional framework, are being established inexorably.

The analyses discussed so far give a central role to actors and their capacities to design and run new forms of intervention. From these, it is immediately clear that a profound transition is underway, from precisely the viewpoint of the needs expressed by the actors. This change marks the shift from a 'functional' policy—usually expressed in undifferentiated support from both the economic and infrastructural standpoints, paying attention mainly to solving company logistics problems—to one of network policy, whose priority is support for collaborative (as well as competitive) relations between actors.

If, as said earlier, functional specialization and differentiation are fundamental to the competitiveness of the system, the possible (and desirable) horizon does not lie in inventing improbable new specializations, but in functionally differentiating and upgrading those which have their roots in Turin's history and culture, in other words in the identity of the products and the actors that make them. So, the transition towards new policy tools based in a systematic strategy of cooperation is an explicit need expressed by the clusters whose competitiveness is grounded in (localized) learning. This regards the clusters already deeply embedded in the local economic system such as Design and Engineering, on the one hand, and Machine Tools, Robotics and Industrial Automation, on the other, and those for which the conditions, potential and the first, however weak, signs of development exist (such as the Security Systems cluster).

The Vehicle cluster, as with the more traditional ones, is not among those for which the pursuit of competitive advantage depends on the formation of company support systems and the activation of territorialized (economic and institutional) conditions. This fact certainly evokes the image of a castle around which the history of the company and the city has raised towering walls, depriving Turin's enterprise system of a cooperative culture.

THE 'STAR OF COMPETITIVENESS'

What are, in essence, the territorialized conditions—some shared, some specific to each cluster—the activation of which would justify expectations of an increase in the system's competitiveness? At this level, the discussion cannot but be highly abstract, as what unites the guidelines derived from the analysis and the implementation of possible industrial policy strategies is too uncertain, and depends on the complex play between institutional bodies, company culture and decision-making processes.

In order to reach a rapid conclusion, the concept of *star of the Turin system's competitiveness*, which synthesizes more numerous underlying lines of reasoning. It attempts to unite the following conditions: a) the *active and decisive conditions (or components)*, both present and historical, in embedding the actors of each cluster in the Turin system that are essential to competitiveness; b) the *latent conditions (or components)*, i.e., those never brought into play, or exploited only selectively, but whose activation—made possible by other conditions present in the Turin manufacturing system—would presumably encourage a strengthening of competitiveness (both promoting forms of functional differentiation, and reinforcing and upgrading the specializations typical of the system).

In concrete terms, four principal determinants of competitiveness have been identified. These express both the relations already identified, and the possible industrial policy and planning options: a) logistics external to the company; b) training; c) commercialization; and d) innovation. Obviously the different clusters show different degrees and forms of embeddedness with respect to the conditions present and/or latent in the system, and these translate into different and specific hypotheses of industrial policy. The analysis that follows also includes the multifaceted world of the often small electronic, engineering and die-making firms that make up the deepest richness of local manufacturing. These largely lend support to the dominant clusters, and for this reason have poor capacities for autonomous activation of the processes of differentiation that would enable them to overcome the turbulences of the contemporary economic cycle.

a) The first concerns *company logistics*. This is the most immediately visible aspect and, in many ways, the least problematic, linked as it is to an organizational rationale of a functionalist nature, typical of a way of conceiving space in an indistinct fashion, malleable to production needs. Strictly speaking, the functional externalities appear at present adequately exploited by the Machine tools, robotics and industrial automation, Ballpoint pen and Security systems clusters (and thus appear as active components of competitiveness). In contrast, the need for rationalization seems urgent in the Vehicle cluster (the selection of components suppliers, their expansion in size and the consequent strategic and financial repositioning still await appropriate rationalizations in terms of logistics) and the Printing sector. These sectors are represented by a wide range of small enterprises whose functioning is still hindered by shortcomings regarding accessibility and the possibility of expansion in size and relocation outside the central and semi-central area of the city. Finally, as far as the Design and Engineering cluster is concerned, the need is felt to encourage the 'concentrated diffusion' of companies within the urban boundaries, both for advantages in terms of image and to keep a hold on skills deeply embedded in Turin.

b) The *training and the quality of the workforce* are decisive factors of some very specialized clusters (design and engineering, security systems, aerospace, and certain segments of the machine tools, robotics and industrial automation cluster). At the same time, training still falls largely on company resources, and paradoxically, this regards traditionally key sectors of the Turin manufacturing system (certain vehicle

engineering sectors, machine tools, and printing) and some more innovative ones (such as CAD design).

It follows that a policy of professional and management training will have to give priority to responding to the need for greater specialization, through the involvement of the companies in the training process and the intensification of relations between the world of production and the university. The relations between enterprise and the city's university structures are still 'institutionalized' only for a relatively limited number of medium and large companies, and mainly occasional for small ones (OECD, 1991).

Forms of 'implicit' professional training, aimed at facilitating the embedding and reproduction of traditional and/or innovative skills and know-how—from design to electronics, from graphics to engineering—can, however, find important enhancement in certain specific projects: from the recognition of training run inside the firms to the creation of design studios which, abandoning the hyperspecialization that is pervading the cluster, bring back workshop techniques (from the development of manual abilities to the personal relationship between master and pupil) that educated Turin's first great designers.

c) The *capacity to commercialize products on the international markets* seems to have been developed above all by the companies belonging to the Machine tools, robotics and industrial automation cluster (in about half the companies, exports cover over 50% of sales) and car design, in which Turin companies effectively hold a world monopoly. Similar considerations concern the niche clusters, such as the security systems and ballpoint pens, in which the largest Turin manufacturers manage to consolidate positions of prestige in an extremely competitive international market.

Taking into account that the international involvement of suppliers of automobile components is still largely dependent on the strategic decision of the final producer, from the point of view of a broader strategy of commercial policy, concerted support action could reasonably take two directions:

i) *the acquisition of international contracts*. The fabric of small- and medium-sized companies in various engineering sectors would benefit from this, as they would thus reduce their dependency on local economic and manufacturing dynamics. In particular, this would mean binding closer together the collaborative links between the car designers and particular sectors of the industrial humus (especially die design), so as to be able to exploit the attraction exercised by the former on all the major car producers, for example organizing guided visits and meetings between Turin producers and potential foreign customers.

ii) *product development assistance services*. This is the most innovative part of the commercialization support policy, directed towards functional differentiation of Turin's production and fostering the formation of new competitive niches on the international level. In concrete terms, this means identifying new product projects and lines worthy of being developed (the collaboration of the car designers is fundamental in this stage), assessing feasibility and commercial

appeal, selecting (once again in the industrial humus of Turin) the most suitable manufacturers.

d) *Innovation* is the most problematic aspect. The main risk related to the definition of innovation-oriented policies is the proliferation of utopian scenarios that do not take account of the peculiarities of the local manufacturing system. The problem is not, in fact, that of preparing standard projects to deliver locally, but to strengthen the innovative environment of each cluster. Taking into account the profound reality of the Turin system, two main lines of innovation policy emerge:

i) *research on materials*. This constitutes one of the main shortcomings of Turin's innovative environment, in contrast to a deeply embedded tradition of processing materials (see, above all, precision engineering and pressing). The possible solutions for this concern *access to knowledge*, i.e., making available innovations developed externally to the local Turin system (through the instruments of international technology observatories) and *research on alternative materials*. In this last case, innovation of materials should be accompanied by the preparation of services to assist product development, and the immediate and continued application of research results.

ii) *electronic innovation*. This is obviously not just a formal homage to those who would like to multiply artificially technology and computer poles. It is needed, instead, to grasp some of the peculiarities of the Turin system and, in particular, to stop the dispersion of the unique Italian electronics knowledge, which was once deeply embedded in the area centered around Olivetti in Ivrea. For reasons linked to international market dynamics, the solutions cannot concern basic research, or electronics components—where the position of the major international competitors now seems impregnable—but have to be sought in one or more areas of applied research in which possibilities of success can be seen. Among the possible directions are the field of electronic and computer applications of *building automation*, which closely involve valuable components of the Turin manufacturing system: the clusters of Telecommunications, Security systems and the Industrial automation sector.

The problem of outlining possible interventions that respond to the needs described can be solved by two distinct plans. The first follows the traditional logic of the technology park, within which information is circulated and competitiveness strengthened through offering companies complex services and assistance. This would pivot on three main activities:

- *materials research*. The park would thus tend to attract 'tailor-makers' and compounders, i.e., companies specialized in producing 'customized' materials for niche applications;
- *sensors and building automation*. This is identified as one of the electronics applications that will see the greatest development in the future, as sensors can find many niche applications;

- *space vehicles*. The presence of companies in the Space vehicles cluster would strengthen the electronics base and would open up the possibility of expanding the range of local manufacturing, substituting components that had been important up to the present.

The second project is for a *diffuse design and creativity park*. In this case, the project would mean preparing network policies that facilitate relations and, at the same time, the territorial embeddedness of the activities most linked to ‘industrial creativity’ which, by their very nature, cannot be concentrated in a traditional technology park. For these activities, a policy could be implemented of concentration in an urban district to be upgraded for production, allowing these activities (which, among other things, do not pollute and occupy little space) to integrate into the social fabric of the area. The activities in question come under the following three main categories: *medium-small industrial designers, car designers and related activities* (design modeling, prototypes, etc.); *design and production of dies* (excluding the pressing of materials); *design and mastering of printed circuits* and electronic and computer services generally.

This would have to be accompanied by the organization by the public authorities of training centers, which again be split in two categories: schools for CAD designers (with training more specialized in reference to the Turin clusters, in particular Vehicles and Machine tools); and ateliers, in other words structures entrusted directly to Turin designers. The public authorities could also intervene by setting up a product support center, a structure to identify new product designs and lines worth developing.³

CONCLUSION: A CHALLENGE FOR THE INSTITUTIONS

The approach in terms of clusters and value systems has allowed the unveiling of the principal competitive advantages of the Turin system. These are present because of the city’s own historical heritage, the processes that have marked the transformations in the manufacturing fabric in recent years and the ‘new’ competitive conditions.

It follows that a policy that intends to make a mark on the Turin manufacturing system will have to act, as a priority, on selected critical variables in a mid-term time span. This implies an industrial policy that operates at the *system level*, and that ‘shares’ the ongoing trends: this is characterized in terms of a *network policy*, that aims to increase the cohesion and embeddedness of competitive factors. The challenge is not, in fact, that of setting up ‘generic’ structures or services, but the creation of specific operating conditions, defining the fundamental bases for the development demanded by the most dynamic production systems.

Taking into account the limits to public authority action, the challenge is essentially an organizational one, i.e., involving the public actors as active (and pro-active) players in the development of an *institutional framework in harmony* with the logics

of the production system, aimed in other words at eliminating the constraints that hinder the activation of the *latent resources*.

This approach is implicit in the hypothesis that inspired this research, and in particular:

- a. in the need for the institutions (as well as companies) to be made aware of the advantages that stem from the realization of a non-generic policy of support for relations between actors;
- b. analysis of the network of relations external to the companies, based on the identification of the key nodes in each system;
- c. analysis of the network potential. In the method followed, the potential is assumed in relation to the strategic objectives of both the individual actors and the system as a whole.

From this emerge possible scenarios and precise hypotheses of strategic intervention, which cannot be separated from the implementation of an *organizational framework*. This is based on a model broken down into three distinct, but inseparable, levels.

Level One—Cluster Observatories. These are ‘open’ and flexible structures, involving the participation of both company representatives and public and private bodies that share problems and goals (already identified in the course of analysis). Each observatory pivots around the figure of a ‘cluster specialist’ who is given responsibility for initial coordination of the participants and definition of the lines of action. The coordinator interacts with the other observatory coordinators, discussing the identification of projects and strategies involving different systems. The observatories’ functions are thus the following:

- i) the processing of the results that emerged from the analyses, identifying needs for further examination;
- ii) identification of the problems and specific needs of the cluster;
- iii) publicizing hypotheses of work with other actors (companies, institutions) potentially interested in their possible involvement;
- iv) identification and elaboration of specific hypotheses of strategic intervention.

Level Two—Institutional Actors. This level is made up of representations of the City, Province and Regional administrations (the three public authority levels operating locally), the Industrial Association, the Association of Small Entrepreneurs, the Chamber of Commerce, Trade Unions, the University and the Polytechnic of Turin, and later, representatives of the Cluster Observatories. They receive the suggestions from the work of the observatories. Their function is centered on the definition of political conditions and opportunities to realize projects defined at the previous level, assessing their consistency with the lines of strategic action already being implemented.

Level Three—Local Development Agency. This is established by reallocating management and white collar staff already working at various institutional levels, while the ad hoc recruitment of personnel is also envisaged. It has a dual function: 1. management of strategic industrial policy projects. In this context, the Agency acts as an interface between the cluster observatories and individual companies and other bodies (promoters, research institutes, etc.) to which the realization of the various projects is delegated; 2. management of company location processes. This concerns projects for simplifying location regulations; the provision of adequate information to individual operators, on the one hand, and the cluster observatories, on the other. In the early stages of implementation, it has also been established that the Agency will manage the ‘sharing’ of the diffuse knowledge present in the local Turin system.

Operationally, it is composed of two distinct units: 1) *An autonomous information processing center* (on employment and financial aspects, markets and their distribution, etc.), the surveying and gathering of the research initiatives already begun by public and private institutions, academic bodies and so on. In this light, the need to pursue integrated information management is achieved (by collecting and networking of the information gathered, the management of Internet sites for company use, the creation of specific data banks); 2. *A support center for training, commercialization and innovation activities.* This responds to the fundamental problems posed by the companies interviewed, which identified, alongside specific logistics problems, the need to have a connective fabric that enabled guided access to the projects and programs identified as constituting the competitiveness of the local manufacturing system.

Finally, the Agency for Investment in Turin and Piedmont (I.T.P.), established in 1996, has its own specific mission: attracting investment from abroad (as well as from other Italian regions). Set up by local political and entrepreneurial institutions, its function is to promote territorial marketing (investment-generating and investment service) and receive from the various levels of the structure described above information on the current dynamics in the local and international system, as well as on the types, characters and costs of the areas available for manufacturing location.

It thus constitutes the one-stop point of reference for companies intending to locate, assuming the function of assisting them in logistical planning and in completing processes to obtain and manage the (possible) funding from the European Union.

The two strategic projects outlined above (The Design and Creativity Park, the Technology Park and the Building Automation hypothesis) represent, in this light, the test bench on which the possibilities of constructing the city of the 21st century will be measured.

NOTES

1. The whole group, established by the City of Turin and coordinated by Sergio Conti, has involved the local Chamber of Commerce, the Industrialist's Associa-

tion, The Province of Turin, the Agency for Investment in Turin and Piedmont, as well as the collaboration of university and private research centers. In this light, the complex dialectic which in this century has both bonded and separated the great car company from the other components of Turin's society and economy would require much more attention than is possible here, strongly involving policy-making and socio-cultural reproduction. See for example, Bagnasco (1986), Bottiglieri and Ceri (1987), and Gallino (1990).

2. In the cases of 'Printing and related services' and 'Manufacturing of paper and cardboard articles', growth has been in terms of local units.

3. A similar structure has been created in Westphalia by Dieter Siegel, the founder of Siegel Design Consulting, based in the castle of Harkotten.

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