

SPATIAL STRATEGIES FOR INDUSTRIAL MODERNIZATION AND RECOVERY PROSPECTS *

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abstract

Industrial change seems to be a key problem in the processes towards new patterns of accumulation confronting overaccumulation crisis and falling rates of profits. Industrial transformation, presented through deindustrialization and reindustrialization procedures, depends on the changes of traditional branches as well as on the extension of high-tech productive processes concerning new use-values (electronics, energy systems, biochemicals, etc). Two different spatio-sectoral "models" concretize, for the moment, the on-going productive shift: a) that of modernization of traditional activities linked with the restructuring of their urban spatiality, as happened for example in the Turin metropolitan area, and, b) that of new high-tech activities linked with the development of new growth poles (technopoles), like the case of the development around Cambridge. But, is extended industrial change on the basis of these models possible? If yes, under which conditions? Which are its options and their social significance? Which major societal changes and class relations in particular do they presuppose?

1. Crisis and industrial modernization

Industrial change, in both the form of modernization of traditional firms and of development of the science-based industry, is considered as a major way leading out of crisis; as a necessary modification of relations of production, and through them of class structure, in order to restore the lost profitability of enterprises and to lead them out of overaccumulation conditions. So, the meaning we attribute to modernization is double: the transformation of traditional industries mainly through process changes, but also the development of new use values and commodities mainly through product innovation.

If we assign the term "restructuring" to define the process of this change, then the ultimate objectives of the restructuring processes are either the reversal of the Taylorist and Fordist methods of work organization in favor of more flexible, labor saving and higher-productivity ways of production, or the functioning of production units under the conditions of the overproduction crisis. Through the generalized recomposition of work processes, in terms of relations, functions and numbers of places, a capitalist rationalization is introduced confronting the problems of timing in the spatial shift of activities, of overspecialization, of large stocks according to a just-in-case

system, of large numbers of controllers, as well as of the wider proliferation of tertiary activities and work places into industrial enterprises (Sayer A., 1985; Mossey D., 1985; Soja E., 1983).

However, we think that the restructuring literature or the "restructuring school" (if such thing exists) as M. Storper (1985) has put it, in its various expressions, has somehow overestimated the significance of industrial relations and has treated the restructuring question in the "closed universe" of industrial phenomena (Costello, M., 1985; Hall P., 1985). Having started a research project with such a conviction, we realised suddenly that contemporary industrial change overpasses industrial activity and change and deals with important modernizations at the global system of social relations, from the level of production to state structure and ideologies; that options for industrial change are simultaneously options for the modification of class relations, for the geography of development, for the conflicts on the levels of firm, of social strata and territory.

So, presenting industrial restructuring as a way out of crisis is at least misleading, unless all its underlying conditions are taken into account. But, let us begin with some "models" of industrial change, as they appear through a literature schematization.

2. Paths for industrial change

Industrial restructuring and change is linked with the controversial processes of deindustrialization-reindustrialization. Behind them it is possible to recognize the efforts of the bourgeois class to confront the effects of overaccumulation and overproduction, and to reach at least the pre-crisis levels of profits.

Deindustrialization accelerated during the present crisis period in terms of industrial production, and even more in terms of employment. This shift is the direct outcome of a twofold process: A short-term strategy which manages overproduction in many industrial branches and mainly in the automobile, chemical, textile, steel and coal, electric machines, heavy engineering and ship production (see *L'Expansion* 1975 and 1985 special issues). Secondly, it is an effect of overaccumulation. Overaccumulation

occurs when introduction of new surplus-value into production does not yield the previous rate of profit. This decline in profitability leads productive investments to a decline, and capital to a reproduction crisis. It is worth noticing that overaccumulation has been confronted via inflation and austerity policies attempting a temporal reestablishment of profits in their previous levels. In both cases, production rationalizations and cuts, labor reductions, and plant closures, in other words a functioning of firms at lower levels, was inevitable.

Deindustrialization affected mainly the major centers of the post-war accumulation like metropolitan areas, assembly and mass-production urban centers. It is manifested via plant closures, locational shifts of industrial firms (relocations or branch movements) towards low-cost localities, like the outer metropolitan rings or the medium-size cities, massive metropolitan unemployment, fiscal crises of local regulatory institutions, and crises of local autonomy and democracy. As far as the spatial aspects of these phenomena are concerned, environmental and fiscal crisis couple the socioeconomic dualism based on income and employment variations. Places of production rapidly deteriorate as firms do not modernize, reduce their capacity or move away. The images of devastated places extend to housing and infrastructure conditions, as reductions of the local tax base, of central state expenditures and of individual consumption do not permit a normal replacement of the general conditions of production.

However, all industries do not function under overaccumulation conditions. In branches of electronics, scientific instruments, plastics, some subsectors of chemicals, etc., where new technologies transform the production process (automation, multifunctional workshop, alternative production), the resulting gains in productivity sustain profitability, industrial growth and expansion. So, a new round of technological innovation and work intensification produces an expanding spatiality based on reindustrialization processes. This is the case of the science-based industry or high-tech industry.

Although high-tech industry does not obey a uniform locational pattern - and why should one expect certain shared technological characteristics such as rapid product development or high

automation to have uniform locational effects across otherwise different industries in different countries? - specific spatialities emerge due to innovation and its industrial applications: science parks, high-tech production centers, techno-cities, rapid development corridors, neo-urbanized areas, metropolitan restructured areas, etc. The evidence about these localities is extremely fragmented (see Okey et al, 1980; Malecki, 1980; Kellerman, 1984; Plonque, 1983; Glosmeier, 1985; Kerrougen and Merlant, 1985). However, it seems that these forms of development follow two different spatial patterns with respect to different socioeconomic realities. On the one hand, we may observe small scale projects under the form of science and industrial parks, which solidify the cooperation among industrial activities, University-based research institutions and state finance; a form corresponding mostly to the European experience with about forty high-tech centers, parks and zones in France, UK, Italy, W.Germany, Spain and the Netherlands. This is the case of new use-value productive processes and technopole development. On the other hand, we may observe more important development schemes, based on innovative firms, where R&D is incorporated and specified within industries; this leads to more spontaneous forms of urbanization as has happened in the Turin metropolitan area. This is the case of industrial modernization and metropolitan restructuring (Kominos N., 1986).

TORINO

In areas of traditional industrial concentrations, where crisis is more severe and apparent, selective reindustrialization strategies are taking place and restructuring experimentalities are introduced. One may note the massive introduction of information technology and automation into traditional industries. This modernization does not concern the big firms only; small enterprises in cooperation with research institutions can change their technical base and production techniques. One may also note the efforts for development of new products, production processes and know-how with respect to local and regional resources, aiming at the rational use of scientific personnel and labor skills, as well as at the exploitation of local natural resources. These kinds of modernization are coupled by modernization in management and organization. The point is to support flexible patterns of work organization, forms of collective non-linear production, and ways of reducing non-productive labor power. In

industrial relations it becomes very important to possess a policy of harmonization. In return for a better place of work, the firm achieves flexibility in organization, transfer of personnel and its specialization in more than one places of work, creation of multifunctional workshops, etc. The previous posts of controller and of syndicate representative are replaced by a new one, that of "facilitator", whose mission is to activate the autonomous production teams. Flexibility becomes the major feature of a new productive system together with the ideology of individual commitment and combined actions between the syndicate and management. We must also note that many firms proceed to unprecedented reselection of personnel and retraining to new production tasks, a procedure which sometimes lasts for two years.

Spatially, the modernization of production and management are related to regional development programmes (in contrast to national ones or the absolute absence of planning). But, this time the initiatives belong to the private sector and to local institutions of industry and research. Mixed organizations of interested parties, of industry, of research, of communities and consumers support the local and regional developmental actions. The financial sources are also very diversified, based on joint ventures between local or regional institutions and private enterprises.

A typical case of this form of sectoral and spatial restructuring took place in the Turin metropolitan area. A few years ago Turin was considered as the most "Fordist" and "Taylorist" city of Europe. During the second half of the 70's, the crisis in automobile sector received in this area epic dimensions leading the global social system of the city to an unprecedented transformation. During 1977-1983, industrial employment declined by 8% (43,000 work places), and if one adds the technical long-term unemployment (75,000 places), a total unemployment rate of 13% was reached. This severe deindustrialization process was followed by intense restructuring and productive changes which influenced profoundly the local society.

In the first place, it was observed an important proliferation of the tertiary sector, where dependent and independent employment increased; this change was attributed to a tendency of fragmentation and autonomization of productive systems, as well

as to the important reduction of firm size. On the other hand, new industrial processes were developed, based on smaller and more flexible productive units, increasing the total number of enterprises by 35% during one decade. In the case of Turin, background of the deindustrialization-reindustrialization processes was FIAT, which "exported" its crisis to linked enterprises by modifying the commercial and productive policy. However, this productive transformation and heavy automation contributed to the creation of new firms related to the production of "machines-tools", electronic components, automation systems and robots. So, three new types of enterprises were presented. The first type is constituted by firms working exclusively for the big industrial automation (like DEA, COMAU-FIAT, OSAI); the second one by the small, not very specialized, with an ambiguous sometimes profile, firms linked to local industrial activities; the third type is based on the initiatives of scientists and technicians, and the firms so created are very specialized and enter directly to international competition of high-tech products.

However, it is very important to underline that the reindustrialization process is considered as a global process affecting the entire city and its region. Two urban projects, the "Turin Project" and "Technocity", proposed by political and syndicate forces and the Agnelli Foundation respectively, formulate a definite transformation of the city with respect to the specific role of technical universities and research centers, to the development of information technology and advanced mechanics, to the restructuring of local labor markets. In both cases, through the cooperation of industry, of finance, of university system, and of local authorities, one of the most important clustering of high-tech activities and metropolitan transformation is taking place.

CAMBRIDGE

The Turin experience does not provide a prototype for the development of new use-value productive processes, which is better exemplified by the development of Cambridge.

55 hectares, 30 enterprises and 1700 employees form today the Cambridge Science Park, created in 1970, the first in UK. However, today high-tech production is not limited in the area of the park, and Cambridge has moved into the public eye because of

the establishment in the city, mainly over the past 10 years, of some 450 technology-based companies in areas such as computers, instruments and biochemistry. They account for 17,500 jobs, equivalent to 13 per cent of the local work-force, which is twice the average for high-tech employment in Britain.

Today, the key issue for Cambridge is how to provide for high-tech expansion, while at the same time preserving the special characteristics of the city. The high-technology surge has increased traffic and housing prices as large numbers of highly-paid people have been attracted in the region; and if action is not taken to reduce some of the unfavorable effects of growth, its pleasant environment will be ruined, removing one of the aspects to the city that many of the high-technology companies find appealing (F.T., 13.7.1987).

What differentiates this form of spotto-sectoral development from the Turin case is that at the beginning we find a non-industrial initiative, through the form of the University based science park (an external cooperation among small and medium capital, specialised labor and the state).

It is worth noticing that the main objectives of a science park is the experimentation on a new form of social cooperation among innovative industry (capital), research institutions (labor), and the state. The scene of their collaboration is placed in the fields of electronics, aeronautics, chemistry, biotechnology, information technology, telecommunications, artificial intelligence and automation (Kerouguen and Herland, 1985). Their effectiveness is based on the necessities and characteristics of the production of innovation. According to R. Oakey, (1984) for example, the poor performance in product innovation by the small and medium-size firms is due to their low "local resource environment". As product innovation demands a positive environment and a dense network of high-tech producers, of firms developing R&D or using external research services, of overspecialized labor and finance possibilities, the clustering of firms is presented as a vital necessity. So, this socio-spatial cooperation develops:

- a new concept for investment by the so-called community of venture capital; in many cases, traditional finance is replaced by University sources and others related to scientific expertise, who can better evaluate the risks of high-tech investment;

- a new entrepreneurial behavior which accepts the possibility of failure and the progress through experimentation; it flourishes in relation to less formal and less hierarchically structured organizations of work, and to ideologies of individualism, individual effort and commitment;
- and the usual state intervention which finances directly R&D activities, provides the needed general conditions of production, and creates the also needed markets for new products.

The meaning of the science park is not to replace industrial development or industrial zones. But to act like an incubator for a new social cooperation, for mobilizing investments of a particular type, for promoting particular products, and for creating conditions of profitability. At a next stage these social innovations have to expand over a wider area. However, these new centers of growth do not emerge on their own; on the contrary, they demand the creative intervention of regional or local institutions.

So, two different models of reindustrialization have been identified which correspond to different social actors, social alliances and accumulation conditions. In the "Torino" model, the main social actors are big capital and syndicate organizations, "harmonization" relations are developed between them, there are internal (intrafirm) cooperation between capital and specialized labor, external relations to the state and open competition. In the "Cambridge" model, the main social actors are small or medium capital, specialized labor and the state; a "new cooperation" is developed among them, an external cooperation; there are also state subvention to R and D and restricted competition.

3. Obstacles

After this schematization of spatio-sectoral restructuring processes, we will deal with modernization of traditional industrial systems with respect to the paths for industrial change already identified. The question is whether "Torino" or "Cambridge" are adequate models to promote production modernization and shifts toward new productive processes. We will refer to the results of a continuing research program concerning the modernization of the Greek industry; and we will discuss: a) the obstacles to modernization of a traditional

industrial structure, and b) the problems of cooperation among industry, research institutions and state authorities, which stand at the basis of the technopole development. We must mention that research to modernization obstacles has been undertaken to the most advanced part of the Greek industrial structure and mainly into the sectors of rubber and plastics, chemicals, mechanical eng., electrical eng., vehicles and scientific instruments.

The main obstacles to the modernization of traditional and dynamic industrial branches up to the 70's refer to questions of investment, technological obsolescence and labor modifications.

In small and medium-size firms investment difficulties are mainly linked with their limited resources. Most firms aspire to modernization, as it is obviously related to a better place into the market and to higher rates of profit. But, low quantities of accumulated capital and short-term policies by financial institutions make the radical renewal of fixed capital in these enterprises and the labor retraining which extends over a long period, quite impossible. Somehow this obstacle is attributed to particularities of the Greek economy, where intense commercial and financial speculations do not permit a "normal" functioning of industrial capital. But, it also goes back to the nature of the firms, their long-term accumulation policy in the past, and their usually archaic production equipment. In large firms, where capital availability presents no problem, investment projects are linked to overproduction conditions, hence commercialization security, and to general projects of multinationals which hold the package of assets. In both cases, although in a different way, the state is called to assume the production restructuring conditions either by incentives and financial policies, or by opening markets and sub-contracting. Industrialists usually blame the state for lack of modernization support, for particular privileges to commercial capital, for the non-protection of the interior market and the non-rational, with respect to industrial growth, indirect taxation policy. And it is very characteristic of this ideology that they seek to assure commercialization in order to modernize production, instead of promoting commercialization through modernization.

In our opinion investment difficulties are not the major ones, at least as far as the Greek case is concerned. On the contrary,

access to production and management "savoir faire" is the main issue. And we do not mean by that the institutional barriers to technology transfer which doubtless exist; but the real capacity of firms to observe new technology. In cases of multinational subsidiaries or joint-ventures with multinationals, the technology transfer barrier is absolutely absent, in both the form of legal or technical obstacle. Although in these cases there is no R and D activity and innovation production into the subsidiary, the parent firm secures the transfer and the training to new production technologies. The same holds for big Greek companies which develop an international activity; the existence of R and D activity, and the already developed high "savoir faire" permit them to incorporate automation, robotic applications, advanced mechanics or to link mechanics to information technology without problems. In any case, the royalties paid for technology transfer represent a very small percentage (2-3%) of the value of the finished product. It is on the level of small and medium firms that the technology barrier prevents modernization. Very frequently, interviews given by this kind of firms contain statements on the agony of how to get new technology, who will organize the transfer, how to use it, how to be informed about innovations in the field of their activity, or how to train or to find skilled personnel. In these cases, modernization is once again ascribed to state or cooperative actions, resolving the problems of infrastructure, labor and relations needed for the production change and the introduction to international markets.

A third set of obstacles starts from the modification of the labor process during modernization. In all cases of automation and information technology application, an important reduction of personnel was realized, as well as the retraining of personnel in new functions. Most affected was the mass of unskilled workers; for them, modernizing was equivalent to unemployment. This is the basis of the syndicate opposition to new technology use, and of their reluctance towards retraining programs. Training inefficiencies appear in following stages as a barrier to high-tech incorporation. By the occasion, it is worth noticing the challenge for the whole educational system to contribute towards the construction of a quite different labor market.

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A radical change towards the production of new use-values through intensive cooperation between industrial firms and research institutions does not exhibit minor difficulties. Empirical research reveals again the main questions of the technopole movement: that of the needed cooperation for the production of innovation, and that of the diffusion of the latter in a wider context.

From questionnaires to University laboratories involved in industrial activities, three types of cooperation gaps were identified. The first one could be qualified as "lack of tradition"; this means that the existing network of relations between research and production is very underdeveloped. Whenever it exists, it has very narrow sectoral specification, mainly to sector mechanical eng, and it concerns the adaptation of a technology, rather than the production of a new one. So, many laboratories are not familiarized with the logic of production, and on the other hand industries are not informed about the abilities of some advanced research institutions. As the usual sources of production technology are royalties and joint-ventures, industries prefer to use ready systems from developing their own. The second cooperation gap could be qualified as "lack of infrastructure"; this means that the equipment of laboratories are not sufficient to support advanced applied research. A result of limited state finance, this reduces significantly the possibility of executing important research projects; and this leads finances to a short of vicious cycle. The third one concerns "mutual understanding"; it is stated that research and production have not the same objectives; that communication between researchers and managers is not easy, mainly because of the reduced technical background of the latter; that there is not a wide and permanent flow of information about the needs of industries and the potential of research centers. Research institutions hold sometimes a "treasure" of technical knowledge, but the outside people cannot always find easy access to it.

So, it seems that the conditions of the "interior cooperation" (among capital, state and specialized labor) with respect to the requirements of new use-value production are not fulfilled. On the other hand, the conditions of "exterior cooperation" (among science parks, urban environment and local authorities), which secure the diffusion of innovation beyond the limits of

science-parks, and the evolution of a science-industrial complex, are totally absent. The existing context overemphasises the main inabilities of the technopole policy to secure an extended production shift. It is possible to create some cells of science-industry cooperation, on a state or university initiative, but it is quite improbable that these centers will lead to a quantitatively important change towards high-tech production.

4. Options and conflicts

However, this form of approach to modernization and the language which was used are rather formal and we must try to understand the very real meaning of the identified obstacles; the nature and the social background of the problems which are expressed as difficulties to modernization of firms and branches. So, we wish to underline three points only, which permit to constitute a reference framework for industrial modernization.

Industrial modernization versus global transformation

Firstly, we shall return to our initial statement that industrial restructuring goes beyond the frontiers of industry. If we take the example of laboratories which attribute the underdevelopment of applied industrial research to the lack of equipment, then the question of state expenses and their options immediately appears. The same applies to companies which relate directly investment projects and market stability, as the latter are often achieved through state contracts. If we examine another question, that of new use-value production generalization and diffusion, we face another aspect of the restructuring question. It is admitted that science parks function like incubators for new firms which, at following stages of their life-cycle, grow and relocate their routine production processes out of the parks. So, an articulation is developed between innovation inside the park and mass-production in its surrounding area. A park's efficiency, in last analysis, depends on the functioning of this articulation to the surrounding urban environment, which permits the growth and expansion of the science-based industry. The same applies to the extended restructuring, where industrial change is linked to urban changes, and in particular to urban labor markets.

By these examples we wish to introduce our conviction, that industrial restructuring deals with three objects: industry, state

and urban system as a production-reproduction system, and on their cooperation the fruitful evolution of the first one is standing.

The dark future of modernization

It seems that modernization is a very "painful" process and various capital respond very differently. Existing large firms and big capital are in a better position to modify the production processes through their own investment projects. For existing small firms and small capital the future is really dark, unless new spatial state strategies contribute to resolve the labor, technology, market and finance problems. But, this is not the only intercapital variation with respect modernization; the latter constitutes for big capital a new expansive strategy as far as many disperse and independent capitalist are pushed out of the market. Sometimes, for small capital modernization has the same meaning as urban innovation for lowest incomes.

The modification of exploitation relations

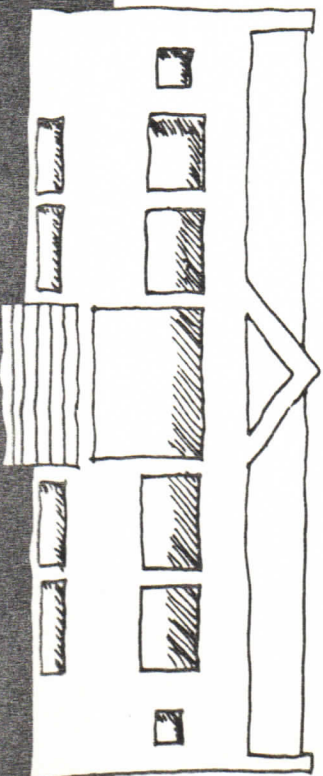
The third point concerns the mutual impact of restructuring and exploitation relations. Many technical obstacles are nothing less than an ideal expression of intercapitalist and interclass fights. Modernization is not always welcomed especially by individuals or institutions whose position in production is challenged. This struggle prevents a rapid extension of modernization processes, and it may explain why technological innovation proceeds mainly on the basis of new firm creation. It permits also to realize why modernization of traditional industries is so painful, and the image of technopole development so romantic. As extended modernization has to confront and to renegotiate exploitation relations in their totality, it seems that the technopole movement provides an easier way to industrial change. But, we must repeat that the latter is not an issue of production, and that it is profoundly linked to class and space transformations. In this sense, recovery prospects have to be placed on a much more wider modification of the urban-industrial system and its political regulation. However, the differentiation of the identified models with respect to exploitation relations permit us to expect a greater expansion of the technopole strategy in the near future.

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