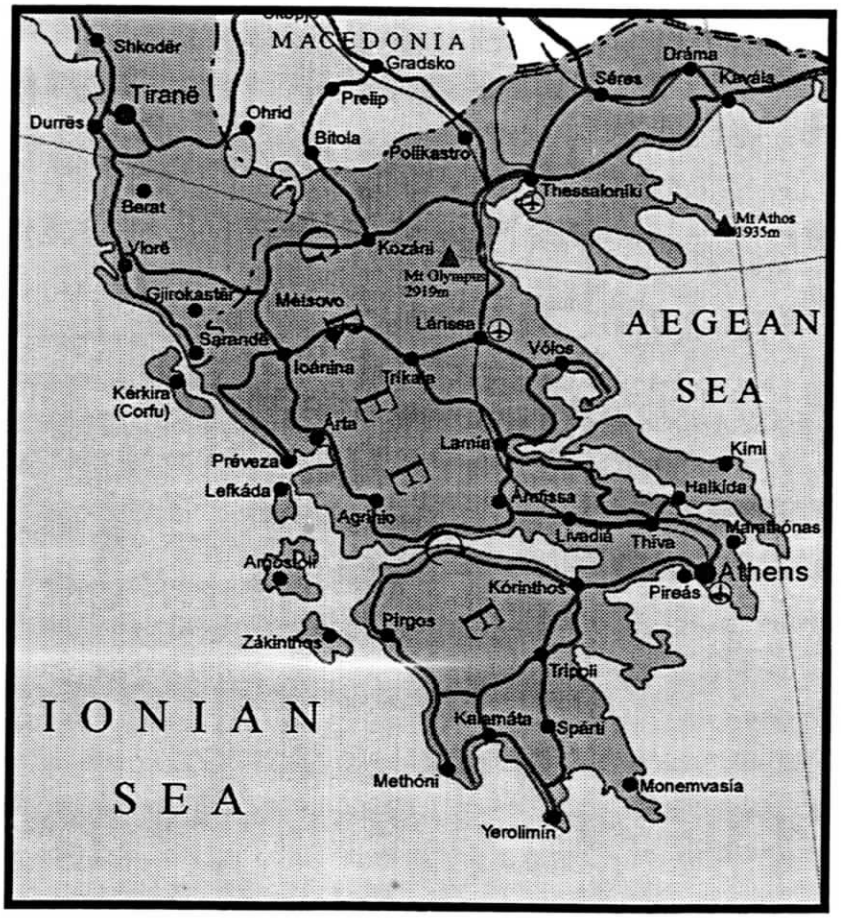
URBAN POLICIES AND ENVIRONMENTAL ISSUES IN AN AGE OF ECONOMIC RESTRUCTURING



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TECHNOPOLES AND SCIENCE PARKS IN EUROPE: FLEXIBLE PRODUCTION, PRODUCTIVE DISINTEGRATION AND R&D.

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The last decade has witnessed the rise of new forms of industrial organisation and the development of new growth spaces. In Europe, examples of these new growth centres include the cities of Cambridge, Milton Keynes and Bracknell which are considered as models of a flexible capitalism in England, the cities of Toulouse, Grenoble, Montpellier and Sophia - Antipolis which constitute main technopoles in France, Turin and the areas of flexible specialisation in Italy, Munich and Baden - Wurtemburg in Germany. The dynamism of these localities lies in two factors: their flexible industrial organisation, and new institutional compromises which resolve the contradictions of new production practices.

Flexible production, disintegration and the R&D problem.

By the mid 1970s major changes in corporate strategies and the organisation of production were under way as a result of the crisis of mass production and the regulation of national welfare states. The term 'flexible production' is sometimes used to characterise the emerging industrial paradigm, but this does not arise spontaneously ,being based rather on the innovativeness of firms and their efforts to introduce types of flexibility into the production process, inter - firm relations and the labour market. An attempt has been made to summarize these strategies in Table 1. This compares the critical issues with which flexible production strategies were concerned with some of the forms they assumed. The Table shows that flexible production strategies can take many forms, and that these forms lead to new modes of organisation. The critical issues listed point to the emergence of a new way of thinking about production and competition. Flexible production strategies, centred on technological learning and product innovation, involve high levels of expenditure on R&D and producer services. This is not simply a once for all need, but increases as product cycles become shorter: whenever a new product is introduced, a new niche market is created or customised goods are produced, a new round of research and
producer services is set in motion. With the emergence of these strategies there have also been significant moves toward greater vertical disintegration and growth of the small firm sector, sustained by three processes:

* First, larger firms pursued multiple structural fragmentation including the introduction of tendering arrangements so that, for example, R&D departments were required to compete for work with outside contractors.

* Second, larger firms engaged in externalisation of activities and contracting out of tertiary activities, leading to a wave of creation of new small firms.

* Third, there was a proliferation of small businesses which proved themselves particularly effective in producing for and operating in market niches.

The consequence of these developments is contradictory; flexible production strategies demand increased R&D and producer service inputs on the one hand, while favouring the rise of small firms on the other. This results in problems for small firms which have difficulty in providing high R&D inputs. This conflict was quickly recognised as a constraint on growth and various solutions were attempted including networking and alliances amongst firms, corporate integration, public support and incubator environments. A new set of relations between the state and the market began

to emerge centred on the development of public environments that enhance the efficiency of individual actors. Science Park policies have been supported throughout Europe, involving links between Universities and the R&D market, and aiming to create environments for technology transfer and the growth of technology based small companies.

Table 1.Flexible production strategies

Critical Issues	Forms of appearance
Level of strategy:the production process	
-Separation of machinery and product -Separation of workplaces and skills -Mulitfunctional tools and labour -Just-in-Time management of stocks	-Global automation and ComputerIntegrated Manufacture -Partial automatization and worker'sinvolvement -Artisan production
Level of strategy:product innovation	
-Innovation versus economies of scale -Quality circles - Total Quality Control -Small series, frequent change ofmodels	-R&D intensive small firms -Deeper integration of R&D andmarketing departments in multi-divisional firms -Strategic alliances of firms -Public R&D and university-industry interface
Level of strategy:inter-firm cooperation	
-Disintegration and market mediated relations -Disintegration and vertical-near integration -Changing flows between firms	-Hierarchial network of large & smallenterprises -Stable producer-supplier relations -Labyrinth of small firms and relationsof thrust
Level of strategy:the labour market	
-Labour market flexibility -Cooperative form of industrial relations	-Advanced fragmentation of the labourmarket -Upgrading of skills -Numerical flexibility -Plant versus sectoral unionisation

Science parks in Europe .

The basic nucleus of the science park is the university or research centre around which are three groups of activities : technology transfer agencies, internal companies including relocations, new start - ups and spin-offs, and external companies which are linked to the park. The character of science parks varies significantly from one part of Europe to another. This situation has to do with the strategy for technology transfer within each country. The UK, Germany, Holland and Greece follow a model of small parks orientated toward new technology based firms, while the parks in France and Spain are larger and have sought, at least in their early years, to attract established companies and multinational R&D departments

Science parks, institutional agreements and technology transfer.

Regardless of their differences, European science parks link university and research centres, technology based enterprises, consultancy and training agencies. Between them, different types of technology transfer take place: from universities to companies, from company to company, and from the park's occupants to the surrounding environment of the park. The technology transfer activities of the parks are sustained by the links with the universities, venture capital funds for new start-ups which in many parks has come increasingly to be organised by the managing authorities of the parks, and partnering between firms. A consequence of this latter tendency has been the development of networks between firms, having the effect of throwing the process of vertical disintegration into reverse.

Evaluation : science parks, R&D and small firms.

Any evaluation of science park policy and projects needs to answer questions concerning the effectiveness of technology transfer, the success of small high tech firms and the contribution of science parks to the technological restructuring of industry. At present, however, there are relatively few such assessments. An investigation of science parks in Belgium, Germany, France, Italy, the Netherlands, Spain and the UK revealed some critical issues.(Komninos et.al. 1990). Many types of environment are covered by the term science park, and a current major tension is that between the role of science parks as technological environments for technology based firms and as high technology industrial areas - the distinction between science parks and industrial zones is not always clear, even for park managers and developers. Not all science parks succeed. They may fail either because the assessment of the local market for the services of the park was misguided or because the conditions for local innovative growth were not appropriate. Two critical factors for the development of science parks are their regional context and their sectoral specialisation. Parks located in fast growing areas perform better than those in old industrial areas, and those specialising in electronics grow faster than those specialised in other industrial sectors. Each park needs to be considered as a single project and output of a specific planning process, its evaluation being based on the initial objectives, the type of park and the regional development context. Evaluation of science parks is at the same time an appraisal of a local strategy for the development of small technology based firms, spin - off support and innovative local growth. Science parks, incubator environments and links with universities may be good solutions to the difficulties of reconciling R&D with small firms, however the critical issue is whether or not they help consolidate the position of small independent R&D intensive firms and therefore whether or not technology transfer processes come to count for more than property and land speculation.

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