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CHANGING GOVERNANCE OF LOCAL ECONOMIES

RESPONSES OF EUROPEAN LOCAL
PRODUCTION SYSTEMS

COLIN CROUCH, PATRICK LE GALÈS,
CARLO TRIGILIA, AND HELMUT VOELZKOW

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Contents

<i>List of Figures</i>	ix
<i>List of Tables</i>	x
<i>Notes on the Contributors</i>	xii
1. Introduction	1
<i>Colin Crouch and Helmut Voelzkow</i>	
Part I. Established Local Production Systems: The Machinery Industries	11
2. The European Machinery Industry Under Pressure	13
<i>Colin Crouch</i>	
3. Collective Goods in the Local Economy: The Packaging Machinery Cluster in Bologna	23
<i>Henry Farrell and Ann-Louise Holten</i>	
4. Refining National Policy: The Machine-Tool Industry in the Local Economy of Stuttgart	46
<i>Ulrich Glassmann</i>	
5. Machine Tooling in the United Kingdom	74
<i>Colin Crouch and Joe O'Maboney</i>	
6. Machine Tools in France: A Century of Failure to Build a Competitive Industry	99
<i>Patrick Le Galès and Nicolas Gaubert</i>	
7. Hybrid Governance and Networked Firms	119
<i>Colin Crouch</i>	
Part II. Trying to Establish Local Production Systems: The Ex-Steel Cities	129
8. The Reconstruction of Declining Local Economies in Europe	131
<i>Helmut Voelzkow</i>	
9. Restructuring Duisburg: A New Local Production System Substitutes an Old Steel Plant	139
<i>Ulrich Glassmann and Helmut Voelzkow</i>	

10. Life after Industrial Decline in St Etienne: Robust SMEs, Deterritorialization, and the Making of a Local Mode of Governance	160
<i>Patrick Le Galès and Olivier Tirmarche</i>	
11. Regeneration in Sheffield: From Council Dominance to Partnership	180
<i>Colin Crouch and Martin Scott Hill</i>	
12. Industrial Decline and Local Development Policies in the Steel Area of Piombino	197
<i>Annalisa Tonarelli</i>	
13. After Steel: Some Minor Emergence of Local Production Systems Based on SMEs	218
<i>Patrick Le Galès</i>	
Part III. New Local Production Systems: High-Tech Sectors	227
14. High-Tech Districts	229
<i>Carlo Trigilia</i>	
15. The Biopharmaceutical Cluster in Oxford	237
<i>Neill Proudfoot</i>	
16. Recombining Governance Modes: The Media Sector in Cologne	261
<i>Arne Baumann and Helmut Voelzkow</i>	
17. Between Cities and Districts: Local Software Systems in Italy	283
<i>Andrea Biagiotti and Luigi Burroni</i>	
18. Grenoble Valley	306
<i>Valeria Aniello</i>	
19. The Governance of High-Tech Districts	321
<i>Carlo Trigilia</i>	
20. Conclusions	331
<i>Patrick Le Galès and Carlo Trigilia</i>	
<i>References</i>	344
<i>Index</i>	364

List of Figures

2.1. Machinery industries' share of total world trade, 1980–1998	16
2.2. Share of the four countries in world trade in machinery, 1980–1998	17
2.3. Trade balances (\$m) in machinery, four countries, 1980–1998	18
2.4. Machinery exports and all exports, 1980–1998, four countries (1980 = 100)	19
3.1. Number of firms specialized in mechanical engineering by size category in Bologna, 1971–1996	26
3.2. Geographical distribution of employment and firms in the packaging machinery industry in Emilia-Romagna by province	28
4.1. Number of machinery firms in the Stuttgart region, 1982–1999	54
4.2. Turnover of machinery firms in the Stuttgart region, 1985–1999	54
4.3. Employees in the machinery industries in the Stuttgart region, 1982–1999	55
9.1. Production of crude steel and crude iron in Germany, Duisburg and Dortmund, (1950–2000) in tons	144
9.2. Employment in city of Duisburg, 1976–1999	145
9.3. Turnover of iron-producing industry in Duisburg, 1977–1997	145
9.4. Employment in logistics in Duisburg, 1990–1998	150
15.1. PRB centres of excellence, UK, 1996	244
17.1. Local systems specializing in software activities (Italy, 1996)	289

List of Tables

3.1.	Mechanical engineering by province in Emilia-Romagna (numbers employed)	25
3.2.	Employment in Province of Bologna, 1996	28
5.1.	Investment in machine tools in % of industry GDP, 1960–1990	76
5.2.	Employment in the machine-tool industry (000)	77
5.3.	Concentrations of small machine-tool production units, 1991 and 1996	80
5.4.	Machine-tool production in the main West Midlands centres, 1991, 1996, and 2000	81
5.5.	Most common institutions used to support machine-tool manufacturing, Birmingham and Coventry area	93
5.6.	Institutions used to support machine-tool activities (detailed analysis, %)	95
6.1.	The French machine-tool industry in the mid 1990s	110
6.2.	Collective competition goods, France, 1970s and 2000	117
9.1.	NRW-EU-Objective-2-Programme 1989–1999: Grants of Public Funds (ERDF, <i>Land</i> , <i>Commune</i>) in million Deutschmark until 31 December 1999	152
9.2.	NRW-EU-Objective-2-Programme Phase IV (1997–1999)	154
10.1.	Main industries in St Etienne/Loire sud, 2001	163
10.2.	Size of firms, St Etienne/Loire sud, 2002	163
11.1.	Employment by sectors, Sheffield, 1991 to 2000	189
12.1.	Number of firms and employees in Piombino, 1951/1961/1971 censuses	198
12.2.	Employment in the major Piombino steel firms, 1981–1991	200
12.3.	Employment by sector, Piombino and Tuscany, 1981–1991	201
12.4.	Unemployment rates, Piombino and Tuscany, 1981 and 1991	202
12.5.	Percentage of retired (male and female) in total population by age, Tuscany, Piombino, and Livorno, 1981–1991	202
12.6.	Dependent workers' income in the Piombino area (000 lire)	202
12.7.	EU, national, and regional policies implemented in Piombino	205

12.8. Projects implemented under Regulation 2081 in Piombino, 1994–1999 (€)	208
12.9. Resider Financial Plan (1994–1997), Piombino (€ thousand)	210
12.10. Entrepreneurial projects granted by law 181/89, Piombino	210
12.11. Outcome of law 181/89 projects (Piombino, 2002)	211
12.12. Territorial Pact projects and investments proposed, granted and not granted, Piombino (investments in €)	214
15.1. DBF biopharmaceutical product pipelines, UK, 2001	241
15.2. Informal links maintained by Oxford DBFs	246
15.3. Rating of LCCGs by Oxford DBFs	256
17.1. Size of firms in computer-related activities, 2000	284
17.2. Added value and employment growth in service activities, Italy, 1992–2000	285
17.3. Export of commercial services related to software (total services = 100)	285
17.4. Percentage of employment in different informatics activities, Italy (1996)	286
17.5. Employment and resident population in local software systems (LSSs), Italy, 1996	288
17.6. Employment in local software systems, Italy, 1996	290
17.7. Local production systems and local software systems, Italy, 1996	290
17.8. Metropolitan local systems and employment in software and total activities, Italy, 1996	291
17.9. Employees by size of unit in the Pisa LSS, 2001	292
17.10. Local productive units by number of employees in the Pisa LSS, 2001	293
18.1. Main industrial sites in the Grenoble metropolitan area, 1998	309
18.2. Employment by sectors in the Grenobloise region, 2002	310
18.3. CCGs, manufacturing procedures, and actors in Grenoble	319
19.1. Public policies and LCCGs in high-tech districts	326
19.2. Intermediary organizations	327
19.3. Models of governance	329
20.1. Local production systems and modes of governance	337

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1 Introduction

COLIN CROUCH AND HELMUT VOELZKOW

In a previous work, the present group of editors gave an account of 'local production systems' in the four largest western European countries (Crouch et al. 2001). We used this term to designate types of economic activity concentrated on geographical localities, usually individual cities or local labour markets (travel to work areas). We were particularly interested in systems of specialized manufacturing, and in those dominated by small- and medium-sized enterprises (SMEs), that is in 'industrial districts'. However, we recognized that these constitute only a subset of local production systems in general. Indeed, the 'company town', dependent on a single giant firm or small number of such firms constitutes the most easily recognizable form of specialized local economy. And by the end of our research we were able to see the role of such large firms in sometimes sustaining networks of SMEs. But our interest was turned towards smaller firms because of the important distinction which needs to be made between mere local economic growth and local economic development (Trigilia 1992*b*).

A high rate of economic growth in an area signifies only that the area is experiencing good income returns on its economic inputs; it says nothing about the spread of autonomous and endogenous entrepreneurial and innovative capacities within the area. For a particular locality a problem with the large-firm model of growth is that key innovative managerial and technical skills may be retained in the headquarters and other key plants of the enterprise, so that if the firm closes its branch in a particular peripheral area it may leave behind little of these skills as a legacy to the local community. There have been major examples of this, in cities dominated by obsolescent large manufacturing corporations, or in unsuccessful attempts to stimulate growth through the establishment of large production plants in an area (the so-called castles in the desert). After such firms go, little is left behind. Where autonomous SMEs develop, however, the theory suggests that they spread a culture of endogenous skills that may survive the departure or collapse of some of them. Fundamental for this project therefore has been the hypothesis that there are viable alternative forms of manufacturing in advanced societies beyond the model of large firms and classic cases of vertical integration.

In order to develop and prosper, firms need to use all sorts of goods and services that are provided in different ways, from knowledge about foreign

markets to specialized skills. A central problem for small or even medium-sized firms in an advanced economy is that, whereas large corporations can provide many of these goods in-house for themselves, smaller firms must buy them on the market, where transaction costs are likely to make them more expensive than in the large-firm case. They often lack the specific resources that would enable them to cash in on their potential advantages within the competitive marketplace—flexibility, creativity, the high motivation of both management and workers, links with innovative firms and markets, etc.—and can be pushed out by large firms. They may lack, for example, specialized know-how regarding the introduction of new technologies; or they may need information regarding current developments on sales or procurement markets; or they may be too small to afford the costs of setting up a differentiated marketing system. Many SMEs solve these problems by clustering geographically, and finding means whereby these facilitative goods and services can be made available on a more or less non-market basis within the locality. We call these *local collective competition goods*. Within such a network, internal cooperation secures firms' external competitiveness.

Networked forms of production make firms more dependent on the local environment in which they are located. Therefore, local contexts became important as providers of rich external economies. In particular one can distinguish between two basic kinds of such economies: intangible and tangible. The former have to do with cognitive and normative resources, such as tacit knowledge, specialized languages and conventions, and trust. The second include infrastructure and services.

Provision of such goods on a more or less non-competitive basis among firms otherwise engaged in product competition will rarely be maintained by chance and happenstance. If they are provided without cost, who has an incentive to supply them and to maintain their quality? And who can control access to them, so that the beneficiaries remain the intended ones? It is at this point that our analysis finds an important use for the idea of 'governance', understood to mean 'the entirety of institutions which coordinate or regulate action or transaction among (economic) subjects within an (economic) system' (Le Galès and Voelzkow 2001: 6). To take our analysis of local production systems further, we therefore drew on the so-called governance approach. 'Governance' refers to the entirety of institutions which coordinate or regulate action or transaction among (economic) subjects within an (economic) system (Streeck and Schmitter 1985; Hollingsworth, Schmitter, and Streeck 1994a; Hollingsworth and Boyer 1997a). The concept was originally developed for application within comparative social research because it considers a wider range of forms of regulation than the familiar dualism of the state and the market. It is also more varied than the transaction-cost theory of Williamson (1985), which typically positions economic institutions on a range between markets and (business) hierarchies only. It is especially

well suited for making the specific qualities of the structure and development of modern societies recognizable in their respective national economies.

The approach can also be used for analysing the internal functioning of local economies. It assumes that every modern society contains specific combinations of modes of regulation. In order to be able to identify such combinations of patterns of social order, research following the governance approach selects from various models of social order (ideal types) which are then recognizable in real contexts in a more or less definite form or in particular combinations. The attempt is then made to find the best fit between the empirical cases and the ideal-typical models of social order, in the knowledge that this requires radical analytical simplifications.

Five ideal-typical models of governance have been identified (Hollingsworth and Boyer 1997*a*: 9): the market, the (business) organization, the state, the community, and the association. Accordingly, a distinction can be made between competition (the market), hierarchy (the business organization), coercion on the basis of a monopoly of the use of physical violence (the state), solidarity (the community) and negotiation (the association). Decisive for distinguishing among the models is the motivation that pushes actors to take up relations with other actors.

The hypothesis that local collective goods and the modes of local governance of the economies are the key to explain the successes of local economies is not a new one. It is the lowest common denominator of the literature of recent decades, the search for what Doeringer Terkala and Topakian (1987) have called the 'invisible factors of economic development'. In the following we use just some of this literature to stress the questions of local competition collective goods and governance of local economies.

By no means all collective competition goods of this kind are local: national governments and other institutions may well provide them across their territories as part of their actions to guarantee the competitiveness of the national economy. In fact, some of the collective goods we identified in our study, particularly in Germany, were nationally produced, though locally delivered. Some policies of the European Union (e.g. rules for product standardization) are designed to provide competitive advantages for all firms in a given sector across the whole of western Europe. Such phenomena are relevant to our approach if means exist for 'capturing' them to the advantage of firms and other institutions in specific localities, and excluding access to them by outsiders.

The Underlying Dynamics of Governance Mechanisms

We therefore hypothesized that, wherever a distinct local production system could be observed, it would be possible to identify the collective competition goods that were sustaining it, and the governance mechanisms which in turn held these in place.

We tried also to submit the idea of governance institutions and in particular of variation among forms of governance, to more abstract analysis, by reducing them to three main variables, each of which offered contrasting approaches. These were endogeneity versus exogeneity (relating to where the rules of governance were made), procedure versus substance (indicating their type of content), and informality versus formality (their means of implementation) (Crouch and Trigilia 2001: 224). An ideal typical district based on a network of SMEs would be endogenous to the locality, would involve substantive rather than procedural forms of cooperation (e.g. over actual production or training), and would include high levels of informal exchanges not requiring embodiment into formal contracts. Other forms of governance would diverge from this model in a variety of ways, not necessarily contrasting on all dimensions.

The main aim of our study was to delineate national patterns of local production system, and in particular those involving SMEs, in France, Germany, Italy, and the United Kingdom. In developing both our arguments and our evidence we were able to draw on a rich line of existing work, though no previous authors had tried to designate national systems, the focus of most work being on case studies. We were also able to challenge some findings of these earlier studies. Some literature tended to romanticize Italian industrial districts, exaggerating the degree of unselfish cooperation to be found among their firms (Putnam 1993). There has also been a tendency to misinterpret institutions in Baden-Württemberg, seeing them as both distinctive within Germany, and as similar to those in Italian districts (Herrigel 1987, 1996a).

On the other hand, several observers during the 1990s had pointed to the limitations, and thus predicted the demise, of highly embedded systems of the industrial district kind (Grabher 1993a; Kern and Sabel 1994; Herrigel 1996b). While embeddedness in wider social relations was a key strength of firms in districts, enabling them to call on the resources of a wider community in ways which did not incur production costs, costs of a different kind were incurred: embeddedness would prevent or make more difficult a search for ideas and resources for innovation and change that could not be provided from within the community. In particular, firms in industrial districts might remain trapped in declining sectors because none of the resources in which they were embedded could assist them in finding totally new activities. Neoclassical economists could further argue that the benefits of collective goods are always misleading, because such embedded firms will have less incentive to respond to radical change than firms more exposed to market signals. (However, this argument assumes that market-exposed firms are in possession of perfect information concerning the kinds of adaptation that they need to make, though neoclassical theory does not specify how they are to have access to such information. Local production system theory, in contrast, is very much concerned with issues of information access.) Overall,

it might be argued that embeddedness would be useful in a vibrant sector where endogenous resources could be a source of vitality; but a burden in a static or declining one which had exhausted the current stock of endogenous ideas. Other critics argued that local systems of SMEs would lose their advantages as large corporations overcame their earlier incapacity for flexible specialization and restructured themselves internally to resemble a group of SMEs (Harrison 1994*b*).

We found that SMEs and local production systems based on them had been able to ‘fight back’ and avoid the predictions made of their demise, though this often took the form of becoming part of localized supplier hierarchies grouped around one large enterprise—we described this as a change from the ‘network of firms’ to the ‘networked firm’ (Burroni and Trigilia 2001: 60–6). This type of system, signs of which were to be seen in each country, represents a kind of synthesis between the earlier SME district model and the giant firm challenge. While it preserved the identity and some of the autonomy of the smaller firms, it was not without risk of draining localities of their entrepreneurial and other resources. The corporate hierarchy form of governance has clearly become increasingly important, though it often shares place with other forms, in different patterns in the different countries, or sometimes sectors.

This rise of the corporate hierarchy supplier chain needs to be distinguished from the other general prediction usually made during the 1980s and 1990s of the growing importance of the market against other governance forms as part of the general rise of neo-liberalism. Because corporate hierarchy, like the market, is a form of governance that tends to exclude actors other than corporate managers—in particular, governments at all levels and trade unions—there is a tendency in some literature to fail to distinguish between them. This is erroneous. The governance mechanism of the market comprises anonymous, perfectly competitive markets where no firms have a capacity to shape prices and contract relations except through pure competition, within a context of institutions for maintaining the strictness of these rules. Corporate hierarchy becomes important precisely at the point where some large firms are able to escape the severity of the pure market. They become sufficiently large to be price makers and not just price takers; they can shape contracts through the exercise of authority over subordinates rather than through a pure bargain; and they can develop long-term relations with suppliers which may be able to withstand short-term market fluctuations.

Interpreted in the terms of our analysis of governance mechanisms, both the market and the corporate hierarchy are exogenous to particular localities, and here they both contrast with the community regulation of the classic industrial district. But the corporate hierarchy, like community regulation, operates through substantive rather than the purely procedural rules of the market, and is implemented through informal as well as formal means.

The Need for Sectoral Analysis

Not even the rise of supplier hierarchies could count as a master trend; our research revealed considerable complexity and changes in various directions. Our analyses had been conducted at the level of the manufacturing sectors of whole economies, leading us to seek comparison and contrast at the level of the nation state. It was possible to give only small attention to differences among different sectors, either within or regardless of an overall national governance regime. Given the complexity of patterns found, it was clear that further analysis would require more focused attention on detail. While we had gained an important perspective in comparison with the predominantly case-study-oriented approach of most literature on this subject by examining entire national contexts, we now needed to return to the more typical approach, armed with our new insights. This was particularly important in the light of the arguments of some studies, cited above, which suggested that embeddedness might be a strength at certain points in a sector's development but a weakness at others, implying that different situations might appear at different times in different sectors.

The present volume represents the results of this shift of attention. Since the number of identifiable sectors in a modern economy is very large, it was not possible in a single study to consider more than a small selection. We selected our cases, not in order to achieve some representativeness of the economy, but in order to follow the development of the literature on the subject of local production systems, since our concern is still to evaluate contrasting accounts made of the viability of different forms of such systems.

First had come the pessimism following the recession of the early 1990s, the general mood of 'The corporate giants strike back', as the Anglo-American model of giant conglomerates seemed to be able to imitate anything small firms could do, and considerably more. Alternatively, production in a sector was seen as more profitably conducted in lower-cost countries than those of Western Europe. Those SMEs remaining in a sector in the face of these challenges would have to be those trapped by their embeddedness in declining profitability and incapacity to adapt. Such a perspective was strengthened by the apparent decline of the industries and/or geographical areas which originally stimulated the industrial district literature: textiles, clothing, machinery; the districts of central Italy, especially in the towns around Bologna and Modena in Emilia-Romagna; the different but not dissimilar concentrations in the German machinery industry, most prominently around Stuttgart in Baden-Württemberg. Many of these concentrations are seen to have peaked around the end of the 1980s and to have moved into either terminal decline or a major crisis of the prevailing model since the early 1990s (Kern and Sabel 1994; Braczyk and Schienstock 1996; Braczyk, Schienstock, and Steffensen 1996; Cooke and Morgan 1998).

Second, however, and in contrast, even as these districts were thought to be in serious trouble, the idea of local economic specialisms based on SMEs was becoming attractive to policy-makers in the European Commission, and national and local levels of government keen to point out new futures to areas caught in a different kind of decline: the clearly terminal collapse of old, Fordist manufacturing industries based on giant firms. The initial response within most countries (and the Commission itself) during the 1980s to the crisis of over-production in a sector like the steel industry was one of modernization, slimming down, and then up-grading of the industry itself, the so-called 'first reconversion'. By the 1990s it had proved impossible to save mass steel production in Western Europe (and other parts of the advanced industrial world) under new conditions of global competition—at least as a major employer of labour. It was therefore recommended to ex-steel cities that they diversify their economies, and in particular that they try to move away from dependence on a very small number of large firms and stimulate endogenous local entrepreneurship. This often meant trying to adopt the industrial district pattern rather than relying on large-scale external investment. In these cases, existing embeddedness was within the old, large-firm system. Creating new SME clusters would involve trying to generate new, innovative contexts which were not (or not yet) embedded. But how would local political and economic elites embedded in the old system be able to do this?

Finally, stereotypes that industrial districts were essentially limited to traditional, *artigiano* products (clothes, shoes, jewellery, food, specialized machines) were confronted by evidence that, in Europe, the United States, and the Far East alike, several particularly new, high-technology sectors seemed to take a similar form to the industrial district: geographical clustering of large numbers of SMEs, possibly surrounding some larger core enterprises (Swann, Prevezer, and Stout 1998). This was the case for biotechnology, the media industry, computer software, and other aspects of information technology. These would be cases of newly established, vibrant embeddedness that were still far from exhausting the collective competition goods of their local environment.

These diverse experiences of the local production system model suggest that different fates might await it in different types of sector and in different stages in the history of sectors. In other words, the local cluster form will not be able to ensure success if the sector is in decline, but it may be used by successful firms in new, rising sectors. These possibilities can be examined in particular by comparing the machinery and high-tech cases.

The former steel cities raise a different question. Unlike areas in which the machinery industries were concentrated, steel cities were not characterized by SMEs; very much the reverse. At stake here, therefore, is not the capacity of SMEs to 'save the steel sector', but to provide a basis for new ventures in new sectors, and of course not necessarily in manufacturing. This immediately

presents a puzzle. If central to the industrial district model is its endogeneity, can it be introduced by exogenous actors, in particular those as external to a locality as the institutions of the European Union, frequently the main inspirers of such policies? What kinds of new sectors of economic activity emerged from such attempts? And how successful have they been?

Paying attention to these last questions required a certain shift in our methodology. Our main concern in our previous volume, and in the first and third parts of the current one, has been with actual practice among firms and other local actors, though there has inevitably always been some consideration of policy and of policy actors external to the context of the local production system under consideration. An investigation of whether, or to what extent, exogenous policy actors could stimulate local practice requires paying more attention to policy, particularly when that policy has not (yet) resulted in much practical output. Part II of the present book therefore necessarily has a different balance between policy and practice than the rest of our study. This is impelled partly by the particular questions we are asking concerning the former steel-making cities, but it reflects substantive differences; national (and European Union) policy is simply more relevant to the discussion of some sectors than to others, a fact which in itself says something about the character of governance mechanisms.

There is then a final set of questions necessarily raised by our approach. How, by the early twenty-first century, did the local production system model fare in each of these very different contexts? Are there common patterns, among both the different industries and different national situations? Or have firms in the three different cases gone very different ways? We address these issues through twelve case studies—four national examples in each of the three contexts. Comparison is therefore along two axes: between economic sectors and between countries. The latter is not seen as either a consistent or a major source of diversity; there is no a priori expectation that we shall find consonant national patterns across the three sectors. Also, our interest is not concentrated on learning whether this or that ‘national system’ performed better than another, but to gather evidence of the diversity of patterns which may be emerging.

Structure of this Volume

In Part I we focus on those two key cases which dominated the initial, 1980s industrial district literature: Emilia-Romagna and Baden-Württemberg; and on the machinery industry. We compare their experience with sections of the same industry in France (concentrating on certain areas of Rhône-Alpes) and the United Kingdom (the West Midlands). Although empirical concentrations of SMEs making machines can be found in France and the United Kingdom, though mainly the latter, these countries are explicitly regarded by

much of the literature as lacking certain core characteristics of industrial districts. It is therefore important to discover whether the former ‘strong’ districts fared better or worse during and after the 1990s recession than the ‘weak’ ones. If the French and British industries emerged stronger than the German and Italian cases, theories about the inflexibility of embeddedness would be supported. If the opposite occurred, theories about the superior viability of clusters and districts would seem to have continuing viability.

However, in addition to, and even more important than this, cross-national comparisons can provide evidence of changes in patterns of governance as firms and others in all or any of the cases grappled with the problem of survival. The Modena-Bologna district had earlier been typified by endogenously provided, substantive and mainly informal competition goods. That around Stuttgart had also been endogenous and substantive, though the endogeneity was rooted in an external, national chain of institutions; but the German form of provision had been considerably more formal. The machinery industry of the British West Midlands had been less rich in the provision of collective goods, but those that existed were a mix of endogenous and exogenous (as large corporations began to dominate the sector), substantive, and informal except to the extent that they were part of the formal plans of large enterprises. French firms were dependent on exogenous national provision of a procedural and formal kind. Were these diverse patterns shifting in identifiable and/or convergent directions?

Part II holds constant, not sector of SME cluster specialization, but that of pre-crisis, large-firm, Fordist specialization. Whether or not clusters and strong SMEs developed, and if so what forms of governance regulate them, becomes the research question. And, as noted, policy attempts rather than on-going practice become more clearly the focus of our research. We took four cases of previously strong steel-making and steel-dominated cities: Sheffield, Duisburg, S. Etienne, and Piombino. The last is considerably smaller than the others, but it has the advantage of presenting a one-industry Fordist town surrounded by the very different economy of clustered SMEs and industrial districts of Tuscany. In each case the city has been in receipt of EU structural funds support intended to encourage the development of SMEs and a range of specialisms—goals which were supported by various levels of local and national government. What did they do? Can we identify more and less successful approaches? Again, what patterns of governance have been emerging, and what relation do these bear to what we have come to see as those typical of individual countries. Can we identify any elements of endogeneity in the governance and collective goods being developed? Were substantive and/or procedural goods being produced? Through formal and/or informal rules?

Finally, in Part III, we present examples of flourishing new industries where SME clusters are important: the biopharmaceutical industries around Oxford; the media sector in Cologne; information technology at Pisa; and

computer technologies around Grenoble. In Part I we selected on the current industry and evaluated recent success; in Part II we selected on the past, failed industry, and evaluated what people then tried to do. Here we select on known current success, and try to establish to what extent existing theories about clustering and local collective competition goods help explain that success, and also the limits to that success. A particularly interesting question is whether the governance modes used in these sectors resemble or differ strongly from those with which we are familiar from older industries, in terms of endogeneity and exogeneity, substance and procedure, formal and informal rules.

Part I Established Local Production Systems: The Machinery Industries

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2 The European Machinery Industry Under Pressure

COLIN CROUCH

Machinery-producing industries occupied an important place in the literature on local production systems which developed during the 1980s. Innovative final goods industries usually required frequent changes in the tools and machinery they used. Firms in both the machinery industries and their final goods customers would gain if they had access to tacit knowledge and rapid informal communications to improve speed and accuracy of the response of the former to the needs of the latter. There was therefore an observed tendency for firms in machinery industries to be located geographically close to their customers. For examples, firms making machine tools for the motor industry would cluster around motor-manufacturing corporations. While some machinery firms were themselves large, these were also sectors where adaptable, flexible small firms could thrive according to the model of flexible specialization. As a result industrial districts, or at least local clusters, of small- and medium-sized enterprises (SMEs) in associated machinery industries would develop around either large individual customer firms or industrial districts of final goods producers. These machinery districts would in turn either produce or benefit from further local collective competition goods (LCCGs) as a result of their own mutual proximity.

Machinery firms within clusters therefore had a double advantage over similar firms in isolated locations. First, their proximity to the customer industry brought the competition good of ease of knowledge transfer and responsiveness to the customer's changing needs. Second, the cluster of machinery firms produced aggregations of services relevant to their own work.

These industries featured prominently in the two European regions which produced much of the 1980s literature on flexible specialization and local clusters: the area in and around Stuttgart in Baden-Württemberg; and Emilia Romagna, one of the main Italian regions which produced the original concept of industrial districts. Important in the former was the machine-tool industry supplying the motor industry and some other branches of engineering (Herrigel 1989; Maier 1989; Sabel et al. 1989; Cook and Morgan 1990; Semlinger 1993); and among several districts in the second was the packaging machinery industry in and around Bologna and Modena (Brusco 1982, 1992; Piore and Sabel 1984;

Bianchi and Gualteri 1990; Curti 1994; Capecchi 1997; Curti and Grandi 1997). In both cases the sources of LCCGs were identified as the sharing of facilities and expertise rendered possible by relations of high trust, themselves developing from the strength of the embeddedness of the industry concerned within the local community and its institutions. These two sectors were economically successful, and the machinery industries in Germany and Italy in general thrived, certainly in comparison with their equivalents in France and the United Kingdom. These latter two countries were normally considered to lack industrial districts and LCCGs (for the UK see Zeitlin 1995). All this seemed consistent with the 1980s theories of local economies.

Then came the European recession of the 1990s, and hard on its heels a change in the academic analysis of these industries. Most of the German machinery industries went into steep decline, the country's share of global exports in the sector dropping from 22.6 per cent in 1992 to 17.7 per cent in 1993, before recovering a little in 1998 (UN: various years). Academic observers began to speak of a crisis of local production systems, especially in Germany (Cooke and Morgan 1994; Kerst and Steffensen 1995; Braczyk, Schienstock, and Steffensen 1996; Heidenreich 1996; Heidenreich and Kraus 1998). Some authors discovered the disadvantages of local embeddedness, the excessive specialization and local rootedness of German local production systems. Initially this referred more to the heavily locally integrated system of Nord-Rhein Westfalen than to Baden-Württemberg (Grabher 1993*a*), the latter being seen as having retained a capacity for adaptation and innovation outside its core activities (Herrigel 1993); but see Herrigel (1996*b*) for a slightly later and more pessimistic view of the south-western *Land*. At the same time other, or overlapping, groups of observers saw the inevitable advantages of giant global firms over SMEs (Heidenreich 1996), and anticipated the demise of the SME cluster model in Italy and elsewhere (Harrison 1994*b*).

How does the situation look now, at the start of a third decade? What proved more accurate: original assessments of the advantages of SME clusters and flexible specialization, or the later predictions—often by the same authors—of the obsolescence and growing rigidity of the model? Or can one distinguish between forms of local rootedness that produced lock-in, and others which left scope for or even encouraged diversification? And was decline specific to 'locked in' machinery industries? If revisionist theories of the negative consequences of embeddedness and the new advantages of scale were accurate, then the German and especially Italian machinery industries should have fared worse than the French or British ones. Alternatively, embeddedness might have led Stuttgart, Bologna, and Modena to remain trapped, though flourishing, within a dying industry, while less rooted environments made possible escape from machinery into new activities. According to this possibility, small-firm machinery sectors might be expected to decline more comprehensively in the relevant regions of Britain and

France than in Baden-Württemberg or Emilia-Romagna, but would be replaced by employment in more dynamic sectors.

This gives us an initial concern with cross-country comparisons, as our chosen countries seem to give us two previous cases of strong machinery industries within strong local production systems, and two cases of weak industries within weak local systems.

In looking at the cases in this way, we must first bear in mind that in previous work (Crouch et al. 2001) we have challenged some of the findings of the initial flexible specialization literature as it related to Germany. We did not find either that Baden-Württemberg constituted such a distinctive economy within the overall German context, nor, more significantly, that German LCCGs depended for their production on inter-firm networks, whether of the informal kind hypothesized for Italy or of the more formal associational kind usually seen as effective in Germany itself (Glassmann and Voelzkow 2001). German production clusters seemed to depend more on access to specialized, publicly provided facilities than on any sharing and trust among producers. And the firms taking advantage of such facilities were not necessarily small, though they often took the form of large customer firms and circles of suppliers, many of the latter being SMEs. Our findings for large parts of Italy did not contradict the early literature so strongly, provided this accepted the role of local political and governmental institutions in the provision of LCCGs—and also the growing role of large customer firms—and not just inter-SME relations (Burrioni and Trigilia 2001).

Our study of the United Kingdom was also consistent with the existing emphasis of the literature: ‘Why are there no industrial districts in Britain?’ (Zeitlin 1995), though there were strong indications of at least empirical clustering in some sectors in that country, including both traditional and high-tech goods, as well as the machinery industries of the West Midlands (Crouch and Farrell 2001). France, again following the expectations of the literature, was also a weak case for small-firm clusters, but (as the literature would lead us to expect) for partly different reasons than in the United Kingdom (Aniello and Le Galès 2001). In the former country economic governance was provided by a certain mix of state and market institutions; in France it was the state. Whereas the machinery industries had once been strong in the United Kingdom, they had always been weak in France; never included among the state's strategic sectors, they were left to develop according to the market. Meanwhile, in both France and the United Kingdom the exceptional status of the national capital cities seemed to have negative consequences for the maintenance of dynamic SME sectors in other parts of the country.

But we are not solely interested in inter-country comparisons. In fact, the knowledge gained from these comparisons is mainly important for what it can tell us about a more general question. As the machinery industries tried to come to terms with the crises of the early 1990s, did they do this by

enhancing or by dumping local production systems? Was an emergence of large firms necessary to save the sector, or did SMEs provide a better degree of flexibility? Could the sector be saved at all within these economies, or was the only viable solution an exit into other activities? And, finally, can we identify a specifically European approach to the resolution of these problems, or did nation-state differences remain paramount? The four case studies which follow try to address these questions.

Machinery Industries in the 1990s

The machinery sector is concentrated in two two-digit categories of the International Standard Industrial Classification: 72, Machinery for Special Industries; and 73, Metalworking Machinery. Machine tools, a sub-sector of particular interest in the literature on flexible specialization, are found within sub-categories of each of these: 7281: Machine Tools for Special Industries; and 736: Metalworking Machine-Tools. This latter comprises the bulk of category 73 and the majority of machine-tools production.

As can be seen from Fig. 2.1, worldwide category 72 suffered a 12 per cent decline as a proportion of total world trade during the 1990s, falling steadily from 3.3 to 2.9 per cent. It should not however be seen as a secularly declining industry, as in 1980 it had also represented only 3.0 per cent of total world trade. The much smaller category 73 remained constant at around 0.7 per cent throughout the period. The share of global production taken by our four countries together in category 72 dropped gradually from 45.7 per cent in 1980 to 38.9 per cent in 1997, before picking up in 1998. The fall in the smaller metalworking machinery sector (73) was steeper, from 50.1 per cent in 1980 to 34.1 per cent in 1997, again picking up slightly in 1998. Since these two

Figure 2.1. Machinery industries' share of total world trade, 1980–1998

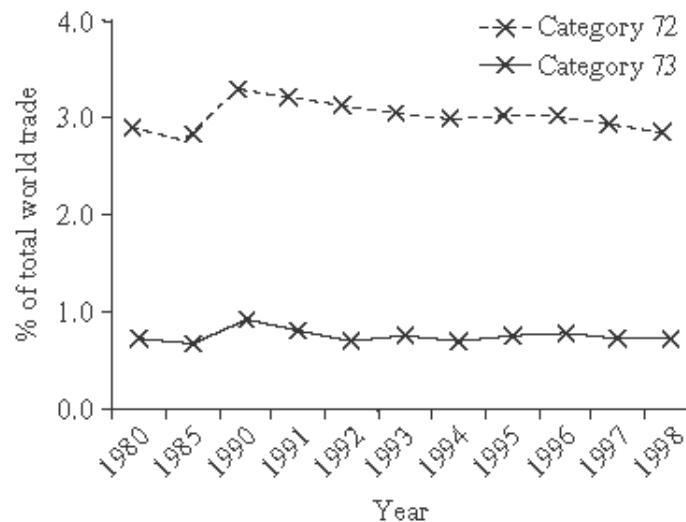
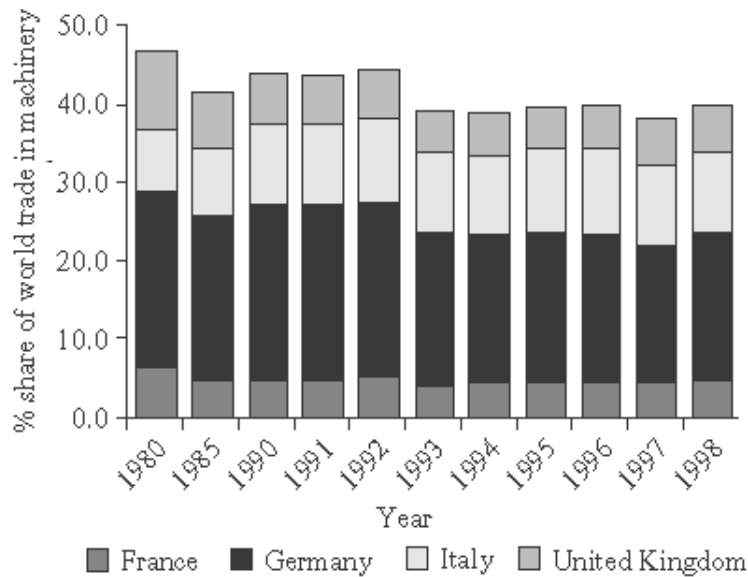


Figure 2.2. Shares of the four countries in world trade in machinery, 1980–1998

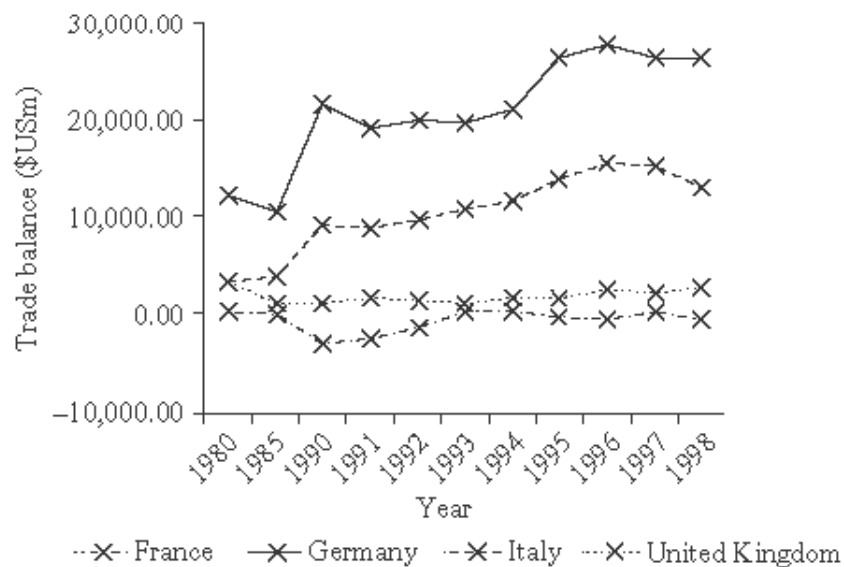


decades saw the arrival of a number of new major producing countries and the general process of economic globalization, it might be considered that the main western European producers had successfully maintained their presence in these sectors. However, distribution among the countries is very uneven. Germany normally takes up almost half the share of the four countries in the two industries combined, and Italy a further quarter, leaving the United Kingdom with between 12 and 14 per cent, and France with between 10 and 12 per cent (Fig. 2.2).

Shares of world trade provide a useful indicator for assessing the strength of an industry within a country. An important argument of authors critical of local production systems is that these bind together the industries of a region in a way that eventually becomes uncompetitive, because they have no incentive to respond to exogenous change. For example, Grabher (1993a) attributes the decline of the industries of the Ruhr to the virtually perfect interdependence of supplier and customer industries and the economic policies of the *Land* government of Nord-Rhein Westfalen. While the final producers in the Ruhr system sold their products on world markets, it would seem to follow from Grabher's argument that supplier firms were tied overwhelmingly to their local customers and did not participate in export activity themselves. Industries with high rates of export participation should escape this trap.

In addition to Fig. 2.2, showing trends in export performance, Fig. 2.3 shows trends in our countries' trade balances in these industries. Italian firms had an impressive performance, defying the overall trend for European producers to take a declining share of world trade in machinery, maintaining and even strengthening their international position, until a decline in the final year of the series. Rising from 8 per cent of world trade at the start of the

Figure 2.3. Trade balances (\$m) in machinery, four countries, 1980–1998



1980s, during the 1990s Italy's share ranged between 10.2 and 10.5 per cent. The country also sustained constant very positive trade balances in both industries.

Interpretation of German data between the 1980s and 1990s is made difficult by unification of the eastern and western republics in 1991, and the absence of reliable data on East Germany before that time. We have little alternative but to assume that the eastern *Länder* made a zero contribution to exports during the 1980s, but to do this probably exaggerates 1990s performance in relation to that of the 1980s for all Germany. However, even this shows some decline in German performance after 1994. But it is a decline from a very strong position, the country still accounting for over a fifth of world trade in both industries. Both also continue to sustain very positive trade balances.

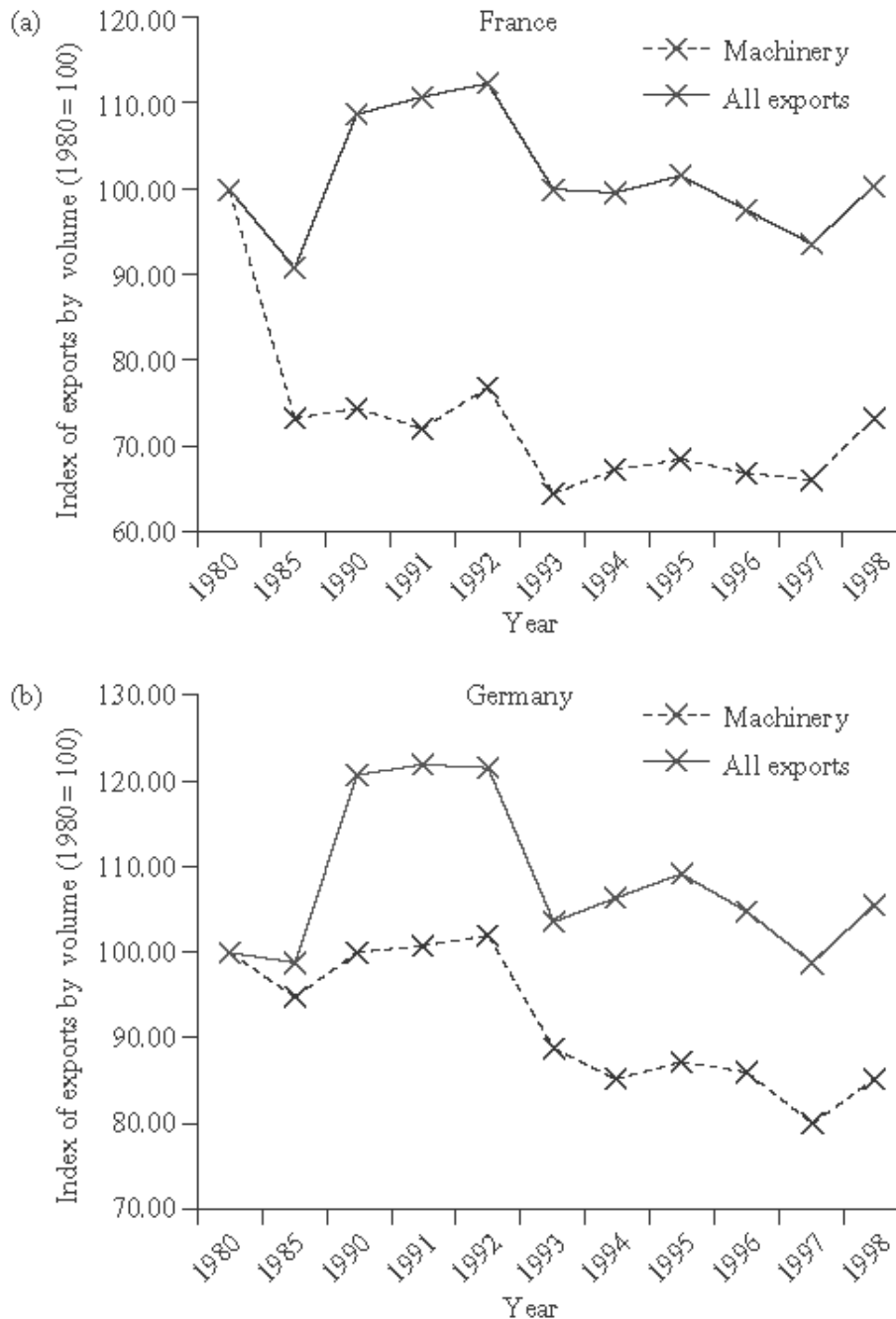
The British machinery industries were in gradual decline from an already small share of world trade throughout the 1980s and until 1993, when they reached about half of their 1980 level. Since then they have staged a small recovery. The country has maintained a surplus in the special machinery sector, though this had become weak by the mid-1980s. Metalworking machinery moved into deficit by the mid-1980s, worked itself back into a small surplus by 1993, but has since slightly declined again.

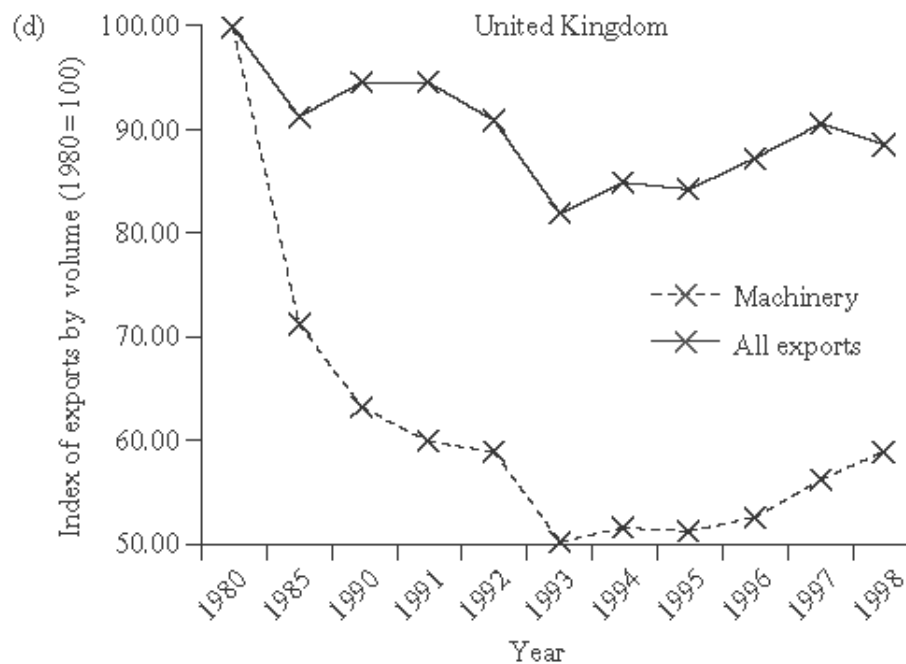
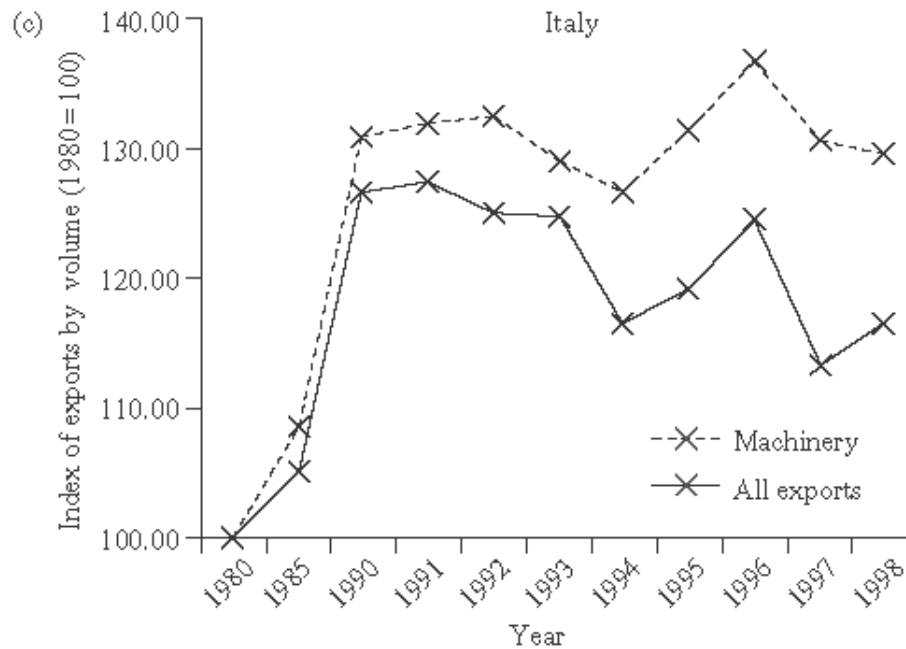
The French industry, which had a slightly smaller international prominence than the British up to the 1980s, went into considerable decline in the first part of that decade, and continued to move downwards until 1993, since when it has moved back to the 1985 level. The special machinery industry moved into deficit at the start of the 1990s, but has since hovered around balance. Metalworking machinery has however continued to be a deficit sector.

These overall national records are consistent with the hypothesis that local production systems bring competitive advantages, and are not consistent with that which would expect lock-in effects of such systems to weaken international performance. The Italian and German industries performed well; the least locally embedded case, the French one, had the worst performance.

It is important to bear in mind the major exogenous shocks which affected the four countries asymmetrically during the 1990s. Germany experienced a major blow to its competitiveness when the Deutsche Mark rose in value as a hedge currency following the collapse of the European Monetary System in

Figure 2.4. Machinery exports and all exports, 1980–1998, four countries, 1980 = 100





1992; an initial boost to, and then a major drag on, performance following first the euphoria of unification and then its costs. In common with France and Italy it then underwent the constraints of preparation for entry into the Single European Currency until January 1999, which had serious deflationary consequences for all sectors. Since then all three countries enjoyed gains in competitiveness consequent on the low international exchange value of the euro in its early career. Italy had an opposite experience to Germany following collapse of the ERM, achieving a competitive boost from devaluation after it was forced to leave the mechanism; it obviously did not have the

German unification experience; but it then had a similar record to Germany in preparation for and subsequent movement of the single currency. France's experience was similar to that of Italy, but without a competitive gain following the ERM collapse. The United Kingdom shared this last with Italy, but then went a different way from the other economies as the country did not join the single currency. It was therefore not vulnerable to the recessionary policies of achieving the membership criteria, but by 1998 was beginning to suffer from the high level of sterling in the foreign exchanges.

It is difficult to disentangle anything specific relating to the machinery industries from these major macroeconomic disturbances. One way to approach the question is to examine how these industries fared in a particular country compared with the country's overall trade performance. The thesis that local production systems are advantageous for machinery industries leads us to predict that these industries will perform better than the national average in Italy and, to a lesser extent, in Germany. French machinery industries should perform least well in relation to overall national performance. Figure 2.4 shows changes in the export performance of the machinery industries and of all industries since 1980. Italy was the only country where the machinery sector out-performed the whole economy, with an increasing gap. Of the other three cases the German machinery industries under-performed less than in France and the United Kingdom. However, the worst relative performer was the United Kingdom rather than France. Overall the evidence is consistent with the thesis of the *advantages* of local production systems. Germany and Italy remain considerably stronger relative performers to France and the United Kingdom in the 'embedded' machinery and machine-tools industries, with Italian experience out-ranking that of Germany.

The Case Studies

To learn more we need to shift to a micro-level analysis, where we can consider directly processes of adjustment and adaptation, and the role of LCCGs within them. To study these it is more useful to consider cases in detail, not necessarily relating them to cross-national comparison. For example, assume that we learn that British machinery firms make use of associations when they need technical advice. This can be used to adjust stereotypes of collective goods provision in the British case. But it can also contribute to knowledge of the kinds of resources firms use to make adjustments which, if put together with similar recourse to associations in other countries, will suggest a significance of associations regardless of cross-national comparisons. Our case studies are therefore presented, not so much as international comparisons, but as four examples of adjustment to crisis within a sector where it is known that in the past LCCGs have been important in the maintenance of clusters of dynamic SMEs.

Three of our cases concern the machine-tool industry. One is located in the area around Stuttgart in Baden-Württemberg which has featured in much of the literature about embeddedness. Both the industry and the region experienced both the heights of German economic success during the late 1980s and early 1990s, and much of the subsequent crisis and decline.

The machine-tool industry in and around Birmingham and Coventry in the English West Midlands is also a historically important area for the sector, and experienced a major boom in the 1950s and 1960s alongside the growth of the motor industry. The sector is certainly highly concentrated geographically. From the outset therefore it does not fit the stereotype of the British economy as lacking in clusters. The question then arises of what, in this case, maintained the cluster? What is its internal governance structure? What are its LCCGs? And what role do these play in the story of the industry's decline and subsequent partial recovery?

The French machine-tool industry shows far fewer signs of clustering than the other cases. It is dominated by large firms, and the sector, never strong, is the smallest of the four countries under consideration. This chapter necessarily operates at more of a national level than the others. What collective goods are available to firms in such a case? Does centralized state provision substitute for more local sources of collective competition goods? Given what we now know of the German system, the comparison between these two countries becomes one of the locus of delivery of state-provided resources.

Italy is a strong performer in machine tools, though not as impressively as in various kinds of machinery for special industries. The Italian machine-tool industry is concentrated in Lombardy, which earlier writing on local production systems had tended to ignore. The Italian north-west was stereotyped as Fordist, and it is only in recent years that researchers became aware that this was not the full story (Burroni and Trigilia 2001). The paradigm case of the early literature, paralleling Baden-Württemberg, was always Emilia-Romagna. This lacks a machine-tool industry of any importance, but does have important examples of clusters in other kinds of machinery for special industries. Since our starting point is this region rather than a particular sub-sector, we therefore take an example of one of these: the packaging machinery industry around Modena and Bologna. This inhibits very detailed comparisons with the other cases, but cross-national comparison it is not the main aim here. All these industries suffered shocks in the course of the 1990s. To the extent that they either managed these shocks or succumbed to them, was the presence or absence of local production systems helpful, irrelevant, or harmful to the outcome? And in what ways, if any, did local systems for the delivery of LCCGs change in the process?

3 Collective Goods in the Local Economy: The Packaging Machinery Cluster in Bologna

HENRY FARRELL AND ANN-LOUISE HOLTEN

The debate about the industrial districts of central and north-eastern Italy has evolved over the last twenty-five years. Initially, many saw them as evidence that small firms could prosper contrary to the arguments of the proponents of big industry. Debate focused on whether small-firm industrial districts had a genuine independent existence, or were the contingent result of large firms' outsourcing strategies (Bagnasco 1977, 1978; Brusco 1990). This spurred discussion about the role of local and regional government and political parties—small firm success might need services from government, associations, or local networks (Brusco 1982; Trigilia 1986). The difficulties that many industrial districts experienced in the late 1980s and early 1990s, together with the greater flexibility of large firms, led to a second wave of research, which asked whether industrial districts had long-term prospects (Trigilia 1992; Cooke and Morgan 1994; Harrison 1994*a*; Bellandi 1996). The most recent literature examines the responses of industrial districts to these challenges; it is clear that many industrial districts have adapted successfully to changing market conditions, but only to the extent that they have changed their modes of internal organization, and their relationship with the outside world (Belliandi 1996; Dei Ottati 1996*a, b*; Amin 1998; Burroni and Trigilia 2001).

While these debates have generated important findings, much basic conceptual work remains unfinished. There is still no real consensus about what forces drive evolution in industrial districts and lead to their success or failure. Some scholars focus on the role of local government and associations in providing 'real services' to small firms in industrial districts (Brusco 1992), whereas others focus more on cooperation or collaboration between the firms themselves (Piore and Sabel 1984). The literature is split between those who are more interested in policy, and those who are concerned with small firm interaction. While some authors seek to examine both, they have had difficulty in creating a single analytical framework. Further, the division between the two has been intellectually unhelpful in discussions of the regional economy of Emilia-Romagna.

In this chapter we argue that the source of the success and failure of industrial districts is local collective competition goods (LCCGs) (Crouch et al. 2001). The collective competition good perspective allows us to focus more directly on the factors underlying firm success; small firms are unlikely to succeed on international markets if they do not have access to outside resources. By employing this perspective, we can understand how both cooperation between firms themselves, and government assistance, may be important to districts. More pertinently, we may characterize districts with reference to the varieties of governance through which these goods are provided, and the different institutional forms associated with these forms of governance. Finally, and perhaps most importantly, we can better understand the *dynamics* of industrial districts. As authors such as Becattini have usefully emphasized, industrial districts are works in progress—they have succeeded exactly insofar as they have been able to change appropriately in response to new challenges. These responses are largely dictated by the particular mix of governance modes found in a given industrial district. But, as Le Galès and Voelzkow (2001) have observed, governance in a specific situation is not simply a functional response to collective needs; it may be the result of political struggles between actors with differing objectives and interests (Knight 1992; Locke 1995). Thus, even though LCCGs are vital to the success of local economies, their provision may be shaped by particular interest as well as collective need. The individual and collective interests of actors, and power relations between them, may change over time; and these changes will themselves lead to shifts in the mix of modes of governance, which in turn will affect the amounts, and sorts, of LCCGs which are produced; and thus, finally, lead towards economic success or failure.

In order to substantiate this case, we analyse the recent evolution of one well-known industrial district, the packaging machinery cluster in Bologna, in Emilia-Romagna. Our analysis seeks to address changes in the ‘Emilian model’ as a whole, using this district as a test-case. By employing the collective competition good perspective, we can analyse changes in regional state policy, in associations, in relations between firms, and in how these interact. The evolution of this industrial district has been driven by both the emergence of new challenges in the packaging machine sector, some of which require a collective response, and shifts in both the interests of actors, and the power of actors to achieve those interests.

The Packaging Machinery Cluster in Bologna

Bologna is the capital city of Emilia-Romagna, which has a strong and variegated mechanical engineering tradition (Bianchi and Gualtieri 1990). It is concentrated in the ‘core’ provinces of the region: Bologna, Modena, Parma, and Reggio-Emilia, with a small centre for machine-tool production

in Piacenza, linked to the large industrial firms of northern Italy (Table 3.1). Mechanical engineering in Emilia-Romagna contains a wide variety of local specializations. Thus, food processing in Parma has an associated cluster of producers of food processing machines, whereas the celebrated tile industry of Sassuolo has grown in association with specialized makers of ceramics processing machines and kilns. Machine production is often dependent on local clusters of production in other sectors. However, some machine producers find most of their customers on national and international markets. Some clusters are moving from the one situation to the other. For example, producers in Sassuolo are now selling their machines internationally, to the dismay of local tile manufacturers, who perceive themselves as guinea pigs for the development of technologies which will ultimately aid competitors. Other clusters of machine manufacturers have always had an international presence, including packaging machinery in Bologna.

This cluster of production, sometimes erroneously described as a machine-tool cluster, has its proximate roots in the development of the packaging industry after Second World War, previous to which there were only two firms producing packaging machinery in the province, Acma and Sasib (later joined by GD). These three were to serve as 'mother firms' after the war, as technicians working in the firms started up their own companies. Acma alone gave birth to ten important new companies which were to play an important role in the cluster. This proliferation depended on two factors. First, burgeoning cross-sectoral demand for packaging machines meant that there was a wide variety of market niches, and room for many producers; technicians could strike out on their own without succumbing to competition from their parent firm or other firms. Second, despite this variety, the mechanical skills needed to produce packaging machines for one market segment usually transferred with relative ease to another.

Table 3.1. Mechanical engineering by province in Emilia-Romagna (numbers employed)

Province	All machinery	Special machinery
Piacenza	5,634	1,366
Parma	9,221	5,323
Reggio-Emilia	16,963	2,609
Modena	24,643	4,533
Bologna	27,372	12,340
Ferrara	5,910	1,110
Ravenna	3,696	1,323
Forli-Cesena	3,240	927
Rimini	3,349	2,237

Source: Based on 1996 Industrial Census Data, ISTAT.

The industry grew both in number of firms and number of employees during the 1950s and 1960s, despite occasional industrial unrest. However, the *autunno caldo*, the period of industrial and political unrest, which spanned the end of the 1960s, had important consequences for the structure of the cluster. Trade unions gained victories which impacted on both the internal and external organizational structures of large firms in particular. The result was a radical shift in the form of production. As can be seen in Fig. 3.1, there was an explosion in the number of very small firms working in specialized mechanical engineering in Bologna between 1971 and 1981. During the same period, employment among such firms nearly tripled, growing from 672 to 1,863. The number of one-person firms grew over tenfold, from 10 to 105. The same time-period saw only moderate increases in the number of medium-sized and larger firms.

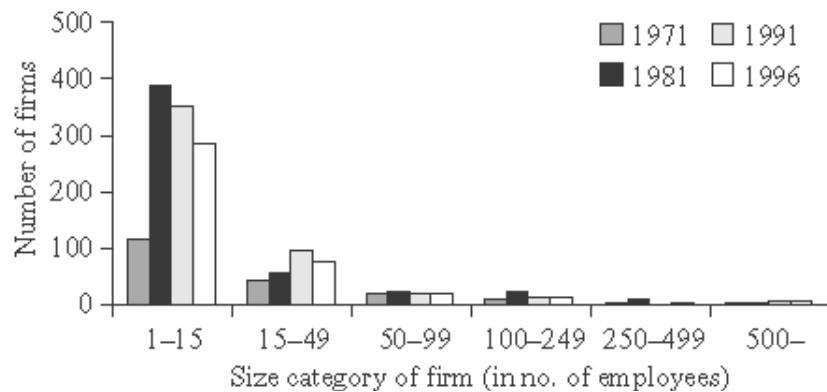
This enormous expansion was almost certainly a reaction to changes in labour arrangements. As one small-firm association representative put it: ‘When certain factors lead to problems for the firms... —the choice was above all to ‘terialize’—i.e. to put work outside the firm—to put out production, planning, offices, in order to optimize costs.’

More rigid conditions within medium sized and larger firms encouraged them to subcontract work, wherever possible, to small subcontractors. These latter were better able to avoid regulation and trade unions. Thus, firms were encouraged radically to decentralize production, and to respond to burgeoning demand by putting work out, rather than hiring new workers. Small artisanal firms sprang up, often specializing in one or a few phases of the production process. Designs were sent out to these firms which then created pieces to specification, and either returned them to the buyer firm, or sent them on to other subcontractors for final processing. The buyer firm usually retained control of the strategic phase of assembling the final product.

This system of production, as in other Italian industrial districts, helped packaging machine producers to become highly successful on international

Figure 3.1. Number of firms specialized in mechanical engineering by size category in Bologna, 1971–1996

Source: Based on ISTAT's Industrial Census Data 1971, 1981, 1991, 1996.



markets. The period in which firms shifted to decentralized production saw substantial growth in employment in specialized mechanical engineering in Bologna, from 8,296 in 1971, to 12,451 in 1981 (Istat Industrial Census Data). Afterwards, employment in the sector seems to have gone into very slight decline, falling to 11,573 in 1991, and 11,354 in 1996, broadly congruent with an overall decline in manufacturing employment in the region.

Meanwhile, the industry saw nearly continuous growth in turnover during the 1990s. The serious crisis that hit German machine producers between 1991 and 1993 seems to have had no equivalent in Emilia-Romagna; although machine producers in the region saw some fall in turnover in late 1991 and 1992, the devaluation of the lira within the European Monetary System (EMS) in September 1992 appears to have boosted sales in this heavily export-oriented industry. The following years saw continued growth in turnover, reaching a peak of 20.3 per cent between 1994 and 1995. More recently, however, the sector has had some difficulties as a result of the more general turbulence on export markets in 1998 and 1999. In particular, firms producing tobacco machinery have had problems, due to a substantial drop in demand from traditional customers (large cigarette producers), together with a nearly total drying up in demand in new export markets such as Indonesia and China during the Asian financial crisis. While some firms and local economic actors believe that these changes might herald future difficulties, the general consensus appears to be that the problems were conjunctural rather than structural. Furthermore, the continued prosperity of the packaging machine industry in the recent past suggests that its competitiveness on export markets was not fundamentally dependent on successive devaluations of the lira—which in any case has now disappeared within the single European currency.

Today, the packaging machine cluster appears to enjoy a position of relative stability. Emilian producers dominate the Italian industry, providing almost 70 per cent of total employment in the sector (see Fig. 3.2). In 1995, the national industry's sales were 2.5 billion dollars, of which 1.97 billion dollars came from exports. Within Emilia-Romagna, the province of Bologna predominates in terms of both the number of companies (61 per cent of the total number in the region) and number of employees; some (69 per cent of total regional employment in the industry).

The packaging machine cluster of Bologna is not an industrial district according to the statistical definitions used by many authors (Sforzi 1996; Burroni and Trigilia 2001); it accounts for only a relatively small share of total employment in the province. The province of Bologna has roughly 900,000 inhabitants; like many areas of Northern Italy it has suffered from demographic decline over recent years. It has a strong manufacturing sector, which accounts for nearly 38 per cent of total employment, within which the machine industry, not including basic 'metal bashing', accounts for 22 per cent, including 'other specialized machines', which accounts for 10.3 per cent

Figure 3.2. Geographical distribution of employment (left) and firms (right) in the packaging machine industry in Emilia-Romagna by province

Source: Curti and Grandi (1997)/ISTAT's 1991 Industrial Census.

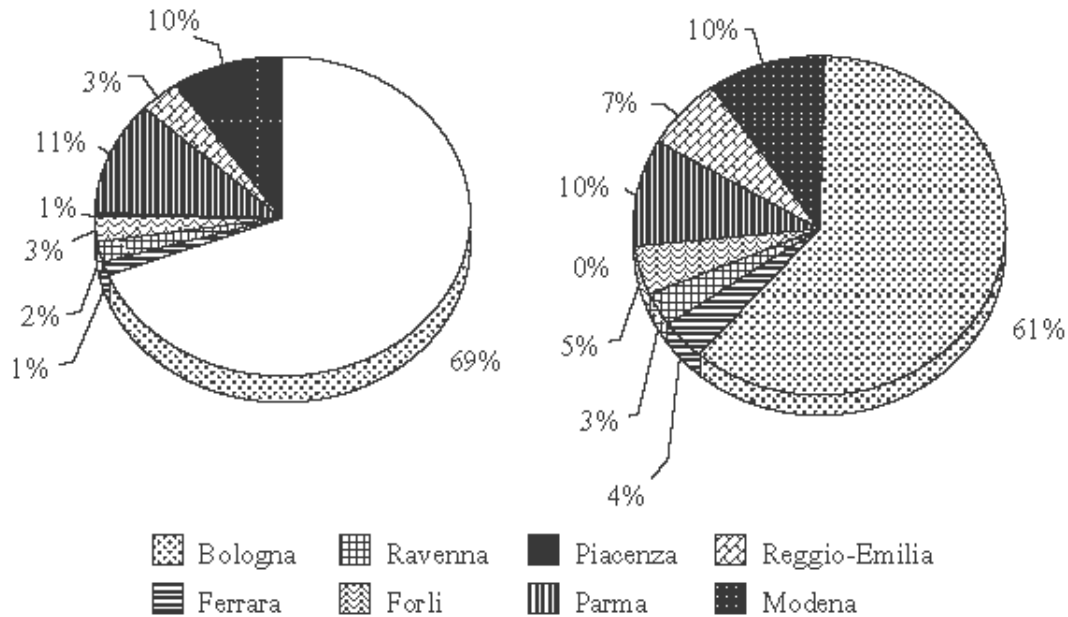


Table 3.2. Employment in Province of Bologna, 1996

Total	All manufacturing	Machinery	Spec machinery
316,951	119,420	27,372	12,340

Source: 1996 Industrial Census Data, ISTAT.

of total manufacturing employment. Thus, while the specialized machine industry does not dominate Bologna as, say, textiles do Prato, it does play a substantial role in the city's economy. Furthermore, the specialized packaging machinery industry was an important motor force driving Bologna's economic success in the postwar period. 'Packaging valley', as it is dubbed, has a high degree of internal coherence, and densely structured relations between local firms, suggesting that even if it does not fit the statistical definition of an industrial district, it may possess the governance characteristics associated with the industrial district model (see Table 3.2).

The particular mode in which LCCGs are provided has clear implications for the organization of production in the district. In the next section we spell out the relationship between these collective goods and modes of governance at greater length. Before so doing, however, it is appropriate briefly to examine LCCG provision in three important areas—training, technology transfer, and provision of information on foreign markets.

Packaging machinery manufacture in Bologna differs from machine-tool manufacture in Germany in its lack of emphasis on formal, standardized

training. On the one hand, engineers play no role, except in the very largest firms: design work is done by draughtsmen and technicians. On the other, there is no formal national apprenticeship system worth speaking of. Traditionally, the *apprendistato* contract, such as it is, has been used to deny full employment rights to younger workers, rather than to ensure proper training in skills. While this may be changing—new requirements require that apprentices spend a certain amount of time in the classroom—it is too early to assess the impact of the reforms.

As is often true in Italy, there are local solutions to national deficiencies: in this case commune-funded technical training institutes. One such body, the Aldini-Valeriani Institute in the commune of Bologna, plays a vital role in training technicians (Curti 1994). It has deliberately sought to provide the skills needed by packaging machine manufacturers, and to keep up with emerging technologies. The main problem faced by this institute is demographic: it has faced a 50 per cent fall in its catchment pool of potential students in recent years. Unlike other technical training institutes, it has managed to remain attractive to young students, but the end result has been a dearth of young qualified technicians in the industry. The competition among firms for recent graduates of the Aldini-Valeriani is sometimes vicious, resulting in opportunistic poaching (see below) and very high salaries for individuals with qualifications. Even so, firm owners and local associations believe that many young people are no longer attracted to careers as technicians: they prefer instead to learn about information technology. The Aldini-Valeriani has sought to diversify its courses to cater to new needs, while local business actors have sometimes toured schools to persuade young students of the benefits of working as a technician.

There has been a recent—and quite important—initiative to provide further training for technicians already in employment. Discussions among relevant actors led to a scheme, spearheaded by the Agenzia per lo Sviluppo Tecnologico dell' Emilia-Romagna (ASTER), a part of the regional economic development body, to train technicians in the industry in areas such as control systems, quality evaluation, reduction of production time, and integration of machines in the total production process. This scheme, run by the University of Bologna's engineering faculty, in association with the Unione Costruttori Italiani Macchine Automatiche (UCIMA), the relevant trade association, proved to be extraordinarily popular; twice the anticipated number of technicians signed up for training. At the time that research was conducted (mid-1999), it was anticipated that the scheme would be repeated in following years.

Technology transfer constitutes another potentially important area for packaging machinery manufacturers. While there is some regional provision of aid through the system of the Ente per la Valorizzazione del Territorio (ERVET), the sorts of linkages between institutions to be found in Germany, and even Britain and France, have few parallels in Emilia-Romagna.

The provincial government provides some aid to small firms seeking to introduce new technologies, but its funding possibilities are extremely limited. Cooperation between universities and firms on technical issues has traditionally only been possible where personal friendships existed between businessmen and professors (Bertini 1998). There is no equivalent of the Steinbeis or An-Institutes of Baden-Württemberg, to provide a formalized means of linking the two environments, nor even British-style encouragement of 'entrepreneurialism' on the campus. This said, recent institutional changes, and the pro-active policy of the current rector of the University of Bologna, may lead to improved university-industry links in the future. Further, the Aldini-Valeriani Institute provides an informal variety of technological transfer, introducing new technologies to the district through its training programmes.

The lack of outside aid in technology transfer has been less of a problem for large firms than for small ones. Larger firms in the district often rely on their foreign branch offices to keep an eye out for potentially useful technologies; one large firm in the district has recently licensed an important patent from The US National Aeronautics and Space Administration (NASA). Smaller firms may become involved in pilot projects conducted by ASTER, or make use of the facilities provided by Democenter, another part of the regional economic development system, to acquaint themselves with recent innovations. More usually, however, they observe each other, and their foreign competitors, at trade fairs, in order to find new advances. Technological progress in the manufacture of packaging machinery tends to be incremental rather than accelerated, and it is frequently possible to understand a new mechanism by examining it, and then to employ it in one's own machines (many advances are difficult to patent). Furthermore, there is high turnover of technicians in the district: firms sometimes rely on their new employees to tell them the technological tricks of their former employers.

Finally, provision of information on foreign market opportunities usually takes place through market mechanisms. There are two potential public sources of such information: the Istituto nazionale per il Commercio Estero (ICE), and the quasi-public chambers of commerce system. The first of these is only sometimes helpful. Although local firms have received help from ICE, they observe a substantial difference between the ICE offices located abroad, which are often helpful and responsive, and the central offices in Rome, which tend not to be especially interested in firms' needs. Further, some foreign offices appear to be more helpful than others. The chambers of commerce also provide some information on foreign markets, albeit usually of quite a basic variety. There was little evidence of firms making use of chambers for such information.

In the absence of public provision, firms usually turn to market provision of this CCG. They usually rely on one of three sources of information. First, the very largest firms have extensive sales organizations of their own, and branch offices in the more important foreign markets. Thus, these firms have people in important customer countries who can inform them about relevant

market and regulatory developments. Some smaller firms which have become highly dependent on the larger ones may also sell through these organizations. Second, some smaller firms appoint agents in foreign countries, who receive commissions for any sales generated. Third, there are several firms in Bologna which are specifically devoted to sales and export of other firms' machinery—these 'commercial' firms play a highly important role for many small enterprises. Typically, such a firm will have a long-term relationship with several manufacturers, selling complementary machinery, and will seek to find orders on foreign markets, and then negotiate a package deal on behalf of the manufacturers, receiving a percentage of the sales price as its reward. These sales firms are crucial to the success of smaller firms in the district, yet tend to go unrecognized by national, regional, and local government—they do not receive the sorts of export insurance assistance that their German equivalents do. Furthermore, the associational structure of the district is poorly suited to their needs: while they are unable to take advantage of associational assistance provided for manufacturers, the relevant organizations for commercial sector companies also has little relevance for them.

The State, Governance, and LCCGs in the Packaging Industry

If, as both Ganne (1992) and Aniello and Le Galès (2001) have suggested, the state lies behind the pattern of local economic development in France, it also plays an important, albeit very different, role in Italy. The Italian political economy is fundamentally conditioned by the weakness of the national state, and the relative importance of local and personal forms of social organization (Trigilia 1996). Indeed, 'private dynamism' and 'public disorder' can be seen as two sides of the one coin (Trigilia 1996). As Locke (1995) argues, the relative confusion of the national political economy goes hand in hand with an extraordinarily wide degree of variation between local economic systems. The 'Third Italy' has enjoyed considerable economic success. Other regions have stagnated, although local economic systems are beginning to spring up in the Mezzogiorno (Burroni and Trigilia 2001). Others again have been dominated by large firms, although here too small firm systems are beginning to play a significant role.

The weakness of the state not only creates regional variety but affects the form that local economic organization takes. The state can act to affect the provision of LCCGs in three important ways. First, it may use its Weberian monopoly on legitimate violence to regulate, mandating rules that actors on its territory must obey. This may involve 'beneficial constraints' (Streeck 1997), which force actors to contribute to LCCGs. Second, it can use revenues to provide grants or other resources to alleviate LCCG deficiencies. Third, it may act together with private actors in a cooperative mode, seeking to solve collective competition problems together, and providing monetary, enforcement, and persuasive resources to this end.

The Italian state only partially approximates the Weberian model. First, as Regini (1997) has observed, its power to regulate is limited: 'It has been widely observed that even when public policies apparently assign a leading role to state regulation, ... mechanisms for circumventing them are often set in motion; or else the state rules are only weakly and inefficiently implemented'.

In contrast to Germany, where macroeconomic policy and heavy regulation lead to high predictability in economic life (Streeck 1996; Cooke and Morgan 1998), Italian state regulation imposes a heavy burden on economic actors without any guarantee that rules will be applied consistently. Neither state bodies nor courts are perceived as impartial or efficient. More recently, the Italian state has been affected by Europeanization, which binds the government, making it a more credible actor, and has transferred many regulatory functions upwards, in a 'hardening' and 'hollowing out' of the state (della Sala 1997).

The picture is somewhat more mixed when it comes to the second and third modes of provision of financial resources, and cooperation with private actors. There are important differences between different levels of the state. Italy has four main levels of government: national, regional, and local provincial. Some national state-sponsored bodies provide LCCGs that are of use to local producers. For example, the Sezione speciale per l'Assicurazione del Credito alle Esportazioni (SACE) provides export credit guarantees for risky markets, and ICE, information on these markets. However, the provision of these goods is patchy. Firms in the packaging machine cluster in Bologna believe, whether correctly or incorrectly, that SACE assistance tends to go to big firms with good connections in Rome. Even larger local firms have had difficulty in securing aid.

The regional level of government is closer to local firms, and should logically play an important role in small firm policy. Indeed, this is partly the case. However, the importance of the regional level to Italian economic and social life has sometimes been exaggerated. On the one hand, authors such as Nanetti (1988), Putnam (1993), and Cooke and Morgan (1998) accord it a central role in their analysis of Italian economy and society. On the other, Trigilia (1991) and Dente (1997) suggest that the region is still a relatively weak level of policy and interest articulation, and that local government and local loyalties are still much more important.

Regional government policy in Emilia-Romagna has been the subject of much academic debate (Leonardi and Nanetti 1990; Cooke and Morgan 1998). Attention has focused on the regional planning process, and the role of the regional economic development organization, ERVET. Emilia-Romagna, like other regions in Italy, has prepared economic plans at frequent intervals since its creation (Bellini 1990, 1998). These plans have helped set the terms of regional economic debate. They also have been shaped by tensions between the regional and local levels, which are downplayed in much

of the literature. In the period when the Communist party was prevented from playing a role in national government, Emilia-Romagna demonstrated that Communist rule need not lead to economic disaster. Thus, the success of the industrial districts of Emilia-Romagna was welcome. However, these districts also posed political problems, precisely insofar as they were organized on a small geographical territory. Not only did this suggest that industrial districts were local rather than regional, but many parts of Emilia-Romagna had no industrial districts, and thus had different economic needs. The response to this dilemma was twofold. On the one hand, regional planning authorities sought to replace the localist networks characteristic of industrial districts with national and international networks, where the region would continue to be a privileged sphere of regulation. On the other hand, for purposes of regional economic policy, planners identified industrial districts in outlying provinces which clearly had very different forms of economic organization, in order to avoid the perception that industrial policy was favouring the heartland of the region at the expense of the rest. The region also sought to use the planning process to subordinate provinces and communes to its authority. At one stage, it sought (together with other regions) to have the provinces replaced outright by new planning districts; when this initiative failed, the regional government contented itself with ensuring that local and provincial economic plans would have to be both compatible and consistent with the overall regional framework.

The most recent planning document, *La Regione Globale: L'Emilia-Romagna nell'Europa del Duemila* (Regione di Emilia-Romagna 1999), is a continuation of these trends. It too speaks of industrial districts which do not fit the commonly accepted definitions of the term, as for example the seaside tourism industry and large-firm chemical industry of Romagna. It points to the districts as important sources of economic growth, but suggests that they need to be embedded in global rather than in local networks. The renewed emphasis on global networks is linked to important policy changes. First, planning officials speak of how regional policy may help give local firms the necessary credentials to participate in these networks. Here, officials suggest that it is important that they do not rely on 'old' personalized trust relationships, but rather acquire externally validated certification through International Standards Organization (ISO) or similar schemes. Second, officials are seeking to respond to the difficulties experienced by certain Emilian industrial districts by helping them reposition themselves as nerve centres in international production networks, hiving off lower-end manufacturing to other parts of the world, while retaining higher-end manufacture and design. Third, there is a new emphasis on helping internationally oriented leader firms within the district, rather than the district as a whole. In principle, these leader firms are supposed to diffuse an outward focus to less open firms in the district. In practice, it may be expected that many weaker firms will fail, be subordinated to, or be absorbed by, their more successful competitors or buyer firms.

These changes in broad outlook are reflected in policy changes within ERVET, and are also linked to genuine changes in relations between firms. ERVET, the independent agency and holding company charged with overseeing economic development in Emilia-Romagna, has received considerable attention in the academic literature (Bellini 1990; Leonardi 1990; Mazzonis 1996; Amin 1998; Cooke and Morgan 1998). It has also recently been undergoing substantial changes in both its goals and the methods used to attain these goals (Cooke and Morgan 1998). ERVET, as it is currently constituted, has two elements. First, it coordinates the planning and implementation of much of the region's economic policy. In the 1970s, it was perhaps the most important nexus of regional economic decision making, with enormous informal clout. Recent years, however, have seen ERVET assume a much less political role, and concern itself more with the implementation aspects of policy.

Second, ERVET provides a framework for a number of regional service centres, the majority of which were set up to meet the LCCG problems of industrial districts within the region, such as the Centro di Informazione Tessile dell'Emilia-Romagna (CITER), in the knitwear district of Carpi, which is now experiencing difficulties. Other centres were set up to provide general services to firms in the region, rather than to particular districts. For example, ASTER is involved in technology transfer across a wide variety of sectors, while Democentre provides demonstrations of new technologies, and the Centro Regionale di Ricerca, Verifia Qualità Prodotti, Processi e Certificazione Sistema Qualità (CERMET) provides testing and certification services for the machinery sector in particular. Despite their general orientation, some of these centres retain a largely localized clientele; *campanilismo* remains a strong force guiding business relationships.

ERVET has seen changes on two fronts. First, there has been an ever stronger push towards marketization of its services. The centres were set up in a period when there was a perceived deficit of certain services for small- and medium-sized enterprises (SMEs). Now, many of the centres set up with regional funding are facing increased competition from private sector organizations which offer many of the same services. There are also more overt forces pushing ERVET service centres to adopt a more market-based approach. Until relatively recently, ERVET's funding from the regional government had been ring-fenced, giving it considerable freedom from external pressures. However, the continuing hostility of business organizations such as Confindustria to regional industrial policy led to a reopening of the debate on regional economic development strategies, and a new approach in which funding to ERVET and its service centres is more directly tied to specific projects. The more rigorous approach to regional funding has pushed the centres to seek new sources of funding, from either the market or the European Union. Nowhere is this more obvious than ASTER, the technology transfer agency, which has recently reorganized itself so that its divisions map the different areas of funding available under the EU Fifth Framework

Programme. ERVET officials foresee that as funding becomes less and less tied to the region, the centres will adopt an increasingly national, and indeed international, orientation, seeking to market themselves to firms outside the region. Thus, ERVET is moving away from a traditional 'state' mode of governance to a more market-based approach on the one hand, and an approach conditioned on the need for EU-level funding on the other.

Second, as previously discussed, there has been a fundamental shift of regional economic policy. Insofar as ERVET still acts as a regional development agency, it now focuses on linking firms into international networks rather than local ones, and on ministering to leader firms within the district, rather than to the district as a whole. It seems increasingly necessary to work in a very differentiated manner with particular attention to the leader firms, because it is these that are succeeding in globalizing themselves, and in remaining in the market.

These two changes go hand-in-hand; officials within the regional government and ERVET believe that it is exactly the leader firms who have the potential to participate in international networks. This marks a fundamental shift in the Emilian model of provision of real services—the emphasis is now on helping leader firms to survive on international markets, and on helping medium-sized firms to grow and adapt to a leadership role, rather than on supporting the network of small firms as such. This tendency is most marked in ERVET policy towards districts such as Carpi, which have seen radical changes and internal reorganization. Here, ERVET policy aims to help leader firms assume privileged positions in international *filieres* of production, rather than remaining embedded in localized ones. At a more general level, centres such as CERMET play a very important role in this strategy; certifying Emilian firms according to internationally recognized standards and helping them succeed in becoming partners for other firms in the global arena.

The changes outlined above are important for policy, but it remains to be seen how successful they will be. What is clear is that they are having consequences for the interface between policy makers and local firms. In the packaging machinery industry in Bologna, there are complaints that some centres, such as ASTER, are more responsive to the possibilities for external funding than to the actual needs of firms. Projects often tend to be more tailored to EU research frameworks than to the realities of the local economy. However, there are highly important exceptions, such as the previously described initiative to improve training; here was one example at least of ERVET securing outside funding to meet important LCCG needs within the district. One may also point to CERMET's certification and testing services. While CERMET is located in Bologna, it does not provide the informal governance for the district that more 'traditional' real service centres used to. Instead, it provides services on the market, in competition with other providers. What reaction there was among local firms to CERMET was highly positive.

Finally, there are the two lowest levels of government in Italy, the provincial and communal administrations. The former has only marginal relevance to firms, whether in the packaging machinery cluster or elsewhere. While it administers some grants programmes for SMEs, its role is largely technical. The communes, in contrast, may provide highly important LCCGs to industrial districts, including social services, control of land prices, and basic utilities (Brusco 1982; Brusco and Righi 1989). The packaging machine cluster is spread across several communes, which provide such goods; one may point in particular to the Aldini-Valeriani institute (already discussed), which is funded by the Comune of Bologna and is described without exaggeration by firms and other local actors as the heart of the industrial district. This institute also has an associated museum, as well as the Aldini-Valeriani Foundation, created in 1997, which provides a venue where local economic interests can discuss technical training (Curti 1994). While some local actors worry that it has failed to keep pace with the very latest technologies, and that demographic changes have led to a fall off in the number of students, most felt that it still played a highly important role, and indeed was irreplaceable. It is difficult to underestimate how Aldini-Valeriani has cemented the social world of the local packaging industry; most local firm owners have passed through its doors, as have their employees.

Associations and Governance in 'Packaging Valley'

Much of the interest in the 'Emilian model' (Brusco 1982) has been in how small firms' associations provide services to their members. The LCCGs provided, it has been argued, are essential to the success of Italian industrial districts. Such associations allow firms to capture the economies of scale that would otherwise only be available to large firms with hierarchical organization.

These arguments hold considerable merit; it is undeniable that the success of small firms is linked in large part to these associations. Unlike other European contexts, where small firm organizations tend to be weak or concerned more with their representative functions than with providing services to members, Italian associations such as the Confederazione Nazionale dell'Artigianato edelle Piccole e Medie Imprese (CNA) are involved in the day-to-day lives of their members. Interviewees who had had contact with these associations almost universally expressed a high degree of satisfaction. This said, the governance approach allows us to put these associations in a broader perspective. What is striking is the degree to which small firm associations in Italy seek to respond to the deficiencies of the state. On the one hand, the state fails to provide many important LCCGs. Thus, associations can 'sell' themselves to members by offering to provide these goods. On the other hand, the state nevertheless imposes an almost impossibly high regulatory burden on small firms so that associations act as intermediaries, representing the collective or

individual interests of firms to bureaucratic agencies and interpreting the regulatory requirements of the state in a language that small firms can understand. These functions do not exhaust the role of small firm associations, which also provide additional bargaining weight to small firms in their dealings with banks, and may organize cooperation among their members on issues of common interest (but see below). But efforts to alleviate, or counteract, the deficiencies of the state probably account for the majority of their everyday business. Thus, the state not only fails to provide certain LCCGs but it may also create the need for the particular good of intermediation with a complicated and unpredictable state sector.

There is a high degree of fragmentation among business associations in Italy. Unlike some other European countries, there is not a neat split between representative associations and those concerned with industrial negotiations; the same organization may represent business interests to government, bargain with organized labour, and provide services to its members. The multiplicity of organizations sometimes leads to confusion, but may also be one of the reasons for their responsiveness to their members: competition is vigorous.

Organizations may be identified according to political affiliation, or size category of firm, or category of industry, or combinations of these. In the packaging machinery industry, the important associations are the CNA and Confartigianato, both of which have traditionally ministered to very small artisanal enterprises, Associazione di Piccole e Medie Imprese (APE), which has a membership consisting of small- to medium-sized industrial enterprises, and Confindustria, the umbrella business organization, which has members from all size-categories, but has typically been dominated by large firms. The CNA is undoubtedly the most important association in the region in terms of both numbers and political influence; it has 62,700 member firms in Emilia-Romagna, and has traditionally been linked to the Communist party and its heirs, which dominated regional politics until very recently. Confartigianato, which has a more right-wing viewpoint on economic and social issues, has far fewer members in the region (although it is the larger association nationally), but still has a very respectable representation among firms in the packaging machine industry. API has some 1,300 members in the Bologna area, and 70 per cent of its members are involved in the metal or mechanical engineering industries in some way.

Finally, Confindustria is primarily concerned with the needs of larger firms, and is perhaps not as politically weighty as its national equivalent, although its regional leadership has had a very substantial role in recent debates. The trade association for packaging machine manufacturers, the UCIMA, is affiliated to Confindustria, and has played an important role in the industry, although some local actors criticize it for: its removal from the day-to-day issues concerning manufacturers; its geographical distance from Bologna (it is based in Milan, and has recently closed down its Bologna offices); and its insensitivity to small firms.

Italy also has an extensive system of chambers of commerce, with mandatory membership and a privileged legal status, which was reinforced in 1993 (Law 580/1993). Chambers may occasionally play an important role in local economic regulation (Perulli 1989) but are more usually ineffective and isolated. While the Chamber of Commerce of Bologna does provide basic information on export markets to its members, has some regulatory functions, and has an associated facility for organizing trade fairs, it is often regarded as irrelevant by firms and other organizations.

As has been mentioned, small firm associations such as the CNA, Confartigianato and API offer important services to their members, many of which alleviate the heavy regulatory burden of the state. The CNA in Emilia-Romagna handles tax accounting for some 40,000 of its members, and payrolls for 20,000. They also represent their members in labour negotiations. The Italian industrial bargaining system is quite convoluted; while bargains are made on the national level, considerable variation is possible at the firm level. Larger enterprises bargain individually with the relevant trade unions, but artisanal firms are represented by their associations, who negotiate regional agreements to cover all artisanal producers. Labour relations in the recent past appear to have been relatively peaceful, and Federazione Impiegati Operai Metallurgici (FIOM), the dominant trade union in the industry, is eager to explore new forms of cooperation which would help secure jobs in the area, building on the success of the Ente Bilaterale Emilia-Romagna (EBER) (see below). Its efforts have usually been rebuffed by firms and business organizations, who wish to confine the role of unions to labour issues alone. The creation by the regional government of a new body, the Institute for Labour (Istituto per il Lavoro), which examines economic issues from a viewpoint sympathetic to the trade unions, may help unions expand their ambit in the future.

Artisanal and small firm associations also advise their members on European affairs, as EU regulations and quality requirements become ever more important. At the time of research, the CNA in Bologna was putting together a project to help small firms in the packaging machine industry comply with EU quality regulations.

Nowhere is the role of associations in making up for the deficiencies of the state clearer than in the so-called *enti bilaterali*, bilateral bodies set up by trade unions and small firm associations. Cooperation between business and trade unions to provide LCCGs has some history in Italian industrial districts; Trigilia documented early forms of such arrangements in Prato (Trigilia 1989). More formal bilateral arrangements at the regional level came into being through a national agreement between the artisanal associations and trade unions in 1988. EBER began its activities in 1993, and, like its equivalents in other regions, had its beginnings in the failure of the state to provide certain collective goods to artisanal firms. In particular, there was no provision for social insurance for small firms in difficulty, unlike larger ones. Now, in

return for a relatively low subscription, all artisanal firms in Emilia-Romagna who subscribe to EBER have access to funds which allow them to pay 40 per cent of the wages of their workers during crisis periods.

Initially, small firms were deeply suspicious of the arrangements, in part because of the degree of trade union involvement. However, the financial difficulties that many small firms experienced in the 1993–1994 period showed EBER's value; by 1999, some 85 per cent of the eligible firms in Emilia-Romagna were members. EBER also helps member firms meet legal requirements for health and safety, and is assisting actively in on-the-job training. Although it has relations with some state bodies, it perceives itself as far more efficient; while a government body may take up to sixty days to approve an apprenticeship contract, EBER has a 7–10 day turnaround. It helps meet trade union and regulatory concerns in areas like health and safety—problematic for micro-firms, which cannot afford to devote an employee to these issues—by creating a system of trained regional representatives. The most comprehensive study available of *enti bilaterali* suggests that they may provide an embryonic alternative to the failures of the welfare state (Perulli and Catino 1997).

Cooperation between Small Firms as a Source of LCCGs

Perhaps the most widely debated feature of industrial districts has been small firm cooperation. The claim that small firms are motivated to cooperate has been well received by economic sociologists suspicious of economics. Cooperation in industrial districts has been ascribed to the survival of communitarian norms of solidarity, which transcend rational egoism, and allow firms to work together for common ends.

These arguments are by no means incompatible with the governance approach to economic institutions, which stresses how community may provide a means of governance (Streeck and Schmitter 1985; Hollingsworth, Schmitter, and Streeck 1994; Hollingsworth and Boyer 1997*a*; Le Galès and Voelzkow 2001). Indeed, Streeck has suggested (perhaps tongue-in-cheek) that cooperation in Italian industrial districts, unlike in Germany, is based on community norms and a voluntaristic ethic. However, it is also possible to treat the community form of governance in a more restrictive sense (Farrell 2000; Le Galès and Voelzkow 2001; Crouch and Trigilia 2001), and see it as differing from other forms of governance insofar as it involves more informal institutions, rather than a different set of normative motivations. In many settings, 'community' governance may rest on a set of informal rules to which actors need have no particular normative attachment—they may obey them because it is in their interests to obey them, rather than because of any sense of fraternal attachment to others in the community.

Our research suggests that the latter characterization of the community form of governance better describes relations among packaging machinery

producers in Bologna than the former. There was little evidence of the sorts of strong fraternal bonds between firms of which some analysts of industrial districts speak. Indeed, the opposite usually seemed to be the case. Small-firm organizations spoke of the difficulty of encouraging their members to cooperate; small firms were highly individualistic even where cooperation could clearly have been advantageous. It is true that small-firm owners were coming together to try to counter the increasing dominance of larger firms in the district, by presenting a common front on export markets. But even here, cooperation was problematic. One owner of an export firm spoke of how difficult it was to persuade the manufacturing firms that he worked with to cooperate. There were clear financial advantages to further cooperation in areas such as supplies and financial services, but individual firms did not want to sacrifice their autonomy. Indeed, individualism was arguably more important than communitarianism to the success of the district; the desire of technicians to work on their own, rather than as employees, had historically driven the creation of small firms.

There was considerable opportunism among firms in certain areas. A severe shortage of qualified workers in the industry meant that firms had little compunction in poaching workers, and in using their new employees to find out about the production methods and techniques used in their former workplaces. Indeed, there was a more general phenomenon of diffusion of technical information through copying of designs. While this may have had some positive effects for the district overall, it also discouraged major investments in research that could not be protected by patent.

Unsurprisingly, there was little horizontal cooperation among competitors or potential competitors. Relations among these were usually seen as a zero or constant sum game; a firm was likely to suffer lost sales if a competitor made advances. While there was horizontal cooperation among firms which made complementary rather than competing products, it was not generalized, but usually based on personal relations. For example, a firm which received an order for one of its machines might tell another firm which made complementary machines about this possible new customer.

This is not to say that there was no norm-driven cooperation whatsoever. The packaging machine industry involved a relatively small number of actors who met together repeatedly in a shared social setting, and sometimes formed friendships. In addition, shared locality had a modest positive effect on cooperation. But what must be emphasized is that cooperation coexisted with opportunism, and that most 'costly' forms of cooperation seemed to be based on shared interest rather than community feeling or deep personal ties. Individual interests did not become merged in the collective interest of the community. Other scholars who are familiar with the district report similar findings; Vittorio Capecchi, in conversation, spoke of his disappointment at the relatively low level of cooperation among packaging machine manufacturers, whereas Silvano Bertini (in interview) stated: 'I do not share the

opinion of theorists of industrial districts that there is an almost fraternal trust ... It is a trust that is based on relationships that become consolidated over time, and that are profitable for both parties.'

Where there is clear evidence of widespread cooperation is in the vertical organization of production. As in many other Italian industrial districts, the production of packaging machinery in Bologna is characterized by radical vertical disintegration. Except for the very largest firms in the district, the usual pattern is for all, or nearly all, the parts of a machine to be put out to artisanal producers, who make pieces to a design drawn up by the final firm, and then return these pieces, or send them on to other producers for further processing. The final firm may only perform the final assembly (which is, it must be said, the most strategic stage), and in some cases the buyer firm puts out even this to other firms. The few very large firms, as might be expected, rely more on their internal resources for production, but even these make heavy use of subcontracting, especially during periods where demand is rapidly shifting. Also, specialized subcontractors may often amortize the costs of advanced machinery more rapidly than hierarchically organized firms, which may only need such machinery on an infrequent basis. While this may have had its beginnings in large firms' outsourcing practices, it relies (as discussed below) on previously existing informal community rules, and has demonstrated its merits in economic conditions quite different from those where it had its beginnings.

This form of production requires a very high degree of cooperation if it is to work properly and gives rise to risks of hold-up (Williamson 1985). However, formalized, contractual commitments do not play a major role in relationships between subcontractors and final firms. Instead, informal, 'personal' relationships prevent both parties from behaving opportunistically most of the time. Subcontractors who behave well and provide good quality at a reasonable price can be reasonably assured of a long-term commitment on the part of their buyer firm, even if there may be dry periods when the market is bad. Buyer firms, in contrast, may have a high degree of flexibility from subcontractors with whom they have a long-term relationship; these may be willing to work long hours or weekends if necessary to complete contracts that are time sensitive.

Our research suggested that this honesty on the part of both sets of actors could be attributed to informal institutions and their associated enforcement mechanisms. Informal institutions (defined here as sets of rules, following North 1990; Knight 1992; Trigilia 1998), provided orientations to both buyer and subcontractor firms as to what each could expect. These informal norms built on local traditions which mandated a high level of honesty in personal relations, so that subcontracting relationships in the packaging machine district were seen as personal ones, even in situations where it was unlikely that any genuine bonds of friendship existed. Thus, there were rules which stated that certain kinds of opportunism were unacceptable. But the norms might have had little force if they had not been accompanied by enforcement mechanisms.

The social world of packaging was relatively transparent and firms which consistently violated the perceived rules of interaction between subcontractors and final firms would eventually be unable to do business. Thus, social rules and enforcement mechanisms combined in such a way that it was in the interests of firms to behave honestly in most aspects of subcontracting relations. There is evidence that these results may be generalized to other industrial districts; as Brusco and Bianchi seem to argue (Brusco 1992; Bianchi 1993), a focus on informal rules and their consequences may lead us further than the rather vague attribution of cooperation to a cooperative set of values. In many ways, these relations resembled the forms of social cooperation modelled by game theorists (Greif 1994; Calvert 1995), but they were not identical: norms did sometimes appear to affect actors' internal motivations.

These findings have important consequences for the characterization of change. Previous authors have suggested that many industrial districts are moving from a 'community' form of governance in which affective ties predominate, to a more hierarchical and stratified form in which economic interests motivate actors (Franchi and Rieser 1991). Change, for these authors, involves a move towards calculability. Such a theory apparently lies behind the arguments of Bennett Harrison, who uses the machinery industry in Bologna as a test case for the apparently ineluctable decline of the Italian industrial district (Harrison 1994*b*). Harrison takes the guardedly pessimistic arguments of earlier writers on Emilia-Romagna and radicalizes them. He looks at how Sasib was bought out by a nationally based holding company, which sought to create a new group of machinery companies which would achieve economies of scale by centralizing subcontracting decisions. This, in Harrison's opinion, was emblematic of changes which would almost inevitably lead to the decline and disappearance of localized subcontracting networks in Bologna. Community ties would be replaced by the hierarchical domination of large firms.

Unfortunately for Harrison's thesis, the forces he identifies as vectors of change did not have long-term consequences. It is true that Sasib, along with other large firms in the region, sought to centralize their subcontracting relations on the group rather than the firm level in the early 1990s. However, this policy proved, in the words of one interviewee at another large firm in the district, to be a 'disaster.' It was swiftly abandoned by all the firms, which had adopted it.

This said, there is good evidence of a shift in the district to a more hierarchical form of production, which may have consequences in the long term for the kinds of subcontracting based on informal, long-term relationships which we have previously described. The district has been seeing a process of consolidation since the early 1980s. Previously, a producer might specialize in one particular machine for a particular stage of the packaging process for a particular sort of product; for example, blister-pack machines for pharmaceutical products. Thus, an entire packaging line might incorporate machines

from several different producers. Now, multinational customers firms in sectors such as food, pharmaceuticals or tobacco, are more and more likely to demand 'single solution' packages of machines from a particular firm. This trend has led to a process of consolidation within the industry, as larger firms buy out specialized producers in order to integrate their machines into a broader range, so as to meet customer demands. On the one hand, this means that there is less space for specialized final firms within the industry. Some, in niches which are unattractive to larger firms, are relatively secure. Others are likely only to be able to find markets through subordinating themselves to larger firms in the district, who have a lock on important customers. This means a substantial shift in the balance of power within the district to larger 'group' firms (Farrell and Knight 2003). While smaller firms are seeking to meet this threat, their efforts are being hampered by the fundamental individualism of their owners. It appears that the district is shifting from a 'network of firms', in which no one firm or small set of firms predominated, to a 'networked firm' model in which large, leader firms play an important role (Burroni and Trigilia 2001).

These events are also having knock-on effects for relationships between final firms and their subcontractors. The larger firms are moving towards more formal and more hierarchical relationships with their subcontractors, in which key suppliers are identified and built up, and very frequently asked to manage the relationship with smaller sub-suppliers. This system will probably see a greater share of the profits of cooperation go to the firms at the top of the system than in the past. One larger firm in the district (not the one quoted above) speaks quite candidly of how it squeezes the subcontractors it has built up when it needs to; it treats them, in Semlinger's (1993) term, as 'flexibility reservoirs'. While this is not necessarily representative of the district as a whole, it is clear that even those large firms which seek to adopt a more cooperative attitude to their subcontractors have little compunction in using their leverage to further their own particular interests.

In part, this matches Harrison's pessimistic predictions and Franchi and Rieser's romanticism, but only in part. The vectors of change are quite different. Even if informal community rules have played an important role in subcontracting relations, these rules are more based on calculability than identity, so there is no simple destruction of *Gemeinschaft* by *Gesellschaft*. Furthermore, the forces that appear to be driving institutional change are twofold: the individual interests of actors, and the power of actors to achieve those interests (Farrell and Knight 2003). Individual actors who are powerful enough to bring through changes that are beneficial to themselves are likely to do so, regardless of whether or not this helps the overall prosperity of the district. In this case, large firms which are seeking more formalized relations with their subcontractors are not doing so because they are interested in the collective interest; they are doing so because this is to their individual advantage.

While this might be in the collective interests of the district, it might just as well be that it has negative consequences in the long run. Large firms are able to do this because of their increased bargaining power, suggesting that change in the industrial district is better seen as the contingent result of alterations in the bargaining position of actors, than the ineluctable effect of macro-level social forces. The changes that we identify appear to be real, and will likely structure the district in the short-to-medium term. But it is also possible that shifts in final customer markets will again favour smaller enterprises over larger ones; the evolution that we have identified is by no means set in stone, and may be revised if external circumstances are such that there are changes in the interests or the bargaining power of the relevant actors.

Conclusions

In the above, we have examined the mix of governance institutions in three important areas affecting the industrial district of packaging machine producers in Bologna, and indeed the ‘Emilian model’ as a whole—the state, associations, and relations among firms. The governance approach gives us tools to understand both continuities and changes in these areas. Regional economic policy and service delivery are moving from a mode in which the state provides funding for projects and cooperates with local actors, to one in which it has a secondary role in centres that are more and more market-oriented. Policy goals now focus not on the delivery of LCCGs to industrial districts as such, but on providing key leader firms with the necessary credentials for international networks. In relationships between firms, we see the continuation of a ‘community’-based system of informal rules in certain interactions, but also how this system is threatened by external forces privileging large enterprises, allowing them to assume a more dominant role. As a result inter-firm relations do not take place among a community of equals, but hierarchically.

More cogently, the governance approach allows us to examine the local (and regional) economic system as a totality. The different modes of governance are clearly interrelated. This is most obviously so in the way that the relative inefficiency of the state sector impinges on the others. Associations both provide LCCGs that are not provided by the state, and seek to inter-mediate between small firms and a system of regulation that these firms often find incomprehensible. Furthermore, they are responding to changes in the constitution of the state, adapting to EU requirements as these become more important for producers. Small-firm subcontracting relations tend to be informal; this reflects the weaknesses of the state legal system. But on another level, the regional state responded to changes in inter-firm relations, in the shift of policy from building up districts as a whole to work with ‘leader firms’. In part, this reflects genuine changes in the organization of the packaging machinery district.

Yet the governance approach also allows us to focus on the *political* nature of change. It would be a mistake to conceive of the governance system of the packaging district of Bologna in purely functional terms, in which the strength of one mode of governance may automatically compensate for the weakness of another in guaranteeing economic success. Instead, the mix of governance, and changes within it, can be attributed to shifts in the political opportunities open to various actors, whether they be firms, local government, regional government, or associations. Thus, the regional government's new approach may also be seen as part of a history of struggle between local and regional levels in Italy, in which regional policy actors have continually sought to justify their relevance in a context where local economic ties remain strong. Similarly, recent changes in relations among firms appear to be the result of larger firms pursuing their self-interest, rather than a strategy aimed at preserving the strength of the district as a whole.

Here, the weakness of one form of governance (such as the state) may provide political opportunities for other actors, but does not necessarily imply that these actors will respond in such a way as to meet the collective needs of the local system. This may indeed happen (as is arguably the case with EBER), but one also may envisage situations in which actors pursue their individual interests in such a manner as to lead to a collectively undesirable outcome. Arguably, the new orientation in regional policy is more rooted in political considerations than socio-economic fact; by neglecting the traditional sources of success in industrial districts it may lead to the long-term vitiation of their economic dynamism.

4 Refining National Policy: The Machine-Tool Industry in the Local Economy of Stuttgart

ULRICH GLASSMANN

As presented in the introduction to this Part, although Germany's machinery industry suffered from serious decline in the early 1990s, it still has a larger share of world trade than the other countries we examine. The aim of this chapter is to analyse the preconditions for the recovery, which lay behind this relative success, with special reference to the machine-tool industry around Stuttgart in Baden-Württemberg. To assert that Stuttgart's specialized machine-tool firms were able to maintain comparative advantages may sound provocative to authors who have argued that these advantages (including their wider infrastructure such as the training system; Kern and Sabel 1994) turned into disadvantages during the years of crisis. But our analysis is not primarily designed to explain the overall performance of this sector; it depicts *how* the local economy recovered in relative terms. Many niches have certainly been lost to foreign competitors, leading to declining employment and turnover (Kerst and Steffensen 1995; Lippert 1999).

Using the governance approach we therefore analyse the external challenges to the local economy in the 1980s and 1990s and show how firms and supporting institutions adopted new strategies.

As we discussed in the previous volume (Glassmann and Voelzkow 2001), local collective competition goods (LCCGs) for territorially anchored production systems in Germany are provided according to two basic forms of public governance: federalism and corporatism. We also highlighted the relevance of vertical relationships between large and small firms, and the relatively large size of German small- and medium-sized enterprises (SMEs) with their corresponding capability for in-house production of LCCGs and their low acceptance of community based (horizontal) cooperation. In this chapter we shall show how local recombinations of governance modes within a national governance framework can occur as a result of temporal, sectoral, and regional variations, still assuming that for German firms clustering is not as important as it is for firms in some other countries (Lau 1997). However, there do remain distinct benefits from local clustering, and we shall consider these below.

We shall first examine the historical origins of the machinery industry in Stuttgart to discover the structural path-dependence of the production system. Second, we shall depict the development of the Diversified Quality Production (DQP) regime in Germany after the Second World War and the role of Stuttgart's firms and institutions within this national setting. Third, we give a short overview of the city's economic performance in the 1980s and 1990s. Fourth, we shall describe the challenges of the 1980s and the specific responses by firms and supporting institutions, followed by an analysis of the challenges that pressured this regime in the 1990s. Finally, we shall examine the outcome of this transformation process; in particular, whether the DQP regime had to be abandoned or not.

The following account makes use of in-depth interviews carried out by the author and H. Farrell with firms and institutions concerned with the machine-tool industry in Stuttgart. In order to respect the confidentiality of the firms, citations and quotations from these interviews are referred to in the text by the codes:

BW-F-01/02/03/04/05/06/07/08/10/12/14/18;
and BW-I-01/02/04/05.

Historical Origins of the Machinery Industry in Stuttgart

Until the mid-nineteenth century Württemberg was a backward rural region, lacking the natural resources important to most early industrialization and embedded in agricultural protectionism. Important in achieving change was Ferdinand Steinbeis (Marquardt 1985). Like many of the early entrepreneurs of the region, Steinbeis was a Schwabian Pietist—a form of Protestantism, which stressed independence (Bechtle and Lang 1999). As president of the new Central Office for Commerce and Trade, founded in 1848, Steinbeis introduced a new industrial code in 1862, which abolished the guilds. Central regulation of the code made it possible to establish more favourable conditions for firms. (The equivalent organization of trade in neighbouring Baden was still in guild hands.)

The arrival of the railway in 1840 reduced the isolation of Württemberg and Stuttgart and opened a huge market for machines. Imported locomotives had to be adapted for the mountainous environment of Stuttgart and other parts of the southwestern German territories. Firms emerged to produce machine tools for the construction of both locomotives and spinning machines.

Steinbeis' ambitious programmes helped to diffuse knowledge of machine construction throughout the region. The Central Office established a workshop where foreign machines were made available for study. Fairs were organized, and the *Landesgewerbeamt* (LGA), which still acts as an organization of the *Land* government and carries out programmes for the support of SMEs, helped

to settle firms, which specialized in machinery construction (Semlinger 1993). Technical colleges were established, and student exchange programmes supported knowledge transfer from beyond Württemberg's borders.

A major breakthrough came with the development of electricity—in Stuttgart represented by the firm of Robert Bosch—and the early days of car construction. Gottlieb Daimler founded the Daimler–Motoren–Gesellschaft in Canstatt in 1890. It produced motors for coaches and ships. Magnetic ignition, an invention of Bosch, was introduced for the production of Daimler's motors, Daimler himself abandoning his own ignition system (Daimler-Benz 1998). Around the turn of the century Bosch and Daimler became the first Stuttgart firms to employ more than 1,000 workers. In 1926 Daimler merged with Benz & Cie. and was transformed into the Daimler-Benz AG with its home base and central administration in Stuttgart.

Many inventions in car construction and other sectors came from the machine-tool industry, which changed the inner structure of firms as new machines stimulated rationalizations. (This mutual penetration of sectors even today constitutes a comparative advantage of the area's machine tool firms and is the main reason for clustering.) Locally sourced machine tools introduced new production methods at Daimler, for example, the presses manufactured at Weingarten, which enabled production of large parts of the car body with a single machine (Daimler-Benz 1998). Daimler's efforts at vertical integration, and thus the establishment of hierarchical governance, would have been more difficult to manage without the quality and customer orientation of local machine-tool firms. This was probably less a conscious decision by individual firms than the most viable road to success given initial backwardness. And the quality of Stuttgart's machine tools met the standards of the local motor industry.

While big firms created a certain demand structure, machine-tool firms did not completely rely on these new industries, but had been watching out for other opportunities in the textile, paper, and printing industries—but within a process of 'coordinated specialization' as Herrigel (1987) argues. Specialization in general was necessary to fulfil customer requirements for specific machine-tool functions in high quality market niches. A coordination of this process was necessary to avoid competition between the sectorally specialized firms and to secure cooperation. Herrigel shows how this rested on associations like the industry association of the machinery industry, the Verein Deutscher Maschinen- und Anlagenbauer (VDMA) or the Union of German Engineers (Verein Deutscher Ingenieure—VDI). Both are typical examples of German organizations concerned with the production of LCCGs, especially for training and innovation. The VDI had to organize the education of engineers at polytechnics, since engineering was difficult to establish at university level throughout the nineteenth century (Keck 1993). Although Germany had 27 per cent of the world production of machinery in 1913 (Keck 1993), the education of engineers was considered a second-rate science.

However, in Stuttgart and Württemberg engineering constituted a way out of agrarian backwardness; the polytechnic school in Stuttgart had been transformed into a *Technische Hochschule* (allowing university level technical education) as early as 1876. The consequent specialization in engineering disciplines helped the industry compete successfully against British and US firms. The relevance of singular engineers and inventors like Gottlieb Daimler, Ferdinand von Zeppelin, Wilhelm Maybach, Ferdinand Porsche, or Karl Benz cannot be denied for the region. However, increasingly important was this general scientific approach towards inventions in the field of machinery construction. The University of Stuttgart established chairs for motor vehicle construction and aviation technique in the first quarter of the twentieth century.

As Keck (1993) has shown, higher education was generally important in Germany after 1870, but the specific specialization of Stuttgart and Württemberg needed additional instruments of collective goods provision, even in such well established fields as worker training. For larger firms it has always been important and possible to develop such skills via in-house production; in 1925 Daimler had established an in-house apprenticeship school (*Werksberufsschule*), which on average had 200 apprentices obtaining their certificate every year (Daimler-Benz 1998). It has also been claimed that inter-firm cooperation, even between competitors, has also been important (Herrigel 1987, 1996a). This has recently been contested, other scholars denying that regular cooperation among competitors can be found (Kerst and Steffensen 1995; Braczyk, Schienstock, and Steffensen 1996). Although we shall show that such cooperation began to rise under the pressure of increasing competition in the 1990s, in general clustering of machine-tool firms does not *primarily* result from cooperation among small firms, but from that between large customer firms and SMEs—from the networked firm rather than from networks of firms (Crouch and Trigilia 2001).

Adaptation of the DQP-regime in Stuttgart since the Second World War

The production range of German machine tools has decreased dramatically since the Second World War. This means that individual parts now carry a much higher added value. Therefore cooperation was more necessary in earlier days, when a well-equipped supply network of many different firms was needed to produce a machine tool.

In the 1970s a machine was probably composed of 500–800 parts. Today a machine of that kind could be made out of 100–150 parts. It has a much higher productivity, a higher capacity, and its parts are of higher value, but also they are just buy-in parts (Interview BW-F-01).

Vertical buyer–supplier relations became even more important because of this development, but such intensified vertical relations only made sense where a few important business partners were able to produce high value-added machinery parts. Consequently, firms cooperating vertically pushed each other into high price, high quality market niches, thereby fostering the DQP path for the local industry. On a macroeconomic level, Streeck (1991) has shown the connections among such a development in the production regime with a high-wage economy (Vitols 1996), the underlying social understanding of *Beruf* (Streeck 1996), and an advanced welfare state. Stuttgart's governance structure fitted well into this national institutional environment, because its local economy was oriented towards high quality standards, which had been achieved by regional support for qualifications in engineering.

In the Federal Republic the development of technological change in machine-tool engineering has been supported by public actors such as the Federal Ministry for Research and Technology (BMFT), industrial associations like the VDMA and the unions—which in the 1970s and 1980s were concerned with social issues raised by technology. Political parties battled over the appropriate public policy instruments to support innovation. Two major approaches had evolved as opposing strategies to shape the machine-tool sector as well as other innovative capital goods industries. The conservative parties proposed an *Ordnungspolitik*, whereby the state would just set the framework for private entrepreneurship. The Social Democrats then in government, contested this with what they termed *Strukturpolitik* (Ziegler 1997).

Strukturpolitik involved government, advised by experts, anticipating major challenges to industrial sectors and safeguarding their technical development. In 1974, a Commission on Economic and Social Change recommended initiating programmes on the capacity of tool-making and numerical control for machine-tool firms. Although these measures took account of the DQP-regime and the high share of SMEs in this sector, the general policy impact was ambivalent. In the beginning it neglected smaller enterprises. This was due to the fact that many measures by the federal government had neither been sector specific nor in particular designed for SMEs, but aimed at the innovation resulting from cross-sectoral demand for new technologies. These had been termed key technologies (*Schlüsseltechnologien*). Their technical development was supposed to be supported by indirect–specific measures, by which grants were offered to those firms expressing an interest. Very often it was large firms that made use of these grants, because their in-house capacities for the production of collective goods gave them resources that SMEs lacked. Consequently the federal government strengthened the role of large firms as flagship enterprises, while a complementary strategy for smaller firms was pursued at *Land* level and by associations.

The VDMA and VDI supported the struggle of SMEs to develop customized products, which met the demand of new technology, and these efforts were accompanied by programmes of the *Land* government. In particular the

restructuring of the Steinbeis Foundation (described in Glassmann and Voelzkow 2001) played an important part, because it received enough funding to act autonomously (Semlinger 1995). In addition, the Landesgewer-beamt LGA provided support specifically designed for SMEs, while *Land* polytechnics and universities specialized in particular engineering disciplines. In these ways the *Land* government integrated the local production base further into the existing technology transfer and knowledge transfer infrastructure, achieving a better supply of collective goods for SMEs.

The net consequence was even stronger ties between SMEs and large firms. The mutual penetration of different sectors—diagonal cooperation—was deepened in the mid-1970s by research projects (also funded by the federal government) of the Fraunhofer Institute for Production Technology and Automation (IPA), an institute for applied research located in Stuttgart. Thus the government made use of the established external support infrastructure for the production of collective goods, thereby creating what might be termed the German version of *servizi reali*, though these goods had not been produced only for the local production system. Geography has never been a restriction for the German system of collective goods provision, just an opportunity to pool resources. The territorial and sectoral dimensions of the production system are quite balanced, which can be demonstrated by the relevance of further innovation in the industry, initiated elsewhere and then later adapted by firms in Stuttgart.

For instance, in 1975 the Institute for Machine Tools at the Technical University of Berlin cooperated with one of the largest German lathe producers, Gildemeister, to develop an ‘integrated operating system for numerically controlled lathes ...’ (Ziegler 1997: 132). In one of our firm interviews we discovered that these machines had later been bought by a small machine-tool firm in Stuttgart from Gildemeister, which itself had obtained government aid up to DM 1 m. for the development. The firm that had first bought the new machine arranged a press conference and invited other Stuttgart machine-tool makers, in order to present the latest development on numerically controlled lathes for which the firm in Stuttgart then developed parts of the machine-tool system (Interview BW-F-10). From this event developed many new firm contacts including a long-term relationship with Gildemeister. However, these had been pure market relationships, beginning at a fair for machine tools. No horizontal ties had been established.

German machine-tool firms tried to acquire LCCGs through corporatist interest networks in which solutions for newly emerging collective goods problems were jointly articulated and solved. Such arrangements existed on the level of the federal and *Länder* governments with a corresponding associational support that is typical for Germany (Mayntz 1989). These arrangements were needed in particular when the federal government realized the necessity for further support of SMEs in the machine-tool industry. The first programme carried out according to the research demand of smaller

machine-tool firms (i.e. up to 1,000 employees) was implemented in 1979 by the prominent *Arbeitsgemeinschaft industrieller Forschungsvereinigungen (AiF)*. This is an intermediary organization responsible for such tasks at SME level (Hirsch-Kreinsen 1993: 195). The FDP-led Ministry of Economics contested the ignorance of SMEs' problems of the SPD-led Technology Ministry, and did not force firms to follow a particular strategy for innovation. Technical options were to be chosen by firms themselves, respecting their standard of technology and specialization within the industry. This conflict between the policies of two federal ministries was less a result of different party control of the ministries than a general problem resulting from the fact that the Technology Ministry was concerned with structural policies. Although intervention in this field was originally a task of the *Land* government, the federal government expanded its competences, but aimed at large enterprises only. It took time until the federal government realized that it could not claim responsibility for support measures in technology transfer and at the same time neglect the demand of smaller firms.

In the early 1980s, measures were implemented for the development of products using microelectronics, which aimed at long-term innovation in defined key technologies. DM 450 m. were spent within two years for a federal programme, which was finally designed for SMEs (Ziegler 1997). The machinery industry had run into severe crisis in Germany, including Baden-Württemberg. But it recovered soon after 1983, probably also because the innovation process induced the production of new flexibly usable machines. The subsequent outstanding local production regime of Stuttgart's machine-tool industry was in reality based on national policy initiatives.

From the beginning therefore the local economy of Stuttgart was a networked firm economy dependent on large car and electrotechnical firms as well as general support from the federal government. The specialization of firms was customer oriented and technology- and quality-driven. This road to success certainly fitted the science-based approach and individualistic mentality of the south-west German territories. The consequently developing *Sondermaschinenbau*, which produced machines in high price and quality market segments and did not compete with mass products, still flourishes today, probably much more vital than many scholars had predicted in the 1990s.

Performance since the Early 1980s

Any lessons learned from past research on the performance of local economies is unlikely to predict their future prospects; one cannot easily draw conclusions from the social organization of the economy concerning the immediate market benefit this organization creates. Many argued that Baden-Württemberg would benefit extraordinarily from its rich support environment in technology transfer (Piore and Sabel 1984). However, when

the crisis of the early 1990s shook the region, the argument was turned around and the same organizations previously enumerated as promoters of outstanding economic success were now creating lock-in effects (Cooke and Morgan 1998). By the end of the decade many firms had gone bankrupt, but others survived surprisingly well and witnessed a brilliant recovery. These trends change so quickly that it does not make any sense to use them as indicators of long-term success or failure of the social institutions in which markets are embedded. Institutions adapt their capability to support a local economy with LCCGs after a phase of hard learning and thus with a time gap, which may often cause further downturns. What we have to explain is the specific solution Stuttgart chose in order to remain in the league of successful economies.

The cluster we examine is confined by the borders of the Stuttgart region, which contains six *Landkreise*: Stuttgart, Böblingen, Esslingen, Göppingen, Ludwigsburg, and the Rems-Murr-Kreis. In 1982 there were 444 machinery firms in this area, 480 in 1992, 441 in 1994. Esslingen, which was among the areas where the industry emerged in the nineteenth century, still has the highest percentage of machinery firms in the region, more than 120 having been identified there. Unfortunately we do not know at this aggregate level how many of them are machine-*tool* firms. Many have diversified their production. For instance, we found a firm that produced lathes as well as packaging machines. Smaller suppliers may not specialize in tool systems but only on less complicated parts, and thus supply machinery firms with a varied product range. Especially because of transportation costs, such smaller suppliers often limit their activities to the region; even integrated machinery parts were sourced with '95 per cent from firms operating in a distance not greater than 100 km' (Interview BW-F-01). However, such approaches varied and seemed to depend on the size of firms and their market strategies. Bigger firms had sometimes already changed from regional to global sourcing in the 1980s (Interview BW-F-18).

Quantitative data analysis shows that in 1990 machinery firms sourced 12.3 per cent of machinery parts from within the *Land*, while about 30 per cent of the generally supplied components and services for machinery firms in Baden-Württemberg were machinery parts (including steel and ADP in both cases) (Heidenreich and Krauss 1998: 226) (see Fig. 4.1). This might not seem much for an Italian industrial district, but it is evidence of close local buyer-supplier relations in Germany, where firms still rely heavily on in-house production (Hirsch-Kreinsen 1993; Knodt 1998).

While trade with firms in foreign markets should have alarmed observers of the branch in 1991, the reunification boom compensated for this in 1991 and 1992. Then, in 1993 turnover of machinery firms in the Stuttgart region shrank from DM 19 bn. in 1990 to DM 16 bn. (see Fig. 4.2). Changes in statistical classification make it impossible to compare data before and after 1994; a much higher level of turnover and employment in 1995 may be partly a statistical artefact. However, we can analyse developments from 1995 onwards. With the

Figure 4.1. Number of machinery firms in the Stuttgart region, 1982–1999

Source: Statistisches Landesamt Baden-Württemberg div. vols. (1982–1999). Due to the new classification of sectors, data from 1995 onwards are not directly comparable to previous numbers.

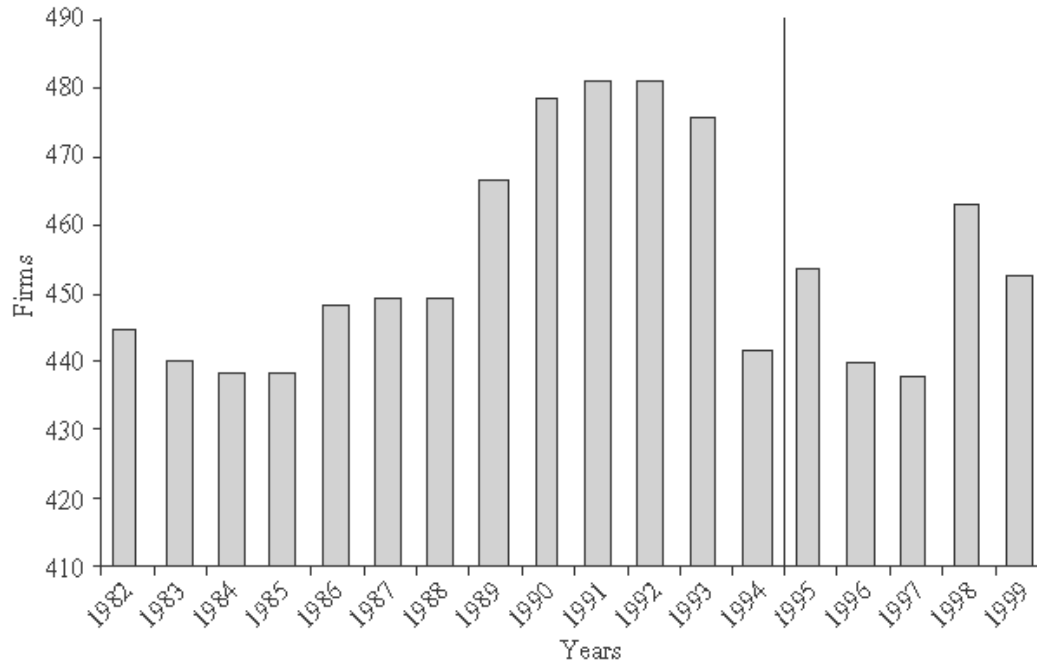


Figure 4.2. Turnover of machinery firms in the Stuttgart region, 1985–1999

Source: Statistisches Landesamt Baden-Württemberg, div. vols. (1985–1999). Due to the new classification of sectors, data from 1995 onwards are not directly comparable to previous numbers.

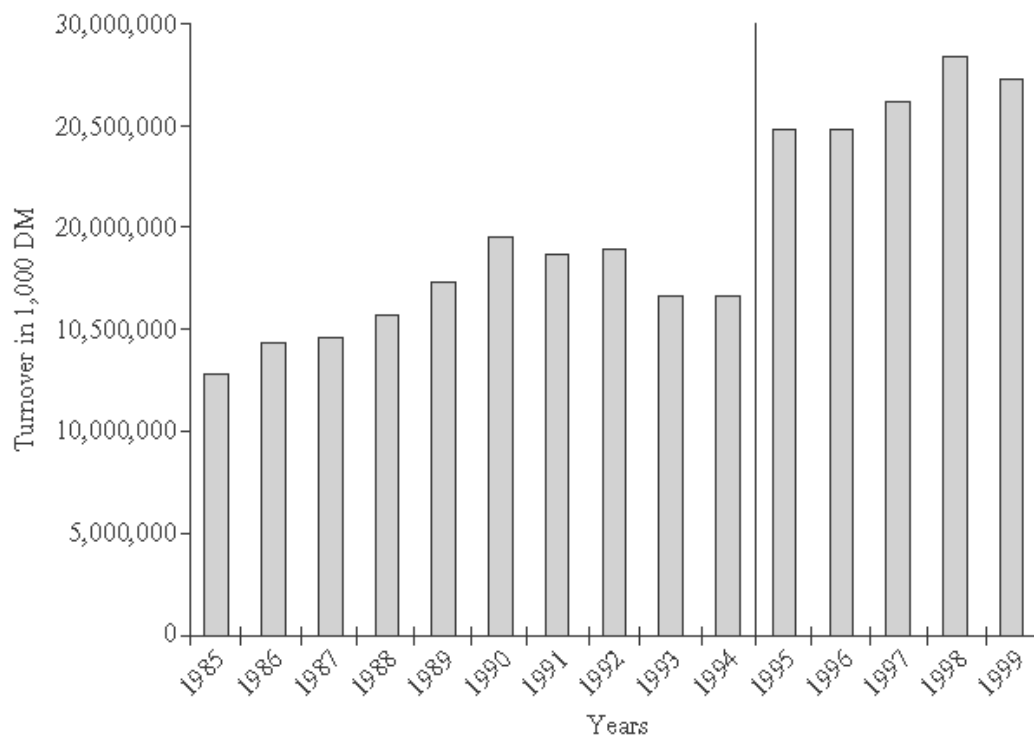
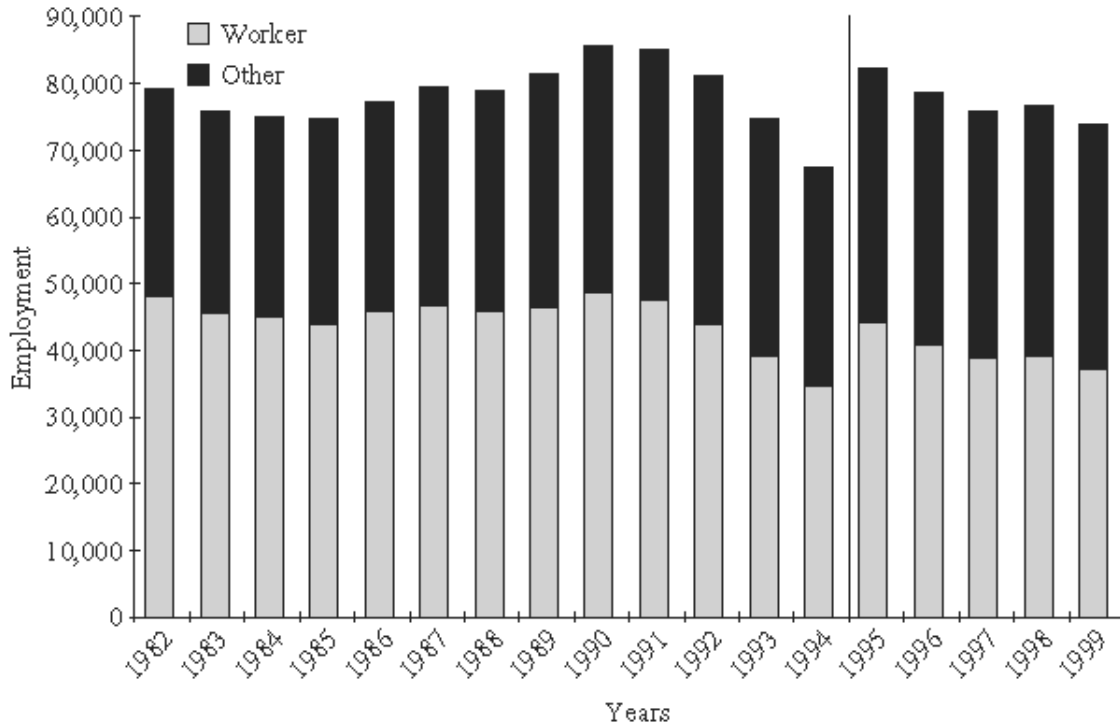


Figure 4.3. Employees in the machinery industry in the Stuttgart region, 1982–1999

Source: Statistisches Landesamt Baden-Württemberg, div. vols. (1982–1999). Due to the new classification of sectors, data from 1995 onwards are not directly comparable to previous numbers.



exception of 1999, turnover of machinery firms in the region has continuously increased. In fact, the relative increase of turnover between 1996 and 1998 is comparable to the growth between 1988 and 1990 when it reached its highest level before the crisis.

However, the employment situation has been reversed (see Fig. 4.3). While in the growth period at the end of the 1980s employment rose to 85,546 employees, by 1994 it had declined to 67,478; 18,068 workplaces had been lost in four years. Between 1995 and 1999 employment decreased again, causing a further loss of 8,314 jobs.

Whereas in the 1990s too many engineers entered the labour market, today firms are searching in vain for qualified personnel, despite the fact that they employ fewer workers overall. This raises the question where the many workers and engineers made redundant in the years of crisis have gone. Workplace statistics on the machinery sector show that many of them are 'older' workers (over 45) (VDI 1997). For many it might be difficult to re-enter the labour market, either because they are not qualified enough or they simply appear to be too old.

Individual firms have recovered. Those that survived the crisis (still 452 firms in 1999) managed to position themselves quite well again on the market, though the economy remained fragile. Bankruptcies continued to increase in Baden-Württemberg until 1997 (Statistisches Landesamt Baden-Württemberg 1999a).

The banks had withdrawn from the industry after the collapse of Deckel Maho, which was later taken over by Gildemeister. SMEs in Stuttgart were therefore forced to leave their capital in the firm. Their survival became dependent on their willingness and capacity to invest in innovation, their capability to restructure according to more efficient standards of production, their niche specialization (previous strong dependence on the motor industry, which also suffered from decline, had proved to be a weakness), and of course the capacity to find new customers in foreign markets, where Japanese or American firms had beaten German competitors with lower prices. To restructure the product segments and to adopt a new philosophy of cost-control became essential.

Why the Networked Firm Model became Increasingly Important

The 1980s had been turbulent for Stuttgart's machine-tool firms. They had begun with a severe crisis and ended with a period of unprecedented economic success, a high estimation of their flexibility and a still growing demand for their high-price, high-quality engineering products. A major challenge occurred with the introduction of microprocessor electronics in machine tools, because this technology had to be integrated into the product as well as the production process. If firms wanted to stay on the path of customized production, the new technology had to be individually adapted. Consequently, firms could not make use of a standardized innovation scheme. To what extent and in which ways a firm implemented CNC technology had serious implications for investment in sophisticated R&D, the cost and design of the product, their potential usage, and rationalization effect in the production process of the user firms. Entrepreneurs had to take into account the reorganization of the work process induced by the new machines being bought in or developed. While automation was always one of the major intentions behind the development and application of microelectronics, the firms in Stuttgart refused to 'benefit' from such innovations. Their highly qualified workforce was acting in an environment of changing and multidimensional tasks. Cooperation between engineers and machinists was a frequent and integral part of the day-to-day work process. However, inventions in microelectronics made possible a further elimination of such forms of cooperation, as well as a more executive function for the machinist once these programmes were operating (Hirsch-Kreinsen 1993).

Their implementation shifted the production process towards a more integrated system of toolmaking, while individual machines could be designed for flexible use. Until the 1970s relatively inflexible manufacturing lines had been established in bigger firms of related sectors according to Taylorist needs. In the United States, machinery firms with a strong orientation towards the military and aerospace sector had promoted a further use of

numerically controlled machines as part of a centrally steered manufacturing process. This created rationalization effects through a high level of automation. While the machine-tool firms in Stuttgart had also tried to apply innovations from microelectronics to their machinery design, it took longer until this knowledge was diffused in firms and until they implemented shop-floor solutions. Finally they chose a totally different path of innovation compared to other countries (Hirsch-Kreinsen 1993).

For centrally steered machine tools highly skilled machinists were less important than for machines, which allowed shop-floor programming. Stuttgart's firms would have lost their production base if they had followed this trend because the qualification of *Facharbeiter* and their abilities to handle machines on the shop floor secured the high quality of their products. Apart from this, firms would have sacrificed their niche specialization if they had tried to make use of the general innovation path by which CNC-technology was spread in the industry. The aim instead was to make use of this technology and adapt it to the special needs of customized machinery on a high quality standard. In this context, some authors had suggested that German firms might have kept their innovative potential by a strategy of deepening their specialization (Sabel et al. 1989). Häusler (1990) argued against this interpretation, because medium-sized firms restructured for the acquisition of competence in new technology fields, thereby widening their range of products and extending them towards machine-tool *systems* instead of specialized machines. However, the particular German variant of these systems lay in the design of confined automation and of decentralized options to steer them.

From the organizational perspective, firms could not reduce their cooperation in exchanges of information and support between customer firms and specialized suppliers. Instead they had to watch out for cross-sectoral forms of cooperation between electrotechnical firms and machine-tool firms. They had also to intensify their vertical relations with customers, in order to follow a less market-based and a more technology-driven path of innovation (Häusler 1990). These forms of cooperation fostered the networked firm model in Stuttgart, which favoured collective goods exchange via vertical customer–supplier relations.

Changing Forms of Governance

In tracing the development of new patterns of governance analysis needs to make use of all the governance modes identified as relevant to local economies (Le Galès and Voelzkow 2001). However, these mainly appear in various hybrid forms.

Some issues were of general and collective concern, for instance, the creation of a universal and commonly used programming language. These measures had been carried out indirectly by the state. Cooperation between firms had been established to meet this demand. But the technical adaptation

to specialized machine tools required R&D measures implemented by the firm. Unsurprisingly, Hirsch-Kreinsen (1993) reports that R&D measures in the machinery industry had been much higher in Germany (on the firm level) than in the United States in the 1980s. Many firms which we interviewed stated that customer demand was essential for the firm's own learning and the actual adaptation process. Some mentioned that customers gave advice on the R&D process, but not all of them supported this development by providing infrastructure such as laboratories to the firms (Interview BW-F-03).

Many developments therefore had to be made in-house by the firms themselves, because they knew best how to implement this technology. One entrepreneur bought steering equipment from the United States and constructed an automatic drilling machine; he then invited other firms in Stuttgart which supplied this firm and pointed out that there was a complete new market niche evolving from which they could all profit. A popular new invention in the 1980s was the processing centre (*Bearbeitungszentrum*) at which several different phases of the work process could be handled. This firm earned most of its money during the 1980s just by selling a particular component for processing-centres (Interview BW-F-08). There were more examples, which showed that while some software components came from the United States, their adaptation and the mechanical side of the R&D process were completed in-house in Stuttgart (Interview BW-F-03). But more common was in-house production of CNC machines, cooperation between larger machine-tool firms and SMEs, or cooperation between electrotechnical firms and machine-tool firms or large customer firms and machine-tool firms. The wide variation in the cooperative mode shows that exclusive reliance on in-firm governance was seldom viable or useful. Nevertheless, the scale of in-house contributions to new inventions was impressive.

One firm reported that it had produced the first numerically controlled lettering machine. The steering technology was developed in-house between 1980 and 1981, and the machine became a huge success on the world market. Such development for machines has often been financed by external organizations, like in the above mentioned case by the Rationalisierungskuratorium der deutschen Wirtschaft (RKW) (Interview BW-F-04). This organization was founded in 1921 by the ministry of economics together with associations such as the VDI. Carl Friedrich von Siemens was one of its founding fathers.

The RKW is a good example of how governance structures are mixed even within a single organization, because its support measures cannot exclusively be regarded as state action. The RKW was designed to support SMEs with services for rationalization and innovation. Its corporatist structure, the involvement of unions, enterprises and the state has been retained until today. After the Second World War it functioned as a major instrument for the implementation of Marshall Plan measures for German SMEs. As we have claimed earlier (Glassmann and Voelzkow 2001), it is another good example of a combination of federalist and corporatist governance applied

to German support organizations. Every *Land* today has an RKW, while its central administration is located in Frankfurt. In order to understand how the high degree of in-house production of LCCGs has been achieved in Stuttgart's machine-tool firms, one cannot ignore the regular assistance of external organizations or larger firms. However, this assistance has seldom been reduced exclusively to a local infrastructure.

Machine-tool firms traditionally cooperated with customer firms, because the design of their machines was oriented towards customer-specific needs and thus cooperation between these two groups of firms was indispensable. However, Häusler (1990) discovered the additional need for machine-tool firms to switch from incremental customer-specific machinery development towards basic research and radical innovation in the field of microelectronics. As a result he observed a growing need for and practice of diagonal cooperation between, for instance, electrotechnical firms like Bosch and machine-tool firms like Trumpf in Stuttgart (Häusler 1990: 93). As stated above, this was challenged by statistical data on the actual relevance of diagonal cooperation (Heidenreich and Krauss 1998; Knodt 1998). Against the latter we claim that such statistics do not take account of the exchange of collective goods. Another reason why this analysis could be misleading is that machinery parts are more regularly supplied and visible in these statistics than are steering components. The latter may be supplied on the basis of *intensified* cooperation. In our interviews we found that such cooperation was becoming increasingly frequent.

It has not been sufficient for firms to cooperate with customers because these did not have knowledge of microprocessor technology. The influence on machinery design changed towards a greater importance of visions for automation and flexibility created in universities, big firms, and research institutes. Because the money for technology policy and innovation was going to both public support organizations as well as big firms, the embedded networked firm model became increasingly relevant for Stuttgart as a paradigm. In our empirical research we found that such cooperation was essential for the survival of the local economy. Firms, specialized in automatic grinding, cooperated with a large electrotechnical firm; if a machine-tool firm ran into serious problems during the phase in which engineers constructed the grinding machine and even later, experts from the big firm came to help on a non-contractual basis (Interview BW-F-06). Another interview revealed how both sides gained from such cooperation, because the big firms did not know how to adapt their software products to the specialized machinery—for instance hydraulic presses—while the machinery firms lacked the capacity to develop CNC technology entirely on their own (Interview BW-F-15). After having cooperated both firms would establish a regular supply relationship. Thus, the adaptation of this technology was not a big problem for Stuttgart firms. Workers had been qualified in-house as well as in seminars of the big firms. (Courses for retraining had simply been bought by SMEs and are thus a good example of straightforward market governance.)

However, the shift towards a 'technology-push paradigm' in innovation, which was necessary to sustain the competitiveness of high quality machine tool products, created the later criticized effect of over engineering (Cooke and Morgan 1998). This resulted from the shift of learning from customer firms towards a more sophisticated approach to machinery development and automation. Both public and private enabling institutions encouraged this path, because customizing alone would have reached its limits as a strategy to avoid competition over prices. Some engineers in our interviews agreed that over engineering was a serious problem later, while others insisted on the fact that customers asked for this kind of development.

Outsourcing was a limited strategy to improve the competitiveness of machine-tool firms in the 1980s. It had to be done for reasons of competence, but was regarded as insecure. Flexibility resulted from in-house resources, and less from external networks of small firms (Interview BW-F-03). When very complex parts had to be ordered, they often had been manufactured by firms of the region, in order to secure communication on orders and technical problems. Only the latter form of inter-firm relationship may be described as a pure market transaction. To explain how LCCGs have been acquired by a market governance mode is not easy because of the depicted shift towards intensified cooperation. However, this kind of cooperation often consisted of mutual counselling on the part of the innovation process, where a firm was able to construct a new product, but did not know how to apply the technology for market niches. The latter knowledge was part of an informal process of cooperation, but the actual exchange of competition goods, for instance the development of a new steering technology, had to be paid for. Either firms paid external organizations for their assistance or they bought each others competence for a new product. Thus, the examples mentioned can be classified as a form of market governance; nevertheless, both sides provided additional support, since both had to gain from the new development of machine lines and steering technology.

Much support for the adaptation process towards the new challenges in the machinery industry came from public organizations. One of these that has been little studied is the University of Stuttgart. Entrepreneurs mentioned it as a useful resource for any cooperation requiring basic research. Heidenreich, Kerst, and Munder (1996) deny that such cooperation could have a large influence on firms' innovation path. In their view universities basically serve as an organization for the transfer of human resources, but our interviews confirmed that many entrepreneurs turn to the university or a polytechnic for the solution of a specific innovation problem. Students obtain their diplomas by working on such problems and are often employed later by the firm concerned. But the influence of universities goes deeper than this. The percentage of engineers of all employees in the German machinery industry has increased from 5.0 per cent in 1968 to 10.5 per cent in 1995 (Heidenreich, Kerst, and Munder 1996: 71), and among these the percentage of those coming

from a *Technische Hochschule* has increased as well. The formal degree of training and education has risen considerably. Both formal and informal ties between the University and Stuttgart firms became closer, following the demand for basic research on the firms' side. The scientific infrastructure at the University now includes an impressive range of specialized institutes with contacts to the local economy.

One of these is the Institute of Machine Tools (IfW), which does regular training of engineers at the University and offers various services like geometric testings on machine tools, measuring technical analyses of drives and axes of machine tools, and their design. In addition to this, the institute carries out research projects. Another example of the local specialization of scientific expertise at university level is the Institute for Steering Technology for Machine Tools (ISW). It was founded as a chair at the university in 1965, dedicated to finding computer-aided solutions for problems of automation of machine tools. Today the institute consists of five organizational units, carrying out tasks ranging from central services and steering technology to system integration, design of mechatronic systems, and components in robotics. It is interesting to note how the institute finances these two different fields of applied and basic research. Developments in the former are financed by (local) industry, while the basic research projects are supported by public funds. Thus a multiple organizational structure of teaching and research in both fields emerged, allowing a combination between radical and incremental innovation as well as the diffusion of knowledge in both fields.

In general we found that these activities of the university were positively evaluated by firms, though some had been disappointed by the slow speed of completing research. One owner commented: 'If the university cannot solve the problem, I am sure I cannot do it either' (Interview BW-F-02). Although firms were self-confident that their own niche market know-how could not be beaten by university institutes, for more general problems and completely new innovative solutions they showed a receptive attitude to help from these institutes. This gives an insight into how path dependences might result from the embeddedness of a local economy. If the university is estimated as a high-rank specialized organization, which provides viable solutions, entrepreneurs might sometimes follow its proposals even if the international market prefers less complex solutions. However, we have no indication that the university created a specific lock-in resulting from its specialization as a public organization, because it combined basic and applied research. On the other hand, it did not propose any measures that would have complemented the DQP-regime with more marketable solutions.

One might still ask, to what extent this peculiar infrastructure must be regarded as a local recombination of national governance structures and thus whether it would produce different outcomes elsewhere in Germany. A very close link between university institutes and the local economy had indeed been established in 1989 in Stuttgart, when the Centre for Innovative Technologies

(ZFS) was founded. The ZFS is a very good example of collective action in the local economy because it finances joint projects of common concern for a number of local firms. As a foundation, which signed a cooperative agreement with the University of Stuttgart, it coordinates projects, which are carried out with the support of a number of specialized institutes, among them the IfW and ISW. These projects are financed by some firms in cooperation with the *Land* government. Money can be obtained from the *Land* only if outcomes of general importance for economic performance of the *Land* are expected, or if the project is of a 'pre-competitive' nature.

The firms which have established this cooperation and form part of it are the biggest machine-tool firms of the local economy together with Bosch, Siemens, IBM, DaimlerChrysler, and a few others. This again supports our perspective on Stuttgart as a networked firm model. While the above listed incentives for cooperation between public and private actors within local confines suggests that there exists a very special network of support institutions in Stuttgart, the only distinctive feature lies in the high sectoral specialization of these networks, not their general organizational structure. Another example may illustrate this: among the institutes, which cooperate in the ZFS, is another university organization, the Institute for Laser Tools (IFSW), which has specialized on the development and application of laser technique in industrial production. It is especially interested to diffuse this knowledge in SMEs. Therefore it cooperates with specialized institutes in this field of innovation and chambers of commerce throughout the whole *Land*. As a result of these activities a Joint Council on Laser Technologies South West was founded.

While the IFSW in Stuttgart coordinates the services of this Council, capacities outside Baden-Württemberg are also involved, and specialized institutes from Hesse are incorporated into the Council. This network is financed by the Federal Ministry of Education and Research (BMB + F) as well as the *Land* government. As an initial step to support innovation, SMEs are given free access to the services of this network once a year, including advice on the application of lasers, development of new applications, planning of systems, qualification on these new systems. There is also a national competence network just for this specialized technology. Even in such highly specialized niches, Stuttgart has not created unique organizations.

Vocational training and the re-regulation of the training system in the 1980s were other areas where national organizations were fundamental. The employers' federations as well as the unions participated in a complex interplay between firms, public institutions, and the workforce, initiating training efforts and co-deciding on organizational tasks of training (Streeck et al. 1987). It can be argued that this system responds slowly to needs for change, as new curricula have to be integrated into the courses of the public vocational schools, occupational profiles have to be recreated etc. In our interviews this was less discussed as a problem with respect to the challenges of the 1980s than for more recent ones. In general, entrepreneurs argued that the high skill level

of trained *Facharbeiter* made it easy to retrain workers for CNC-machines. Further training is the responsibility of the firm, which prepares workers for its specific niche competence. The results of our interviews here confirmed the analysis carried out by Bergmann et al. (1986), who also pointed out that adjustment of training profiles in the machinery industry was not problematic.

A community governance mode requires vertical or horizontal ties on an informal basis between firms, and some common values supporting their mutual help and cooperation. We found indeed several firms that had friendly relations with others, and which were able to rely on their help. In one case all employees of a bankrupt firm were found work by a neighbouring company (Interview BW-F-14). In another case a firm allowed a competitor to use a certain component for which it did not itself have the know-how (Interview BW-F03). The most recent examples resulted from the pressure on small firms in an environment of increased internationalization. In the growth period of the 1980s most firms saw only risks in giving information on their products or developments to other firms. This changed during the crisis, though cooperation remained on a bilateral base (Interview BW-F-01).

Some firms kept their cooperation a secret, because they did not want their customers and employees to know. Joint developments were then safeguarded by an external bureau, to ensure that neither firm had knowledge of the special competence of the other (Interview BW-F-10). It was difficult to discover any shared values as a base for the joint production of LCCGs. Two entrepreneurs said that hypothetically it would be possible and useful, especially in the sub-sector of turning machines (highly concentrated in Stuttgart), to develop lines of machine tools together, but this was wishful thinking (Interview BW-F-16): 'Cooperation with other firms is generally difficult, because individualism is very strong in this region' (Interview BW-F-07). In the eyes of many entrepreneurs their firms were not part of a mutually supported local growth process. Where such interdependences existed, they were seen as unavoidable risk factors. Interviewees preferred to act in-house and not give information to external engineer bureaus (Interview BWF-03).

Because of this unwillingness to cooperate machine-tool firms limited their links to subcontractors, using the links only to reduce production range and increase productivity, not to try to qualify a horizontally acting network within the local economy. This does not contradict our concept of the networked firm model, because with this we highlight the vertical relations between large firms and SMEs. Subcontractors of SMEs existed as well, but have not been networked with the machine-tool firm. Business relations remained bilateral between subcontractors and the machine-tool firm. The flexibility of a network was explicitly denied, while flexibility potential was seen in the pooling of in-house resources (Interview BW-F-08). Inter-firm contacts often remained on a bilateral base, and within these confines they were formal, though might become friendly if entrepreneurs knew each other, for example, through their studies at the same polytechnic in Stuttgart.

The production of LCCGs was a difficult task due to this bilateral character of inter-firm contacts, but we shall see that the increase in competition paradoxically changed this attitude.

Offe (1999) has pointed to the fact that a mix of governance modes is always necessary to compensate for the disadvantages of any one. In this way associational governance helped to eliminate the weakness of the community mode. For instance the same entrepreneur who stated that in-house production of collective goods was the most efficient strategy to preserve flexibility for the firm, participated in a joint management project, designed for eight SMEs of the region. Here he had learned about the disadvantages of the entrepreneur as the exclusive and dominant holder of knowledge of his product. He had implemented several of the principles, which had been discussed, such as internal transparency of the firm and possible strategies for cooperation (Interview BW-F-08). This workshop was organized by the Fraunhofer Institute in Stuttgart, the *Landesgewerbeamt*, the *Arbeitsamt*, and the local chamber of commerce.

In general, however, the local chamber was not regarded as important for the production of collective goods. In an interview with the chamber it was stated that its image problem resulted from the fact that it is primarily occupied with such issues as training (Interview BW-I-05)—collective goods which the German entrepreneur takes for granted from public organizations. In fact, the IHK Stuttgart has always pursued a neo-liberal strategy of non-intervention. In line with the conservative *Land* government in the Späth-era, the IHK allied itself ideologically with the *Land* government and its semi-public organizations like Steinbeis against the unions (Knodt 1998), which had an almost hostile relationship with the IHK in the 1980s and a non-existent one with other support organizations (Interview BW-I-04). However, IG-Metall argues that its strategy of ‘interest-based co-management’ allowed it to fulfil its original role as a union, while in other *Länder* the closer connection between the governing SPD and the unions produced conflicts of interests. IG-Metall in Stuttgart was present in the typical niches of LCCG provision, for example, regular negotiations over wages with the regional employers federation VMI or Südwestmetall, and asserting qualitative issues such as *Erholzeiten* (relaxation time) and ecological questions within industrial relations (Interview BW-I-04).

Industrial associations belong to a third category. As a leading support association, the VDMA and its subgroup for machine tools (VDW) has often been mentioned by machine-tool firms as a useful association for assistance with technical data, advice on legal questions, etc. Regional bureaux of the VDMA exist in Stuttgart and decentralized support is offered, but again the association is embedded within a national institutional framework. Another association illustrating how this governance mode compensates for lacking community-based solutions is the VDI. It long ago established a regional organization which is responsible for the old territory of Württemberg, the *VDI-Haus Stuttgart*. Today it is organized as a non-profit

association and is able to acquire public funds from both federal and *Land* governments. Its aim is to diffuse knowledge of engineering to all levels of the firm hierarchy. In an interview with the VDI the secret of its success was depicted as lying in the voluntary participation of local entrepreneurs in workshops, seminars, and lectures (Interview BW-I-01). Local machine-tool firms confirmed that although they would hesitate to cooperate voluntarily with other firms, they would frequently participate in these seminars of the VDI and exchange information on practical problems regarding innovation and firm organization. Cooperation at the VDI is not restricted to machine tool or machinery firms, but extends into the car industry, car suppliers, and electrotechnical firms. But still local firms ask the VDI whether it could offer these seminars in-house. For legal reasons it cannot do this. Local entrepreneurs are forced to make use of the general programme the organization offers. We see how legal and formal aspects enforce collective action where associational support would otherwise just be used for a single firm's benefit. This creates the positive by-product, that entrepreneurs talk to each other and discover common concerns about. The VDI in Stuttgart is linked to the IPA. Lecturers are invited from the university, and staff members of the VDI also participate in subcommittees of the *Landesgewerbeamt*, which discusses issues of vocational training for the engineering sector. Thus the VDI illustrates how public organizations and associations (excluding the unions) are networked locally and support the cluster with collective goods. However, in the 1990s the market situation changed and this regional support infrastructure had to be adjusted to new challenges.

Strength and Weaknesses of the Networked Firm Model

The crisis of the 1990s in Baden-Württemberg has been much debated (Braczyk, Schienstock, and Steffensen 1996; Herrigel 1996*b*; Cooke and Morgan 1998). Eventually however, firms recovered. How did they and public actors achieve this?

Challenges for Firms—Transformation of the Local Machine Tool Cluster

Some firms reported that 1993 was the worst year in their entire history of entrepreneurship (Interview BW-F-08). The comparative advantage of high quality products turned into a disadvantage. This was largely the result of a downturn in traditional mass markets. Almost every interviewed firm produced components or machines for the motor industry, either by supplying directly to firms like DaimlerChrysler or to suppliers, or to other machine-tool firms, which depended on the motor industry.

While in times of growth the networked firm model meant that smaller firms could be supplied with LCCGs by larger ones, in times of crisis this

dependence created three negative effects. First, the absolute number of orders for new machine tools decreased enormously. Second, the restructuring of the large firms introduced new systems of control, which meant that price margin now became the main relevant measure by which supplier relationships were kept or cancelled. Third, while in times of growth a customer firm would make its small suppliers think creatively about innovations, it now only supported innovation if the new product could fit its own existing calculations. An internal restructuring process, which allowed machine-tool firms to produce machines within the demanded price margin, became essential. The centre of attention shifted from product-based to process-oriented innovation, for which in most cases the customer firm made itself responsible. The networked firm had the advantage over an informal network of firms that it could steer the innovation process hierarchically. But this meant that the local economy had to implement the cost reductions which large firms demanded. Japanese machine-tool firms had entered German niche segments with simple and low cost products, even at the high quality end (Naschold 1996).

As a result, six processes transformed the local machine-tool cluster: (1) firms began to restructure their production process; (2) there were massive redundancies; (3) low cost standard machines were added to the current programmes; (4) many firms went bankrupt, while takeovers were organized by the more successful firms; (5) smaller firms began to cooperate more frequently with each other to meet the new criteria for production; and (6) firms invested into new high quality products of their original competence.

1. The restructuring process of firms was oriented towards the concept of 'lean production'. Flat hierarchies had always been characteristic of Stuttgart's machine-tool firms, and a total transformation according to the Japanese paradigm was neither planned nor possible, for cultural reasons, which Streeck (1996) has explained for other sectors. Nevertheless, some elements of the lean production concept had been introduced in larger firms, particularly group working. Not all firms saw a need or benefit in this, but those that switched to it reported that the production process was more efficient. However, two problems arose, concerning the qualifications of workers and formal firm hierarchy.

Since workers had been used to operate on only one or a few machines, the concept of group working demanded greater flexibility, not only knowledge of several machines, but also of different aspects of the production process (e.g. mechanical as well as electrotechnical aspects). The existing training system had restricted such mixes of the knowledge base, vocational profiles being designed to represent portable skills for one specialized part of production. The training system needed to create mixed profiles such as the 'mechatronic'.

The problem of firm hierarchy was often that the *Meister* could no longer function as the leading figure in the team. More important was who was able to work with new machines and teach other members of the team. These

were sometimes *Facharbeiter* from other firms, newly brought in following restructuring. This of course created hostility within the old workforce, which was not used to accepting the authority of informally qualified and formerly external personnel. In one case there was an anonymous threat of violence against a new team leader (Interview BW-F-12). However, workers eventually accepted the new situation because, according to the interviewee, they were fascinated by the new machines.

Some firms had specialized experts for every segment in standard, high and low cost niches, though they were all responsible for the same machine-tool system. Due to the central aim of cost reduction, one firm integrated such different segments, dismissing two engineers and leaving only one responsible for all types of machines in one segment (Interview BW-F17). Firms tried to become more efficient in connecting the sales department and construction bureau with the shop floor, not only by applying computer programs, enabling data to be sent from the construction engineer's desk to the shop floor machine, but also by cooperating directly. In one firm, which applied the lean production concept most closely, teams were formed for every new contract on a new machine tool. This structure was implemented in the sales and purchasing departments as well as on the shop floor, and both levels cooperated to increase the quality of time management, logistics etc. (Interview BW-F-16).

2. We have already shown that employment declined. In all firms we were told that the least qualified or oldest workers had to leave. Retraining is now often seen as a key element for future success. All entrepreneurs were satisfied with the training system and stated that additional skills should be created on the basis of *Facharbeiter* knowledge. However, some firms began to employ unqualified workers and train them in-house, often foreigners who wanted to enter the labour market directly. In all cases such workers had been paid at *Facharbeiter* rates. This was therefore a flexibility measure (e.g. in working hours), not an attempt to profit from a dual labour market structure, which has not existed in Stuttgart. Thus firms recovered; in one case the workforce shrank from 1,100 to 300 during the crisis, expanding again to 800 by 1999 (Interview BW-F-16). But the new cohort of employees is younger. Some firms mentioned this generational shift as the most important transformation, which would also change the spirit of cooperation.
3. During the crisis many firms began to introduce cheaper standard machines in addition to their high quality lines. This was a reaction to the pressure from large firms in Germany and elsewhere. Some firms cancelled local supplier relationships and cooperated with firms from Eastern Europe (Interview BW-F-03). In general more was put out to external suppliers. But two problems followed, especially with partners in Eastern Europe. Sometimes their quality was acceptable, but they could not deliver in time, because their older machines made additional craft work indispensable. Alternatively, they could not meet German quality standards. As a result the quality of Stuttgart machine tools was endangered, but firms agreed to experiment in this way,

in order to keep the contract with larger firms. Since they could no longer ensure the quality of their products, they no longer issued guarantees. When problems arose, the purchasers had either to pay for servicing or to solve problems on their own. Very soon it became evident that it was not a viable solution to leave the path of high quality production. Customers agreed that cheap machines created a serious risk for their own quality-oriented production. Supplier relationships shifted back from Eastern Europe to Germany. The degree of outsourcing in general became higher, but where possible and necessary to secure quality standards, SMEs tried to produce again in-house (Interview BW-F-03).

4. However, this phase of high pressure on small firms undermined the economic base of many. One owner stated that there was no way that one could both innovate and sell products within the demanded margins (Interview BW-F-14). The firm had existed since 1904, but no family member would take over the business in the next generation. Production methods followed conventional paths, so restructuring would have only been possible with a younger cohort of workers. Such firms have not been taken over. But even some larger firms, operating as leaders in niche segments on the international market, have declared bankruptcy. These have been taken over by other firms, mostly Stuttgart competitors wishing to create synergies (Interview BW-F-05). In general, Häusler's (1990) prediction became a reality, that SMEs in the machinery industry would seek a medium sized structure allowing a presence in foreign countries with subsidiaries, and development of a large in-house potential for sophisticated R&D. Those that had enough capital bought markets and eliminated competition, in order to secure their contracts with large firms and their position as niche producers. One entrepreneur stated that in order to survive on the international market, a machine-tool firm in Stuttgart had to have a turnover of about DM 50 m. a year (Interview BW-F-15). However, this was a firm which stated that cooperation had never worked, and that because of this, the only solution was to buy other firms and markets and integrate them.
5. Other firms agreed that there was a tendency to control the market by becoming partners of large firms, but that not all firms were powerful enough to pursue this path. Therefore some owners stated, in contrast to those who wished to integrate competitors and suppliers, that they preferred cooperation with other SMEs. Small firms had to fight against the dictatorship of large firms by cooperating horizontally. An example was given in laser technology, where one firm had acquired competence in physics and another in machinery construction, but their products had been similar. In order to achieve a better quality standard and to innovate, they began to cooperate. Interestingly, the owner said that this would never have occurred in the 1980s, when the success of local machine-tool firms depended on their in-house competence (Interview BW-F-04). But today firms must be part of either an autonomous network of SMEs or a network established by a large firm.

6. Firms survived with innovations in high quality machines, which had a certain standard base, but which were still customized products at the high cost, high quality end. While in general the restructuring process created better cost–benefit relations, Stuttgart's machine-tool firms followed the conventional path of the DQP-regime. This became especially visible in the sub-sector of turning machines, where the two biggest competitors had a similar market idea, which in both cases secured their international market position (Interview BW-F-16 and 05). They were not rescued solely by product design, but also by their openness and flexibility to achieve these results with different manufacturing methods.

New Regional Policies

In September 1992 the first machine-tool firm reported a 40 per cent decline in orders for the third quarter of the year (Interview BW-I-02). In the same year a grand coalition between CDU and SPD took over the *Land* government. During this period of crisis, until in 1995 the economic situation started slowly to improve, it became clear that policies would have to be decentralized, and that traditional aversions between the unions and the institutions of the *Land* would have to be overcome. In order to achieve this, the social democratic minister for economics, Spöri, initiated a dialogue between all public and private actors. In particular the unions, formerly excluded, were supposed to participate, to elaborate jointly a new concept for industrial policy in Baden-Württemberg (Wirtschaftsministerium Baden-Württemberg 1995).

This dialogue-oriented intervention of the ministry helped to establish regular cooperation between VDMA and IG-Metall. However, as will be described later, their cooperation later excluded involvement by the *Land* government, especially after 1996 when party control of the government shifted again towards a conservative–liberal coalition of the CDU and FDP. Nevertheless, it was an achievement of the new policy approach that conventional cleavages between labour and capital broke down a little. Another impact of this new initiative was that policies were supposed to operate on a decentral level. This aim has not been met adequately so far, because the *Land* only claims to be responsible for the stimulation of regional policies, not the regional implementation of *Land* measures. In an interview with members of the ministry of economics it was made clear that an exclusive allocation of resources only to certain regions of the *Land* is impossible (Interview BW-I-02). It would run counter to the principle of equal living conditions. Apart from that the shift from firm-specific support in the whole *Land* to an approach which supported a sectoral recovery made it even more difficult to respect regional peculiarities (Müller-Jentsch et al. 1998).

There has been considerable discussion of the general role of the new *Land* government following the creation of a council for innovation to carry out measures proposed by the Future Commission, but the *Land* has fewer resources available than in the 1980s, having experienced a dramatic reduction of income from taxation during the crisis and having to play its part in subsidizing the *neue Länder*. However, DM 8.2 m. was granted until 1995 for joint projects aiming at cooperation between customers and suppliers in the machinery industry. Vocational schools received DM 18.7 m. for measures to improve their infrastructure (Wirtschaftsministerium Baden-Württemberg 1995). The Steinbeis-Foundation acted as an agent for this initiative by offering advisory services to supplier firms in the car and machinery industry.

Measures within the initiative included projects on information flow, new technology, simultaneous engineering, cost-reduction, cooperation and strategic alliances, support of export measures, training and retraining, and liquidity bonds. All were based on classical instruments of public intervention, but were specifically designed for the machinery industry, elaborated with the help of firms and associations and finally bundled as joint projects of the industry. Thus, not only was financial aid given, but also platforms were created for firms to cooperate or for pilot-projects to start. These cooperation initiatives aimed to include up to ten SMEs and one research institute, but they have been regarded as only models and not as a general support programme, for which there would be no funds.

It is interesting to note, that while these initiatives come and go, a more stable cooperation has been established by associations, not under the rule of the government but under that of large firms, which have obtained a key position within this network of public and private partnerships (Interview BW-I-02). Trumpf in particular has dominated the discourse on future initiatives and still moderates associational cooperation instead of the *Land* government.

The Changing Role of Associational Bargaining

As noted, the crisis of the machine-tool sub-sector caused a reorientation of associational actors to cooperate during the *Land* grand coalition between 1992 and 1996. However, these arrangements were still different from a normal tripartite structure. They were largely initiated by the IG-Metall in Stuttgart, and included cooperation between the union and the industrial associations, especially the VDW subgroup of the VDMA, rather than with the employers' federation (Müller-Jentsch et al. 1998). In 1992 IG-Metall initiated regional conferences, where structural as well as cyclical problems of the local machine-tool industry were discussed. This initiative aimed at a new approach towards decentralized industrial policy. Local firms had to be represented, and this was achieved through works councils. Again Trumpf appeared as a central firm. Its adaptations of new production methods have been valued as a paradigm for restructuring.

Although the *Land* government later tried to regulate this partnership, negotiations remained on a bilateral base. Study groups were initiated, always with a parity board of members from IG-Metall and VDMA, in which problems of machine-tool firms were further analysed, paying particular attention to new products, joint research, regional markets, the organization of work, qualification measures, and strategic alliances (Müller-Jentsch et al. 1998). A report of the work was publicly launched in Stuttgart, containing proposals for the restructuring process, in particular with relation to group working.

This dialogue progressed falteringly, because IG-Metall in Stuttgart was not used to the dual role of shaping industrial policy on the one hand and collective bargaining on the other. Cooperation broke down as soon as the industry experienced a cyclical upturn in 1995. What remained was only a centralized bipartism between the unions and industrial associations.

In 1995 negotiations over wages became again a difficult issue, and IG-Metall pursued its traditional aim. Nevertheless, the need for decentralized intervention and LCCGs provision had been much more accepted by the unions than for instance by the Handelskammer. Since IG-Metall did not wish to give up its wage-bargaining power because of its involvement in cooperation, it insisted that regional industrial policy measures—and thus the production of *local* collective competition goods—were not primarily its responsibility. It argued that a reformed regional association should do this kind of work (Interview BW-I-04). The union agreed to co-finance the association with the chamber and the *Land* government. The outcome has been a compromise on the *Wirtschaftsförderungsgesellschaft* (WRS) as a subgroup of the regional association of Stuttgart.

Another phenomenon, which deserves attention in this context, is the erosion of firms' membership in employers' federations. The decrease of membership in the VMI and Südwestmetall between 1990 and 1995 has been analysed by Schroeder (1997). His analysis of Baden-Württemberg showed that the exit rate is especially high among machinery firms—61 per cent of all firms leaving VMI, though only 23 per cent of members belonged to this sector. The consequences for workers are ambivalent, because wages usually continue to follow the associational agreements. On the other hand, the wage differential among engineers increased during the 1990s (VDI 1997). One hypothesis suggested that machinery firms in a supplier relationship with large firms leave the employers' federation more often than others, but this has been refuted by Schroeder (1997: 236). Resignations have been concentrated among medium sized (100–499 employees) rather than small firms, probably those that had restructured according to new standards of cost efficiency. They may have calculated that they would have more room for autonomous action on working hours and working time flexibility, wages not usually being an issue. Even employees without certified skills, but qualified in-house and doing the same job, receive equal payment.

Conclusions

Our aim was to demonstrate how a German local economy in a traditional sector could remain successful. We found that from its historical origins the Stuttgart machinery industry established a production system based on high qualification of workers and engineers, and sophisticated R&D oriented towards large customer firms (especially the car industry), accepting the rules of a high wage economy, and thus creating a governance structure which we conceptualized as the networked firm model. The basic challenges of the 1980s consisted of the integration of microprocessor electronics for customized machines, which allowed decentralized operation and programming. Although this demanded radical innovation, the local economy dealt with it by cooperating with larger firms and public funds and institutions, especially institutes which combined basic and applied research. Even traditional and more centralized institutions like the training system adapted vocational profiles according to the new knowledge base in machinery construction.

However, the 1990s challenged the local economy with efficiency standards mainly created by large firms that now demanded better cost–benefit relations from their dependent SMEs if they were to remain in the supply chain. The networked firm model revealed its ambivalence in an environment of increasing global competition. The power of large customer firms as among the most important private providers of LCCGs enabled them to put pressure on smaller firms. Therefore the latter saw the need to cooperate more horizontally to solve their collective action problems. However, since the local economy could not rely on a tradition of informal self-help, it needed additional support from associations and public institutions.

The need for decentralized political intervention grew dramatically. While the unions supported this approach, they preferred public agents acting on their behalf and co-financed by them, to avoid compromising the traditional field of wage bargaining. Many machinery firms, which considered that there was a need to decentralize the industrial relations system, left the employers' federation. While the restructuring process of firms, which has been supported by the traditional support infrastructure and the *Land* government, has been successful in that the DQP-regime remained alive and firms recovered through quality oriented innovations, the local economy has witnessed a concentration process among those firms which created new subsidiaries abroad, maintained in-house production of LCCGs, and intensified their cooperation with larger firms. These latter produce according to the rules of the DQP-regime and remain stable. Smaller firms will not survive on this traditional path, unless there is more decentralized bargaining over working hours and wages. While solidarity among small firms may increase and solve collective goods problems, both small and large firms have dismissed

a large number of unqualified workers. Older engineers and unqualified workers cannot be reintegrated into the labour market of the local economy, if the DQP-regime remains the only means for the local production system to produce for the world market.

It seems that the German system of production still survives and only produces local refinements of the national policy, not autonomous and completely diverging systems of production on the local level. But the (welfare) costs of maintaining this model seem to have reached a new peak. So far, the advantages of clustering for firms in German local economies have lain in the mutual learning and exchange of competition goods between larger and smaller firms. If now some of them become excluded from this process, they will have to reorganize cooperation on a decentral and horizontal level; but so far public support for this is only half-hearted.

5 Machine Tooling in the United Kingdom

COLIN CROUCH AND JOE O'MAHONEY

I built this factory up from scratch and have never asked anyone for help, I'm not going to start now.
(West Midlands machine-tool firm owner-manager)

The machine-tool industry began in the United Kingdom and from there spread around the world to create a \$35bn. business. Since its initial point of pre-eminence, British production of machine tools has dropped to about eighth in the world and since 1960 employment in the sector has fallen by 90 per cent. The traditional view of the decline of British manufacturing has focused upon both external determinants such as the loss of the Empire and the rise of American and Japanese manufacturing, and internal issues such as the short-termist economy and the rise of the services sector. The extent to which the machine-tooling sector fits with this explanation has received renewed attention recently with a revisionist analysis of the 1951–1990 period by Zeitlin (2001). He emphasizes actual choices rather than structural determinants as leading to the demise of the sector, and in particular the preoccupation of both successive governments and industry experts with securing domination of the sector by a small number of large firms.

This chapter analyses the decline of the sector in the United Kingdom. In the first section a brief history of the industry finds that part of the explanation lies in both globalization and the familiar British story of a low-cost strategy, short-term investment patterns, and general neglect of manufacturing. However, it does not conclude that the outcome was inevitable. As Zeitlin argues, within the structural framework elements of political decision-making can be shown to have had a clear detrimental effect—not least in failing to tackle the supply of local collective competition goods (LCCGs) through any other means than concentration within giant firms. In the second section, we examine the current interplay between structural weaknesses and political institutions in the West Midlands part of the industry. This regional study argues that, despite some evidence to the contrary, the institutions which might support industrial networks are still weak. Little is done to capitalize on the potential advantages of clustering beyond what the

market provides, apart from certain consequences of hierarchy, both within conglomerates and in supplier relations.

Machine Tools in the United Kingdom: A Historical Perspective

The early industrialization of the United Kingdom explains the predominance of British machine tooling in the eighteenth century (Fermer 1995). Much production was geared around heavy engine machines and skilled labour was cheap, so there was little demand for specialized batch or one-off machines (Rolt 1971). By the mid-nineteenth century American manufacturers and the so-called American system dominated the precision end of the market, attracting orders from industries which required smaller, faster, and more precise engineering (Sciberras and Payne 1985). By 1913 German exports of machine tools too outstripped British, by a factor of four. The period before the Second World War saw a growth in diversity of machine tools. The needs of the automobile and aircraft industry required robust and powerful machines, requirements which were met by the growth of high-power and electric innovations, especially in the United States. The decimation of the German and Japanese economies following the Second World War held mixed blessings for British manufacturing. While competition was reduced during this period, the need for investment in the Japanese and West German economies proved to be the lynch-pin of their later success.

The British industry now began to be restricted in its expansion by shortages of skilled workers. Zeitlin (2001) points out that the sector was continually competing in the (limited) skilled labour market with the motor and defence industries. Despite repeated criticisms from the industry, academic experts, and trade unions, the fundamental weaknesses of skill shortages, lack of investment in research and development, and the resulting pursuit of generalized (rather than high-performance or precision) machines, were not tackled adequately.

Lack of investment (see Table 5.1) in the postwar period was manifest in the failure of Britain to compete in terms of research and consequently innovation. Despite the early adoption of numerical control systems in the 1950s, the incorporation of the computer and associated technologies into machine-tool design was more difficult in the low-investment environment of UK manufacturing. The most dramatic innovation after the 1950s was, without doubt, the introduction of computer numerical control (CNC). High levels of investment, especially in Japan, combined with a market strategy of quality rather than cost meant that other countries were swift to adopt and apply CNC technology. The sluggish take up within the United Kingdom was not only due to the failure of machine-tooling industries to produce CNC machines, but also because the home market itself was very much geared around low-cost, low-quality production. Even in 1992, the United Kingdom

Table 5.1. Investment in machine tools in % of industry GDP, 1960–1990

Year	Britain	Germany	Japan
1965	18.5	28.5	32.0
1970	18.8	27.6	39.1
1975	19.7	19.7	32.8
1980	17.9	23.4	32.2
1985	16.9	19.6	28.0
1989	19.6	21.3	31.5

Source: Shaw (1992).

did not possess one manufacturer of the control mechanisms needed for CNC machine-tools. The failure to develop new products was, according to Parkinson (1984), one of the major contributory factors to the malaise of UK machine-tool production.

Following a series of reports in the 1960s, improvements in investment and the encouragement of qualifications in the sector were undertaken by both government and the industry itself. However, the United Kingdom still lagged behind West Germany and the United States in these areas, and its relative improvements were far behind the emerging economies of Japan, and later Taiwan and South Korea. These trends were exacerbated during the major restructuring of the 1960s. Debate over the industry's structure concentrated on whether it should be concentrated in the hands of a few large enterprises or, as the unions and eventually the Labour Party considered, be amalgamated within one large state-owned firm. It seemed taken for granted that amalgamation of some kind was the only means of providing the research, marketing, and skills infrastructure which the industry would need. It was virtually taken for granted by most experts and government committees that the presence of small- and medium-sized enterprises (SMEs) constituted a weakness to be overcome, not the basis of a possible future strategy (Zeitlin 2001: chs 11, 14).

Strategic industry-wide rationalization of businesses which was later encouraged by the Industrial Reorganization Corporation (IRC) did little to improve specialization and nothing to improve efficiency, despite a dramatic increase in R&D expenditure (Zeitlin 2001). The IRC held strongly to the established view that improvement could come only through a rationalization of the number of firms in the business, including a large state-holding (Zeitlin 2001). It did not seem to notice the constant drift of R&D facilities away from the West Midlands, where most production was located, towards London and the South East (Lissoni 1993; WMDA 1998: 8, 23, 35). While this was true of many of the region's industries, it was particularly so in machinery. Several of these were dependent on the defence sector,

which located its R&D facilities close to the Ministry of Defence's own laboratories, heavily concentrated in the South East (Buswell, Easterbrook, and Morphet 1985).

By the end of the 1970s the global position of British machine-tooling manufacturers was unrecognizable from that of a century previously. The following decades saw the transformation of the British industrial landscape by deregulation, privatization, intensified competition, and the promotion of the services sectors. However, none of these changes led to a revision of views in either government or the sector itself over the best means of furnishing competition goods, with the exception of the policies of government during the 1980s to encourage Japanese entry into certain customer industries (especially motor vehicles), in the hope that this would encourage improved supplier chains. Simultaneously, global competition was opening the British market up as never before, not only to existing competitors, but also to the emerging economies of Korea and Taiwan, who could compete effectively at the cheaper end of the tooling market. The decrease in British employment in the machine-tooling sector within this period in relation to that of Germany is traced in Table 5.2.

The low point came at the end of the 1992/3 recession: only 125 machine-tool firms had survived, employing under 12,000 workers, compared with 46,000 in 1980, and producing only ECU 572m. worth of tools. Thereafter however there was a change in fortunes. The end of the early 1990s recession signalled a recovery for British manufacturing generally, and from 1996 machine tools and the rest of the machinery sector responded to the recovery of their customer industries with a marked improvement, both absolutely and relatively in relation to other European economies, as was shown in Chapter 1. By 1998 these industries had regained their 1992 share in world trade, though renewed decline soon

Table 5.2. Employment in the machine-tool industry (000)

Year	Britain	Germany
1960	81	n.a.
1970	65	121
1975	49	109
1980	46	98
1985	24	88
1990	20	103
1995	13	68
1997	14	64

Source: Shaw (1992); CECIMO (1998).

Note: German data 1970–1990 amalgamate those for the Federal and Democratic Republics of Germany.

followed as the value of sterling rose against the newly established single European currency. Given the scale of the decline of the sector during the 1980s, it can be surmised that those firms which survived were resilient, and either were always, or rapidly learned how to become, highly competitive. The so-called lame ducks, which were often assumed to be a burden on British industry so long as government policy sought to sustain aggregate demand, had disappeared, leaving only the tough to flourish in the new market place.

The Institutional Context

The consensus of much of the literature on British manufacturing in general is that it has been subjected to short-term financial, rather than longer-term technological criteria (Bessant and Grunt 1985); and that firms have been in aggressively competitive relations with each other. Zeitlin (2001) has related this general situation to the machine-tool sector in particular. The convergence of British industry at the lower end of the quality market, combined with poor innovation and development due to short-termist investment criteria, is seen as explaining how the opportunities offered by CNC in the 1960s and 1970s were missed. On the other hand, some authors have argued that, given the inevitability of British relative decline from the advantages of early industrialization, the UK economy has in fact survived and adjusted quite effectively. Also, the short-termist shareholder-driven model has become that most admired by the newly important global financial markets, which prioritize flexibility and ease of exit. This has led to some positive investment flows to economies which, like the British, follow closely the approved model.

Government policy, particularly during the 1980s and 1990s, has often been described as encouraging the intensification of competition at the expense of inter-firm cooperation, while withdrawing even more than in the past from direct provision of services itself. The high numbers of foreign owned firms (e.g. Cincinnati Milacron and Yamazaki) may have contributed to this outcome; Malecki (1982) found little evidence that Japanese and other direct inward investors brought R&D facilities with them. They kept these in their home countries, just as UK-based firms themselves kept such resources close to their London head offices and not in the regions of production (WMDA 1998: 23).

On the other hand, Crouch and Farrell (2001) have argued that there have in at least some sectors been functional equivalents of cooperation and favourable government policy in the United Kingdom. University research departments and other serendipitously located institutions have sometimes provided non-market centres for the coordination of collectively available competition goods, amounting to forms of economic governance. These have enabled points of considerable strength to develop within the United Kingdom, especially in high-tech science-driven sectors. These developments have mainly affected 'new' industries located in South-East England

and East Anglia (see Proudfoot, Chapter 15, this volume), rather than the more 'traditional' sectors concentrated in the Midlands, the North, and Scotland (Crouch and Farrell 2001); though as we shall see below, they have not been entirely absent from the West Midlands machinery industries.

It is also important to note that, contrary to some stereotypes, UK government policy since the 1980s has not just been devoted to clearing away market impediments. Government departments, in particular the Department of Trade and Industry, have been active in promoting various self-help quality improvement devices among firms, including production of a battery of quality benchmarks (e.g. British Standard BS 5750, International Standard ISO 9000, Investors in People and Quality Assurance).

At local level Training and Enterprise Councils (TECs) were established to encourage cooperation and the pooling of expertise among firms, and were used as channels for government policy initiatives (Bennett and McCoshan 1993; Crouch, Finegold, and Sako 1999: ch 6; Crouch and Farrell 2001: 202–4). In particular, it was hoped that a local contact point of this type would help bring SMEs close to government initiatives for improving performance. (During 2000, TECs were abolished and their functions incorporated into regional learning and skills councils.) There is also some evidence that higher quality standards have been demanded of companies by the buyers of parts and tools, such as the QS9000 programme of Ford and General Motors (O'Mahoney 2000). As a relatively low tier in the supply chain, machine-tooling companies are often the last to feel either the benefits or drawbacks of such standards, and the extent to which these have trickled down to them has remained under-investigated.

Some observers have argued that the logic of the traditional short-termist, low-cost, low-quality approach has forced the machine-tooling sector into an unworkable path of competing on price with the emergent economies of India and Asia (*The Engineer* 1998). On the other hand, we have the evidence of the recovery in the late 1990s, which it could be argued occurred when the combination of eliminating inefficient firms through tough monetary policies with locally delivered, voluntarist national policies of bench-marking and emulative performance improvement had become fully effective. We need both to decide whether we are observing relative failure or relative success, and to decide how to explain the performance that is observed. Did finance-oriented short-termism finally come into its own as the shareholder-value model of the corporation came to dominate the world economy following the combined revolution of deregulation of financial markets alongside new information technology in the late 1990s? Has this rendered LCCGs and local production systems in this sector irrelevant for success? Or did the more institutional innovations of the 1980s and 1990s finally pay off? Or was there just a continuing relative failure, which the institutional policy initiatives were too weak to assist? In particular, what part was played by SMEs in the process of change?

In this chapter we can address some of these questions to the extent that they operate at the level of local production systems. Table 5.3 shows the

Table 5.3. Concentrations of small machine-tool production units, 1991 and 1996

Area	1991		1996	
	Units	Employees	Units	Employees
<i>South East</i>				
Aylesbury	36	514	37	377
Banbury	3	25	*	*
Colchester	28	323	*	*
Guildford	29	565	23	164
Hertford	37	504	51	347
Hitchin	*	*	22	113
Medway	34	436	23	235
Slough	29	546	25	329
Southend	23	438	38	266
Watford	51	604	48	670
<i>Greater London</i>				
Heathrow	55	979	70	804
London	104	1,336	123	1,044
<i>South West</i>				
Bristol		26	270	32
325				
Poole	*	*	23	53
<i>West Midlands</i>				
Birmingham	159	2,908	212	2,435
Coventry	76	1,277	118	1,325
Dudley	52	1,267	87	722
Walsall	35	954	73	677
Wolverhampton	*	*	32	324
<i>East Midlands</i>				
Leicester	41	1,290	66	772
Nottingham	42	673	37	369
<i>Yorkshire and Humberside</i>				
Bradford	27	517	*	*
Calderdale	27	930	34	1,034
Leeds	34	951	29	350
Sheffield	37	1,317	50	862
<i>North West</i>				
Liverpool	33	409	27	207
Manchester	49	1,042	69	669
<i>North</i>				
Newcastle upon Tyne	*	*	22	211
South Tyneside	37	195	*	*
Sunderland	25	292	*	*
<i>Scotland</i>				
Glasgow	23	544	27	429

Source: Crouch and Farrell (2001); unpublished data of UK National Statistics Office.

Notes: Units=no. of units 200 or fewer employees, excluding all areas with 20 or fewer units.

* signifies a number of units of 20 or less.

geographical location of all concentrations of more than twenty small- and medium-sized units producing machine tools in Great Britain in 1991 and 1996. It will be seen that there are very few of these concentrations, and most of them are found in two locations: Greater London and a number of areas contiguous with it in the South East; and the area around Birmingham in the West Midlands, which we have already mentioned as being the industry's heartland in the United Kingdom. The highly populous combined South-East and Greater London region contained 460 of the units in 1996, employing 4,349 persons. The considerably smaller West Midlands region had 522 units and 5,483 employees.

In an analysis of employees in small units in the industry as a proportion of total employed persons in a Travel to Work Area (TTWA), Coventry in the West Midlands emerged as the only one to have a significant concentration (Crouch and Farrell 2001: 171). Within the West Midlands, machine-tool production in 1991 was largely concentrated in four contiguous TTWAs: Birmingham, Coventry, Dudley, and Walsall. Between 1991 and 1996 (the first year of the recovery of machinery production) each of these had seen increases in numbers of *units* considerably larger than the national average (Table 5.4). Total numbers of *persons employed* declined in all except Walsall, where there was a very small increase. But this decline was considerably less than the national average. It is in this area, and particularly around Birmingham and Coventry, that a viable British local production system in machine tools can still be found. Our research has therefore concentrated on this location.

After 1996 there was a major change in the designation of TTWAs in British statistics, and it is difficult to make more recent local comparisons. However, we can plot the development of the Birmingham and Coventry areas until 2000. There was a continuing small growth in numbers of units but decline in persons employed in Birmingham, but in Coventry both units and, even more so, employees declined considerably.

Before starting this local study, and while remaining at the national level, we should give some attention to a hypothesis important to the theory of

Table 5.4. Machine-tool production in the main West Midlands centres, 1991, 1996, and 2000

	1991		1996		Change, 1991–1996 (%)		2000		Change, 1991–2000 (%)	
	Units	Employ- ees	Units	Employ- ees	Units	Employ- ees	Units	Employ- ees	Units	Employ- ees
Bir- ming- ham	160	3,339	213	2,903	33.12	–13.06	223	2,022	39.37	–39.44
Coven- try	78	1,773	119	1,651	52.56	–6.88	92	935	17.95	–47.26
Dudley	55	2,368	87	722	58.18	–69.51				
Walsall	35	954	74	977	111.43	2.41				
All UK	2,106	53,535	2,565	36,261	21.79	–32.27				

Source: Own calculations based on unpublished data of UK National Statistics Office.

local production systems. This should predict that SMEs (here, proxied by small units), which are located in clusters should stand a better chance of growth or survival than those which are relatively isolated, specifically that change between 1991 and 1996 in both the number of small units and the number of their employees should be positively related to the absolute number of such units in the TTWA in 1991; more formally:

$$(E_{t+1} - E_t) = f(U_t)$$

and

$$(U_{t+1} - U_t) = f(U_t)$$

where E =the number of employees in each unit and U =the number of small units within a TTWA. Small units are defined as those employing 200 or fewer persons.

The number of small units within a TTWA can decline for two opposite reasons: the disappearance of units; or the growth of units to more than 200 employees. Because of the latter, it would be inaccurate to measure the growth or survival of a cluster of firms solely in terms of the fate of small units. It would also be an error to exclude TTWAs with twenty or fewer machine-tool units from consideration in the statistical calculation. Therefore, instead of making calculations based on the TTWAs reported in Table 5.3 we need to consider all 193 areas where there was at least one unit in the industry in 1991, irrespective of the number employed.

In carrying out such a test we found that there was no support at all for the employment equation (1), but there was a positive correlation for the units equation (2), which was significant at the 10 per cent level ($R=0.1277$, $R^2=0.0163$, $F=3.18$, $F \text{ sig.}=0.0761$). This gives moderate support to the thesis of the advantages of clusters over isolated sites, but also suggests that units achieved their success or survival partly by reducing their numbers of employees. This latter is of course consistent with much that is known about the 1990s restructuring process in many industries and countries.

Machine Tooling in the West Midlands

In addition to the existing literature, the following account of the current state of the West Midlands machine-tools industry draws on our own case study research. This included the formal questionnaire reported on below, and also a series of over twenty visits to firms, trade associations, central and local government agencies, universities, and other research and consultancy groups concentrated within Coventry.

By the nineteenth century the West Midlands led the UK dominance of the machine-tooling sector. The reputations of Coventry and Birmingham as highly skilled crafts areas had already been established due to the preponderance

of ribbon, watch and gun manufacturers, and the increasing demand for mass-produced products as well as specialist machines served only to improve the reputation of the region as possessing a diverse and highly skilled workforce. At the turn of the twentieth century, the skilled labour market and the numbers of small-scale precision metal works attracted in increasing numbers the expanding industries of the bicycle, and later the car.

Famous companies such as William Morris, Courtaulds, Alfred Herbert, and Rootes were established, drawn by the plethora of skilled workers and excellent communications. These, and many other industries fed the demands of the automotive trade by adopting the 'American system' of mass production. The increasing use of electric tooling and the demands of the war periods enabled the massive expansion of manufacturing in the area and consequently the machine-tooling industry. However, even at this stage, the lack of innovation amongst machine-tool buyers was having a constraining effect upon some manufacturers: 'recognizing the conservatism of British customers who were used to having machines built specifically to their requirements instead of adapting standard machine tools, Herbert compromised, catering for individual customers' (Lancaster and Mason 1986: 154).

After 1945 the West Midlands recovered quickly and employment expanded into the 1950s. The period 1951–1961 saw over 360,000 jobs created in the area, mostly in engineering (Wood 1976). Many local people still remember this period as the region's 'golden age', when many workers migrated from other parts of the country to work in the engineering factories of Coventry and Birmingham. Employment was, however, highly dependent on the aircraft and car industries, the latter of which comprised almost a third of local employment. The vulnerability of this dependence was revealed as under-investment began to take its toll. When manufacturing began to decline during the mid-1960s, Coventry was particularly badly hit, despite the presence of major motor manufacturers such as Triumph, Jaguar, and British Leyland.

The knock-on effect to machine-tool producers was severe. Throughout the period 1966–1973 unemployment increased at a rate well above the national average. The losses were primarily from electrical goods, vehicle production, and consequently from machine tooling. By 1980, unemployment in Coventry was, for the first time in decades, higher than the UK average. Between 1972 and 1982 employment at the top fifteen firms fell by 50 per cent. While manufacturing output in the United Kingdom declined by 14 per cent in the period 1979–1983, the West Midlands figure was around 20 per cent. In some companies, such as Rover, it was as high as 37 per cent; over 72,000 jobs were lost in the Black Country alone. The 1980s were particularly hard on Coventry, as it had few service industries to make up for declining employment. As Britain's largest city after London, Birmingham was the primary services centre of the region, making diversification into this sector difficult for Coventry.

As we have seen, manufacturing in the area revived well during the mid 1990s as the UK economy recovered earlier and more rapidly from the collapse of the start of the decade. However, by the end of it there were new signs of crisis. With the value of sterling being maintained by the Bank of England at a level designed to restrain inflation in South East England, export prices of British manufactured goods were again becoming uncompetitive. During 2000, the German car firm BMW (which had earlier bought Rover from its Japanese owners), and the US giants General Motors (owners of Vauxhall) and the Ford Motor Company (which had maintained manufacturing plants in the United Kingdom since the 1920s) announced that they would gradually cease production of motor vehicles in the United Kingdom. With the exception of some small but profitable Japanese factories, this marked the end of bulk motor vehicle production in the country. Ford's main plant was at Dagenham, near London, and Vauxhall's at Luton in the South East, but Rover's factories were concentrated in the West Midlands. It seemed that the industry which had sustained the region and its machine-tool sector in particular throughout the postwar years was almost gone.

General engineering remained, as did important defence contracts. There is also another, quite different and highly specialized industry: jewellery, which forms a true industrial district of very small firms within Birmingham city itself. With a few exceptions, West Midlands machine-tool firms serve either the automotive/defence sector or jewellery.

We have seen that there was a statistical association between the size of a cluster of machine-tool producing units and chances of surviving the early 1990s recession. Can we find substantive reasons to support this link? Did the perseverance of machine-tool firms and manufacturing in general in the region result from self-regeneration of a few individual firms which survived from an earlier much larger number, or from institutions of regional or local support?

Local Institutions for Collective Competition Goods

Institutions for supporting the practices, knowledge, and networking of machine-tool companies either with each other or up and down the supply chain, are divided between those which are designed specifically for the machine-tooling sector and those which are intended for industry generally. The latter easily outweigh the former. We shall consider both, following the modes of governance approach initiated by Hollingsworth, Schmitter, and Streeck (1994*a*) and applied to the analysis of local production systems by Le Galès and Voelzkow (2001). As will soon become apparent, an interesting aspect of the story is the development of amalgams of two or more governance forms at any one time.

State Agencies

As already noted for the United Kingdom generally, official policy towards the machine-tools industry long concentrated on producing

amalgamations and reducing the role of SMEs. There was a radical change in this, not from central, but from local government, and initiated from the political left. During the 1980s sections of the Labour Party reacted against the centralizing tendencies of the neo-liberal Conservative government by breaking from their own centralist traditions and trying to establish autonomous local economic policies, particularly in Greater London, the South Yorkshire area around Sheffield, and the West Midlands. There was some conscious emulation of the Italian left's construction of economic strongholds in Emilia Romagna. The West Midlands Metropolitan County Council (MCC), which covered the whole area around Birmingham, Coventry, Dudley, and Walsall, established the West Midlands Enterprise Board (WMEB), with representatives from local government, businesses, and trade unions. It followed the lines of a similar board in Greater London.

The Board acted partly as a venture capital broker for medium-sized firms, mainly in manufacturing, which it felt were neglected by most British financial institutions (WMEB 1986). It helped secure private investment for firms with proposals which it approved. Approval was based, not just on the marketing viability of the proposals, but on firms' willingness to remain committed to the West Midlands, to constitutional industrial relations, and to other social policy goals. It also sought to aid SMEs with such needs as technology transfer and training. It concentrated on a limited number of sectors, including components suppliers to the motor industry and therefore an important segment of the machine-tool sector.

Partly to prevent the growth of this kind of local economic policy autonomy, in 1986 the government abolished the powerful level of local government concerned: the Greater London Council and the MCCs. However, the seven successor district councils of the West Midlands MCC sustained the activities of WMEB until the mid-1990s, though it increasingly became more a straightforward source of venture capital than a distinctive political initiative.

During its most active years, in the late 1980s, WMEB established a distinctive analysis of the problems of machine-tool and other engineering SMEs. It pointed to the weakness of R&D resources available to these firms, and to the negative role that might be played here by the otherwise welcome overseas inward investment. Foreign investors, it pointed out, tended not to bring R&D to the West Midlands, only the less knowledge-rich production activities (WMEB 1988). On the other hand, it saw potential opportunities for local SMEs as large motor industry corporations out-sourced research, design, engineering, and testing activities (WMEB 1988: 20). It also tried to steer investment towards machine-tool SMEs having difficulties adopting CAD/CAM systems (WMEB 1987). It believed that changes in schemes for government support for CAD/CAM adoption were favouring large firms and producing a growing technology gap between them and their smaller suppliers.

In 1984 central government established its own regional development body, the West Midlands Development Agency (WMDA). This was primarily

representative of firms and central government, though there were local government and union representatives. It was part of a number of such agencies established around the country. Their prime mission was to encourage overseas inward investment. However, the West Midlands Agency has sought also to recognize the problems of local SMEs; including their fears that they were being neglected by the concentration of central government policy on the needs of inward investors (WMDA 1998: 39), and that both these investors and London-based British firms were shifting R&D facilities away from the region (WMDA 1988: 6).

Within central government itself, the most important institution for industrial development is the Department for Trade and Industry (DTI), which attempts at both national and regional levels to encourage best practice and innovation. An example of central provision in the engineering sector has been the 'Achieving Competitiveness through Innovation and Value Engineering' (ACTIVE) campaign. While this is aimed at process engineering construction in the oil and gas industry rather than the machine-tooling sector, the latter is affected by the professed aim of developing effective supply chains. This is therefore a government strategy for encouraging competition goods through the hierarchies of networked firms. Projects of this kind, in which 'partners' are encouraged either to bid competitively for centrally provided funds or to pay a subscription for centrally provided consultancy/benchmarking are typical of the policy model developed during the 1980s and 1990s at the DTI.

The DTI also has programmes for networking, which affect the machine-tooling sector in several ways. First, it encourages international cooperation between sectors in different countries. An example of a forum established to achieve this is the Innovation Relay Centre. In all, sixty-three of these centres were established throughout the European Union area by national governments in order that the funding provided by the Fifth Framework Programme for Research and Technological Development might be more effectively competed for. The Midlands Innovation Relay Centre is the regional support centre for the West Midlands and surrounding areas. While the asserted aims are to aid the process of technology transfer across Europe, to promote the exploitation of results, and to provide assistance in applying for EU research and technological funding. Its diary from January to April 1999 shows that the institution is primarily concerned with providing information concerning EU funding, and encouraging talks from industry-associated MPs and ministers as well as DTI experts in innovation and technology.

A newer initiative by the DTI is the Foresight programme, which aims to provide a centrally managed pool of information to help firms reshape their business strategies to meet future changes. The industrial panel is called Manufacturing 20/20 and attempts to get businesses to share their expertise in anticipating change in markets, technological developments and training needs. In December 1998 the Machine Tooling Trade Association (MTTA)

proposed the development of a 'technology map' for future developments in machine-tool research which would be joint funded with the DTI and the Advanced Machine Tool Research Institute (AMTRI).

A more regionally based institution associated with the DTI is the Business Link programme. The Business Links are centrally licensed, but locally based, institutions which provide information, help develop business plans, help implement quality systems such as the BS EN 9000 of the European Union, and help buyers find the most competitive suppliers within the region. Business Link in the West Midlands amalgamated with the Coventry and Warwickshire TEC (CWTE), which, like many others during the 1990s had earlier merged with the independent Chamber of Commerce. The resulting amalgamate was named 'The Chamber'. Further changes will be produced by the regional centralization of TECs in progress since 2001.

While initially a government initiative, this policy mechanism developed as a novel combination of state, associational and possibly community governance forms. Chambers of commerce are formal representative associations, while if TECs and Business Link got off the ground they produced action at the informal community level. Thus, The Chamber takes responsibility for: the governmental function of supervising National Vocational Qualifications (NVQs); the associational task of representing members' interests, and organizing benchmarking and conferences; and the informal process of building inter-firm networks. It is difficult to assess whether the reality lives up to the rhetoric on this last. As Crouch and Farrell (2001) found more generally, networking meetings organized by TECs and Business Link often took the form of social gatherings rather than working sessions. The events diary for The Chamber in 1999 comprised short courses, management 'master classes', and breakfast meetings. These last were the main functions of the Manufacturing Network 2000, which organized a Breakfast Club at which the fifty-five members paid £289 each year to attend breakfast talks and to discover what services were available to them. Business Link subsidized 66 per cent of the costs.

Specifically for SMEs, the DTI has been working with Business Links to create 'The United Kingdom Benchmarking Index'. This attempts to overcome the problem that many SMEs do not have the resources for successful benchmarking. A computer-based system uses data collected on a national scale to allow companies to compare their performance in key areas such as finance and operations, business excellence, and manufacturing with similar firms elsewhere. However, defining and measuring success is problematic. One of the representatives on the Birmingham TEC said the amount of support available for industries to network or indeed to improve, was 'laughable', and that building up long-term networks between manufacturers was 'not practised widely, or well'. At a regional level, the West Midlands Development Agency (later renamed Advantage West Midlands) aims at encouraging inward investment, improving skills and competitiveness and physical

regeneration. Although in 1999 the West Midlands won the highest number of overseas investment projects of any English region, the agency appears to do little to encourage intraregional horizontal networking of firms.

However, it is working with the West Midlands Regional Supply Office and local Business Links to promote purchasing and supply chain development. Meetings with buyers, seminars on Japanese techniques and overseas promotions are designed to develop better supply chain developments. In 2000 a bid was made for European funds to strengthen these activities. However, partly due to restructuring and difficulties in getting information, it is difficult to ascertain either the effectiveness of these projects, or the extent to which they have affected the machine-tool sector. Similar to many of the other quasi-government organizations we have studied, Advantage West Midlands often appears to be more concerned with propagating knowledge about its own existence than with substantive content. Not only was much of its publicity concerned with its own proposed name change, but it was criticized in Parliament for its jargon-packed publications.

Associational Functions

Business associations of various kinds are important in the region, and have at times been the focus of more collective approaches to economic regeneration. The collapse of West Midlands manufacturing in the 1980s produced one such response in the Birmingham Employers' Forum. It commissioned a report from the accountants and management consultants Price Waterhouse to devise an economic recovery programme for the region (Price Waterhouse 1987). This identified the whole range of private, public, academic, and associational resources of the area, and proposed a series of strategies, all of which included encouragement of cooperation or means for enabling SMEs to access LCCGs. It clearly identified poor access to these as one of the region's main problems, drawing attention, *inter alia*, to the difficulty of West Midlands machine-tools firms in moving out of the low-skill, low-technology product markets in which they were becoming trapped (Price Waterhouse 1987: 24). Not much came from the initiative, and by the 1990s this kind of activity had been largely replaced by such initiatives as The Chamber.

The project of The Chamber which seems most valuable to SME suppliers in the region is called 'Accelerate'. It is primarily an EU funded project run between The Chamber, Coventry Centre for Investment, Birmingham TEC, and Birmingham and Coventry Business Links. Since it is not an initiative of the DTI, it seems best to regard this as coming under the formal associational functions of The Chamber. Conducted in two phases (Accelerate One and Accelerate Two) the aim has been to 'promote world class manufacturing in supply chains for the automotive industry'. The total package amounted to £29m., £11m. of which was a grant from the European Union. Phase One, which ended in December 1998, was an analysis of the needs of 500 small first, second, and third tier supply companies, potentially including some

machine-tooling firms. Benchmarks were developed for these companies and support was generated for clients to form contracts with their suppliers. A third of the costs were met by the £11m. from the European Union with the remainder being met by the companies involved. By December, Accelerate One had helped 120 supply development contracts in Coventry and Warwickshire and 400 in the West Midlands generally. The project used £9m. of the money available.

The second phase of the project is smaller and began in May 1999. To date there is little published information about Accelerate Two, which is a supply chain development programme run by the Coventry Centre for Investment. The money available is less tied to specific programmes of improvement and more available to the companies for their own needs. For some of the advisors involved, this programme was symbolic of the movement away from cost-based supply chains to more developmental partnership approaches of the kind associated with large Japanese firms and introduced to the United Kingdom through the transplants of Japanese direct inward investment. For others, the money was wasted, as many of the companies used available funds for short-term gains rather than systemic improvements.

Within the machine-tool sector there appears to have been little take-up of the programme. This may be unsurprising, as it was primarily geared around second and third tier suppliers, though an alternative explanation from one regional advisor was that 'local companies are so suspicious they will not take money even if it is thrown at them'. While this might be an overstatement, it does suggest that SMEs are unused to making use of, and perhaps reluctant to use, the resources at their disposal, within both Accelerate and in the local chamber.

More autonomous of the DTI than the Business Link and TEC developments are trade associations. The two which have had the biggest impact upon the machine-tooling industry are the Society of Motor Manufacturers and Traders (SMMT) and the MTTA. The latter is clearly directly involved with representation, research and information for the industry. It organizes exhibitions, conferences, statistical services, and technical assistance so that best practice, benchmarks, and training can be disseminated more effectively to its members. With the DTI it launched in 1997 the 'Step Change' programme to encourage best practice management strategies and continuous improvement. It has enabled several machine-tool businesses to adopt a more strategic approach to quality initiatives within the workplace.

The SMMT has also affected the tooling trade, in particular in encouraging the large motor industry firms to develop their supply chains (an amalgam of associational and corporate hierarchy governance modes). When asked about which institutions they used to develop their supply chains, local car manufacturers Rover and Peugeot both named the SMMT, and the related DTI Forum Action group. Adding the state to the governance amalgam, the DTI has been providing support for the SMMT in the form of developing best practice

manufacturing techniques, including development of the supply chain. Measure Four of their Quality, Cost Delivery programme is termed 'Delivery Schedule Achievement' and focuses upon pressurizing suppliers to achieve '100 per cent on time delivery and quality'. Thus the encouragement of quality benchmarks within supplier factories (such as Ford and Chrysler's QS9000) are aimed to have a cascading effect upon the supply chain. Although the SMMT forum is primarily aimed at high volume suppliers, in interviews both providers and buyers of machine tools have commented upon the increasing pressures upon them in terms of quality and delivery. The SMMT is being used by the DTI as a 'best practice' example of a trade association. The technical director of the MTTA has been invited to DTI/SMMT discussions aimed at developing a similar model for the machine-tooling sector.

Some associations exist as hybrids with market or other institutional forms. Important here are organizations for assisting engineering companies with R&D. The two main (non-university) institutions in the United Kingdom are the Institution of Mechanical Engineers' Rapid Prototyping and Manufacturing Association (IMERPMA) and AMTRI. AMTRI was one of a number of government sectoral research institutes which was privatized in the 1980s. They work on a partly commercial basis with machine-tooling companies which require development of new products, but also seek funding for such projects from the DTI. AMTRI is also involved with the Foresight and Manufacturing 20/20 project (mentioned above). IMERPMA, on the other hand is funded by its members (two-thirds of whom are businesses, the rest being academic groups) to develop prototypes and organize seminars.

In the West Midlands several universities are involved with local manufacturers, the MTTA and AMTRI. Particularly important is the Warwick Manufacturing Group of the University of Warwick, located in Coventry itself, which has the largest tooling centre in Europe. In the neighbouring East Midlands region the newly developed Manufacturing Research Centre at De Montford University in Leicester is also significant. According to buyers of machine tools and the MTTA, these centres provide essential equipment and expertise in developing joint bids for funding from the EPSRC, the DTI, and CRAFT.

In general, the use of universities as resource centres appears to be an increasing phenomenon in the West Midlands for many large companies, sometimes with funding from the DTI. The Accelerate programme mentioned above, for example, used three local universities as 'delivery centres' for best practice.

Community Governance

As other observers have commented (Zeitlin 1995; Crouch and Farrell 2001), informal community modes of governance are not often found in British industry, though as we shall see below from our more direct evidence on firms in the West Midlands machine-tooling sector, they are not entirely absent. Their encouragement has also been the target of some

of the government and formal associational initiatives described above. However, these seem more interesting for their creative attempts at institutional hybrids rather than as instances of strong community networks. Research by the WMDA among local business leaders highlighted the lack of collective action within the West Midlands to identify new challenges and opportunities, particularly the lack of shared 'competitor intelligence', and the relative (though not total) absence of cooperation in vocational training and in identifying export markets (WMDA 1998: 38, 39).

Corporate Hierarchies

The governance functions for SMEs of the corporate hierarchy mode are expressed mainly through supply chains, as in Japanese (Sako 1996; Crouch, Finegold, and Sako 1999: ch. 7) and north-east Italian (Burrioni and Trigilia 2001) examples. Apart from government programmes for the encouragement of Japanese imitation already mentioned, there is some evidence that large companies such as Rover, GEC, and Peugeot have by themselves begun to learn from their Japanese competitors about supply chain management. This appears to have been relevant to some machine-tool manufacturers, and was commented on by several of our interviewees. Thus, the fostering of long-term relationships in terms of investment, orders, communication, innovation, and information technology is increasingly being practised by companies in the West Midlands. Several tooling and tubing companies have commented on the increased interest that large companies are taking in their day-to-day operations.

The Market

Given the prior existence of a strong cluster, market forces may serve to perpetuate and even reconstruct it. Economies of scale, reputation, and the importance of sunk costs will prevent destruction of a strong specialism, provided there are enough units in it to start with. Some firms will, given large numbers, find solutions to new problems, and the creative destruction of the market will ensure that these survive, even if large numbers of others fail. Even without overt cooperation, where there are clusters of firms doing the same business, there will be informal discussions among those involved in separate firms, exchanges of tacit knowledge, aided by the movement of personnel between firms.

This process is a hybrid between market and informal community. According to economic theories of the pure market no information is exchanged without payment, and the acquisition of knowledge, as a commodified good, is regarded as unproblematic. Therefore a geographically isolated firm purchasing expertise from specialized consultancies should be at no disadvantage in relation to clustered firms. In fact, it should be at an advantage, since its information has been acquired through a market and therefore a more efficient source than an unquantified, casual, and even implicit network. The existence of clusters therefore suggests that something other than pure markets is at work.

The Views of the Industry

In order to understand which of these governance modes and institutions are most important in sustaining the industry in the West Midlands a questionnaire was sent out to all surviving seventy-four machine-tooling SMEs in the Birmingham and Coventry area. (This figure in no way corresponds to the statistics given for manufacturing units in Table 5.3. The current data, which were drawn from trade association records, concern actual firms rather than the indeterminate idea of 'units' used in UK official statistics. Although these production units appear as individual firms, they are in fact often wholly owned by larger groups and are only occasionally fully free-standing enterprises.) The questionnaire asked which institutions were used by the companies when tackling a specified list of challenges. Firms were asked both about their past experience, and their expected uses in the future. Despite several direct follow-up requests to firms to complete the questionnaire, only seventeen companies responded, giving a 23 per cent response rate. Although the response rate was poor, for those who did reply it clearly made sense, in that in only seven cases out of the total 264 replies to individual items in the questionnaire, did respondents reply that they had never experienced the problem concerned. It had been hoped to make a separate analysis of firms serving the automotive and jewellery industries, but the response did not include enough of the latter to make this possible.

Table 5.5 shows the overall reported and anticipated uses of agencies of various kinds. Agencies have been grouped according to the various models of governance:

- *Government* (government agencies, together with government agencies mentioned by respondents under 'other')
- *Associations* (trade associations and chambers of commerce, including trade and employer associations mentioned by respondents under 'other')
- *Community* (similar firms, facilities on trading estate)
- *Hierarchy* (head office; supplier firms; customer firms)
- *Market* (consultants; trade fairs)
- *Research* (universities, and various research centres mentioned by respondents under 'other').

Looking first at reported past uses, we can conclude that West Midlands machine-tool companies perceive themselves as receiving little help from outside their own corporate organization. The most common answer by far was that the company 'worked it out for ourselves'. When those who 'consulted head office' are added to this category, 49 per cent of respondents chose intra-company responses. This was valid for all activities about which firms were questioned, but especially so in researching new markets, patents, and equipment, and acquiring training and new employees. External consultants were used for training, qualifying for IiP, BS 5750 etc., and legal advice. The trade

Table 5.5. Most common institutions used to support machine-tool manufacturing, Birmingham and Coventry area

	% used in past	% would use in future
<i>State agencies</i>		
Used a government agency	2	2
<i>Associational functions</i>		
Went to our trade association	13	21
Went to the Chamber of Commerce	5	5
Total	18	26
<i>Community governance</i>		
Consulted similar firms	6	5
Used facilities on trading estate	0	0
Total	6	5
<i>Corporate hierarchies</i>		
Consulted head office	7	6
Consulted a supplier firm	2	4
Consulted a customer firm	1	3
Total	10	13
<i>The market</i>		
Bought it from consultants	18	15
Used a trade fair	1	2
Total	19	17
<i>None of these</i>		
Worked it out for ourselves	42	36
Other	1	1

association (the MTTA) was primarily used for expressing policy concerns and acquiring information on new markets, production methods and technology.

These small-firm survivors seem to correspond to the stereotype of West Midlands manufacturers: independent, and using few resources outside themselves. It would also be reasonable to surmise that the 77 per cent of firms who did not respond to our questionnaire were even more likely to be introverted than those who replied. Next after self-reliance came use of normal market procedures, confirming the pattern of very low use of LCCGs. However, associational resources were almost equal in importance with market forms.

The picture changes slightly when firms were asked about future intentions, associations increasing, largely at the expense of self-reliance and overtaking

market mechanisms in importance. It is difficult to tell whether this represents a recently improved profile of the associations or wishful thinking.

More can be learned from the detailed analysis of types of issue or problem set out in Table 5.6. The topics concerned are grouped according to types of issue:

- *Technical* (research and development of a product; improving production methods; introducing new technology; researching a patent; acquiring new equipment; ensuring standards; securing access to services; achieving benchmarking standards);
- *Marketing* (securing orders; acquiring information about both domestic and overseas markets; establishing arrangements in new foreign markets; acquiring information on product costs and demand);
- *Labour* (equipping work force with new skills; recruiting new workers; dealing with a labour dispute);
- *Policy lobbying* (seeking to raise a policy question with national or local government);
- *Other managerial issues* (management problems; raising capital; seeking legal or accountancy advice).

Associations are mainly and particularly used for political lobbying; very little indeed for technical questions. This reflects the general changing role of associations in the UK away from technical and other substantive services, though their role in helping with marketing questions was significant for our respondents. Research facilities have some role, as one might expect, for solving technical questions, but much less than hierarchy or market, and less than might have been assumed from the involvement of Warwick University's engineering departments with larger firms and some other sectors, and of Wemtech. This latter, based at the University of Birmingham's Science Park and managed by groups from local industry and education, has the mission of easing the access of SMEs to high technology (WMEB Consultants 1992). British West Midlands SMEs in machine tools do not seem to take the same kind of advantage of such collectively available facilities as do their German counterparts (Glassmann, this volume, chapter 4). Labour and general managerial issues are mainly dealt with through firms' own resources and services purchased in the market. Our findings here echo those of the WMDA survey of local business leaders, which posed the puzzle of the coexistence of a multiplicity of public and private agencies for assisting firms with new challenges, and the lack of much use of these by SMEs (WMDA 1998: 40).

Overall these results are consistent with the general view of traditional British industry as lacking strong institutions for LCCGs, except for the important role of corporate hierarchy and supplier chains. The geographically clustered character of this industry seems therefore to be sustained primarily through a mixture of market and hierarchy.

Table 5.6. Institutions used to support machine-tool activities (detailed analysis, %)

	Technical	Marketing	Labour	Policy lobby- ing	Other mana- gerial issues	All
<i>State agencies</i>	0.90	6.56	4.44	0	3.57	3.03
<i>Associations</i>						
Trade associ- ates	7.21	26.23	6.67	63.16	3.57	15.15
Chamber of commerce	3.60	4.92	6.67	31.58	0	6.06
Total	10.81	31.15	13.34	94.74	3.57	21.21
<i>Community</i>						
Similar firms	5.41	1.64	4.44	0	3.57	3.79
Trading estate facilities	0	0	0	0	0	0
Total	5.41	1.64	4.44	0	3.57	3.79
<i>Hierarchy</i>						
Head office	9.91	4.92	2.22	0	3.57	6.06
Supplier Firm	5.41	3.28	2.22	0	7.14	4.17
Customer firm	1.80	4.92	2.22	0	0	2.27
Total	17.12	13.12	6.66	0	10.71	12.50
<i>Market</i>						
Consultants	15.32	8.20	22.22	0	35.71	15.91
Trade fair	3.60	3.28	0	0	0	2.27
Total	18.92	11.48	22.22	0	35.71	18.18
<i>Research facilities</i>						
Universities	0.90	1.64	0	0	0	0.76
Other	6.31	0	0	0	0	2.65
Total	7.21	1.64	0	0	0	3.41
<i>Did it ourselves</i>	36.94	32.79	44.44	5.26	9.29	35.23
<i>No problems</i>	2.70	1.64	4.44	0	3.57	2.65
Total	100.01	100.02	99.98	100.00	99.99	100.0

The questionnaire was supported by extended visits to seven sites in order to get a more qualitative feel for the processes involved in these responses. Free-ranging interviews were carried out, usually with the owner or owner-manager of the firm. These conversations suggest that many companies are having difficulty meeting the increasing quality requirements of their customers.

On the other hand, the interviews also indicated that there are still large numbers of traditionally skilled metal workers in the area.

All owners felt a reluctance even to enter into communication with competitors, let alone cooperate with them: 'we've had such a hard time in this industry that we have only survived by being cut-throat. I'd bomb the competition if I had the chance, but only because I know they'd stitch me up if they could.'

The questionnaire responses suggest that this particular approach is not universal, though several of the owners interviewed (especially the owner– managers) appeared to be proud of the fact that they had never turned to the outside for help. One commented: 'I built this factory up from scratch and have never asked anyone for help, I'm not going to start now'.

At the more formal associational level, the MTTA was mentioned twice in terms of providing useful information and once for its Step Change programme of 1999. This new programme might help explain the differences between past use and expected future use of associational resources noted above. The general feeling conveyed was that although knowledgeable institutions such as the MTTA were sometimes consulted, most outside agencies were viewed with suspicion and cynicism. Consultants, though heavily used, were generally seen as a necessary evil.

Some firms spoke favourably of the development of 'preferred supplier status', supply chain ties forged with buyers of machine tools. Many of the companies visited in this research which were signing up for BS 5750, ISO 9000, IiP or various Quality Assurance programmes had often done so either to gain access to the money provided for training, or simply to gain accreditation for their company brochures. As a relatively low tier in the supply chain, however, machine-tooling companies are often the last to feel either the benefits or drawbacks of the move towards formal quality standards.

The interviews also confirmed the role of internal company hierarchy as well as that of the supplier chain. For example, R&D was seen as a concern for head office—which, as noted above, is usually located in the South East, outside the region of production. This may also help explain the low reported use of local university research facilities by these small units.

The findings suggested that low use made of official mechanisms was not the result of the firms' own attitudes to such help, but of problems in accessing it. Companies felt themselves isolated from government assistance. All the owners interviewed had, at some point in the last five years, applied for funding from the DTI, IiP, or the TECs, but only one had succeeded in his aim. Several owners commented that their industry was not fashionable in England anymore, and complained that the UK government had allowed China, India, and Korea to 'steal it away from us'. Two pointed out that much of the funding which they could receive was geared to achieving IiP or BS 5750, or for training the workforce. One maintained that much of this funding was wasted because it 'was intended to line the pockets of consultants

rather than help our company'. In some ways this comment is insightful. Rules for IiP, BS 5750, and the first stage of the Accelerate programme, all *required* the use of consultants. Previously, the DTI's Enterprise Initiative (phased out in the early 1990s) had provided financial support for SMEs wishing to make use of specialized consultants (WMEB Consultants 1992). State agencies therefore appear in close relation to market mechanisms.

As we have seen, it would not be at all true to say that there was no official interest in the sector during the 1980s and 1990s. However, the emphasis was on activities which could provide short and medium term financial rewards, in the form of successfully competing for funding from Europe or the development of saleable prototypes. The owners we spoke to often felt that these activities were undertaken mainly for publicity reasons, and were again too often geared to the purchase of consultants' advice in the market.

These findings confirm the conclusions of Hoppe and Voelzkow (2001) from a comparative study of approaches to financial assistance to troubled industries by German and British governments. While the former tried to form corporatist coalitions of involved interests, British governments tended to establish competitive bidding systems. In other words, a policy instrument frequently seen as a means of tackling market failure was converted into as close an analogy with the market as possible. Therefore even the state form of governance may actually take the form of the market. A complex amalgam of market, state and corporate and supply chain hierarchy therefore seems to constitute the prevailing governance form of the West Midlands machine-tool cluster.

Conclusions

The British machine-tooling industry has followed the downwards trajectory of British manufacturing since its ascendancy at the turn of the century. The traditional lack of investment in development resulting from short-termist financial institutions and the positioning of manufacturing at the low-cost end of the market ensured that the foundations of the tooling sector were to be fragile. More recently the globalization of the tooling market and the decimation of British manufacturing during the 1980s contributed further to decline. Our research was carried out during a moment of strong recovery, and before the high level of sterling resulted in the announcement of further closures in the Midlands motor industry during 2000. The number of firms is probably declining again. This is no longer an important activity for the British economy.

Whether the lack of a top-down strategy in these areas will be compensated by a bottom-up initiative led by research centres and buyers cannot yet be ascertained. However, in the Coventry area at least, there are signs that the defence industry and what remains of the automotive sector are starting

to demand greater quality and performance from their suppliers, while cost-effective development appears to be improving. Although the manufacture of machine tools is fairly low down the supply chain, there is some evidence of a growing interest in networks among firms themselves and increasing though still very low involvement of local government and universities. If any form of LCCG provision seems likely to increase as a result of recent policy effort and also from change in the structure of the industry, it will be the growth of the networked firm, operating through the hierarchy of supplier networks, acting alongside government initiatives which themselves acquire a quasi-market form.

6 Machine Tools in France: A Century of Failure to Build a Competitive Industry

PATRICK LE GALÈS AND NICOLAS GAUBERT

The long story of the failure to build a competitive machine tool industry in France is an interesting puzzle for economic historians and economic sociologists alike. Many explanations have been put forward, from the more cultural ones, that is, machine tools are not a noble industry for elitist French engineers of the ‘grandes écoles’, to neoclassic economists criticizing the role of the state in the economy.

In France, the machine tool industry usually means metal machine tools, and is the symbol of the failure of state industrial policies. State programmes to develop a national industry were started from the first national plan of the postwar period and lasted until the last grand attempt after 1981. When the Socialists came into power aiming at reviving the declining fortune of French industry, machine tools were a priority. The left started an ambitious ‘*plan machine outil*’ to restructure the industry and reorganize small- and medium-sized enterprises (SMEs) into larger firms able to compete on international terms, one of the last examples of ‘industrial Meccano’ (Bauer and Cohen 1985). The language used to describe the outcomes of this strategy (i.e. *déroute, naufrage*) has epitomized the failure of a dirigiste state-led industrial policy. In the language of this project, the local collective competition goods (LCCGs) provided by the state on that occasion proved inappropriate to restore the fortunes of the sector. In many respects, the industry remains the symbol of the failure to develop competitive SMEs in the German way.

The chapter first analyses the governance of the industry by stressing the interdependence of the sector with other industrial sectors and the state that led to its collapse. It then considers how firms were then reorganized following market modes of regulation and using LCCGs produced by transnational machine tool firms from Italy, Japan, and Germany. The reviving fortunes of firms during the past seven years reveal: the relative success of this strategy; the remaining dependence upon the success of leading French industries (the motor industry in particular); the virtual absence of clustering processes; and the attempt to develop the production of LCCGs organized by business leaders and public agencies.

Lack of Fit with the Dominant Governance Pattern

A Minor Sector of SMEs Organized Around the Defence and Motor Industries

Some key figures illustrate the long-term weakness of the industry in France. As early as 1913, French machine tool production was already 1/6th of that of Britain, 1/11th of Germany and 1/22th of the United States. By 1922, 75 per cent of machine tools used in France were imported, especially from Germany and the United States. The classic French–German comparison stresses the lasting differences between the two countries. While at the time of postwar rapid economic growth the French industry represented up to 20 per cent of its German counterpart, the collapse of the 1980s put it back at 10 per cent (Maurice and Sorge 1989). Recent improvements do not mask the main point: the machine tool industry has been a minor industrial sector in France for most of the past century.

A brief analysis of the structure of the industry and its mode of governance within the French context provides some explanation for this state of affairs. First, the sector is mainly organized in SMEs with a strong inheritance of craftsmen moving on to become small entrepreneurs. The machine tool sector illustrates the fate of SMEs in France (Lescure 1996, 1999; Lévy-Leboyer 1996): their diversity, their family structure, the weakness of intermediary institutions to strengthen their environment, the role of the state first to protect them before the war and then to organize their decline after it (Aniello and Le Galès 2001). Generalized criticisms of French SMEs also applied to those in machine tools: lack of innovation and marketing, too much dependence upon large state-owned firms, lack of an internationalization strategy, too small, too isolated, too conservative, controlled by the founding family, with weak financial capacity and R&D to organize development (Segrestin 1994). Within this broad picture the opposite characteristics are also to be found: the remarkable resilience of some firms, which found niches and became well known for specific products, their adaptation to the French model, the resources they mobilize in specific contexts (Ganne 1992; Courault and Trouvé 2001).

Second, following the analysis developed in Crouch et al. (2001), the machine tool sector was not among the priorities of the French state. It mainly developed around two sectors: cars and defence. In the late nineteenth century, craftsmen and small firms could not respond to the demand of the economy and imports soared. The first collective organizations of the sector were created to limit exports in 1840 and then 1865 in part because of the pressure of trade unions. The Société d'Outillage Mécanique et d'Usinage d'Artillerie (SOMUA) was created in Puteaux, within the Paris region. From then on, the defence industry was a main market for machine tool firms. Eager to ensure independence for weapons manufacture, state owned defence

leading firms usually favoured French entrepreneurs. In the tradition mentioned in *Laissez nous faire et protégez nous beaucoup* (Hirsch and Minard 1998: 135), laws were passed to force defence and aerospace firms to buy more expensive French machine tools in return for being able to require machine tool entrepreneurs to respond precisely to their needs, to produce limited series, and to concentrate on their demands. Machine tool business organizations always put first the defence of the *intérêt général de la France* to get support and prevent imports.

This tradition led to a limited concentration of the industry in regions where the defence firms using those machine tools were more important, the Paris region and the Loire *département* around Roanne and St Etienne. However, the main point is the large dispersion of SMEs, which did not depend on their local environment (with the exception mentioned above) for the production of LCCGs—from Dufour in Moulin in the centre of France to Ernault in Cholet, within the textile and shoes industrial districts.

A second major sector has been a long-term client and itself a machine tool manufacturer: the automobile industry. At a very early stage, Renault in particular started to build machine tools to satisfy its own needs. Peugeot and then PSA did the same. Nowadays, Renault Automation and Peugeot Citroën industries are among the ten leading French firms in the sector.

The Problem of Non-territorialized State Collective Goods

Within a context where a large body of LCCGs was provided and organized by the state, the machine tool sector was not central: first because it was a minor sector and considered as such by the industrial elites (in contrast to what Salais and Storper (1998) call *Industries de la grandeur*); and second because the structure of SMEs did not pave the way until very late to the organization of national champions. In that sense, Cohen (1989: 313) makes an important point when he analyses the failure of the machine tool sector in France as:

L'explication la plus probable de la faiblesse relative ... des industries mécaniques avancées, d'automatisme, réside dans le mode d'orientation (militaire), de financement (faible part de l'industrie privée) et de réalisation de la recherche développement (gros laboratoires publics) et dans la constitution après guerre en France d'un bloc étatico-industriel.

Again within the French context—where business associations were weak, intermediary organizations suppressed since the 1789 Revolution, local economies dismantled after 1945—when a sector was not supported by the state, it did not have much chance of a strong development path. National choices made in favour of aerospace, steel, automobile, energy, then telecommunications did not contribute to the making of a national champion in the machine tool industry.

However, that statement has to be qualified. That does not mean that machine tools were not part of the attempt to revive all industries in 1950s France. Within the soft planning of the economy steered by state elites, machine tools were seen as a sector to revive. Committees met around the Commissariat au Plan to revive the industry, and the Hirsch plan (1952–1957) particularly aimed at modernizing production. Machine tools used in the industry were too old, and that was seen as a problem for the aerospace and automobile industries, and also for electrical goods, electronics, and shipyards. Too many imports were seen as a threat to the independence of the defence industry. But plans to develop the industry and to build a national champion never succeeded. French machine tool firms remained organized to satisfy the specific needs of their large national clients, vertically integrated as subcontractors, benefiting from a quasi-captive domestic, and with little concern for international, markets (except Europe to some extent), low prices, marketing, or local collective provision of competition goods. Perrin and Real (1976) show that the machine tool industry in France was never active on all segments of the markets but concentrated on the needs of large domestic industrial clients.

As Maurice (1985) suggests, the machine tool sector is interesting because of the dense and complex set of relations between machine tool makers and their clients, and also between skilled workers, mechanical engineers within the firms, and R&D engineers outside. Clients of the industry are heavily dependent on reliable machine tools for their production. Reliability and long-term relationship are important, hence the inheritance of the artisan tradition that remains in this industry, very different from the Fordist models of production usually associated with the French industry.

This world of machine tools is also foreign to French political and administrative elites, a factor so decisive to understand the history of the French industry.¹ French administrative and economic elites were more interested in the sophisticated game of ‘industrial Meccano’, the rationalization of an industry, international markets, and the top-down promotion of innovative technology and research within national champions rather than in the more obscure yet decisive world of machine tools. When programmes were designed to build a competitive machine tool industry, the same types of norms, procedures, and to a more limited extent resources were used and made available. This is therefore a case where LCCGs were available for the sector, but which were not particularly relevant to the firms of the sectors involved.

When Maurice and Sorge (1989) compared the machine tool industry in Germany and France through the lens of societal analysis (Maurice, Sellier, and Silvestre 1986), they pointed to surprising findings: by contrast to the rest

¹ International comparisons such as the classic work of Maurice, Sellier, and Silvestre (1984), or English and American authors (from Kuisel, Schonfeld, Hall, Hayward to Ziegler or Lévy) have underlined this point with even greater strength, as have Salais and Storper.

of the industry where France was the model of Fordist organization, the machine tool sector was stronger in specialized markets, building limited series of machines for particular clients. By contrast, the sector appeared as more industrialized in Germany, where it was more specialized in middle and large series on international markets. Following Maurice's earlier work (1985) they underlined the difference between two models of organization. On the one hand, in the French context, a major feature appeared to be the gap, sometimes the contradiction, between production itself, organized around SMEs in the artisan tradition, and the R&D side, taking place either within a large client firm or in another part of the first firm separated from the production process. By contrast, in Germany, Maurice and Sorge stressed the close interrelation and cooperation (including in geographic proximity terms) between production on the one hand, R&D and design on the other. That seems to be the case even for the larger machine tool firms such as Gildmeister (Maurice and Sorge 1989: 12). They therefore identified a 'societal contradiction', which has prevented the development of the sector in France: namely, the gap between the realm of French elites, of the management world of large industry, on the one hand, and that of craftsmen and SMEs on the other. When machine tool firms developed, they organized themselves in a way that revealed the wider societal gap. These gaps and conflicts had long-term consequences, as they prevented the development of relevant LCCGs, such as R&D, for SMEs.

Those contradictions of the sector were not so salient during the postwar economic miracle. Although imports were always a worry and machine tool business organizations always bitterly attacked cheaper foreign machine tools, firms were growing and the sector enjoyed considerable growth for three decades. The rapid industrialization of France (cars, defence, steel, but also electric and electronics firms, energy, aerospace, telecommunications) boosted demand for machine tools. Machine tool firms developed as subcontractors to large industrial firms and specialized in limited series, with little geographical concentration. By the late 1960s French machine tool production was 20 per cent of Germany, and equal to Japan. Although mainly oriented towards the domestic market, it also won markets in Europe.

However, the competitive edge was not so strong and imports remained dominant. In terms of LCCGs, this is not so surprising. Most of the relevant goods—R&D, market development, access to information—came from large French industrial firms.

By contrast, not much existed outside this frame. As mentioned before, the state tried to launch programmes to revive the industry, to build a national competitive industry, but failed to do so. General collective competition goods were made available by the state; they were not relevant for this industry. At the macro-level, the close relationship of state, administrative elites, and large industrial firms produced a collective good, which was rapid economic growth fostered by dynamic industrial modernization strategies. The machine tool sector benefited fully from this positive environment and in a modest way

contributed to the success of French industry. But its own competitiveness was not consolidated beyond integration within the French model.

To some extent, economists could argue that in the long term some of the collective goods made available and used by the firms—such as the captive domestic market—worked against the strengthening of their competitiveness. By contrast, there was hardly any community regulation of the machine-tool sector. As noted, there was a very limited exception in the Roanne and St Etienne region, where the proximity of state-owned defence firms and machine-tools firms could lead to shared labour market and information exchanges, though again within a vertical integration framework. Formal associations were even less present. Existing associations were mainly concerned with the limitation of imports to give them time to develop a competitive industry and to protect their domestic market.

Machine-tool sector governance therefore relied on a mix of state and organization (in the sense of vertical integration). A large body of family SMEs was mainly coordinated by hierarchy, instruction-based relationship, and vertical integration under the control of directors of large firms and administrative elites, who happened to be socially the same group. But hierarchy is not the whole story. A lot of adjustments and coordination took place through contacts between professionals in the machine-tool firm and within the customer firms. Dispersal and fragmentation produced a complex and varied pattern of relations within the vertical integration.

Le naufrage 1970s/1980s

All those features of the governance of the tool sector, including the contradictions and weaknesses, came to full light during the industrial crisis, which led to the collapse of the industry over two decades. The story of that collapse has already been written. The following account only briefly underlines the main points (Bauer and Cohen 1985; Cohen 1989; Ziegler 1997). First, most leading machine-tool firms collapsed. Second, the state launched a series of ambitious programmes to first save and second develop French machine-tool firms that could not prevent more collapse and decline.

French machine-tool firms faced the difficulties of all French large firms. In the vertical integration model, tough restructuring in the motor and then defence industry had serious implications for machine-tool firms. They turned to foreign imports and diversified their subcontractors to improve performance and reduce costs. The aerospace sector in particular turned to better and cheaper foreign machine tools, when for years they had mainly used domestic producers. Most importantly, the machine-tool sector was slow to adapt to the new technological environment, the development of microelectronics, and computer numerical control (CNC). By the late 1970s Japanese firms had taken 40 per cent of the French market with the new generation of machines, reliable and cheaper.

Within ten years most well-known firms had collapsed, were reorganized within larger groups, which also collapsed, or were bought by foreign firms. Prestigious names of the industry went bankrupt: Forest, Dufour, Ernault, and then Liné, Graffenstaden. Were dismantled, some plants being sold to other firms. The state tried to steer the restructuring process. By the late 1980s, employment had dropped from the 30,000 in the early 1970s to 11,000. The number of firms employing more than 500 workers declined from 15 to 5, and average firm size declined from 145 to 82 (figures from the machine tool builders association quoted by Ziegler).

Governance Failure

When the crisis became clear, as early as 1974, the administrative elites of the state started to react and to restructure the industry. Three governmental programmes to support the industry were implemented within ten years. The restructuring game was played by the enlightened force of the top French administration against the archaic forces of SMEs in the classic model of French *dirigiste* industrial policy; and the game was lost. Ziegler's telling comparison of the German and French machine-tools sectors analysed the industrial crisis and the failure to adapt to technological changes.

The challenge posed by the machine-tool sector in the 1970s was how to encourage an industry of mostly small, specialized, and geographically dispersed producers to adapt the new technologies of computer control to their products. For the firms, this process often meant incremental improvements rather than radical innovation. For policy-makers, the challenge was not so much to develop technology as to diffuse it. This task led policy-makers in both countries to formulate a number of similar goals. They tried to cultivate sector-specific research capabilities with the help of non-state agencies. They worked with the industry to provide funds for the use of microelectronics in these products. They tried to bolster demand from other sectors for these new products. And they promoted educational efforts to train and retrain workers with the new combination of mechanical and software skills that were needed by the industry. (Ziegler 1997: 92)

The state orchestrated three ambitious plans for recovery, the *plan d'Ornano* (named after the right wing minister of industry under Giscard d'Estaing at the time of the crisis), and the *plan machine-outil* from 1981–1982 implemented by the newly elected socialist government, which was to be followed by the *plan productique* in 1983. Cohen (1989) takes this example as the symbol of the *Etat-brancardier* (stretcher-bearer state), inventing all sorts of agencies, programmes, and procedures to save and restructure French industry. In brief, the administrative elites in charge of the industry used the same norms and policy instruments they used in other cases (from steel to shipyards), among them the classic policy of support for economy of scale through size and the making (once more) of national champions. These measures included: restructuring of

firms brought together within a larger holding; concentration organized by sub-sectors of the machine-tool industries (i.e. the old logic of *pôles*); large investments in capital through state agencies; financial incentives to adopt the most recent and sophisticated technology; organization of networks of research centres for the industry; provision of training responding to the particular needs of the industry; incentives to state owned industries to buy French machine tools; obligation on the Ministry of Education to buy large numbers of machines for training purposes in order to secure a market for the new generation of machines; resources and expertise to boost exports. The scale of public support was quite large for the sector. In December 1981 the state planned the spending of Fr 2.3 bn. over three years, in order radically to reshape the sector, and in particular the twenty-five largest firms. The financial support was provided once contract between the reorganized firms (including mergers and new holdings) and the state was agreed.

All this was done in consultation with business representatives, but only the major ones, not the large bodies of SMEs and more or less without the trade unions although skilled workers are so central in the sector.² This illustrates the classic model of top-down *dirigiste* industrial policy to restructure an industrial sector, which was successful in other sectors until the 1970s, but which did not take into account either the previous governance of the sector, nor the existing structure. However, the three plans brought in large amount of capital and other LCCGs (training, research, and organization).

The machine tool plan failed for various reasons: First, some firms spent a lot of time negotiating and eventually did not join some of the new holdings. Second, the restructuring took place at a time of serious economic recession and the money was mainly used to help the survival of leading firms instead of their restructuring. Third, bilateral discussion between state officials and state representatives did not contribute to any collective mobilization by business. In the terms of this book, either the collective goods made available were irrelevant or the timing was wrong. Some were irrelevant because machine-tool innovations were complex, and bringing together classic machine-tool technology with recent developments in microelectronics and computers required skills and developments, which were far beyond reach of French firms. Choosing breakthrough innovations proved successful in some industries, but a complete disaster in the case of machine tools. Here, Ziegler (1997) emphasizes the role of ideas, knowledge in policymaking and, in the French case, the gap between policy elites and machine-tool firms leading to irrelevant choices of strategies. By contrast, the German industry followed a more modest ‘discussion-oriented strategy’ using existing networks of institutions (see Glassmann, Chapter 4, this volume), which proved successful.

² In his vivid account of the period, Ziegler (1997) correctly insists not only on the strength of norms, procedures, and interests entrenched within the state, but also the role of major groups such as administrative and political elites, their relationship, status, identities, and their representation.

The failures of the French plans attracted sharp criticisms: top-down approach; bilateral negotiation with the centre instead of support to inter-firm cooperation; all the energy taken by the restructuring process among firms; support to radical technology change that French firms were unable to control and manage; lost public funding; failure to implement the programme (for instance, schools did not want to buy the training machines decided for them by the top administration); lack of serious policy to tackle the human resource problem; support for opportunist behaviour among those entrepreneurs who best played the restructuring game. Some leading firms were engaged by the state to participate in the restructuring, but used their position to acquire cheap assets or technologies and then change their plan as soon as they could (for instance, Empain Schneider or Suez). In many firms, the period 1975 to 1985 led to changes in management, changing production, radical technological innovation, changing objectives, and competitors. To complete this long list, the change of government in 1986 also led to a radical change of industrial policy. The neo-liberal minister of industry Madelin stopped subsidizing a number of firms, which went bankrupt.

Some interesting issues were addressed in the plan, but implementation concentrated on financial restructuring. For instance, the gap between the existing skills of the labour force in SMEs where training was never a priority and the goal of producing high-tech CNC machines was considered to be a serious issue at only a very late stage. Some of the initiatives to train workers and develop new programmes within the school and higher education system take years to materialize and or to have a positive impact on firms.

In a similar way, the idea of creating collective networks of firms and research centres, joint organizations to develop R&D for the sector produced initiatives that could be judged only in the longer term. The institutionalization of research networks including ENSAM (Ecoles Nationales Supérieures des Arts et Métiers) and ADEPA (Agence pour le Développement de la Productivité et de l'Automatisme) led to the creation of two organizations on a regional basis: CERMO (Centre d'étude et de recherche de la Machine Outil) and CETIM (Centre technique des industries mécaniques). For the first time ever, some form of collective action developed within the sector beyond the classic demand of the main business organization to limit imports, to ask for more funds, and to force other sectors to buy French machines. So far the new structures have had only a limited impact. The context of restructuring, the decade of chaos, decline, and financial reorganization did not leave much space to develop long-term joint research, collective action between research centres and firms. By comparison to long established similar types of organization in Germany, the first years of CERMO and CETIM do not amount to much. But theory teaches us that the institutionalization process takes time and is often incremental. To develop collective action, actors have to stabilize norms, rules, roles, expectations, and representations. Those organizations

were to play a significant role in the provision of LCCGs some fifteen years after their creation.

In our language, the machine-tool sector requires particular LCCGs, which are not related directly to economies of scale but rather depend upon the coordination between firms within the sector, with its customers, and with centres of research and training. This particular pattern explains why SMEs have remained dynamic and successful in the machine-tool sector. Even in the French case, SMEs remained innovative, far away from restructuring plans.

The exception to this general assessment is the large enterprise Num, a firm based in Nanterre, on the west side of Paris. It is France's leading CNC supplier. It used state support quickly to establish a leading position within the French market for command numerical control equipment, and it then gained markets in Europe. It was the only firm that benefited from support for innovative technologies. Num started in 1964 as the machine-tool department of the engineering firm Télémécanique Electrique. The first range of machines was put on the market in 1971 and Num was created as a company in its own right in 1978 (subsidiary to Télémécanique), with a dominant position in the more technological part of the machine-tool industry. In 1979 and the following years Num absorbed the numeric controller departments of many firms from Matra to Alcatel. At the cutting edge of technology in the booming CNC sector, it became the only success story of the time, with the support of the state, which encouraged aeronautics and car firms to buy Num products for their machines.³ Num became a worldwide leading supplier of numeric controllers for machine tools.

But in general the restructuring plans were unsuccessful. The vertical integration model did not provide new resources. The main customer firms such as Airbus, Snecma (aerospace), and Alcatel were part of the restructuring game. They faced their own difficulty and did not want to take the leadership to restructure machine tools. Also, when directors from the large groups were sent to head SMEs in trouble, that did not guarantee success. The role of Renault was more ambiguous and positive for a while. First, its own machine-tool subsidiary benefited from the plan and developed some relations with other firms. Renault, together with Peugeot, was also involved in capital investment in one of the three new 'poles' of the machine-tool industry. However, Renault was soon to face its own trouble as it narrowly avoided going totally bankrupt (thanks to its public status) in 1985. As might have been expected, the dispersion of firms and the logic of vertical integration did not lead to clusters, to increased local or regional inter-firm cooperation. The story of the collapse of the industry can be analysed in terms of governance failure.

³ NUM has built upon the success; being now part of the Schneider group, it bought the Italian firm SERVOMAC in 1989 (variateurs de vitesse).

A New Beginning for a Residual Sector?

The Machine-tool Sector in the 1990s

Already weakened, and despite two good years in 1987 and 1988, the sector did not fare very well during the early 1990s economic recession, but it was of course not alone in Europe in this respect. Three machine-tool poles had emerged after the three plans in the late 1980s. The first and most prestigious one, Ernault Somua, had been bought by the Japanese firm Toyota, the machine-tool subsidiary of Toyota, in 1986. Following new problems, the company was sold again in 1992 with the creation of the CATO group, a new holding built around what remained of Dufour, Cazeneuve, and SOMAB. Cazeneuve (making turning lathes) was then able to buy Vernier (milling machines) and Syderic (drilling machines). Second, Intelautomatisme was not well supported by its institutional investors. Suez in particular did not fulfil its promises, and the two firms could not be merged (Cohen 1989). De-merger took place, and the whole thing was bought by Fiat's subsidiary, COMAU. Third, MFL, which was seen as the leading holding after the restructuring process, even went to the United States in 1984. It achieved major public funding (over Fr 1bn.). However, things went wrong; it went bankrupt, was disbanded, and sold in 1988 (including Liné and Berthiez). In contrast, some SMEs, which did not receive state help, such as René Brizard, had been a relative success story as a growing firm in the milling and turning sector. But it faced financial problems in 1991.

The main feature of the period is therefore the end of the ideal model of the national champion of the sector and instead massive foreign investments arrived: the Japanese firm Amada (sheet metal press) bought the SME Promecam; Tornos-Bechler (Switzerland) together with FLD Manurhin bought Wirth and Guffat; Nodier-Emag (Germany) bought Sculfort; Shules (Germany) bought Spiertz. The Ministry of Industry tried to save what it could in a more modest way. In 1993 it created a financial holding of the remains of MFL, SFPI, and a few other firms (e.g. Brizard, Liné, Forest, Berthiez, Vernet, Lurem, Acma). No longer did it pursue restructuring through economies of scale. The lesson has been learned and the importance and dynamism of SMEs in the machine-tool sector were widely acknowledged. The idea was rather to build a holding with more financial resources to face short-term financial crisis from one partner or the other, and to develop inter-firm cooperation on a non-hierarchical basis; in other words an alliance to face financial short-term problems without mergers. Employment declined to 8,300 in 1992 and the number of firms to 133.

The End of the 1990s: An Improving Residual Sector

Machine tools were left as a residual sector of the French economy (Table 6.1). Things then improved. The industry took advantage of the growth period of

Table 6.1. The French machine-tool industry in the mid 1990s

Companies	Nationality	Particularities	Events in 1992–1993
<i>Annual turnover: Fr 500m. to 1bn.</i>			
Brisard M.O.	French	Machine-tool pole constituted after acquisition of about ten coys.	Dismantling of group following recapture by SFPI
Renault Automation	French	Renault subsidiary	
Promecam-Amada	Japanese	Amada subsidiary	
<i>Annual turnover: Fr 300 to 500m.</i>			
Peugeot-Citroën Industrie	French	PSA subsidiary	
Cazeneuve-Somab-Ernault	French	Cazeneuve part of Thollon	After successive recaptures of Vernier, Syderic, Dufour, partnership with SOMAB and Ernault (both Toyoda)
Huron-Graffensaden	Italian	Comau (Fiat subsidiary) (born after dismantling of Intelautomatisme)	
NUM	French subsidiary	Télemécanique (Schneider)	
<i>Annual turnover: Fr 100 to 300m.</i>			
Traub-Sonim	German	Traub subsidiary	
Gravegraph	French		
Fld-Manhurin	Swiss	Tornos-Bechler Swiss subsidiary	Bankruptcy
Polymatic	French		
Nodier-Enag	German	Enag subsidiary	
Alcera-Gambin	French		Bankruptcy; recapture by Huron (Comau subsidiary)
Worth and Guffat	Swiss		Bankruptcy

the second part of the 1990s to recover, including the strong growth of French/European aerospace and car companies, its leading customers.

Today the metal-machine-tool sector comprises 130 firms, employs 6,700 persons and is specialized in three main markets: machinery industry (50 per cent),

cars, aerospace, and defence (40 per cent), education (10 per cent). It has taken full advantage of the success of its traditional customer firms to develop its own success. The market is differentiated in three main segments: large series of relatively standard machines such as turning lathes, milling machines, and drills; more technology driven machines; and machines made to order. For the first time ever, 50 per cent of French production of machine tool is exported. In other words, the sector has become small but competitive on international markets.

French firms are small; about half the average of German firms. Although government agencies still complain bitterly about conservative family owned SMEs and the problem of size, all statistics rather show the dynamism of these firms and illustrate the new generation of dynamic French SMEs (Aniello and Le Galès 2001). However, although the restructuring process has led to more concentration, the industry remains very dispersed, with some concentration (about 20 per cent of the firms within the Rhône Alpes region), some in the Paris region, and the rest scattered around.

Following the collapse, the French machine tool sector now mainly comprises three types of firms:

- those which have merged within middle sized international group, French or foreign;
- those who go their own way, being specialized in niche markets;
- those who are still integrated within large aeronautic or car firms.

The provision of LCCGs is now organized in three ways: within holdings and international groups made up of several firms; through collective action organized by public agencies and industry associations; and, to a very limited extent, through a limited territorial concentration.

Radical Changes in LCCGs and a New Governance Model

Provision of LCCGs: Foreign Owned Firms or Larger Holdings

Although not the easiest point to document, the take-over of leading failing French firms by foreign successful ones has proved crucial for the limited recovery of the sector. Italian, Japanese, and German firms have brought in a completely different set of approaches.⁴ First, they provided stability and a lasting strategy in relation with world or at least European markets. They changed the focus and the range of clients. For those local SMEs that used to deal with traditional large French industrial clients, the change of perspective was radical. They had to become competitive on foreign markets and to find

⁴ The evidence for this section comes from our interview with CETIM, firms, and the Ministry of Industry.

customers. The new owners (Japanese, Italian, German, Swiss) first provided information and access to European markets in particular. French SMEs were able to rely upon their new owners to develop strategies and marketing skills to win markets outside France. In the late 1990s, for the first time, about half the French production of the machine-tool sector was exported, thanks to foreign firms.

Foreign owners also provided crucial collective goods in that domain: information about foreign markets, know-how about contracts, estimates, delivery. They brought in their experience in terms of access to R&D, and most importantly the gradual use of new technologies to develop new machines. The management of R&D in those international groups is very different from what was organized in a French context. It took from three to five years for the firms to recover under the new management and to become successful.

During the mid-1990s the organization of partnerships between firms organized in cross-frontier networks became a general feature of the industry (Veltz 2000). The firm Manitou, which builds fork-lift trucks for the agricultural industry, signed a partnership agreement with New Holland (subsidiary of Fiat) in 1997, first to sell Manitou's machines all over the world. This alliance illustrates the types of collective goods that standard French SMEs miss. A second step was taken when the two firms made joint R&D programmes for the use of electronics in their machines. Gradually, they combined their own strengths to develop new machines and reinforce their technological and marketing cooperation. A similar example comes from PCI, the machine tool subsidiary of the Peugeot Citroën Automobile group that specializes in machine tools for the motor industry. It started a partnership with the British firm Transtech to build and sell PCI machine tools for UK-based car firms. In exchange, PCI will build and sell Transtec high-speed machine-tools for the aeronautics industry in France.

The creation of the CATO group signals a similar move organized by a group of SMEs, which were put together (including Ernault (in Cholet), Cincinnati (Chambost-Allères in Rhône), Cazeneuve (Pont-Lévêque, Isère, and Somme), Vernier (Nice), Somab (Moulins)). CATO has become the leading figure of the machine-tool sector, with a variety of machine tools to cover the main segments of the industry. It also has the resources to provide finances to the federation of SMEs it integrates. It can also play an effective role in negotiating with national and regional governments support for the type of collective goods it needs (from training to support for export or programmes to transfer technologies). Last but not least, the CATO group organizes for these once failing prestigious SMEs a dynamic global marketing and commercial network. CATO is therefore a case of loose vertical integration, a flexible integration of SMEs that tries to maximize the strength of innovative firms with the provision of collective goods within an integrated holding.

Collective Action Within a Fragmented Sector: Business Associations and State Agencies

Some of the policies started in the mid 1980s proved to have long-term impact. First, the creation of the renovated business organization, SYMAP (Syndicat de la machine outil, du soudage, de l'assemblage et de la productique associée) signalled the collective dynamic among sector leaders, in particular in relation to the provision of LCCGs. Second, new organizations had been started in the 1980s, such as CETIM and CEMO, to organize local and regional networks, bringing together specialized research centres, groups of SMEs, and customer firms in relation within the broad mechanical sector. At the same time, the major reshaping of the French industrial policy provided funds to finance such networks and specific programmes aiming at upgrading a sector, a group of firms, inter-firm cooperation, and transfer of new technologies.

Training is a good example of the new developments. This was not an issue for a long time except in the case of NUM, which made an unusual effort in favour of training the workforce to adapt to constant upgrading of CNC technologies. However, once the ministry of education took into account the call for specific training in the machine-tool sector, it took a while to implement the decision, to create a number of specialized professional diplomas in technical high schools, but also at the graduate or postgraduate levels (for engineers). In line with the new thinking about (relatively) closer links between industrial sectors and training within schools in France in general, the machine-tool sector was gradually able to benefit from public investment made in that area. In some places, such as the St Etienne area, business leaders were directly involved in the design of new programmes. At the other end of the scale, some engineering schools developed new programmes in terms of both applied research and development and training itself in close relation with the industry. What had been seen as a major failure started to take off, that is, the provision of training at different levels and appropriate R&D centres and networks to support the development of SMEs with a more dynamic business association.

The SYMAP and also the FIM (Fédération des Industries mécaniques), again with the support of the Ministry of Industry, also made an effort to provide information to the profession: figures about the sectors, new developments in terms of research and technology; information about French, European, and world markets; information about good management practices in leading firms and about marketing strategies. This translated in terms of publishing (business and professional newsletters such as *CETIM information* and *EMO*), of economic indicators developed for the sector, of information about developments in foreign markets. It also leads to the development of professional exhibitions, the organization of short-term training programmes to discover new technologies, and information about new environmental law (from the

state or the European Union). This is clearly presented as an effort by the main business organization to provide LCCGs for the sector.

There is now a wealth of information provided by the SYMAP in a deliberate attempt to overcome the fragmentation of the sector. Business leaders in the sector represent themselves as tough survivors who have taken a major turn thanks to foreign firms. They know the limits of their size, but they organize in order to foster their competitiveness on the world market. In that sense, although a much leaner sector, machine-tools firms seem to build upon the recovery of the 1990s to establish governance patterns that will support their development in the future.

Research is probably the best example of that trend. CERMO and CETIM emerged in the 1980s. The CERMO, the only research centre specialized in machine tools was merged within the CETIM network of regional centres. One centre in Senlis (north of Paris) is the leading centre in the CETIM network for the machine-tool industry. According to the Ministry of Industry, French firms in the sectors invest half as much as Japanese firms in R&D. Again, fragmentation, very small firms, and subcontractors are seen as the reasons for this. However, CETIM has gradually taken a leading role in structuring collective action in order to provide LCCGs.

CETIM is funded by a special tax paid by firms. Its machine-tool network comprises about fifty firms. Beyond the Senlis CETIM, other regional centres are playing a leading role in the sector, in particular in St Etienne (specializing in high-speed milling machines), and Nantes (machines for the agri-business sector). CETIM has close relations with machine-tool business leaders and with regional research centres, engineering schools and universities remote from the main research infrastructure in Paris. In close cooperation with SYMAP, CETIM's first role is to provide information to its members about technological changes in France and in other countries. It is part of various national and international organizations to elaborate standards and norms for the profession, and provides experts to international and national working groups. Second, and most importantly, it provides information and organizes R&D about new techniques and new technologies: the use of new material (*alliages, céramiques*), electronics, and high-speed developments in relation with CNC. SMEs in the sector no longer rely just on the cooperation of large firms to develop R&D programmes and then new machines. CETIM plays a pivotal role in organizing collective research projects, bringing together leading firms, small SMEs, leading clients, experts, and regional research centres more interested by applying technology. They get specific funding for those collective research programmes (from different sources), and the benefits are supposed to profit the whole industry.

For instance, this new governance of the machine-tool sector is exemplified by the way it reacts to new technical challenges, such as modular and upgradeable machines. A new generation of high-speed machine tools

is now emerging on the market. Their production raises specific issues, and requires new technology. However, the way these machines are used in their environment also raises particular problems, in particular in customers' firms, which have to reorganize their working environment. However, when well adjusted, firms are able to benefit from these new machines to respond to increasing pressure for just in time delivery or short-notice contracts from major customers.

The new governance of the sector is demonstrated by the fact that some problems raised by the introduction of these machines have been identified as problems of LCCG provision. SYMAP has taken the lead to develop a collective research project with CETIM to address this. The high-speed machine-tool project (for milling and grinding machines) brings together fourteen leading customers and machine-tool builders from Renault and SNECMA and GEC Alsthom to Comau and Cato, together with a network of ten regional research centres (including engineering schools and university departments in Nantes, St Etienne, Compiègne). Participants in the programmes sign a contract, including norms of behaviour and financial contribution.

This is the most complete example of LCCG in the sector. Most of the time CETIM is less central in the management of ambitious R&D programmes and mainly provides information and develops links between partners, or supports small-scale programmes such as the diffusion of one particular type of technology. CETIM spends 42 per cent of its budget on R&D. Beyond CETIM, other public agencies have taken notice of this new capacity for collective action and seem to be better equipped to provide other kinds of LCCGs to the sector. The Ministry of Industry finances inter-firm networks and innovative programmes. Within the central administration of the ministry, one person is specifically in charge of the machine-tool sector.

The DRIRE (*Directions régionales de l'industrie, de la recherche et de l'environnement*), that is, regional branches of the ministry of industry, have taken a leading role in providing information, guidelines, and support to deal with environment issues. Machine-tool SMEs have first to adapt to new rules about pollution, waste, fuels, all themes that they did not deal with for a long time. At the same time, those types of demand are also emerging from the market. Major customers firms have ever stricter requirements. Machine-tools firms are therefore required to be far more clean, reliable, and safe. Often in cooperation with CETIM, the Ministry of Industry has provided not only information and guidelines but also specific programmes to help firms upgrading to those new issues. The signing of regional planning contracts between the state and the regional councils has been used as an opportunity by the ministry to develop programmes and funding, together with more for inter-firm cooperation programmes and technology transfers organized by CETIM regional centres. ADEPA provides specialized engineers to

firms to implement upgrading programmes or to reorganize production processes in relation to technological developments. It played an important role in boosting the diffusion of computer assisted programs for production in general, and in the machine-tool sector in particular. As some SMEs have tried to develop very specific machines for their large clients, CAPO has proved essential to integrate conception and construction. Those developments also helped the building of machine tools devoted to the construction of more precise (sometimes unique) metal parts. After the restructuring process, French machine-tool firms have embraced those new developments at a far higher rate than ever before. They seem finally to have taken advantage of the right kind of LCCGs provided mainly by other firms and to some extent by professional networks bringing together leading public and private actors of the sector.

Weak Territorialization

Clustering and the provision of LCCGs on a local basis are still not much on the agenda of the French machine-tool sector. This is not surprising in the Paris region, where market mechanisms dominate the relationship between firms. This is less true for instance in Alsace, which is a dynamic industrial region made up of a large proportion of foreign-owned firms. When Bureth and Llerena (1993) tried to identify an Alsatian production system in the mechanics sector (including machine-tool firms), they found two main types of inter-firm cooperation: the relationship between machine builders and their customer firms (from commercial relationship to day to day interaction about the use of the machine) and technology transfers to upgrade both the machines themselves and the production process. These authors found intense interaction between Alsatian SMEs and firms in Baden-Württemberg and Basel, that is, within a large region beyond the national frontier. These inter-firm relations take place within transnational groups and market relationships. Second, they found a large set of relations extending beyond this large region. They could not find signs of the making of local industrial or innovation systems. They also notice that the smallest SMEs had more chance to deal with a smaller number of partners on a more local and regional scale. Training was the only exception to this pattern. As far as research was concerned, they identify a complete gap between research conducted in the Alsace region and the research used by the SMEs.

These findings fit with the general pattern of French SMEs, that is, either dynamic SMEs more integrated within international market relations or development within foreign-owned groups providing LCCGs, or large customer firms providing the same. The increasing fragmentation of old industrial milieux is also quite classic (Courault and Trouvé 2000).

However, without disputing this general pattern, there is a special case in Saint Etienne. There are many firms that are well integrated within a dynamic CETIM. They also take advantage of training facilities. Also, within a declining

industrial region, and in accordance with what De Banville and Venin (2000) noticed, there is also a skilled labour market and networks of professionals who play a role. In the machine-tool sector, the diffusion of innovation also takes place either by relations with customer firms or by imitation of the competitors. In this region, cases of innovation following imitation and dissemination through professional networks were noticed.

Conclusions

We have argued that there is a correlation between the governance failures and collapse of the machine-tool sector in France over a long period. By contrast, the recent recovery of the sector goes together with attempts being made collectively to organize the provision of LCCGs and to strengthen inter-firm cooperation in different ways. It is far too early to decide about the future of the sector. SMEs still depend, though less than before, on the success of large industrial customers (aerospace, motors) in France and in Europe, and it remains to be seen how it will face difficult times. Table 6.2 depicts the changes that have taken place since the 1970s, demonstrating the complete change of governance of the sector. We have analysed this as the making of what could become a new mode of governance, a new combination

Table 6.2. Collective competition goods, France, 1970s and 2000

	Mode of provision			Scale			
	State	Organiza- tion	Market community	Local	National	European regional	World
<i>1970s</i>							
R&D	x				x		
Training	x			x	x		
Market in- formation		x	x		x		
Technologi- cal innova- tion		x	x		x		
Environment							
Environ- ment Con- tract			x		x		
<i>2000</i>							
R&D		x	x		x	x	x
Training	x					x	
Market in- formation		x	x			x	
Technologi- cal innova- tion		x	x	x		x	
Environ- ment	x		x			x	x
Contract		x	x			x	x

of association, market, corporate hierarchy, and state (in its new network form of intervention). The long-term development of relationships between research centres and groups of firms illustrate the sea change. The smaller, leaner, more competitive machine-tool sector is now firmly organized along a market governance mechanism with some public support. It remains to be seen if the almost total absence of local or regional integration will prove a handicap in the future.

7 Hybrid Governance and Networked Firms

COLIN CROUCH

The evidence presented by these case studies is confusing, because it demonstrates contradictory convergence processes. During the latter 1990s there was a general, even global, convergence, at least at the level of economic ideas, on the policy prescriptions of neo-liberalism and the strengthening of market forces. This orthodoxy is, however, ambiguous on questions of the role of small- and medium-sized enterprises (SMEs). At one level, the theory of free markets favours these. Not only should free markets contain large numbers of small firms for the sake of competition, but also they are seen as particular centres of enterprise and innovation, stripped of the heavy structures, which sometimes encumber giant corporations. On the other hand, some kind of regulation is usually required to protect small firms from takeover by large ones. Even more important, the latter are better equipped to compete internationally in a neo-liberal policy environment that minimizes the possibilities for public provision of competition goods on which SMEs depend if they are to have an advanced innovative capacity. Large firms can provide such goods for themselves, or as club goods within the hierarchy of their supplier chains.

Two opposing policy trends can therefore be seen, and they can be found within each country. As Farrell and Holten show, during the 1990s the left-leaning regional government of Emilia-Romagna began to shift away from its policy of supporting industrial districts as a whole, and started concentrating on helping larger 'leader firms' to build a place in the global market. Alongside this came a policy of encouraging regional suppliers of real services themselves to market their activities and therefore resile from their earlier concepts of having responsibilities for their localities. In many ways this insistence on the market testing of public services was an imitation of policies initiated in the 1980s in the United Kingdom. Meanwhile, as Crouch and O'Mahoney argue, the neo-liberal central government in the United Kingdom was trying to develop a localized policy capacity so that it could encourage small enterprises—with the strength of the Italian small-firm economy at least implicitly in the background. Glassmann shows that in the Stuttgart area too developments moved in various directions: SMEs simultaneously became more oriented to global as opposed to regional markets *and* discovered scope for

cooperation; the range of regional (*Land*) state-provided competition goods expanded, while large firms acquired a greater prominence as in Bologna and Modena. Le Galès and Gaubert's account of the French case can also be read in two ways. On the one hand, the final break-up of economic leadership by a strong centralized state can be interpreted as part of the neo-liberal turn. On the other hand, what replaced it was by no means pure market governance, but a complex set of institutions including prominently both corporate hierarchy and various forms of state or associational activity.

The model of the abstract components of economic governance regimes developed by Crouch and Trigilia (2001: 224–35) proposes three continua according to which such regimes can be analysed, related to the different ways in which they provide competition goods: endogeneity versus exogeneity, procedure versus substance, and informality versus formality. A move towards a neo-liberal pattern is a move towards exogeneity, procedure and a moderate level of formality.

The cases described in the previous chapters do not fully show such a tendency. There was a certain though moderate trend towards exogeneity, as governments (national and regional), large corporations, and other actors considered that neither the sector itself nor its localized SMEs were capable of resolving their problems. They therefore moved into the sector to displace local actors. However, governments in particular were likely to recognize the importance of working directly with the firms and not at arm's length. There was also a move towards moderate formality: the sheer diversity of new approaches prevented any strict formalism, though the growing role of multinational firms necessarily strengthened formal bureaucratic procedures over the informal ways typical of SMEs. But there was sharp divergence from neo-liberal prescriptions in the strongly substantive nature of the local collective competition goods (LCCGs) being developed to assist modernization. Even in the United Kingdom, where neo-liberal policies were most explicitly stressed, firms were not in practice told that they needed only to be exposed to the market in order to improve their competitiveness. Whatever their ideological preferences, all agencies concerned tried to develop substantive provisions and advice.

Considering the realities of productive achievement, as opposed to policy stance and direction of change, the Emilia-Romagna machinery industry remained internationally successful and comprised relatively small firms; the machine-tool industry of the West Midlands remained internationally weak and saw continued tendencies to concentration; Baden-Württemberg machine-tools suffered considerable decline and then recovered; the French industry, much less territorialized than the others, remained weak but was finally able to aid its recovery with a variety of LCCGs. Were the different policy actors and industry specialists converging on some best-value policy model for the future, in which machinery districts would continue to exist as geographical entities, but with large firms playing a larger role than previously

the case in central Italy? Such a convergence could take place on the basis of the supplier chain, the smaller firms of a district remaining significant for the leader if they could continue to use the advantages of geography to learn rapidly of its changing requirements and quality improvements. Policy makers in each country seemed to agree on the value of supplier chains. Such a development is fully consistent with the major trend identified in our previous study (Crouch and Trigilia 2001), which saw a general move within local production systems away from the model of networks of firms towards that of the 'networked firm'—the large customer firm and its (partly local) suppliers.

As Crouch and Trigilia (2001) noted, while this model can be very robust and productive, and surmounts many of the problems raised in the provision of LCCGs by making these club goods, it may at the same time threaten some of the primary advantages of truly collective goods. When provided within a networked firm, which is itself a national or global corporation, some of these goods may disappear from a particular local region, leaving regions without autonomous capacity for innovation.

It is difficult to establish at this point to what extent the current industrial districts in Emilia-Romagna are threatened with a similar fate. Not all skills that develop in an area are drained from it if a network of firms becomes part of the hierarchy of a large networked firm; and it is not yet clear whether the regional government's strategy of more or less abandoning the industrial district model will be decisive. Farrell and Holten (Chapter 3, this volume) demonstrate the continuing activities of commune-level governments to sustain the capacities of districts. They may well be unable to provide the levels of technological, international marketing, and other support, which small firms may now need to compete, but they may provide those that maintain them as strong and relatively autonomous members of a supply chain. And Italian local governments, alongside the informal networks of firms themselves, may prove more important than the relatively weak regional tier.

The British case provides some evidence that units located in empirical clusters thrived better during the 1990s than more isolated machine-tool makers. However, many of these 'units' were branches of large corporations, and there was no relaxation of the tendency towards concentration in this and other British industries. Indeed, there is evidence that the new (and in the event short-lived) local policy instruments, Training and Enterprise Councils (TECs), themselves depended heavily on local managers of large corporations' links with the SMEs, which had been their initial targets, having proved difficult to develop.

The German model may be more resilient. The relatively large networked firm model has long been more important here than in the Italian case, but these firms have been more embedded into their regional economies than their counterparts in the United Kingdom. If today they are becoming disembedded from an individual region, the implications of such a move are less

dramatic than would be the case in Italy because, as shown by Glassmann here with reference to machinery, and by Glassmann and Voelzkow (2001) with reference to the economy as a whole, there is a rather homogeneous pattern of LCCG delivery across the whole country. The German system is a national one, locally delivered. The French system remains, by contrast, a national one, nationally delivered. The innovations described by Le Galès and Gaubert certainly mark a change from a centralized model. However, the new flexibility and closeness to the firm of government policy actors, and the new prominence of large, often non-French, holding companies, still do not make use of a strong territorial component. This is because the industry was not concentrated in the first place. It will be interesting to see if SMEs in French machinery production can achieve a strong international presence through such means.

Throughout their histories machinery industries, in common with many others, have faced waves of technological change. These initially challenge and unsettle producers; then some firms use the challenge to advance their capacities, while others fail to respond and usually have to leave the market. From the 1970s onwards there have been successive challenges from computer-based technologies. It is remarkable that the Emilian industries, based on small firms, had responded better to this than the British and French, which had undergone major processes of concentration, partly on the strong assumption that only large firms could tackle these technologies. This does not necessarily demonstrate advantages for small firms as such: the German machinery industry, whose firms are only slightly less concentrated than British ones, had the best record of all in technological adaptation. What the German and Italian cases had in common against the British and French was the tendency for their firms to be 'networked', even if in different ways.

By the 1990s global marketing and the global organization of production were replacing technology as dominant challenges. Here the advantages of sheer size may become crucial. While this is likely to make conditions increasingly difficult for all small firms, those that are clustered are likely to continue to have advantages against those that are isolated. Small firms become increasingly dependent on LCCGs if they are to face the new challenges, whether these goods come from associations, local and national government facilities, large customer firms, or other mechanisms.

Access to LCCGs among Machinery SMEs

It is therefore instructive to consider the access to relevant facilities among the firms examined in our case studies, on both technology transfer and marketing. To this we add consideration of a third issue often considered important to economic success: training for skilled labour. In relying on the reported

preferences and actions by owners and managers of small firms themselves, one must remember that this is always a social group that prides itself on its autonomy and independence. They are therefore likely to play down the importance of collective and extra-firm sources of support.

Technology Transfer

In both Italy and the United Kingdom, technology transfer was a weak point, possibly threatening the continued role of SMEs in the sectors concerned. German and, eventually, French firms faced a better prospect.

In the Bologna and Modena area the well known community networks seemed to operate for technology transfer, but weakly, as though the informal, endogenous level could not deal with such complex matters. ERVET understood the problems clearly, but its solution was to support the larger firms, and even to detach its own technology transfer activities from the region. It seems that the view has been taken that small firms in the packaging machinery industry simply cannot equip themselves for advanced technology.

Baden-Württemberg networks differ from Emilian ones in that technology transfer has long been high on their agenda. The firms involved are medium-sized, even large, rather than small. Also, as many authors have noted, the collective networks are more formal than in the Italian case, with well funded and technologically sophisticated organizational resources capable of delivering substantive competition goods. Less frequently noted, but stressed here by Glassmann and more generally in Glassmann and Voelzkow (2001), is the important role of public institutions, at both federal and *Land* level. These include specialized research institutes as well as the public universities, which were extensively used by medium-sized firms.

Small machine-tool units in the British West Midlands seemed primarily reliant on their own resources for developing technology, which makes the term 'technology transfer' hardly appropriate. There seemed little evidence of up-take of the facilities offered by the Machine Tooling Trade Association (MTTA); as we shall see below, the MTTA played a much bigger role where marketing was concerned, so this does not reflect a general invisibility of the association. The rich and extensive engagement of the regions' universities with the industry seemed to reach only large firms. Little response was also reported from small units to the extensive activities of government departments and the scope for EU funding. Paradoxically, although SMEs might appear to be more in need of exogenous and sometimes collective substantive facilities, it is large enterprises that really understand how to tap them.

The French industry seemed finally to be coping with technology transfer, using the exogenous, substantive and (compared with the past) informal governance modes of hierarchies of large holding corporations and the various public mechanisms being established.

Marketing

In both Emilia-Romagna and the English West Midlands both our documentary research and our interviews suggest a more promising situation for small enterprises in marketing than in technology transfer.

While the Bologna and Modena packaging machinery companies mainly relied on market processes for information on how to enter new markets, there was an important role for local specialized firms, which undertook to market the products of the local industry. This is an important combination of market and community, of exogenous procedure and endogenous substance. The firms operate on normal commercial principles; they are not acting as charities. However, the fact that they are locally based suggests the importance of local information flows, contacts, possibly even trust relationships—in other words, LCCGs. This is one of those points at which it is possible to ask whether ERVET's attempts to turn the attention of leader firms away from their local bases may disrupt useful processes. *Local* government agencies, on the other hand, seems to play a significant role, and seem to have seen a niche in providing information to firms on meeting European standards.

In the British and French cases formal associations and organizations were important. Even our British questionnaire respondents considered associations (usually MTTA) to be about equal in importance to their usually preferred 'own resources'. Wider evidence showed this to be a field where consultants—exogenous to the firm, and offering substantive but marketed and non-collective goods, were also significant.

It is often argued that German manufacturing tends to rely on reputation acquired by its technical excellence rather than on direct marketing strategies, and this seems to be reflected in our findings in Stuttgart. The emphasis of both public and neo-corporatist institutions for industry support is on technology transfer and workforce training. But firms themselves are increasingly aware of the importance of marketing, and for this seem to rely much more on their own resources. This has been one element favouring the strengthening of the networked firm model: it is the larger firms who are most able to execute marketing strategies without external support.

Training and Skills

In this classic area of collective goods, Stuttgart firms followed the classic German model of initial vocational training provided through an apprenticeship system regulated by the public schools and by the public-corporate structures of the *Kammer* system. The German system is today considered to be in some kind of crisis of the training system, as more importance is placed on further (where the apprenticeship pattern cannot operate) rather than initial training, and as some firms are reported to resent the costs imposed

on them. There is no evidence from Glassmann's interviews of the latter, but it is clear that further training and retraining are being carried out within the firm and not as a collective good.

Emilia-Romagna firms made use of a number of institutions external to the enterprise for training purposes. Important among these were the usual informal links, but there was also the important role of the Istituto Aldini-Valeriani, a classic example of a formally organized source of local competition goods. Links with universities and trade associations also seemed significant. As Farrell and Holten (Chapter 3, this volume) report, both the ageing of the labour force and the emergence of apparently more attractive forms of employment are producing labour problems for the packaging industry here, which it did not face in past decades. The response seems to have been increased reliance on various collective sources.

Despite the collective goods character of training questions, this topic found the British firms at their most introverted. Both our general research and our enterprise interviews showed overwhelming reliance on within-company solutions and consultants. This cannot be explained by a lack of potential external agencies. The West Midlands Enterprise Board had tried to play a role here; so did local TECs, programmes of the Department of Trade and Industry, and various bench-marking exercises.

The Growing Complexity of Governance

The evidence on these three specific issues demonstrates the general theme of a growing relative importance of the corporate hierarchy or networked firm model. But that finding itself may be only an aspect of a more general conclusion, again embedded in both these particular issues and the general national accounts: the growing complexity of economic governance.

In our previous study (Crouch and Trigilia 2001) it was pointed out that empirical cases were more mixed than theoretical models implied. Even if at the theoretical level we try to define market, state, associational, community, and hierarchical governance modes mutually exclusively, actors on the ground are likely to combine these in complex and creative ways. This does not refute the utility of the theoretical types; provided the typology is useful in identifying elements within the empirical cases, it has done its work. The existence of mixed and hybrid forms is a problem only for any observers who may want to argue that conceptual difference necessarily implies empirical incompatibility.

As Glassmann cites Offe as arguing, mixed modes of action can be extremely useful to practical actors. Virtually all pure modes have their defects; these can be remedied if actors have access to a second different, even directly contradictory, mode. This may both explain such developments as British governments of the 1980s constructing new collective institutions even as they intensify their fundamentally neo-liberal policies, or the regional

authorities of Emilia-Romagna stressing the role of leader firms while the region's economic strength seems to rest in its diversity and large number of small firms. This is the redundancy principle. Its limitation is that it is subject to important congestion and waste constraints. It is not possible to leave a whole array of institutions around unused; and at certain points contradictory principles do become mutually incompatible.

At the present time a large increase is taking place in institutional complexity and potential redundancy, partly because firms and public authorities are aware that past parameters of competition are changing rapidly and that there is a need to investigate new ways of acting, and because globalization extends the potential array of governance modes of which actors have knowledge. At its best this process produces constructive new hybrid forms, enabling existing but increasingly inadequate strengths to be bolstered by new mechanisms. There are several examples of this in Glassmann's account of how Stuttgart firms are acquiring more flexible modes of independent action without destroying the public and corporatist mix of external support, and more generally in the obvious willingness of actors in each country to try to learn something from the experience of others. At its worst it may produce an eventual convergence on a particular path, which may corrode valuable elements in other governance modes and in the end actually reduce the diversity of possibilities available, ignoring Offe's principle. Among SMEs in the machinery industry this threat is mainly posed by the growing dominance of the networked firm model. If this develops beyond a certain point it both destroys the capacity for autonomy of small enterprises and devitalizes LCCGs by internalizing them.

The growing complexity of governance modes also increases the complexity of a question which this study must address. Our four cases include two which were seen as successful examples of machinery districts: Emilia-Romagna and Baden-Württemberg; and two where long-term national policy is seen as having been hostile to the development of districts. If the theory of local production systems is valid, the Italian and German cases should have emerged better from the 1990s recession. If in contrast theories of the rigidifying consequences of embeddedness are more suited to the conditions of the late 1990s and beyond, we should expect either no difference among the countries or even superior performance in France and the United Kingdom.

Both the statistical data presented in Chapter 2 and the individual case studies suggest the former: the industries around Bologna and Stuttgart remain stronger and more vibrant than those around Birmingham and scattered across France. Of course, it can be argued that true success lay in getting out of machinery production altogether; that therefore the smaller the industry by the end of the 1990s the better; and that their lack of embeddedness enabled both British and French capital to escape from industries in which Italians and Germans remain trapped. It is also the case that in each country the industries are smaller in terms of numbers of both employees

and independent enterprises than in the early 1990s. Those who remain are survivors; certainly no approach to machinery production was able to sustain an industry in its entirety.

However, not only have the Stuttgart and Bologna firms shown that machinery production of various kinds can remain viable in western European countries, but also they have refuted those theorists who predicted that strong embeddedness implied incapacity to change. Our case studies describe several institutional as well as product innovations, innovations that produce the increased complexity, which we now see. In fact, however, all four cases experienced institutional changes, which falsifies the idea of a simple 'before and after' comparison between industries embedded in local production systems and those without such structures. The rise of the networked firm model means that neither the German nor the Italian cases present the same institutional structures as they did in 1990. Meanwhile, however, the British and French have been trying to erect some institutions resembling some of those found in Germany or Italy, and also to develop some original hybrids.

It is not possible on the basis of this research alone to determine whether the complex patterns of borrowing and sharing we have observed relate specifically to processes of Europeanization. For that we would need to see if these cases, all in EU member-states, differed significantly from similar industries in other parts of the world. Unlike the steel industry and other sectors in clear crisis, or like some high-tech sectors, which have been made objects of future-oriented policy, the machinery sector has not been at the forefront of European public policy-making. That is a characteristic that makes the sector interesting to those concerned with specifically local and autonomous forms of dynamism. Although our authors have drawn attention to some EU initiatives, they have not been of fundamental importance in reshaping the industries. They have been fundamentally shaped by more global competitive processes, as the various narratives show. It is therefore more likely that borrowing and hybridization have been taking place on a wider scale than the European Union alone.

On the other hand, our findings are relevant to the debate over Europeanization in the wider sense of immanent convergence. Much is made in the institutional and policy-making literature of major differences and incompatibilities of the structures and frameworks of different EU states: for example, German neo-corporatism and French statism. Our account shows considerable variation within countries around such stereotypical positions, and we think we have perceived an intensification of that diversity. If that is the case, cross-national incompatibilities are either becoming less important, or at least are not as set in stone as we are often led to believe. National patterns remain distinctive, but increasingly because of their specific mix of shared elements, rather than because of strongly distinct monopolies of particular institutional forms.

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Part II Trying to Establish Local Production Systems: The Ex-Steel Cities

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8 The Reconstruction of Declining Local Economies in Europe

HELMUT VOELZKOW

Thanks to Alfred Marshall's studies (1919) on the early days of capitalism in Great Britain, we know that local production systems already existed to a large extent during the nineteenth century. Marshall depicted various empirical examples of spatially concentrated small- and medium-sized enterprises (SMEs), which formed an organizational alternative to large, vertically integrated firms by cooperating. Marshall presented the model of a local production system as an alternative to the 'big firm model'. Today we also know that many of these old local production systems have declined in the course of capitalist development, either because they could not compete with large firms or else because the spatially concentrated supply of specialized goods has geographically dispersed. In the first case, the size of firms has changed: the number of firms has been reduced, but due to the fact that some enterprises have been shut down or taken over by others, the size of the remaining enterprises on the market has increased. In the second case, the spatial dispersion of firms has changed. If the spatial concentration of SMEs no longer offers any comparative advantages—which means that the respective product can also be manufactured in other localities at comparable costs with a comparable quality—then the spatial concentration of firms may decrease, though the size of firms is not affected as such.

Vice versa, a number of empirical cases show that the organizational model of the vertically integrated firm may decline as well. If the competitive conditions on the respective markets change, if flexibility, customer orientation and decentralized production are demanded, then mass production in large firms may experience severe forms of crisis (Piore and Sabel 1984). Bankruptcy or the reorganization of large firms may support vertical disintegration, creating a number of smaller production units. When these smaller units disperse geographically, one may distinguish two alternatives: One option may be that the spatial concentration decreases in the process of vertical disintegration, because SMEs disperse over a large territory. Alternatively, SMEs cluster, for example, in the locality of the formerly large enterprise, because they wish to establish *local* comparative advantages. If such a new local production system emerges as a result of vertical disintegration, one assumes that those

SMEs which constitute the new cluster belong to the same sector or a part of the same value chain as the large firm.

If the spatial concentration of a sector in a locality remains almost constant during the process of structural change, the variation of enterprise concentration (either through vertical integration or through vertical disintegration) has no dramatic impact on the local labour market, provided the sales market allows for continuing production on the same level. Enterprises may change their organizational structures, and they may increase their level of vertical integration or disintegration, but the volume of production and employment remains relatively stable. The situation changes fundamentally if the sales markets of spatially concentrated sectors break down, no matter whether a large firm or a cluster of SMEs becomes afflicted by such a development. There are severe problems if the productivity of firms increases continuously, for instance due to technological innovation, while the demand on the sales market stagnates. Such processes produce structural changes causing an immense loss of employment, in particular in localities where the respective sectors have been highly concentrated.

The steel towns of Europe serve as a good example of this kind of crisis, resulting from the decline of traditional industries in which localities and regions have specialized. While the often large steel plants first supported a growth process which created employment and wealth for the respective regions, this same industry later caused economic and social adjustment problems. These in turn provoked a number of national and European support programmes, designed to create new economic perspectives for the regions concerned.

The Decline of the European Steel Industry and European Steel Policy

The steel industry is highly dependent on large energy reservoirs and excellent transport infrastructures, and for technological reasons it has traditionally been dominated by comparatively large firm structures, employing thousands of workers, initially parts of major migrations from other regions and countries (Wienert 1996). As a result Europe witnessed the creation of a small number of highly concentrated steel cities.

Until the end of the 1960s steel was a growth sector. However, in the mid-1970s the European industry began to decline, leading to structural over-capacities. These were not just the result of high exit costs from the production process. Once production facilities have been established in this capital-intensive industry, they remain irreversible for years (Wienert 1996: 65 ff.). Even if demand stagnates, supply is kept at a relatively high level. As a result, European steel firms showed a strong tendency to compete over prices. At the same time, since the industry is concentrated, the local labour market finds adjustment difficult. Capital owners, political actors, and of

course the workforce alike avoid moving out of steel, and seek to rescue a declining steel town by all means.

These technical and social particularities of the steel sector have always constituted a major incentive for state intervention. Although EU member states formally gave up their rights to act autonomously in the politics of steel by founding the European Steel and Coal Community (ECSC) in 1952, there were always some national political interests which were not and could not have been simply subordinated to a common policy approach.

The ECSC Treaty contains contradictory concepts of the political economy of steel. On the one hand, it established a liberal market framework; on the other hand, it proposed a number of interventionist instruments. While tariff and non-tariff trade barriers for coal, iron, and steel products within the Community—as well as measures that in any way discriminated among the member states—were prohibited, the regulation of prices, quota systems for steel products, and single manufacturers were permitted (Dudley and Richardson 1997).

Until the 1970s, EC steel policy was mainly oriented towards the liberal aims of the Treaty. This changed after the first steel crisis in 1974. The breakdown in demand and the following decline of prices provoked the First and Second Steel Plans by the EC Commission. These measures were relatively moderate, being confined to the obligation of firms to notify their monthly production output and to the voluntary advice on the limitation of supply. At the end of 1976 the EUROFER-Cartel, including all EC member states, was founded with the support of the Commission. It was designed to put voluntarily negotiated constraints on price competition between several steel manufacturers, which had become perceived as increasingly ruinous to all firms. The Commission strengthened this cartel in order to beat competitors from non-European markets. In the following years EUROFER controlled the whole European steel market by minimum price rates and supply quotas. Import quotas as well as minimum prices for imports from non-EC markets were combined with voluntary agreements on the limitation of exports. In the mid-1970s the industry and the Commission, while acting in favour of steel producers, assumed that the decline in demand for steel would be temporary. Production capacities were kept at a high level in expectation of better market conditions.

However, these expectations were soon disappointed. While the Commission's First Steel Plan was designed to prevent further enlargement of production capacities, in 1977 the Second Plan for the first time envisaged reductions in production. Then, with the second oil crisis in 1978 and 1979 sales markets for steel and prices for steel products broke down again. Since some enterprises of the EUROFER cartel could no longer act according to its agreements, the cartel itself broke apart. The times of voluntary cooperation were over. Instead, a continuous decline of steel prices as well as an increasing competition on subsidies began to shape the European steel

industry. The Commission felt compelled to activate the system of minimum prices and production quotas according to the ECSC Treaty. For each steel enterprise, production and export quotas were defined for trade within the common market. Also exports to regions outside that market were regulated. At the beginning of the 1980s the quota system covered almost 70 per cent of European steel production, while the remaining 30 per cent had been brought under the control of a regime, which was again based on voluntary agreements, called the EUROFER-II-Cartel. In order to limit national competition on subsidies, two codes were introduced, the second of which contained an agreement only to allow further subsidies for those enterprises, which actively contributed to the cut back of production capacities in the sector.

After several years of *dirigiste* market regulation (1980–1985), which were far less successful with respect to the limitation of production capacities than originally projected, a gradual liberalization was initiated in 1985. The share of regulated steel products was gradually reduced, until the coercive quota system was completely abandoned in 1988. In addition, the codes on subsidies were made stricter. When steel product prices broke down anew in the early 1990s, firms still called for market regulating intervention by the Commission, but this time it refused. Instead it proposed several strategies for a further reduction of production capacities.

The politically initiated restructuring of the European steel industry after 1980 increased productivity remarkably (Mény and Wright (1987)). But this was achieved only by a reduction of production capacities, followed by massive labour redundancies. In addition, the industry faced new competition from poorer countries. The transformation of Eastern Europe at the end of the decade again had negative effects on the EU industry. Between 1975 and 1995 employment in iron and steel in the European Union fell by 65 per cent from 991,000 to 326,000, a decline of 39 per cent. Imports from Eastern Europe increased by around 80 per cent (Wienert 1995).

During the 1990s there were further adjustment problems, but the production of crude steel remained relatively stable. The European Union remains the leading steel producing region in the world, followed by Japan, the United States, and China. It also remains the best performing export region to the most important sales markets for steel, in particular to Asia (including Japan), the former EFTA countries, and the United States (Gieseck 1995). But again, the comparative advantage of the industry could only be maintained by an enormous increase in productivity. Technological innovation supported flexible adjustment to these exigencies. Between 1986 and 1995 production of steel per worker was doubled, in a cycle which saw a comparatively high level of consumption in the period between 1988 and 1993 followed by a downturn.

Behind the overall job losses lie some local ‘catastrophes’. Cities realized that their survival as a steel location might not be saved by the European Steel Policy, since this was no longer designed to stabilize the general employment situation in the industry. Instead, claims for Structural Fund help

became directed towards the unavoidable and problematic consequences of this drastic loss of employment. Such was the experience of the four steel towns examined in our case studies.

1. In Duisburg, employment in the sector declined from 67,501 workplaces in 1976 to 20,515 in 1999 (Federal Labour Office, div. vol.).
2. Piombino is much smaller than Duisburg, with only 30,000 inhabitants, but it lost 3,000 steel workplaces between 1970 and 2000.
3. By 2000 Sheffield had lost over 100,000 of the 120,000 workplaces it had in 1970.
4. St. Etienne experienced a decline of 34,000 of its 55,000 mainly steel-related industrial workplaces between 1975 and 1995.

Following the steel collapse, firms in other sectors began to suffer, either through their specific dependence on steel enterprises or through the collapse of spending power in the localities. Thus, the cities and regions had to spend more on welfare programmes just as their public income deteriorated.

European Regional Policy

Of course, all involved actors would welcome the substitution of workplaces in different sectors. However such a revitalization is difficult to manage, as can be learned from our case studies. Public financial support programmes aiming at such a change were initiated, but positive results could not be achieved in a short time. The demand for political intervention was multi-faceted. Former steel workers had to be newly qualified for other sectors and had to receive mobility aid. The deserted industrial brownfields had to be somehow renovated and ecologically renewed for different activity. Such measures included urban renewal. But in the first place the cities had to attract new investors, to establish new perspectives for employment.

All cities concerned received financial support from structural programmes of their governments and from the European Union, in particular from the EU Structural Funds (the European Regional Development Fund ERDF and the European Social Fund ESF), which operated on the basis of Objective-1 (Italy) and Objective-2 (England, France, and Germany) measures. Another important EU measure was the Community Initiative RESIDER, aiming in particular at the reconstruction of steel regions. According to the view of the steel cities, the public funding offered by the EU should have been perceived as the key for a new economic development beyond steel.

Initially European regional policy was constrained to strengthen only national structural programmes, decisions on the concrete application of funds resting in the hands of the national governments. With the amendment of the funding regulation in 1984, affected regions and cities acquired some voice in the application of funds, but still within the limits of the national

programmes. When the Single European Act was adopted in 1988, the Council of Ministers initiated a far reaching reform which made sure that supported regions would participate in implementing structural policies, regardless of how the member states shaped them. For the steel cities and their regions this reform embodied a kind of role reversal: they were no longer treated as passive recipients of grants, but as active forces which codedecided on the application of the provided funds.

In a further reform, in 1993, the Commission provided additional procedural guidelines, which emancipated sub-national regions and their cities from their nation states and making them self-determined actors with a regional policy approach. This affected not only the relationship between formal political and administrative levels, but also the role of societal interest organizations, which from then on participated in the articulation and implementation of policies on all vertical levels of the multilevel-governance system. The EU demands from all member states the integration of economic and social partners into the articulation and implementation of European support programmes. As has been outlined by Voelzkow (1998), these guidelines may be interpreted as 'staged corporatism' (*'inszenierter Korporatismus'*)

The Commission was not only interested in the modernization of a common structural policy, but also in the creation of a more autonomous role for itself, in part by seeking an alliance with sub-national partners against member state governments. These strategies are mirrored in the Commission's four principles:

1. Concentration of measures around primarily 'territorial' and 'thematic' objectives, which are financed by various (European or national) funds;
2. Programming, whereby multi-annual, multi-task, and occasionally multi-regional programmes, rather than uncoordinated and isolated individual projects, are funded;
3. Partnership, involving 'close consultations between the Commission, the member states concerned and competent authorities and bodies at national, regional, local or other level with all parties, in pursuit of a common goal' (Council Regulation No. 2052 and 88) at every stage in the policy from preparation to implementation;
4. 'Additionality', such that EU funds complement, rather than replace, national funding. Money from the Structural Funds has to be co-financed by national financial resources at specified shares.

Structural and cohesion policy is now the second most important spending policy of the EC. It accounts for roughly a third of its annual expenditure. Successive increases raised expenditure from 3.7 bn. ECU (1985) to 33 bn. ECU (1999). With the broad increase in the financial resources, which could be spent within the framework of the policy, even national support programmes were increasingly brought under the control of the European regime under the principle of 'additionality'.

In Germany the European concept of 'region' always addresses the *Länder* (not other sub-national entities, neither the cities nor the communes). In turn the *Länder* are aware that their autonomous role as 'European regions' will not be questioned. By comparison, other member states are unitary (United Kingdom), unitary-decentralized (France), or regionalized (Italy) (Engel 1993). The reform of European regional policy particularly enhances the relative political weight of sub-national 'regions' in these latter countries. However, the role of sub-national regional entities remains very different among the respective political systems (Conzelmann 1995; Marks 1993; Kohler-Koch et al. 1998).

By the same token, the role of cities and communes remains important to clarify. In the context of the partnership principle, they participate in the articulation and implementation of European Structural Policies, but how this very general guideline becomes implemented de facto in the various national systems must be discovered by empirical analysis.

The Focus of Analysis of the Case Studies

The European structural programmes were designed to develop new entrepreneurial activity in the SME category. The new policy approach, promoted by the Commission, is explicitly oriented to supporting the local aggregation of new business. Here we must ask, whether such initiatives established SME activity within the same value chain, which can be characterized as a new local production system, or just various individual SMEs, making up a mix of different sectoral specializations. In the latter case, inter-firm cooperation will probably be low. However, in the first case a functional connection could be built between these enterprises, since each would contribute 'components' to the same value chain. Thus, by aiming at a local production system, regional structural policy would probably shape support programmes according to the demand of collective competition goods and not only firm specific measures. The respective instruments, which would secure the support of a firm cluster could include real services, which again vary from those regarding market information and counselling to technology transfer and qualification measures.

However, it is not a priori clear, whether such instruments have really been offered. This question will be addressed by the case studies, which also examine the structural policy approach of each region. It is of particular interest for this discussion to understand whether local production systems have become endogenously established as a result of such policies.

Variation on this issue may also depend on the selected cases. We shall discuss this in our conclusions. As we have claimed before (Crouch et al. 2001), the national factor serves as a strong independent variable. In any case, our research interest will redirect our attention from pure sectoral analysis to the

locality, because here we elaborate the conditions and effects in a process in which location chooses industry and not vice versa.

The case studies also consider the political reaction to the sharp increase in unemployment in recent decades. The main focus has been on strategies to overcome the decline of steel by stimulating new employment opportunities in other sectors. Have localities not only implemented 'passive' measures or social plans, exclusively designed to soften the socio-economic change caused by the declining steel industry, but also supported active intervention, in order to further the local economy and employment? If so, the question emerges, by what means and which instruments they have tried to attract new investments. It is of particular interest, if and how far the establishment of new local production systems has helped the locality to overcome the period of decline. Or did actors rather concentrate on support programmes designed to reconstruct the old industrial facilities, or to attract investments for any kind of firm regardless of its sectoral specialization? And what have been the economic effects of different strategies of reconstruction?

9 Restructuring Duisburg: A New Local Production System Substitutes an Old Steel Plant

ULRICH GLASSMANN AND HELMUT VOELZKOW

This case study deals with the rise, decline, and restructuring of an old steel town in the Ruhr region: Duisburg, a city situated on the Rhine with 513,550 inhabitants in the year 2000. One might expect that not a single steel firm in Duisburg would have survived the crisis of the 1990s, but one of the city's biggest local steel enterprises still successfully competes on the world market, the Thyssen-Krupp Steel Company. Although steel production in Duisburg has declined, a share of 33.8 per cent of Germany's production of crude steel in 2000 still came from the city, while 49 per cent of the country's share of crude iron was still produced there (Statistical Data Office Duisburg 2002).

The restructuring process of Thyssen and Krupp included the closure of two giant industrial complexes, causing considerable unemployment and deeply affecting the socio-economic foundations of the locality. Since it became clear in the 1990s that employment in the German steel industry would never again approach numbers reached before the first European steel crisis, the locality had to be restructured for other sectors. A relatively recent plan proposed a new concentration of logistic firms. Our study analyses the new economic dynamism which was supposed to be stimulated in logistics and in particular asks, whether it has been possible to substitute large-scale steel production by a local production system. It thus deals with a highly political and ideologically debated issue: if and how social and economic change can be politically induced.

We have argued elsewhere (Glassmann and Voelzkow 2001) that the governance of local production systems in Germany embodies the networked firm model, embedded in federalist and corporatist public institutional arrangements for collective goods provision. We therefore need to examine whether this also applies to the new Duisburg logistics sector. However, this case is distinctive, in that while elsewhere industries choose locations, here the location chose an industry. This is not meant rhetorically: declining localities have to make a decision how they view their economic future and exclude possible alternatives. For instance, they must decide whether they wish to stimulate a diversification process of local production by initiating a number of different

programmes, or whether they wish to offer opportunities for specialized firms. Duisburg has chosen the latter. Our hypotheses are therefore the following: First, the decision to specialize has supported a localized division of labour, forming a local production system. Second, the institutional interplay, by which the local production system is created, shows the typical features of German collective goods provision, again giving important weight to political actors such as the *Land* government of North-Rhine Westphalia (NRW) and the federal government. Third, since declining localities must compete with well developed ones when they wish to attract firms, some unique collective competition goods are required. These must be made available a priori, by exogenous actors.

In Storper's vision of the learning economy, firms agglomerate because they expect to benefit from untraded interdependencies (Storper 1997). These are not in the first place physical buyer–supplier relations, but above all options to pool specialized intelligence on certain technologies and opportunities to achieve product innovation through joint efforts (Scott 1998). Although this seems a plausible explanation for some forms of business agglomerations, it seems a difficult solution for the local economy of Duisburg. With logistics the city government decided to stimulate a sector which depends heavily on physical buyer–supplier relations. A reason for firms to cluster is thus not primarily given through *untraded* interdependencies. However, this is not because Storper was wrong, but because of this reversed order of choice between locality and sector. In cases of organic agglomeration the cluster effect is achieved through the decision of firms to settle somewhere and benefit from the exchange of collective competition goods. The more exclusive and specialized these goods are, the more attractive the respective locality becomes. Public organizations may steer this process accordingly.

However, in Germany, these goods are seldom exclusively supplied to one or only a few localities (Glassmann and Voelzkow 2001). In principle, new industries could be developed anywhere under the rules of the German innovation regime. The locality itself must be (in part) the object of the developmental process of firms and give incentives for joint action. This can best be assured if not only untraded interdependencies are supported, though these are highly important for learning economies, but if inter-firm relations are physically bound to the locus of production, exactly as steel production was formerly bound to the existence of natural resources. The localization coefficients are highest in German local economies that depended on such physical endowments, for example, steel production, ship building (Glassman and Voelzkow 2001). It therefore appears to be rational for declining industries to pursue a different strategy than already developed regions that support an organic process of agglomeration in new technological fields. But this makes restructuring even more difficult, because growth is expected from these advanced technologies; Duisburg will illustrate a viable alternative.

The Rise and Decline of Steel Making in Duisburg

When social scientists talk about the rise and decline of industries, they tend to imagine a continuous growth process until a crisis sends the local economy into a linear decline. However, steel making in Duisburg cannot be described by a simple growth model. Not only have some firms survived the massive decline of the sector; in the history of the local economy there have been many cyclical ups and downs, technological breakthroughs, and phases of stagnation, external shocks, periods of agglomeration and concentration. The roots of mass production steel-making in Duisburg date back to the period 1855–1865. Within a decade the number of furnaces for iron and steel production increased from thirty-four to sixty-eight. By 1870 they had grown to 107. However, even the early days of steel making were difficult due to the sector's dependence on international production and trade. The American Civil War 1861–1865 caused a first downturn in demand, so that the local chamber of commerce expressed its fear in a report on the sector, saying that the local steel enterprises might become 'ruins of modern times' (Heid 1983*b*: 214). Only a few years later, a cyclical upswing produced euphoria, also supported by the reparation payments of France. But again a depression followed and unemployment rose dramatically. The situation improved at the end of the 1880s; at that time August Thyssen began to construct several steel plants in Duisburg, combining coal mining and steel manufacturing in giant industrial complexes such as the *Gewerkschaft Deutscher Kaiser* (Heid 1983*b*: 211).

Krupp followed the example, considering the Rhine important for the transport of goods. The new Friedrich-Alfred-Hütte was thus built near the river, although the place lacked other infrastructural advantages. For almost 100 years it served the local economy, employing thousands of workers over generations, until it closed in 1993 (Blotevogel, Deilmann, and Wood 1996). The name of the district where it was built—Rheinhausen—has become a synonym for decline of industrial production in Germany, just as the final closure of the plant became the symbol of unions' inability to act against capitalist imperatives.

The further success of Krupp's plant was favoured by a growing demand for warfare technology during the First World War. Although the local steel industry was already profiting from the cyclical upswing before the war, the Krupp plant in particular grew enormously between 1915 and 1918. By the end of the war it was the largest metallurgical plant in Europe, employing 10,000 workers (Vinschen 1983: 257). Even during the troubled times of the Weimar Republic, when violent strike action, the *Ruhrkampf* and the declaration of an independent 'Rhenish Republic' made it difficult for Duisburg firms to survive, local entrepreneurs overcame the crisis by initiating restructuring programmes. These were characterized by an immense concentration process, culminating in the foundation of the Vereinigte Stahlwerke AG

(VESTAG) in 1926. Only a few of the bigger metalworking firms stayed outside this merger. But some parts of those enterprises incorporated in VESTAG had been closed, causing a loss of 3,000 workplaces in Thyssen's case (Vinschen 1983: 289). Unemployment in general rose enormously in Duisburg. Krupp's plant in Rheinhausen ran into difficulties as well, but recovered in 1924, renewing and expanding its production facilities. After 1926 the postwar crisis seemed to be managed. Krupp-Rheinhausen had its best year ever in 1928. The high inflation of the 1920s had created some comparative advantages, especially regarding credits and wages, but foreign credits made the firms and the city increasingly dependent on foreign (capital) market actors.

Unemployment began to rise further, also due to the concentration process of the local industry. However, at the same time firms began to show better economic performance. As a result unions became a significant part of the local subculture. The political strategy of the Nazis took account of this particular formation of the class conflict and tried to unite worker interests with those of the entrepreneurial *Mittelstand*. In their programmes, local activists of the NSDAP demanded state ownership for the large enterprises and criticized the closure of large production facilities after the international economic crisis. They pressured entrepreneurs, in particular VESTAG, to reopen the metallurgical plant Ruhrort-Meiderich, which hypothetically offered up to 16,000 workplaces, but had been closed in 1932. By means of propaganda against the large enterprises and organized worker protest, this was indeed achieved by 1934. This was not only due to political considerations, but mainly because the international economy had recovered (Kraume 1983: 315 ff.). Next, the Duisburg steel plants were able to profit from the large construction projects the Nazis initiated, especially concerning bridges and *Autobahnen*. But above all, warfare technology had been ordered by the regime, and Krupp-Rheinhausen was particularly active in this.

In 1933 unemployment in Duisburg had risen to 95,897. In September 1935 it had declined to 29,898, and in 1936 it (officially) reached zero (Kraume 1983: 321). Much of this result was achieved through wage cuts, the abolition of free collective bargaining, and the replacement of unions by fascist labour organizations.

As a result of its involvement in the Nazi war economy, Duisburg was almost completely destroyed by the allied forces during the Second World War. Leaders of the Krupp business, like many other major economic actors, were sent to trial in Nürnberg (Taylor 1992). Although initially Alfried Krupp received a sentence for twelve years in prison in 1948, that was revised in 1951, allowing him to take over the business again in 1953.

The local coal and steel industry never completely stopped production during or after the war, since the allied forces needed to secure energy reservoirs, and thus allowed the maintenance of the production process until a final decision about dismantling machinery was taken. Among those enterprises which continued to produce even during 1945 were Mannesmann, Hahnsche Werke

(Großenbaum), Ruhrort Meiderich, and Krupp Rheinhausen. However, firms performed very poorly, as documented by Pietsch (1983: 363). While in 1938 4.4 m. tons of crude steel were produced, immediately after the war this declined to 606,000 tons. Employment in the sector declined from around 35,000 to 20,500. Industrial dismantling began in 1947, but was relinquished in 1949, though plants of Mannesmann and Thyssen were strongly affected.

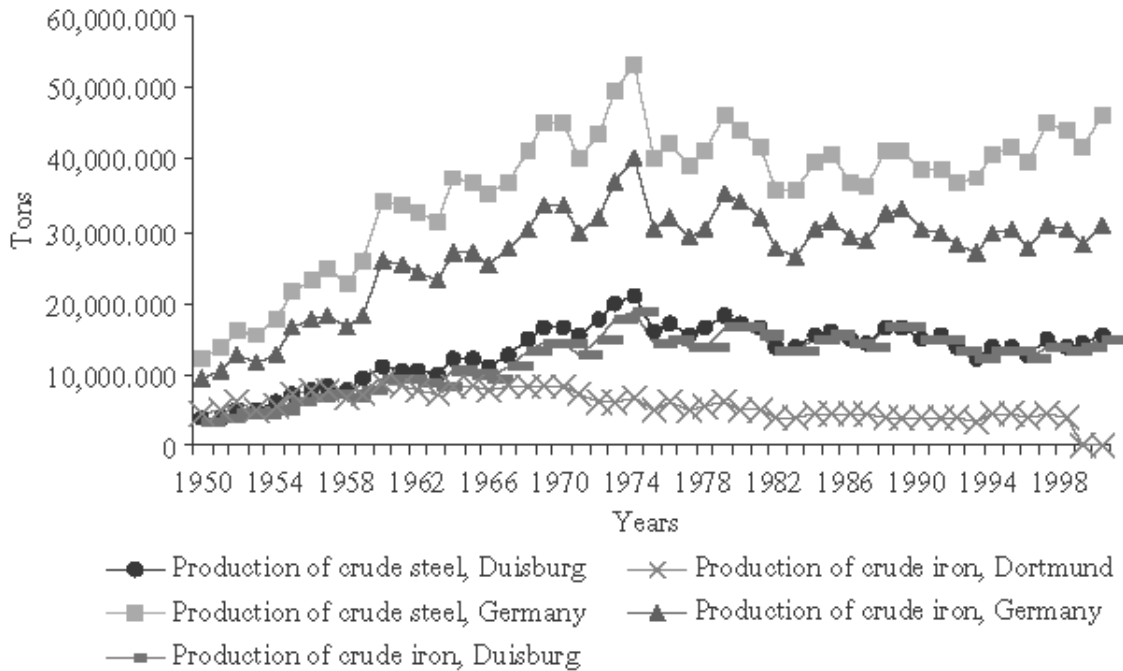
In addition, allied forces implemented de-concentration measures, concerning the large steel enterprises such as VESTAG. As a result, plants of Thyssen, Krupp, Mannesmann, and others were organizationally separated again, a measure which was again quickly reversed in the postwar years (Esser and Väth 1986: 633). Due to vertical integration, the number of steel plants in Duisburg always remained low: by the mid-1970s there were no more than fifteen firms. Between 1983 and 1989 this declined to twelve, reaching nine in 1996 before rising again to twelve in 2000, but only seven of which were directly involved in steel making or the production of crude iron (Statistical Data Office Duisburg 2002).

Thus, the degree of vertical integration of steel plants has been enormous, even after the initial de-concentration measures. Various supplier enterprises have agglomerated nearby, especially machinery firms specializing in technology for metallurgy and mining, like DEMAG. But even these firms have often been integrated into the larger plants: DEMAG for instance has been taken over by Mannesmann. Inter-firm relations have been extremely asymmetrical.

The repeated history of large-firm concentration has kept class conflict alive in Duisburg like nowhere else in Germany. The question whether the large Ruhr firms should become state enterprises long divided the SPD, not only on the local level. However, in the beginning of the 1960s, Willy Brandt ended the debate, which had especially concerned coal firms, because of the crisis in this sector. He feared that such proposals would further divide the electorate, weakening his effort to transform the SPD into a 'catch-all-party' (Nonn 2002). In party politics, the concentration process of steel enterprises became a less ideologically debated issue, but locally it always mobilized resistance by the workforce. On the other hand, these giant industrial structures helped unskilled workers to lead a normal family life with relatively high wages. Thus, the preference to work in large firms, rather than small- and medium-sized enterprises (SMEs) in a dynamic service sector cluster, where different skills are demanded and payment for unskilled workers appears to be lower, remains relatively strong among unemployed workers today (*Die Zeit* 2001). Especially in this regard, the implementation of a local production system is perceived as a radical break with the past, despite the hostile view among workers of the politics of the large local firms.

The first postwar steel crisis came in the mid-1970s (Fig. 9.1). It hit both important Ruhr steel cities, Duisburg and Dortmund, but Dortmund showed far earlier signs of decline. By 1999 the production of crude iron in Dortmund was completely abandoned. The crisis occurred due to over-capacities

Figure 9.1. Production of crude steel and crude iron in Germany, Duisburg and Dortmund (1950–2000) in tons
Source: Statistical Data Office Duisberg 2002 (authors' depiction).



and government subsidies in many European countries. In a reaction to this course of events, firms in Duisburg initiated the further concentration of plants, for example, Thyssen merged with Rhein Stahl-Konzern in 1974. Rationalization and modernization programmes were supposed to protect the local industry from further decline.

However, increasing unemployment seemed to be impossible to avoid with these measures. In 1976 the iron-producing sector offered 67,501 jobs in Duisburg. By 1980 almost 10,000 of these had been eliminated. The decline continued, leaving only 20,515 jobs by 1999 (Fig. 9.2).

Although employment has declined, the turnover of the surviving firms does not show a worsening of competitiveness. Figure 9.3 shows a clear cyclical development. Despite the crisis of the 1970s, turnover reached more than DM 10 bn. between 1979 and 1981. After 1981 we observe a radical breakdown of turnover as well as an enormous decrease of employment. The same numbers (absolute) of turnover (over DM 10 bn.) were again reached for the three years between 1989 and 1991, but this time with only 39,069 employees in 1991 compared to 57,002 in 1981. And in 1997 the margin of more than DM 10 bn. was almost reached again, but with only 20,056 workers. Of course, the large firms tried to diversify their production and reorganized their internal structure and subcontracting relations, adding new network structures with SMEs to their existing inter-firm relations in order to manage the crisis (Grabher 1991; Morris and Plake 1995). What had pressured the large firms?

While all EU member states faced the same problem of over-capacity, France, Britain, and Italy heavily subsidized their (state-owned) steel enterprises,

Figure 9.2. Employment in city of Duisburg 1976–1999

Note: * Since 1998 there has been a new classification of sectors.

Source: Employment Statistics Federal Labour Office, div. Vol., delivered by Amt für Statistik, Stadtforschung und Europaangelegenheiten Duisburg, own depiction.

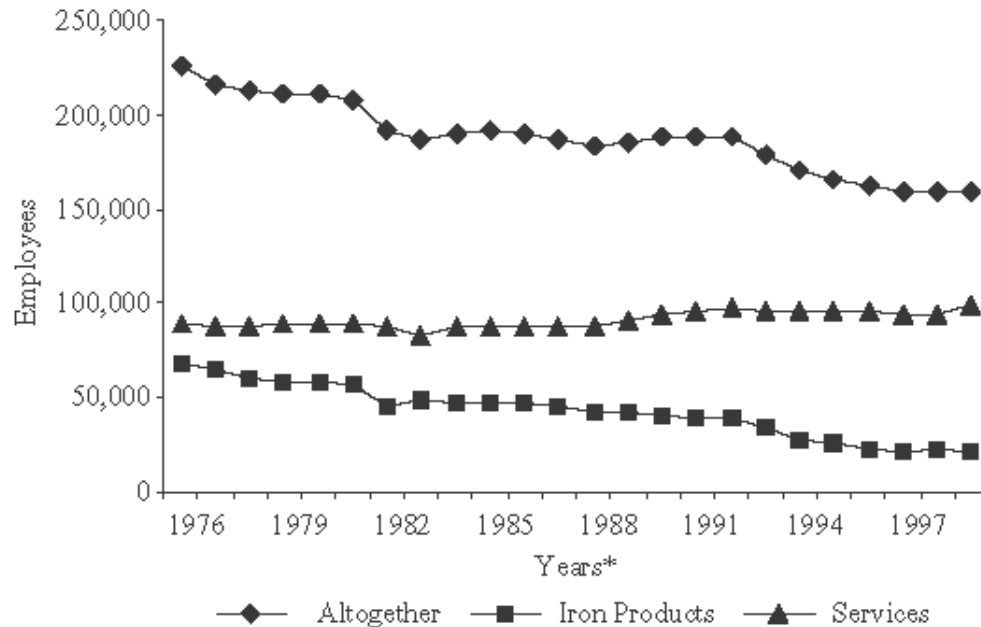
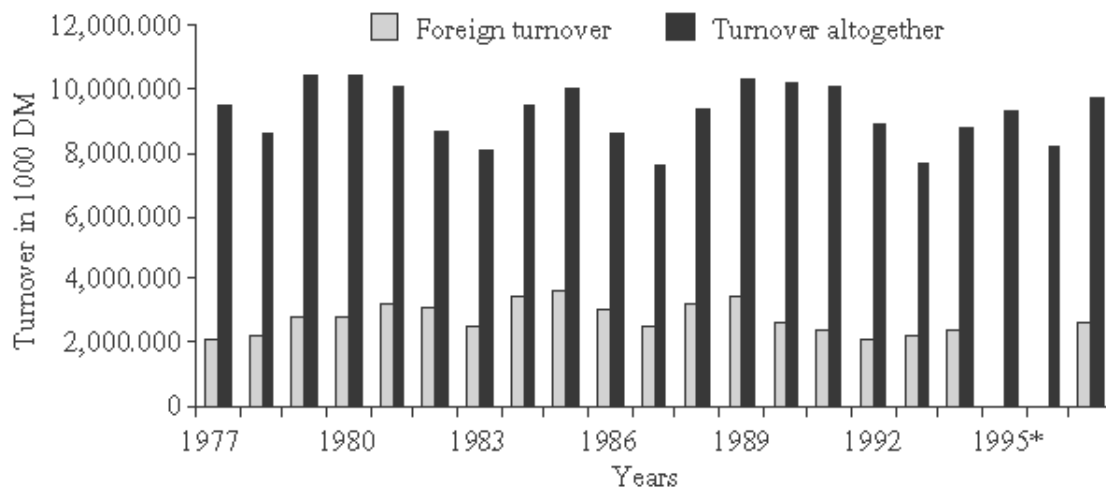


Figure 9.3. Turnover of iron-producing industry in Duisburg (1977–1997)

Note: * 1995 and 1996 no data available for foreign turnover, 1995 new classification of sectors.

Source: Landesamt für Datenverarbeitung und Statistik NRW; Sonderauswertung.



a violation of Article 4 c of the ECSC Treaty of 1951. No action was taken apart from introduction of the subsidy code, added to the treaty in 1981, as discussed in the previous chapter. Since German steel enterprises were mainly owned by private investors, the government opposed strong use of national subsidies, although it could not avoid them when the crisis shook the Ruhr in the 1980s. Between 1975 and 1993 they amounted to DM 7.9 bn., though in Italy

they amounted to DM 44.3 bn. at the time (Conrad 1997: 111). Firm closures were therefore unavoidable in Germany. Due to the technologically advanced market position which the firms in the Ruhr held, the crisis occurred earlier in the Saarland, and did not reach the Ruhr until the early 1980s. As unemployment rates show, Duisburg did not become a trouble spot until the end of the 1970s: in 1975 it had 4.8 per cent unemployment, almost in line with the national average (4.4 per cent). By 1979 this had risen to 6.1 per cent, and in 1982 to 10.2 per cent (Esser and Vãth 1986).

Thyssen was particularly affected. The Gewerkschaft Deutscher Kaiser was closed in 1985 to adjust production capacity to demand. The economic consequences of the first steel crisis made it necessary to end the long and turbulent history of this enterprise and to dismiss around 8,000 employees. The city council bought the old production facilities for DM 1 and founded the Landschaftspark Duisburg-Nord GmbH, designed to steer a development process of ecological and urban renewal. It is part of the Emscher Landscape Park project, which includes seventeen local authorities and has been funded by a ten-year structural programme of the European Union initiated in 1989, in combination with financial support from federal and *Land* governments (iclei.org 2002). The idea behind this concept has been to recreate declining Ruhr communes by maintaining their cultural and socio-economic heritage. To achieve this aim, the old steel plant has been transformed into a museum and a landscape park, which offers a multitude of activities ranging from the bicycle 'Route of Industrial Culture' to rock climbing (La Belle 2002).

This concept was elaborated at a time when social and economic actors considered that the local steel industry only needed to reduce its production facilities in order to get rid of over-capacities. The Landscape Park does not break with Duisburg's social and economic past, local pressure groups having protested against a proposed demolition of the plant. When Krupp also signalled closure of its Duisberg plant, anticipating a second crisis, the general consequences of decline seemed far more disastrous. Although the Krupp workforce organized an unprecedented protest—receiving nationwide media attention—against the plan to close down Rheinhausen as well, its final closure in 1993 could not have been prevented (Bierwirth and Vollmer 1997; Kleinert 2001). However, these events also changed the perception of local actors about what should be done after steel. A second landscape park was not feasible. This time the plant was completely demolished to leave space for a new local production system specialized in logistics.

Logistics in Duisburg

Given the city's location on the Rhine, logistics had been a Duisburg industry since the development of coal shipping in the eighteenth century. This sector then came under stress in the 1980s with loss of demand from the declining

coal and steel works (ISA Consult 2000). It was then exogenously reshaped for the distribution of consumer goods, making use of EU Structural Funds.

Under Prussian administration the harbour had expanded systematically to become and remain Europe's largest inland harbour. During industrialization, it was of enormous logistical importance to ship coal, tobacco, iron, and steel products to Rotterdam and elsewhere. An important railway infrastructure was created to link with the port. In 1905 the several harbour complexes in Duisburg and Ruhrort were united under a single administration, called Duisburg-Ruhrorter Häfen, transformed in 1926 into a stock company, in which two-thirds of the stock was held by Prussia and only one third by the city of Duisburg. Today the company is owned by the *Land*, the city, and private investors.

Although this logistical infrastructure was massively destroyed in the Second World War, the harbour was reconstructed between 1950 and 1965, enabling it to deal with mineral oil and scrap in addition to coal. The first roll-on and roll-off transport unit was established together with new container-terminals, and finally, at the end of the 1980s, Duisburg became a free port. Free ports constitute harbour zones, in which goods are stored or trans-shipped duty free. They are not bound to national tax laws. Such issues had been set on the agenda at the Ruhr-Region Conference in 1988 in which even the German chancellor participated. It took place when the decline of Thyssen had just shaken the local economy. Because local actors knew that the harbour also depended on local industry, it was important to achieve legal advantages which enabled the harbour infrastructure to keep working as an attractive reloading point for all sorts of goods. Apart from the advantageous harbour and railway infrastructure, several highways had connected Duisburg to the rest of Germany's *Autobahnnetz* and thus made the delivery of goods by a combined logistical concept even more attractive. In addition, nearby airports at Cologne and Düsseldorf further improved Duisburg's logistical location.

The Birth of a New Local Production System

After the closure of the Krupp complex the question arose of what role its site might play and how could a further concentration of firms offering services in logistics be achieved. As Crouch and Farrell (2002) point out, institutional paths can be broken by hidden potentialities of local economies. The fact that the *Land* government is networked with other actors, and therefore has knowledge of different support strategies for other sectors, may well help the formerly 'locked-in' Ruhr region (Grabher 1993a) to induce social and economic change. In order to do this, the *Land* relied on the existing logistics sector in Duisburg. The whole process was critically evaluated to provide an example for similar restructuring plans for new local economies in other declining parts of the Ruhr, a so-called *Leuchtturmprojekt* (lighthouse project). This restructuring process is indeed new, because it includes a shift from an attempt to reshape a sector to one

to redevelop the region, as this has been demanded more generally by the EU Commission for its structural policy (Ferner, Keep, and Waddington 1997).

As stated above, one of the major actors in logistics so far had been the Duisburg-Ruhrorter Häfen AG. It took over strategic responsibility in 1998 for the redevelopment of the space of the former Krupp works. The whole 265 ha complex, including the land of Krupp-Rheinhausen, was bought from Krupp for DM 65m. by Häfen AG (Peitsmeier 1999), which itself transformed into a new and bigger enterprise, integrating its former functions into a modern logistics concept. Since 2000 it has operated as Duisburger Häfen AG, within the umbrella association 'Duisport'.

Krupp had already developed the essential idea of a reloading point for goods. In the new concept this is termed a trimodal connection between the river, rail, and road transport. However, major problems had to be solved first, because this huge area had to be completely cleaned up. The old factory buildings had to be demolished; the area had to be ecologically renewed, and needed a new infrastructure. Then new logistics firms needed to be persuaded that consumer goods could be efficiently distributed from this spot to all over Europe. To meet these challenges a development agency was founded in 1999: the Logport Center Duisburg GmbH. Logport is the name for the logistics concept developed for the industrial zone. This company is primarily occupied with the development and marketing of the former steel area (Logport 2002).

By 2002 more than 50 per cent of the Logport area had been marketed to national and international investors from the logistics branch. The demolition of the old steel plant has proceeded in parallel, while container terminals and warehouses are built next door. In the meantime such firms as P&O, one of the most important businesses in the construction of container ports and other logistics services, has already invested DM 50m. for a new container terminal and logistics centre, employing between 200 and 300 workers. The Japanese subsidiary of NYK, the world's biggest shipping firm, New Wave Logistics, has invested around DM 15m. for a new warehouse, from which consumer goods are distributed from Asia and elsewhere. About 150 workplaces are projected here. Other firms involved are the Interspe Hamann Group, Krüger Terminfracht, Kühne & Nagel, CM-Eurologistik, Rhenus AG & Co. KG (Logport 2002).

The existing street infrastructure has been modernized, according to firms' individual needs. The *Land* government has supported an extraordinarily non-bureaucratic procedure: if land is declared as industrial, the usual rules for urban construction, the *Bebauungspläne*, do not apply. Duisport, and thus Logport, will probably have their own railway company in the near future. Logport already has its own harbour, whose infrastructure has also been modernized. By 2004 Logport should be directly connected to the near highways via Autobahn 57.

While in times of successful steel production such investments could be implemented by a single firm, this time many firms within the same sector,

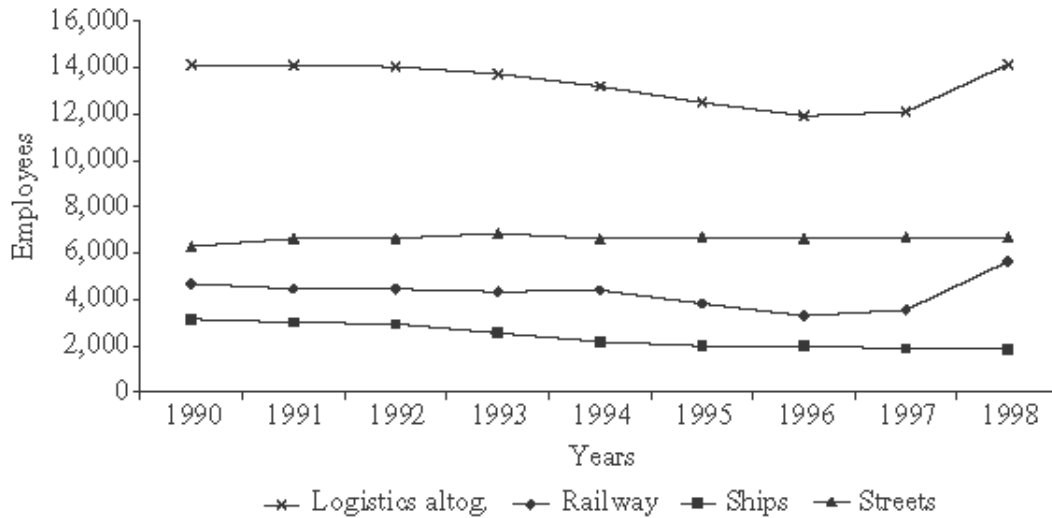
making up a cluster, invest in this infrastructure. External support for coordination is thus indispensable. Exogenous actors, such as the *Land* government, had to initiate investment to encourage further investment and thereby minimize the risk for involved enterprises at Logport. An individual city council could not have taken on such an enormous redevelopment strategy. It therefore comes as no surprise that the mechanism of support adopted in Duisburg to establish a new local production system is very similar to that which we *generally* expect in Germany: Logport results from a joint effort of Federal, *Land* and the city government, and private investors. But a huge flagship enterprise is present again as well: Duisport. This is in itself a public–private partnership of the form so typical of German capitalism. It allows federal and *Land* government to act jointly and in cooperation with private investors, while it can at the same time use the firm as a restructuring agency. In addition, Duisport again supports more partnerships with private investors of the logistics branch. *In this sense*, the strategy is not very different from what can be seen in the media cluster of Cologne and the role there of the publicly owned broadcaster WDR (Baumann and Voelzkow this volume chapter 16), though differences can be observed as well.

However, the private investors which have been attracted cannot be classified as small firms. P & O or New Wave Logistics are global players, which—in the German perspective—fulfil the functional needs of further flagship enterprises for a local economy. Now that these firms have been established, smaller ones are supposed to agglomerate in the near environment, for instance in the Bliersheimer Villensiedlung, a part of the former Krupp land, where fine houses were built in the early twentieth century for the families of Krupp managers. These villas, a ghost town during the 1980s, have now been restored as offices for smaller firms in logistics services.

Ironically, the first step of redevelopment, cleaning the old Krupp site, was carried out by former Krupp workers themselves, a measure implemented by the local labour office. Whether these and other workers will in fact find new jobs in Logport, for which the *Land* envisages 5,000 new workplaces in total, remains to be seen. So far there has been no brilliant recovery of the local labour market; firms in the logistics sector were already dismissing workers in the 1990s (see Fig. 9.4—the rise of employment in 1998 in logistics is due to the inclusion of workers of the Deutsche Bahn AG in the statistics). The shipping sub-sector came under particular stress when the local steel industry further closed down its facilities. The restructuring process should perhaps be seen as a pre-emptive strategy to rescue the remaining production potential of Duisburg. However, numbers for the most recent years, when Logport and Duisport actually began to implement their new logistics concept, are not yet available.

Although being shouldered by EU Structural Funds and other support programmes, the financing of Logport is also fragile. The DM 65m. needed to buy the land from Krupp constituted only a small part of the whole debt. Cleaning up the area and redeveloping it required credits guaranteed by Duisport. If Logport is not successful, Duisport will fall as well.

Figure 9.4. Employment in logistics in Duisburg, 1990–1998.



So far, we have identified a few features of local economic support, which are familiar from other case studies of German local production systems. However, the effort of restructuring is immense and the question remains how Logport was possible and what role private and political actors played in the provision of collective competition goods. The next sections will further examine these questions.

The Objective 2 Programme and the NRW Regionalized Structural Policy Approach

The economic policy aim was to consolidate the local economy with the establishment of a logistics cluster following the 'networked firm model' (Crouch and Trigilia 2001). Such a combination of large, global-player firms and small service enterprises was supposed to stabilize the economic development in Duisburg. The *Land* government had asked its regions to articulate their substantive interests for the future of the coal mining and steel regions in several meetings starting in the late 1980s. The aim was to reach a mutual consensus on regional structural policy.⁵ All relevant actors, from local government to the chambers of commerce, as well as the social partners, environmental

⁵ Information on the implementation of European Structural Fund programmes (especially on the Objective 2 Programme) is drawn from several empirical evaluation studies, which have been carried out with others by one of the editors (Helmut Voelzkow). Within the framework of this project, several interviews were carried out with representatives of the ministries of NRW, with public and private actors from the development area as well as leading representatives of the regional economy. See the research reports by MR Regionalberatung and inWIS and NEI (2000a,b).

associations, and women's rights associations, participated in this new co-decision process.⁶ They were to give an account of the strengths and weaknesses of each region, and then to propose new models and aims.

In 1993 the regional conference for Niederrhein reached agreement on a first development concept (ISA Consult 2000). This already proposed a strengthening of the logistics branch in Duisburg. While it is unclear whether this idea was initiated by the *Land* government itself or by local actors themselves this is not the most important issue. It is rather to analyse how, by introducing a co-decision procedure like the regional conference, the *Land* tied local actors to a concept, which later had to be executed and implemented by the *Land* itself and not by local government in the first instance. By achieving a consensus on the selection of a certain branch beforehand, the *Land* government could legitimately intervene into local government affairs, since it was only realizing a concept on which almost all political and societal actors had agreed. These initial projects included all the infrastructure provision, together with such urban renewal measures as the International Construction Fair, Emscher Park. Another grand project was the decentralized reloading centre Duisburg Niederrhein (GVZ DUNI). Such a giant bundle of measures would have been impossible to realize without financial resources from European support programmes. Because of this, a further examination of these programmes as well as a scrutiny of the specific use of them by German governmental authorities might help us to understand how the new local production system in Duisburg came into existence.

Since 1989 NRW has been able to acquire money from the European Structural Fund to support the economic restructuring of the Ruhr. Measures aiming at the improvement of the regional economic structure and the labour market are defined on the basis of so-called operational programmes. The European Regional Development Fund (ERDF) serves as a co-financing instrument of economic policy tasks, while money can be obtained from the European Social Fund (ESF) to support labour market and training measures. Since 1989 four operational programmes and thus four phases of Objective 2 Programmes have been initiated (1989–1991, 1992–1993, 1994–1996, 1997–1999). Duisburg, with its little more than 500,000 inhabitants, had to be grouped with several other cities for these purposes.

The Objective 2 Programme provides economic and employment measures in the form of: (1) industrial investment, especially for SMEs; (2) technology and innovation as well as counselling services for SMEs and start up support; (3) the construction and extension of infrastructure for the economy; and

⁶ On the regionalization of structural policy in NRW, see Voelzkow (1991, 1994, and 1998) as well as the contributions in Heinze and Voelzkow (1997), which contain results of a research project on this policy account. Other *Land* governments have introduced this account as well, learning from NRW (see Ziegler et al. 1995).

Table 9.1. NRW-EU-Objective-2-Programme 1989–1999: Grants of Public Funds (ERDF, *Land*, Commune) in million Deutschmark until 31 December 1999

Priority/Measure	1989–1991	1992–1993	1994–1996	1997–1999	Total	In %
1.1 Grants for industrial investment, especially in SMEs and in the promotion of industrial facilities	44.2	13.8	72.8	138.5	269.3	7.4
1.2 Benefits on interests and the promotion of investment capital for SMEs	22.3	21.3	22.5	7.9	74.0	2.0
1.3 Promotion of investment in job-initiatives and -projects	0.7	0.2	4.4	0.0	5.3	0.1
1.4 Promotion of productive investment in environmental tasks	0	2.4	6.4	7.3	16.1	0.4
<i>Priority 1: Promotion of industrial investment, especially SMEs</i>	67.2	37.7	106.1	153.6	364.6	10.0
2.1 Technology and innovation, media, and telecommunication	69.9	62.4	93.7	136.3	362.3	9.9
2.2/2.4 Counselling and information services for SMEs	6.5	13.4	31.1	90.6	141.6	3.9
2.3 Regional offices, and women and occupation	5.8	11.8	18.2	23.0	58.8	1.6
2.5 Tourist marketing	0	0	4	24.7	28.7	0.8
2.6 Regional development concepts, trans-border cooperation	13.3	2.3	6	16.5	38.1	1.0
<i>Priority 2: Promotion of technology and innovation, counselling and other 'software-activities'</i>	95.5	89.9	153	291.1	629.5	17.2
3.1 Technological infrastructure	91	125.1	83.5	138.5	438.1	12.0
3.2 Training and further training facilities	86.9	96.5	177	189.1	549.5	15.0
3.3 Logistic infrastructure	0	0	100.0	31.7	131.7	3.6

3.4 Tourist infrastructure	0	0	7.8	61.0	68.8	1.9
<i>Priority 3: Establishment and extension of accompanying economic infrastructure</i>	<i>177.9</i>	<i>221.6</i>	<i>368.3</i>	<i>420.3</i>	<i>1,188.1</i>	<i>32.5</i>
4.1 Renewal of industrial brownfields and buildings for SMEs	106.2	277.1	413.3	457.2	1,253.8	34.3
4.2 Improvement of the life- and environmental-quality	35.4	3.8	35.0	125.9	200.1	5.5
4.3 Investment in infrastructure for the efficient usage of energy and the usage of nonexhaustive energy	0	0	24.6	0	24.6	0.7
<i>Priority 4: Renewal of industrial sites/ environmental quality</i>	<i>141.6</i>	<i>280.9</i>	<i>472.9</i>	<i>583.1</i>	<i>1,478.5</i>	<i>40.4</i>
<i>Priorities 1–4</i>	<i>482.2</i>	<i>630.1</i>	<i>1,100.3</i>	<i>1,448.1</i>	<i>3,660.7</i>	<i>100.0</i>
<i>Priority 5: Promotion of human capital resources (ESF)</i>	<i>149.7</i>	<i>176.8</i>	<i>536.9</i>	<i>691.1</i>	<i>1,554.5</i>	
<i>Priority 6: Technical Support</i>	<i>1.9</i>	<i>1.5</i>	<i>2.9</i>	<i>4.6</i>	<i>10.9</i>	

Source: MWMTV, own calculations.

Note: The presented structure follows the arrangement of NRW-EU-Objective-2-Programmes of phase IV; previous phases have been integrated into this arrangement.

Table 9.2. NRW-EU-Objective-2-Programme Phase IV (1997–1999)

Description	Commune	Investment costs (DM)
<i>Extension of logistic infrastructure according to the demand of SMEs (Section 3.3)</i>		
Development of a technical concept for the transport of container bridges for inland navigation ships	Duisburg	227.700
Extension of the NIAG-Rhine-Harbour Orsoy and connection with the train station in Moers	Rheinberg	18,475.000
Extension of the harbour in Emelsum, Kreis Wesel, autonomous operation harbour Emelsum	Voerde	3,850.000
Construction of storehouse and reloading facility	Lünen	9,175.000
Project driven studies for the construction of the reloading point Emscher/provision of logistic infrastructure for SMEs	Herne	395.111
Planning measures for the realization of the decentral reloading point Emscher (West-Harbour)	Herne	2,229.300
European development centre for inland navigation (Initiating Phase II)	Duisburg	2,203.900
Reloading tasks within the combined logistic concept for an integrated solution	Duisburg	2,246.000
Material management- and logistic cooperation NRW	Düsseldorf	7,122.400
Practical use and test of fibreglass plastic-parts for city train-wagons	Dortmund	2,700.800
Development of fast vessels for inland navigation waterways and coastal shipping	Duisburg	1,721.700
<i>Promotion of new technologies (Section 2.1 a)</i>		
No data available	No data available	860.856
Development of a data-processing supported simulation model for the depiction of the choice for logistic transportation-carriers	Duisburg	270.230
<i>IB-TPW-Promotion</i>	Dortmund	1,779.300
Model experiments with the <i>LSBK</i> by the <i>Versuchsanstalt für</i>	Dinslaken	362.715
<i>Binnenschiffbau e.V. Duisburg</i>		
<i>Regional development concepts and cooperation (Section 2.6)</i>		

Acquiring a development concept <i>Logistikforum Duisburg</i>	Duisburg	50.000
Support of the <i>Logistikkongress Duisburg</i> in March 2000 by an internet presentation supposed to serve as a platform for the exchange of ideas	Duisburg	120.000
Preparation and implementation for the customer of the <i>Logistikforum Duisburg</i> on 16 March 2000	Duisburg	1,032.550
<i>Technology and start up centres etc. (Section 3.1)</i>		
Extension of the tugboat channel with a fast tug-facility	Duisburg	1,869.500
<i>Renewal of industrial and military sites (Section 4.1)</i>		
Renewal of logistic harbour infrastructure	Duisburg	65,513.684
Renewal <i>Gaterweg</i> and renewal south of <i>Gaterweg</i>	Duisburg	58,145.420
Marketing activities	Duisburg	3,436.500
Revision of the licensing plan for the drainage of the whole area	Duisburg	623.340
Study on the continuation of the using-concept regarding the extension of the mining site of Krupp-Hoesch	Duisburg	110.725
Examination of underground water on the former Krupp-Hoesch territory	Duisburg	243.723
Renewal and drainage of former Krupp-Hoesch territory, concerning the area bought by the Development Agency of the <i>Land</i>	Duisburg	25,037.766
Renewal of the former Krupp-Hoesch ground	Duisburg	11,135.500
<i>Total</i>		220,938.720
Only Section 3.3 of Total		50,346.911

Source: MWMTV, own calculations.

(4) the renewal of industrial brownfields and military bases, the improvement of its environmental quality and the reduction of the damaging consequences resulting from early industrialization. These four measures are co-financed by the ERDF. In addition the ESF provides measures for the development and support of human capital resources. Although the structure of the Programme has been slightly adapted to new challenges over the various phases from 1989 onwards, its fundamental logic has not been altered.

From 1989 to 1999 public funding from Objective 2 Initiatives in NRW amounted to DM 5.25 bn.; DM 2.2 bn. from EU Funds (ERDF and ESF); DM 2.05 bn. from the *Land*; and DM 1.0 bn. from diverse public authorities, mainly local government. Of the DM 2.2 bn. provided by the European Union, 1.6 bn. were ERDF resources and about DM 600 m. were from ESF. The amount of this funding continuously increased: Starting from DM 622 m. in 1989–1991, it rose to DM 806 m. in 1992–1993, to DM 1,640 m. in 1994–1996), and finally to DM 2,166m. in 1997–1999 DM. Table 9.1 shows in detail for which measures this money was provided. It also indicates how the priorities for certain measures were balanced, and how this balance changed over time. For instance, the initiatives concerning technology and innovation counselling for SMEs increased in importance and obtained more resources during the various phases of the programme.

An analysis of the operational programmes shows that in the period from 1989–1993 no specific measures for the logistic branch were prepared. However, from 1994–1996, the operational programme for the first time contained such tasks as the extension of logistic infrastructure. These measures aimed at the extension of a runway for the regional airport at Dortmund as well as two reloading centres, one of them being projected for Duisburg (GVZ DUNI). In 1997–1999 the programme further focused on the support of logistics infrastructure, and in particular it was proposed to strengthen projects which concerned the transport of industrial goods. Apart from the further construction of a reloading centre in Herne, more of these centres were projected for the regions of Dortmund, Unna, and Hamm. The support of air traffic was not again elaborated by the programme. In sum, at first glance, the construction of the logistic cluster in Duisburg Rheinhausen does not appear as an explicit aim, at least not in the operational programmes.

However, if one only lists those initiatives that were somehow concerned with activities designed to establish and extend logistic infrastructure, a different image emerges. One can demonstrate that these measures mainly focused on Rheinhausen. Table 9.2 gives an overview of these projects. Measure 3.3 (extension of logistic infrastructure according to the demand of SMEs) includes projects from which the harbour in Duisburg and its inland navigation infrastructure took its profits. Among the bundle of measures concerning regional development concepts a project can be identified, which helped the *Logistikforum* to develop, an institution well known to enterprises in the logistic branch. In the categories ‘support of new technologies’ and

‘support of technology and start ups’ one also finds projects aiming at the logistic branch in Duisburg. The massive support for the branch becomes particularly visible in Section 4.1 of the programme, which describes the renewal of industrial brownfields and military bases. Several financially ambitious projects are located here, which all deal with the renewal of the old steel plant.

In order to avoid further measures and projects being divided into several subunits, political actors changed the design of the operational programme for the period of 2000–2006. Priority 3 (development of infrastructure) explicitly contains the support of logistic services and infrastructure. The aim of this design is to establish ‘tailor-made’ activities by which the development of individual sectors may be combined with the strengthening of high quality logistic services.

The way in which the branch has been supported at different points in time within the programme shows that its general target has been altered. While in the beginning massive investments for logistic locations were the main focus, the strengthening of interplant logistic services later gained in importance. The reorganization of support activities is also indicated by the *Land* Government Initiative for Logistics, which was established by the *Land* ministry of economics in 1999. Although designed for the whole *Land*, this initiative offers a lot of useful local collective competition goods (LCCGs) for the logistics cluster in Duisburg. The following collective competition goods are provided for (the spatially concentrated) logistic firms by the *Land* initiative:

1. *Vocational and further training*: Support measures to attract pupils and students for training in the logistic branch and the creation of specific training profiles in logistics;
2. *Marketing and image campaigning*: Image support for NRW as a logistic region in a European context, with strengths and perspectives of specific locations, Duisburg being a focal point;
3. *Counselling and development*: Development of information and communication based solutions for logistic services, strengthening of technical expertise by information and counselling services for logistic firms (Lahmeier and Dornier SystemConsult 2000);
4. *Information and communication*: Establishment of dialogues and cooperation between the state and the economy, especially between ministerial departments and associations, widening the competence sphere of the state and the reduction of bureaucratic influence; provision of ground for logistic activities;
5. *Model Projects*: Analysis of experience of firms with new technologies and logistic concepts and implementation of model projects (for instance, multi-modal junction within the logistic chain).

The project ‘Land Initiative Logistics’ is not exceptional. Comparable programmes are available across the whole *Land*, which is typical for German federalism. However, collective competition goods are delivered in particular to

those localities that claim to be able to make specific use of them. Another example of such an initiative, designed to support the whole *Land*, is the Further Training Initiative in NRW. It is subdivided into several units, including 'further training and logistics'. For this initiative, the *Land* government, the chambers of industry and commerce, the artisan chambers, the unions as well as the employers associations and the *Land* labour office have cooperated to strengthen further training and firms' search for adequately trained personnel.

Conclusions: How New Local Production Systems are Established in the German Governance Model

The central question, whether regional structural policy in Germany is able to solve problems on the local level which resulted from the decline of steel, and whether this policy effectively helps to establish a new local production system, can definitely be answered positively on the basis of the Duisburg logistic cluster. As a result of the massive intervention in the regional policy sphere, we observe a spatial agglomeration of sectorally specialized firms, which act in a functionally complementary way as cooperators or as competitors within local confines for the international market. However, these activities are not primarily or exclusively performed by SMEs, for which the structural policy had been designed. The starting point for the structural policy initiatives as implemented in NRW was directed towards existing or newly attracted larger firms, around which smaller ones with specialized profiles for the value chain were supposed to agglomerate. The primary focus of the structural policy approach can thus be identified as being on the 'networked firm' model. The former steel city is attractive for larger enterprises of the logistic branch, because market proximity as well as the connection to diverse transport means have created a unique and very promising precondition for logistic businesses. For enterprises of this branch, the politically supported provision of the terrain and the connection to a trans-regional logistic infrastructure have been decisive in locating their subsidiaries in Duisburg. Further LCCGs (especially interplant logistic services like R&D measures or the provision of training facilities) add to the other locational advantages.

The shift from steel production to a logistics cluster has been strongly moulded by *Land* policy. Thus, the restoration and renewal of industrial brownfields, and especially its arrangement for logistic firms, as well as the provision of specific services for the branch, would have completely overstrained the capacity of the city of Duisburg and other local actors (Kuban 1996). For the build-up of a local production system in Rheinhausen the immense support of the *Land* was decisive. However, it in turn had to rely on the financial resources of EU Structural Funds as well as on the federal government, whose commitment the *Land* government coordinated.

The specific implementation of concerted action for the formation of a local or regional focal point in logistics took place within corporatist arrangements, formed at the instigation of the *Land*, in order to transform its structural policy, with its large variety of support programmes, into a concrete development strategy for the locality. The aim of diversifying formerly mono-structured crisis regions demanded a number of singular measures, whereby so-called real transfers have gained in importance compared to simple financial support measures. The provision of these transfers again assumes a specification of particular target groups and real services. In order to avoid the damaging consequences of ‘watering can politics’, the *Land* asked the local authorities of the various development areas to name concrete economic clusters, which they considered would have a promising prospect. In a second step, the variety of potential support measures were supposed to be well directed and combined, while the local actors were obliged to implement the resulting development strategies.

10 Life After Industrial Decline in St Etienne: Robust SMEs, Deterritorialization, and the Making of a Local Mode of Governance

PATRICK LE GALÈS AND OLIVIER TIRMARCHE

It has been argued elsewhere that industrial and research policy in France, once integrated within what was called the 'Colbertist state', had been profoundly restructured since the mid 1980s (Cohen 1989; Aniello and Le Galès 2001; Mustar and Larédo 2002). Local and regional actors in particular, from both private and public sectors, were given more freedom and resources to develop initiatives, leading to diverse modes of governance of local economies in some parts of France. St Etienne is an example.

The local economy was transformed by the rise of tertiary sector jobs in both public and private sectors, and by the persistence of the local industrial tradition, nowadays organized by SMEs. Before focussing on the production of collective competition goods (CCGs) by various agencies, we consider the ways in which industrial small- and medium-sized enterprises (SMEs) use those goods. This enables us to show the fragmentation of the local economy, a deterritorialization of market ownership. By contrast it also brings to light the persistence, even the strengthening, of the use of local collective competition goods (LCCGs). These ambiguous, sometimes contradictory results are first set in historical perspective before we present a detailed analysis based on a survey of firms, and finally a survey of local agencies. Local economic leaders have now given up the idea of a major revival based on large firms. They are trying to organize and represent themselves as an urban engineering area, possibly an industrial district.

The Rise and Fall of Industrial Development

St Etienne was *the* French working class city, the main industrial town, which rose to prominence during the nineteenth century, when it became the tenth biggest city in France. It did not look like a French city but rather like an accumulation of industrial firms, cheap overcrowded housing, both within the centre and in the neighbouring industrial valleys of Ondaine and Giers.

Its local bourgeoisie was historically weak and, with the exception of some house-building activity by employers, played a minor role in the organization of the city. By contrast, the working class belonged to a proud militant and anarchic tradition. The city enjoyed strong industrial growth during the twentieth century, until the severe industrial restructuring of the 1960s and 1970s. Of the other cities of the region, Lyons became the centre for tertiary activities, and Grenoble became the symbol of modernist economic development (Aniello, this volume, chapter 18).

Because of early support from the state, and despite sharp economic decline, St Etienne did not face major demographic decline, just a slow decrease in the number of inhabitants. The population aged; the young people left; and the city did not attract many new inhabitants. From 1990 to 1999 it lost 21,536 inhabitants, reaching 321,703 (1999 census, Insee).

The economy was based on three industries: coal, steel, and textiles. Coal declined first, but the others remained the main industries until the 1980s. Others emerged such as metal manufacture, machine tools, armaments. In the 1970s the city's identity crystallized in support of a glorious football team.

It was a typical industrial urban area structured by large firms. They organized networks of subcontractors within hierarchical relations and were integrated within about ten large French industrial groups (such as Les Houillères, Rhône-Poulenc, Pechiney, la Manufacture d'Armes de Saint Etienne-Manufrance, the steel group Creusot-Loire). They were closely integrated with the French state industrial complex, in some cases the military-industrial complex. Collective goods were produced by large firms and local subcontractors for the benefit of this hierarchical system. Local subcontractors were close to the artisan tradition. Large firms were in charge of the marketing and commercial side; they organized R&D and trained the labour force. In contrast to other areas, and although the subcontractors were dependent upon the large firms, these networks of firms allowed for LCCGs to be produced mainly by those firms. That came to an end during the 1970s, as large firms restructured and gave up their links with local subcontractors.

The story of the industrial collapse of St Etienne is well known (De Banville and Vêrilhac 1983). The closure of the coal sector cost 25,000 jobs in the 1950s and 1960s; 25,000 industrial jobs (out of 55,000) disappeared between 1975 and 1990, and a further 9,000 between 1990 and 1994. Meanwhile all leading industrial firms left the area. After the collapse of Manufrance in particular,⁷ several problems were identified:

- the environment of a 'black' industrial city, which had known anarchic development;

⁷ Manufrance was a symbol of St Etienne (Kukawka 1980). After its first severe problems, both communist-led council and the communist trade union took over and supported it. Political pressure after 1981 led to further state aid until the final collapse. Manufrance is one of the cases criticized by Cohen (1989).

- the disorganized local economy, an ‘orphan’ of the large firms;
- inadequate labour force skills (although St Etienne workers had had a high-skill reputation, this declined with technological changes in the 1970s and 1980s);
- social and political conflicts accompanying the decline;
- the lack of a tertiary sector;
- the image as an industrial city with population decline;
- a lack of dynamism, entrepreneurship, high-tech developments, leading large firms, new investments.

Under those circumstances St Etienne benefited from large-scale public subsidies, but our survey of firms suggests that they managed on their own without using the facilities provided by public agencies at local level.

Slow Rise of Services and the Dynamism of Industrial SMEs

Despite the tough times, the urban area did not collapse. The boundaries of this area are not easy to determine, for both geographical and political reasons. The St Etienne travel to work area comprises most of two neighbouring industrial valleys, Ondaine and Giers. Often statistics include the south of this area within Loire sud—an area closer to Lyon and benefiting from different dynamics. The municipality of St Etienne as such represents about a third of the firms in the area.

Although St Etienne is no regional capital, it is still a French city and therefore benefits from a relatively high level of public services, which in turn produce jobs. Although the growth of public sector jobs has not been as high as expected, it remains a solid pillar of the local economy. In addition there are about 14,000 jobs in private-sector health and social services, and about 15,000 in sport, education, and culture. Services to firms and commerce have also been rising, in particular the former, ranging from transport and logistics to cleaning and security. The existing sectoral structure of economic activity in the area is given in Table 10.1.

The main characteristic of St Etienne remains the diversity of a surviving group of industrial SMEs, from high-tech and international to the small traditional ones. Table 10.2 shows that they are varied in size, some being the remains of externalized branches of departed large firms. Only a handful of steel firms remain, in Firminy or Ondaine Valley, usually in specialized steels. Other SMEs are specialized internationalized firms such as SNF (chemical products for water treatment) or Chambon (known worldwide for its crankshafts for Renault and Ferrari), or Thuasne (over 500 employees, which produced specialized medical textiles) or Desjoyaux (swimming pools). As mentioned, some of them were bought by foreign firms. Some remain smaller, about fifty employees but specialized in one market (car safety belts for instance). The evolution of SMEs' ownership demonstrates

Table 10.1. Main industries in St Etienne/Loire sud, 2001

	Number of firms	Employment
Food processing	796	5,755
Textile	174	4,918
Clothes making	76	1,960
Leather, shoes, wood	40	640
Paper	24	616
Printing, publishing	190	1,989
Chemicals	22	1,222
Plastics	60	1,755
Minerals	89	2,079
Steel, metal	26	1,690
Metalwork	724	12,073
Machine tools, equipment	249	5,673
Electric machine making	63	2,553
Medical, optical instruments	108	1,603
Furniture	174	1,596
Energy	19	112

Source: CCI St Etienne-Montbrison (2002).

Table 10.2. Size of firms, St Etienne/Loire sud, 2002

Size of firms (employees)	Number of firms	Number of jobs
1–4	10,432	19,814
5–9	2,799	18,586
10–19	1,327	17,829
20–49	551	29,348
50–99	279	19,348
100–199	111	15,472
200–499	66	18,472
More than 500	12	10,814

Source: Atlas de l'économie de Loire sud (2002).

constant changes: management buy out, foreign investment, one firm buying its neighbours. The whole industrial tissue is still under ongoing restructuring, including job losses. However, St Etienne is maintaining its industrial reputation, and has a distinctive density and variety of its industrial firms.

Within the industrial sector, there is still a large area of not so specialized firms with niche or regional markets, from textiles to engineering. There are also two strong areas: metalworking and engineering, even if both sectors

lost a significant share of employment over the years. These used to work for the main local large firms. Some were formed from those firms, but most have moved towards forms of upmarket subcontracting, doing most work for large customer firms in aeronautics, cars, and construction. Metalworking creates a wide variety of objects from tubes to springs or electronic metal components, often very specialized. St Etienne is ranked as the first region in France for engineering, comprising a myriad of specialized small firms. They need CCGs to move to new foreign markets and to work with new technologies. By contrast and less expected, there is a rapid increase of firms and jobs in areas such as plastics, chemicals, or even electronic and optical components, for instance, for the telecommunications industry or health related prostheses.

Despite being supposedly an unattractive region, St Etienne has managed to attract an average amount of foreign investment for a French urban area. Also, it has a noticeable above-average rate for the creation of new industrial firms. But is the area in a real decline that is being smoothed by grants and policy initiatives, or is its economy gradually being reshaped and reorganized around a network of dynamic SMEs?

Firms and Collective Goods: Integration Within Larger Groups

The following section is based on our interviews with forty firms. Our questionnaire was designed to enable us to understand how firms used collective competition goods⁸ and how relevant that was. Our interviewees were directors of the firms, either the owner and chief executive or one of the directors. The firms have the following characteristics.

1. Most are rather small SMEs, with under 100, often under 40, employees; we have not met the growing high-tech large SMEs identified in other parts of France. Most are subcontractors: engineering, textiles, specialized goods, various crafts, and consumer products.
2. Several were bought by the managers after difficulties, in close relation with the workers; but a larger number was bought by firms outside St Etienne. About a third of the firms we interviewed were old family firms, which managed to stay afloat, for instance by buying local competitors, but several are in the process of being bought because of either financial or inheritance problems. A small number of firms was created by managers of former large firms, who took over segments of their former business.

⁸ We acquired a full list of industrial SMEs in the St Etienne travel to work area (mostly St Etienne, Ondaine Valley, Giers Valley and to a limited extent, Plaine du Forez), and interviewed a sample of every three firms. When there was no response, we interviewed the next firm on the list. Forty industrial SMEs were interviewed.

3. Most have dense relations with other firms beyond St Etienne, for instance, for commercial development and marketing, and from the St Etienne area for subcontracting work and technical developments.
4. In metalworking, engineering, and machine tools local subcontracting and the density of relationship between SMEs is particularly important.
5. Several SMEs remind us of the tough, robust survivor firms in the UK machine tools industry that Crouch and O'Mahoney, chapter 5 (this volume) have identified. They develop products, improve existing ones, develop *ad hoc* relationships with external firms (in particular their clients), have their own limited commercial capacity in house, and have limited contacts with public agencies. Several have hardly more than regional markets—for instance, the metalworking and engineering SMEs. Rhône-Alpes is the second industrial region in France, including Lyon, Grenoble, and the dynamic Alpine industrial systems. St Etienne SMEs have contacts and clients all over this region. Among them one finds several family firms, which used to be subcontractors for the armament industry, and which have gradually found new regional and national clients. This autonomy and capacity for entrepreneurship is not limited to independent SMEs. Even within regional or international groups, directors of SMEs in St Etienne have been asked to develop new products and to find markets beyond the group. Others have development strategies and invest in R&D or develop their own conception capacity to upgrade their products. When local family firms expand, they buy other local industrial firms and expand the geographic coverage of their activities.
6. Many of the firms we interviewed were subcontractors who progressively try to add value by developing new products, adding technologies to the production process (micro-technology for instance) and to their products, to look for new clients. They are cautious, however, and operate at a limited scale to avoid too many risks.
7. The long story of lack of decision-making power in St Etienne continues. Because many industrial SMEs were bought by either foreign firms or regional/national groups, power has been relocated outside St Etienne. This increases fragmentation and makes collective action difficult.

The characteristics of our sample of firms make sense in relation to what has been argued about the restructuring of the St Etienne economy after the collapse of large firms.⁹ A first major conclusion derives from the analysis of employment and company statistics: after the collapse of the large firms,

⁹ We also use the figures and analysis of the planning and strategic agency, EPURES, INSEE, CCI documents, and reports by the development agency in Vallée de l'Ondaine and Vallée du Giers. Within their research centre, CRESAL in St Etienne, Banville and De Venin (2000) have analysed the population of firms and their changing configuration over time. We also refer to the work of the other research centre, CREUSET, in the faculty of economics.

a number of industrial SMEs have managed to survive, to develop, to create jobs. The St Etienne travel to work area is characterized by a large number of rather small industrial SMEs operating within a limited number of sectors, which are not always booming: they are not high-tech, there are few innovations, many are not growing. Beyond this macro-analysis, more detailed surveys reveal two chaotic decades for those SMEs: many went bankrupt, were bought by outside industrial groups or local ones; others closed, others merged, others reorganized several times; others were established; some reappeared as smaller parts of departing large firms. Life has been hectic, unstable, with many reorganizations. Second, those SMEs are predominantly in the industrial sector. De Banville and Venin (2000) have long argued that the continuing reinvention of new forms of organization in St Etienne was always based on the industrial tradition.¹⁰ Third, foreign investment has become a norm among St Etienne SMEs (an acceleration of an existing trend), being responsible for several dozen firms and over 6,000 jobs in the St Etienne urban area. De Banville and Venin note that after the American and Italian investors who started new firms, British and German investors came later to buy existing ones. They note that the area does not attract leading international firms but rather medium-sized transnational groups—for instance Alumax, Krupp, Schlumberger, ZF, Ratti, Adwest, Freudenberg. Fourth, they also note the long-term growth of regional industrial groups in electronics, textile, or metalworking. We found several in our sample. Fifth, their analysis shows the role of local, young, well educated men in starting new firms—people who previously worked in another local firm, hence their close links with the local economy.

The Use of Collective Competition Goods

We asked the firms how they found and used the following CCGs:

- Information about markets, clients, exporting,
- Technological developments, R&D,
- Finance, grants,
- Information and training about new norms, certificates,
- Training, recruitment.

Information about markets, clients, exporting

Most firms internalize their commercial functions and devote resources to it. Collective organization is rare. In those rather small SMEs, directors tend to deal with these functions. However, if they are part of a larger group, they tend to be organized by it or in close association with it. No firms we visited had only a local market, but

¹⁰ By contrast, they argued that the more Fordist types of organization did not 'fit' St Etienne and were not successful.

a significant proportion had a robust regional one (i.e. within the Rhône-Alpes region). At a time when globalization is supposed to be the norm, it was quite surprising to identify such a bulk of industrial SMEs operating mainly at the regional level, both in terms of market, subcontractors, and even suppliers (often even more local). In metalworking in particular (galvanizing metals, or sheet metal manufacture), we had cases of several firms for whom 60–80 per cent of the turnover was done within Rhône-Alpes. This is also the case for firms producing specific products such as winter sport textiles or luggage.

In this industrial sector, marketing as such seems a rare thing. Most firms develop close connections with clients, suppliers, sub-contractors to get information about market trends and to identify new clients. Most importantly, directors emphasize the role of exhibitions and international fairs, to make their products known, to meet new prospective clients, to get information about market trends. Also most of our interviewees insist on the role of national professional organizations to get information about market trends in their sector. Sometimes, as in the textile industry, these may have dynamic regional branches (St Etienne is close to Roanne, a textile industrial district) and provide LCCGs in the form of collective visits to large international trade fairs. In one or two cases of old family firms (third generation), the owner and chief executive happened to be a leading member of the chamber of commerce and industry (CCI). He would refer to the work of the CCI to provide information about clients and organizing collective flights to trade fairs too.

Suppliers' exhibitions are the next main source of information. One or two firms producing basic plastic products are integrated under the hierarchical principle, and all marketing is organized by the firm that owns it. Another makes outdoor washing lines. It went bankrupt and was bought by a French client outside St Etienne, which now handles all marketing.

Not many firms found clients through specifically local information. About half our interviewees said that initial information was obtained through subcontractors or owner firms. There were a few examples of reciprocity and mutual support in textiles. One case concerns an artificial prosthesis producer firm. In that sector the small number of SMEs is resisting the pressure of giant multinationals, so there are many examples of cooperation between them, but not on a territorial basis. Finally, cases of information exchange and help in obtaining clients existed, but not often among firms within St Etienne.

Clients are overwhelmingly the main source of information about market trends. Professional journals, meetings, fairs, private consultants are also important—but again not on a territorial basis. A street lighting maker mentioned the mediating role of architects and designers working for several firms. A swimming pool builder uses detailed data analysis from market research firms.

Several firms said that exporting was a new development for them. In several cases (engineering, industrial cleaning products, textiles) exports now represent over 10 per cent of turnover. Although SME exports have been a policy priority for a number of years, St Etienne industrial SMEs seem first to have survived, to develop a different relationship with their environment (horizontally within local and regional networks, and within vertical networks). They now move towards diversification of their markets and clients, including exports. One would assume, but we do not have clear evidence, that SMEs, which were integrated within larger firms were among the first to develop exports, and that dissemination of ideas led others to follow.

When they move to new markets, exports in particular, SMEs either manage on their own, recruiting new staff, or use specialized companies. Many have incremental trial and error strategies with limited investment before moving forward, for instance, with private commercial agents specialized in foreign markets in their domain. Alternatively, they use the resources of the larger group to which they belong. Often, the development in new markets is related to the merger, or the acquisition of another firm specialized in that domain. A St Etienne firm specialized in thin metal sheet for computers bought another one specialized in a different product, a few miles outside St Etienne. It then expanded both in terms of products and geographically. By contrast the firm making prostheses is part of a local family holding. It expanded in Germany by using resources within that holding. Again, local networks seem to be of limited use in that case, except for the textile firms, which are quite specialized, and one or two cases in the engineering sector.

Joint marketing, even for firms from the same sector within St Etienne, is the exception rather than the rule. Despite all the efforts of various agencies, which are vaguely mentioned in the interviews, commercial independence, vertical networks, and market relationships prevail.

Technological developments, R&D

Here again the survey gives mixed results. SMEs in St Etienne are mainly subcontractors. By contrast with other competition collective goods, R&D is more dependent upon cooperation among firms and other partners, hence there is less isolation here. However, only one limited part of the R&D and technological project brought several firms together with technical or research centres based in St Etienne. Most SMEs either use external sources or alternatively have project by project *ad hoc* cooperations. Local collective action remains the exception. Investment in and use of R&D are often the outcome of pressures from clients, for instance, in the engineering or machine tools cases.

Our sample could be divided between firms broadly belonging to the engineering sector (including metalworking and machine tools) and the rest. For the former, R&D and technical improvement as collective competition goods are mainly produced in the day to day interaction between firms, most importantly between the subcontracting firm and its clients. This is the case of a machine-tool firm working for Peugeot. Although the clients are no longer

large firms, in the engineering sector close cooperation with clients and subcontractors is seen as a major condition of economic success. SME directors belonging to either international or regional groups emphasize the importance of that point to invest and to stay in St Etienne. In the machine tool case for instance, SMEs are engaged on a specific project, as one director put it: 'Dans notre domaine, ce n'est pas facile d'aller à l'étranger. C'est lié au marché, aux projets, c'est pas facile de travailler dans un pays sans y être implanté.' When those firms go foreign, they do so within their larger group.

In engineering as opposed to machine-tool firms, most directors emphasize the importance of R&D and improvement of the production process. Of course, most signal the importance of close relationships for the conception, research, production, or even design of pieces of metalworking or new machines, or specific products for clients. Although some stress that they have to include microelectronics or numerical commands in their equipment, there is remarkable unanimity concerning the importance of technological improvement and R&D.

Second, for firms in that sector, technical and research centres of the engineering and technical schools (IUT) in St Etienne, and sometimes in Lyon or Cluses (within Rhône-Alpes region), are major sources of R&D and support for innovative projects. The engineering firms all mention the work of the CETIM (Centre technique des industries mécaniques) created in the mid 1980s on a regional basis. That includes a research centre, an association of firms, and consultants, and they work on innovations for firms within the sector. They also develop relations with university centres and engineering schools. Several firms mentioned *ad hoc* projects either with CETIM or with centres of expertise and research centres within the university or IUT. But there are no long-term integrated collective programmes.

This is particularly important for the engineering and textile sectors, where specific technical centres were created to respond to their need for modernization. Although that point is not always emphasized in the interviews, several detailed examples suggest that those centres, created fifteen years ago, have now penetrated the dense network of traditional industrial SMEs. Finally, most firms use private sources such as national or often regional consultants and national professional organizations.

Most firms have now developed their own R&D departments, an incentive to keep more closely attuned with technological changes even if they are part of a larger group. Again, relationship between subcontractors and clients is the main basis for collective competition goods. When those relations have a strong territorial dimension, R&D only reinforces that dynamic. We find cases of relatively integrated networks only in engineering.

For the 'other' firms the situation is different, because they are not embedded in such a dense network of interfirm relations. Several have their own small R&D department (from one to five employees) working to improve products or invest heavily (in relative terms, considering their size) in new

products, for instance, in textiles. Several firms mention the use of consultants to bring innovation, technical improvements, suggestions about the modernization of equipment. In some cases, these are just consultants on the market; in others, they are linked to local agencies (CCI, DRIRE, ANVAR) and therefore their use is subsidized by local authorities.

Directors are well aware of the technical centres, research centres likely to respond to their needs and to produce adequate answers. Also, on the financing side, they were able to mention different types of aids—for instance for technological upgrading (ANVAR) through local technological networks (Ministry of Industry), or to get the relevant information from the CCI.

Outside the engineering sector directors rather despise the university and the local R&D facilities. They get grants from local agencies, but they either develop R&D inside the firm or use consultants and professional organizations, or they use the R&D produced within their larger group.

We further asked about expensive CCGs, such as testing new products, simulating their production, making complex estimates related to the implementation of R&D before the production stage. In our sample firms mainly used local and regional expertise and technical centres (CETIM, ITC), research centres related to the university/engineering schools, and local public grants. About a third also use private consultants from the Rhône-Alpes region.

All in all, firms contribute to the making and use of large amounts of CCGs, in relation either to other firms or to specialized public or semi-public centres. Most also use regional private consultants on a regular basis.

Finance, grants

Firms were sometimes reluctant to talk about these. Most first use ‘normal’ private banks for development. However, several mentioned that in case of need they were able to get support either from their owner or from their subcontractors, but not systematically on a territorial basis.

Most firms benefit from grants. Although they tend to despise them as irrelevant and mock the weak constraints attached to them, it seems that they are all well aware of at least some of the grants: to hire consultants, to finance expensive equipment, to develop technological innovation, to export new products. Most directors are aware of the European Regional Development Fund (ERDF) financial grant but regret the delays and heavy administrative procedures. These financial aids were usually used to expand in new buildings, to finance costly new equipment, to hire new people, to support new investments.

Again, in the financial domain, examples of support among local firms remain the exception such as in textiles, where firms gave money to prevent the bankruptcy of a vital supplier—the last one in France—and to avoid dependence on their Japanese competitors.

Information and training about new norms, certificates

All firms are today faced with growing demands concerning quality assessment (ISO 9000, ISO 9002), environment, contracts, etc. SME directors mention that they feel

the pressure to adapt their organization to respect these norms. Again, pressure from clients within and more importantly outside St Etienne proves crucial.

For these collective goods the local environment proves decisive. Nearly all our interviewees mentioned that they had contacted either local branches of the state (AFNOR, DRIRE for the Ministry of Industry) or a business organization or chamber, or a centre such as CETIM to adapt smoothly. That usually requires some sort of training for management and workers alike.

In the quality certification domain, local business organizations (SMPL and CCI) have played a very active role. They organize many meetings on the subject together with auditing and training on a collective basis. They also receive funding from public sources (Conseil régional, ministries, EU) and created a training organization (IDECQ) around a network of technicians with St Etienne SMEs. This theme of quality improvement has therefore been organized on a territorial base, bringing together under the leadership of business associations public agencies, public funds, and private consultants. The firms saw this as a relevant CCG, but not as a major problem. They usually considered they had rapid access to information and effective consultants to react, train, and adapt to the new norms.

Training, recruitment

As explained below, St Etienne, once characterized by the underdevelopment of its education and training system, benefited from heavy investments to develop all sorts of training, including that in cooperation with firms, first in the 1960s and then more related to industry's needs in the 1980s. It is worth noting that most workers and technicians in our SMEs come from St Etienne. This is a labour market with low inward mobility. The traditional know-how of skilled manual workers is now mixed with a sophisticated system of upgrading skills. Most directors mentioned either the quality of the workforce or the possibility to train it quickly for new projects and technologies. They also benefited from the production of technicians by IUT and BTS (Brevet de technicien supérieur) who are well adapted to SMEs' needs. Again the statement has to be qualified, because this would not be true for middle management. Because many firms were bought by outsiders, their management tends to come from outside the area, including from the United States or Italy.

The results of our survey seem similar to what Veltz (2000) shows concerning the networked firm and the importance of interrelations for productivity. Most firms have close interrelations with both their clients and subcontractors as far as technical improvement or R&D is concerned. However, five managers in our sample said that they did not have close relationships with other firms within the area, but stand on their own. Then they explain that they rather look for clients within the Rhône-Alpes region and St Etienne area, because it is very important for them to have day-to-day relations with their clients—to get more detailed information, to exchange ideas to improve their own products, and to adapt them to the anticipated needs of clients. The same apparent paradox emerges from the analysis of their suppliers and subcontractors. Most of our

interviewees first insist on their independence. Then they point to the diversity of their suppliers and subcontractors—most of which are either within St Etienne or the region. When asked about the rationale for this, they mention that they help each other from time to time, that they are reliable, hard working. Family firms in particular prioritize local firms in the name of identity and proximity. SMEs' leaders stress classic factors, such as the quick reactions of colleagues/competitors in other SMEs, the degree of informality in business relations, long-term relationships with a diversity of SMEs' leaders, the pride of the city in the engineering sector. As one interviewee put it: 'Here they have engineering in their blood'.

But networks and market relationships extend beyond the local or regional market. From the point of view of capital ownership, markets, and access to R&D, both market relationships and vertical networks within international and national groups and professional organizations provide a large proportion of the CCGs these firms need.

Economic Development Policies in St Etienne

There are two contrasting ways to analyse public policies for economic development in St Etienne. The first focuses on the mainly local and national programmes aiming at supporting firms and promoting local economic development, the production of LCCGs. That leads to the analysis of rivalries between agencies, the lack of effectiveness and the fragmentation of the governance of the local economy (Tirmarche 1999). The other perspective underlines long-term investment in the urban area, indirect support for the environment of firms and the slow making of LCCGs, what Veltz (1996) calls 'Les sucres lents du développement économique'.

National and European Programmes to Eradicate the Legacy of the 'Black City'

As early as the mid-1960s, the industrial crisis in St Etienne led to specific programmes and concrete support from the state. Together with Valenciennes and the East of France, St Etienne received new investments in the automobile sector: Berliet trucks, then Renault industrial vehicles created 1,500 jobs in the early 1970s. A small Peugeot plant followed. State regional and industrial policy labelled St Etienne a priority area for re-industrialization, thus benefiting from high-level grants for industrial investments. According to state agencies, about 9,000 jobs were created by outside investments in St Etienne between 1968 and 1975.

A second change initiated at that time had to do with the tertiarization of the city. For an urban area of 450,000 inhabitants, St Etienne has a low level of public and private services. Following its designation as 'Métropole

d'équilibre' (a priority of 1960s regional policy to support the development of regional capitals), a university was created to mark a change for the local culture, where higher education had not been the priority of local elites.¹¹ The physical and economic renovation of the city centre became priorities because shops, services, and leisure activities were all under-represented. Chronic deficiencies in urban planning were still seen as a major problem in the city and in the Ondaine and Giers valleys. Massive social housing programmes were started to replace nineteenth-century working class housing.

The mood of the city was becoming more optimistic by 1974 when it was still expected that these investments would make the departure of heavy industrialization easier. Those expectations collapsed when large firms faced terminal decline. However, the city did not face a complete collapse, and even in the worst years the unemployment rate did not exceed 13–15 per cent. But for the next decade St Etienne was often in the news because of large firm closures and social conflicts to oppose them.

After 1984 and then 1987 St Etienne benefited from two main sources of fundings: first, the *Plan conversion*, initiated by the national agency DATAR; then European structural funds (ERDF and ESF); later the European LEDA programme. This money was mainly used in two ways.

First, and most spectacularly, large amount of funds were used to 'clean' the city, which got rid of its reputation as a black city. Large zones of derelict industrial land were cleaned of devastated buildings, the whole centre was refurbished, new industrial zones were created. This physical renovation was executed under the leadership of state representatives (prefect and ministries external services director) who controlled both European and national funds. This strategy was accompanied by funds to demolish/renovate large amount of social housing in the most deprived neighbourhood. The results were spectacular: the city centre emerged as a classical one, the black image disappeared, middle class housing and commercial premises were built. But a lot remained to be done in the suburbs and for the large social housing neighbourhood. In the years when the physical renovation was at its highest (1984–1988), about FF8 m. were spent per year.

Second, the funds were used for the series of economic development initiatives: grants and support for the creation of SMEs, training for unemployed workers, or to upgrade skills.

Third, the state used its 'classic strategy' of directing public investment, a strategy which had started in the 1960s: creation and then development of the university and various higher education establishments (such as prestigious engineering schools), centres of research, concentration of regional centres aiming at upgrading research and innovation within traditional

¹¹ This university grew regularly together with other training institutes and engineering schools. By 2000, St Etienne had about 20,000 students and 12,000 researchers.

SMEs, such as CETIM. The famous '*plan productique*' (Cohen 1989; Lévy 1999) led to the making of a '*Pôle productique*' of St Etienne that is, investments in the research centres and agencies mentioned above to support 'new business training programmes' and to finance premises in the form of a science park.

Fourth, the regional council developed a series of initiatives (under the generic term contracts) to support firms' development, attraction or creation, particularly in the two areas of Vallée de l'Ondaine and Pays du Giers. However, within the regional and departmental system, until the mid 1990s St Etienne economic and political leaders were always marginal within the regional system of Rhône Alpes, hence their weak capacity to extract resources from the region and their dependence on state officials.

Specific Programmes and Economic Development Policy: A Myriad of Initiatives

Our survey of local agencies and the supply of LCCGs was undertaken independently of the survey of firms.¹² Seen from that perspective, the production of these goods for local firms by local agencies comprises a myriad of weakly coordinated initiatives whose main rationale is to spend money made available by national and European programmes. It seems to fit the need of the agencies to spend money and to promote the image of St Etienne, rather than to support the needs of local SMEs.

In the 1980s there were the following developments:

1. *Pôle productique régional*, 1983: an outcome of the newly created '*contrat de plan Etat-région*' in 1983. The idea was to support the restructuring of the industrial milieu by creating a concentration of tools and funds to support the modernization of industrial firms. As usual in France, within the various components of the programmes priority was given to the physical element. A science park was created (one among several dozen at that time) and a brand new '*Maison de la productique*' was erected, supposedly to bring together applied research centres leading to the dissemination of innovation within SMEs. Those centres were also part of a regional association, which aimed at developing '*productique*' within traditional SMEs, part of the last ambitious industrial plan under the socialist government of 1983.
2. Land development: in 1983, the new conservative mayor led an expensive land development policy (including developments on hilltops) in a context of intense local competition within the urban area to attract what remained of existing firms. By contrast, the creation of a local

¹² This section derives from Olivier Tirmarche's master thesis (DEA), and uses earlier work and work by Le Galès (1991; and Lévy (1999).

economic development office staffed with qualified officers only started in the very late 1980s, that is, about a decade after other French cities.

3. A risk capital company created by local branches of national banks to support the development and creation of firms.
4. An outcome of some form of partnership and hailed as an innovation in the St Etienne context was the *Lanceur d'entreprise* (i.e. a sort of centre for start-up firms) bringing together firms, engineering schools, the university, research centres, and local authorities.
5. A small science park.
6. A 'flagship urban project', the transformation of the old Manufrance building into a prestigious urban neighbourhood comprising a congress centre and various amenities.

During the 1990s both the number of funding sources and the amount of money increased dramatically, reinforcing existing programmes, which were originated by state actors, because European money had to be matched by local and national funds. Simultaneously, local initiatives multiplied partly as a consequence of cooperation among newly important local authorities. In the 1970s the centrist mayor had been too close to the conservative bourgeoisie, while his communist successor wanted state public policies and support, and opposed local economic strategies. In the 1980s, although the new right-wing mayor had previously led a rural commune, he was unable to engage in any form of inter-communal cooperation, thus wasting much time and resources for the renovation of the urban area. State officials retained the lead and implemented European programmes and development policies. The new young centrist mayor promoted inter-communal cooperation through the agency 'St Etienne Metropole'. This brought together twenty-six communes, including St Etienne. It created a development agency ADEL, which merged five existing organizations—including the two agencies created by steel and coal firms when they left—to promote and encourage economic development.

Assessing the overall amount of money that was made available through all those programmes is not easy. Adding the figures given by various agencies and state local representatives led Tirmarche (1999) to estimate that about €15 m. a year were spent in the area for urban renovation and economic development.

Formally, the aforementioned measures all aimed at supporting local entrepreneurship, at stimulating cooperation both among firms and between firms and other local institutions, such as technical colleges and public resource centres. They are thus fully in accordance with the new priorities set by the EU, the French government and the region. Beyond such a formal convergence, empirical surveys reveal that cooperation between actors suffers from relatively diverging interests and from power struggles. All involved being virtually equal partners, no-one is able to impose a global plan. The capacity of public and private sector actors to support the development of

LCCGs remains weak. However, there is good evidence of close cooperation between public partners, if mainly motivated by the need for each actor to spend his money and to attract others' subsidies in order to lead projects to positive outcomes.

Large firms, in particular in the steel and coal sector, created '*sociétés de reconversion*', local agencies in charge of organizing the economic development of the area they left. Both were quite active in St Etienne over the years, in particular SODIE, created after the collapse of the steel leader Creusot Loire, and SOFRED created by the state armament public agency, GIAT.

Local and regional branches of ministries or agencies were active: DRIRE (Ministry of Industry), DDTEFP (Ministry of Labour and Adult Training), ANVAR (financing innovations for existing firms) and the prefect himself at the heart of this system. CIEDL (*Centre intergénération pour l'Emploi et le développement des initiatives locales*) was created by various state agencies to manage European and national funds in a systematic way with two priorities: labour market and economic development. Although the state kept the upper hand, CIEDIL became an example of partnership '*à la française*' mainly between agencies from the public sector including local authorities, training organizations, and some associations or banks. A *sous préfet* (i.e. a civil servant), was appointed specifically to run those programmes. State actors are therefore mainly concerned with spending the money which is available and to find firms and projects

The CCI, like other local business organizations in St Etienne, was historically weak (Lévy 1999). It was more a club of notables than a dynamic industrial actor. The owners of leading firms would either be from outside St Etienne (headquarters in Paris) or would not be part of the CCI (e.g. the Guichard family, head of the Casino supermarkets chain and a longstanding investor and head of the prestigious football club). The services the CCI offered were less and less relevant, and it faced competition from consultants. Things started to change in the 1990s (i.e. about ten years after CCIs in other parts of the country). SMEs' leaders took the reins, new staff were hired, and various services to firms were developed.

Training benefited from large sums of money. Usual actors such as the university, *Mission locale*, the GRETA (Ministry of Education), and the CCI's training organization, have played a role together with local authorities to create new degrees, in particular at the intermediate level (two years after *baccalauréat*) to train technicians or the less skilled engineers. Also active were third-sector associations with an economic development goal, such as la Société Forézienne de Valorisation et de Promotion. ADILE (Association pour le Développement Industriel de Loire sud), a partnership bringing together DATAR and local firms, established a dynamic network and provided many LCCGs: training, financial grants, labour market help for managers, innovation grants, consulting, support to develop international markets.

These tasks are not easy, and measuring effectiveness is a tricky challenge. Therefore, the agencies measure their own performance in terms of two indicators: the number of subsidized projects and the ability of each project to fit the eligibility criteria that refer to its specialized domain. There is obviously a tension between those two criteria and therefore a continuous rise in subsidized projects, with no clear line as each organization competes with the others to impose its own criteria.

The local authorities, 'sociétés de reconversion', and local representatives of DATAR find cooperation easier: a contribution to the performance of the whole group is seen as a positive outcome by all. They are less concerned with initiating durable changes within firms than with new investment and job creation. They measure success by attracting new projects, financing more developments, attracting subsidies from various sources. They organize a large and comprehensive network of actors to spend as much money as possible on the greatest number of projects. Accordingly, eligibility criteria are more or less useless, which produces some tensions with the first group.

In this context the rise of European Union and national funding in St Etienne stimulates cooperation and convergence: the need to spend intensifies and draws greater attention to the quantitative indicators. Eligibility criteria are not abandoned, but interpreted in a more flexible way to accelerate spending. Both groups cooperate as there are many resources and not enough projects.

Although cooperation among public actors has increased, their contribution to producing LCCGs has remained limited, as they have concentrated on short-term projects. This has clearly been the case even for the most strategic local initiatives. These were supposed to differentiate and promote St Etienne economic areas, that is, the 'pôles', which became little more than opportunities to demonstrate that something was being done, to promote St Etienne in marketing terms and to spend European money.

However, over time some actors use those initiatives to create more than just *ad hoc* artificial structures. The recent stability of the St Etienne mayoralty has made possible a more coherent strategy at both municipal and inter-municipal levels. Second, as it was realized that large firms would not return, SME leaders in the engineering sector in particular started to organize, to represent themselves, to play a role in the provision of CCGs. With the CCI they developed an organization, MECCAPOLE, bringing together public research and training centres, local authorities and SME leaders of about 140 firms in the engineering field. This network has developed the language and representation of the 'engineering industrial districts', and has an official label promoted by DATAR. They are engaged in a new series of initiatives to create exactly what we understand by CCGs. They organize group of firms to respond to particular contracts, organize specific events (like the engineering forum once a year). They also collectively finance research on new markets and market trends. They are linked to two banks and other organizations to provide funding for innovation projects.

Similarly, within the *pôles* there are some interesting developments. In the medical sector, the creation of the Association pour le Développement et le Rapprochement des Entreprises de Technologies Biomédicales is following a similar trend. It brings together about eighty firms and public research centres to develop marketing, applied research (to develop new medical instruments for instance), attracting new firms, developing training.

Conclusion

It is still difficult to assess the restructuring of St Etienne and the impact of policies. However, it is now clear that the worst is over. The dismantling of large firms is complete and the remaining industrial sector, although diverse and not very well integrated, is fitter and slimmer.

The impact of the programmes should be seen in two different ways. On the one hand, our survey of firms indicate two contrary trends: the deterritorialization of production and use of CCGs; and the importance of clustering for certain kinds of those goods, in order to have a solid base before facing foreign markets. Industrial SMEs tend to use local or regional subcontractors, but not suppliers. However, there are also cases, less related to the industrial tradition of the area, where clients and suppliers are entirely external, with no attempt or desire to increase integration within the local economy. Some of these variations are explained by sector. Our sample was made on a random base and we therefore have a quite large body of firms in different sectors. However, in engineering and metalworking, and to a lesser extent (three firms) in textiles, we identified a dense network of relationship between those firms and the making of CCGs. Although there is intense competition between the firms, there is also a large amount of cooperation, in R&D, training, recruitment, adapting to norms. There is no cooperation in marketing, or finding new clients (except joint trips to fairs). There is close cooperation with centres like CETIM, but that does not lead to jointly developed projects, long-term partnership on specific projects or more institutionalized forms of collective action.

To some extent, the same ambiguous conclusion derives from our survey of agencies producing CCGs. On the one hand, we singled out competition between agencies, and the mechanisms through which spending money on new project becomes the ultimate goal of economic policy initiatives. On the other hand, related to the rhetoric of *pôles* and engineering industrial districts, there are clear strategies to develop CCGs such as training, applied R&D for groups of firms, marketing, finance. That goes together with the strengthening of local actors: that is, associations of local firms, local authorities, and more autonomous engineering schools and university departments.

An optimistic reading of St Etienne stresses the following points:

1. the dense tissue of varied industrial SMEs, in engineering and metalworking in particular but also in new sectors, very specialized, and of various sizes;
2. the territorialization of the production of competition collective goods, which seem gradually more precisely attuned to firms needs,
3. thanks to European Union and state money, St Etienne is investing in new projects, from transport to cultural amenities, and its image is improving.

Local actors seem to be about to create a local mode of governance with sustained priorities over time. The city also has a more diversified economy, from industry to services, from the public and the private sector—the recipe for success in other French cities.

By contrast, a pessimistic reading mentions:

1. the continuing subcontracting nature of local firms, despite initiatives to develop the use of new technologies;
2. the marginal position in the region compared with Lyon;
3. the lack of demographic dynamism and the structural social difficulties, which have not been overcome despite EU and state money.

If French industry keeps its strength in transport, motor vehicles, aeronautics, construction, steel, chemicals, medical instruments, the St Etienne economy should be able to benefit. At the same time, its growing internationalization should eventually bring more positive results. Despite the territorialization of its mode of governance, there is no clear sign of growing autonomy in economic development, and there is still a serious backlog of poverty and social housing to account for, even if the figures are not spectacular by French standards. St Etienne is not an industrial district in the making, but the attempts to produce LCCGs for industrial firms and to organize networks of firms are interesting developments to pursue. Sometimes, not often, the cognitive framework is useful to mobilize energies and to support skilled social entrepreneurs.

11 Regeneration in Sheffield: From Council Dominance to Partnership

COLIN CROUCH AND MARTIN SCOTT HILL

For much of the nineteenth and twentieth centuries the South Yorkshire city of Sheffield stood as the world's major steel production centre. Not only was it a major player in world steel markets, steel was the dominant force in Sheffield, directly accounting for over 40 per cent of the city's 300,000 workforce by the early 1970s. However, the city's success in the steel industry was also its Achilles heel when the national and global crisis of the industry struck from the mid-1970s onwards. Most of the major steel works and associated manufacturing plants closed, forcing much of the city's workforce into redundancy. Between 1978 and 1981 nearly 50,000 jobs were lost in manufacturing, with another 20,000 lost in the following six years. By the end of the century the city's total workforce had declined from its 1970s peak to just 212,000, with the proportion employed in the steel and associated industries falling to just 10 per cent. (Dabinett 2001; see also Strange 1996).

Attempts to solve the problem by subsidizing and then restructuring the steel industry itself had been abandoned during the early 1980s. The strategy of local political actors shifted to attempts at diversification, within which the idea of encouraging small- and medium-sized enterprises (SMEs) soon appeared. These strategies were, however, applied in highly contrasting political contexts, the eventually dominant policy mix being itself a kind of compromise among very opposed forces. From this has also emerged a highly hybrid form of governance of the local economy which, while it has not produced a particularly rich environment of collective competition goods, can be seen as having contributed something to the innovation that can be observed.

This chapter examines two main strands of these approaches. First, it looks at attempts in the late 1970s and early 1980s of Sheffield City Council to halt the decline of Sheffield's industrial base through direct intervention against the background of a largely unsympathetic and sometimes overtly hostile central government. Second, it considers the development of a partnership approach between local, regional, national, and European levels of government combined with a wide range of private sector actors that has taken place from the mid-1980s. We finally examine some of the main projects that have been established over the last fifteen years to regenerate the city's economy.

Initial Responses to Decline

Governance of the Sheffield steel industry had been that of the corporate hierarchies of the great firms, combined also with their strong associational life. They dominated the city's economy alongside its other historically famous industry, cutlery, which was based more on an industrial district model of medium-sized enterprises and their formal and informal associations. Strong though they might have seemed, these firms and their associated structures proved unable to withstand the crisis, which was in fact making mass steel production uneconomic anywhere in the advanced industrial world. They followed economic logic, reduced their work forces, partly by cutting back production, partly by radical improvements in productivity, and partly by relocating elsewhere in the world.

In that context, attempts to save the city more or less in its existing form, ultimately hopeless, passed to political actors, and in particular to the city council. In retrospect, in addition to seeing its attempts to save traditional industrial Sheffield as doomed, it is possible to understand the political form that the response took. Forms of governance associated with business interests themselves had become either too weak to develop a collective response (as with formal associations and informal business networks) or totally ill equipped to take on such a task (corporate hierarchies and markets). Sheffield city council—normally rather marginal and passive in relation to governance of the local economy in the usual way of British local government, but unlike the firms inescapably tied to the city and responsible for its collective competition goods—stepped into the vacuum. It was ill equipped by its past experience for the task, and felt alienation from and hostility to the firms, which seemed to be walking away from the problems.

The council thus stood alone, and therefore dominated initial responses to the decline of Sheffield's core industries from the mid-1970s to the mid-1980s. The local Labour party dominated the council's politics for most of the twentieth century. First taking power in 1926, it kept hold for all but the period of one year during 1968/1969 until the local elections of 1999. For much of this period the party was committed to using public spending to reduce socio-economic divides in the city. While high spending for such areas as education and social services was rigorously defended, the ruling party was not considered 'radical' in the economic sphere, as it stayed away from highly interventionist economic policies. The 1968 election defeat—on the back of the national Labour government's attempts to reduce spending, which led to the city council having to raise local rates to keep its policy programme going—signalled a future change of track for the local party (Seyd 1990: 336).

By the late 1970s a new group of Labour councillors were on the rise who were hostile to the national leadership, which they perceived as out of touch and trapped by the conventional economic orthodoxy of Britain's postwar consensus. Dedicated to pursuing what they saw as a 'radical alternative' they

developed a range of new policies to regenerate the economy and provide a boost to the city's working classes. However, it is important that these 'radical' Sheffield councillors are not confused with the radical left of the same period who were present in such British cities as Liverpool (Seyd 1990: 337). They remained intensely practical in their approach to the city's problems, but isolated from business interests and lacking in business expertise of their own. Such a form of local government, especially given the weak economic planning competences of British councils, could neither provide an adequate form of governance for a city's crisis-ridden economy alone, nor easily form alliances with others for the task.

The national Labour governments of 1974–1979 claimed to have approaches to local regeneration that would foster a new level of cooperation between central and local government. However, the reality was somewhat different. Central government policies effectively left the final say with Whitehall (Strange 1993: 124). The election in 1979 of a Conservative government only served to reinforce both the isolation of city politicians and their resolve that their version of 'radical socialism' must be applied at the local level, and that Sheffield must take a different path. The appointment of David Blunkett—in the late 1990s to become a prominent member of the New Labour government in London—as the council's Labour leader in 1980, assured the left's position. Such was its resolve to retain sovereignty over Sheffield's regeneration that it was even willing to reject central government funding if it did not agree with the way the funds would be distributed (Bache 1998: 6).

One of the main planks of the city's radical alternative was the creation of a city Employment Department in 1981 with the task of rejuvenating the local economy. The methods used included supporting local firms (financially where deemed necessary), encouraging the development of workers' cooperatives, directing council purchasing towards local producers, and defending and promoting the public provision of goods and services. The policies offered were clearly designed directly to intervene in the market economy, shaped by a firm belief that the public sector can and should shape local production systems: 'Positive intervention was the aim with the local authority seen as a significant employer, consumer and producer. It was considered a legitimate economic actor in the local economy—not only in the consumption sphere but also in the production sphere' (Strange 1993: 122–3). Employing a staff of over 21,000—more than five times that of the nearest private firm—and with a budget of around £250 m. at its disposal by the mid-1980s, the council's potential impact on the local business environment was real.

It should be noted that this approach was not a standard British left socialist one, as it was explicitly concerned with assisting private firms and encouraging small businesses. Traditional British socialism was heavily oriented towards public employment, including state-owned industry, and had little

interest in small firms in particular (Assimakopoulou 1997). This reflects a change which had been taking place in British left-wing thinking about urban regeneration at that time and was also reflected elsewhere in the approaches of the Greater London Enterprise Board and the West Midlands Enterprise Board (see Best 1990).

The approach contained certain ambiguities: council leaders had decided that they did not need the actual partnership of the private sector to implement their programme of renewal; but they did give the private sector a distinct role (Gibbon 1989). Meanwhile, while the Conservative national government was arguing that high unemployment was an unavoidable but necessary part of Britain's future economic revival, and that subsidies just encouraged inefficiencies, Sheffield's ruling Labour group was attempting to use public funds directly to subsidize local companies and protect local employment (Strange 1993: 129).

While the council acknowledged that subsidies could not continue indefinitely, like authorities at various levels and in many countries at that time, it promoted the policy in the belief that the economy was suffering a temporary hardship and that the burden of the expenditure would pay for itself when the recession resided (Strange 1993: 146). If the downturn in demand for Sheffield steel had been short-lived, the strategy may have saved thousands of needless job losses. However, by the mid-1980s it had been recognized that, in the face of global competition and a largely hostile central government, much of the distributed funds were being wasted. The Employment Department had proved to be almost powerless, particularly in the context of a severe national recession that led Sheffield's unemployment rate to triple between 1981 and 1984 as nearly 30,000 manufacturing jobs were lost in the city (Seyd 1990: 339; see also Strange 1993: 130). Meanwhile, the strategy of using public spending to lift the city out of recession was in any case being undermined by the severe financial constraints being imposed on local government by the national Conservative administration. Gradually, through a series of measures, local councils lost almost all autonomy in raising money to spend, and were restricted in their spending powers to a declining set of activities.

There was also recognition that the city was woefully under-represented in nationally expanding economic sectors. One of the reasons given for Sheffield's rather rapid economic decline had been its over-reliance on the metals industries, whose successes had drawn on local talent and manpower with the effect that potential high-growth areas, particularly in the services sectors, were crowded out. At the same time that Sheffield was losing its manufacturing base it was failing to attract new high-growth businesses. Some other regional centres were more fortunate, with Leeds, for example, starting to pull well ahead of Sheffield, attracting in particular some financial services activities normally associated only with the south-east in the British context. Given the relative proximity of Leeds to Sheffield, it was doubtful whether

there could have been scope for more than one city to occupy this role as a regional business services centre. As Strange comments:

Sheffield's industrial decline and consequent rise in unemployment was compounded by the fact that it was not well placed with regard to other sectors of the economy. The proportion of the labour force employed in the service sector was small in comparison with other northern cities, and the growth in the business, financial, and high technology industries had increased at a rate below that of the national average. (Strange 1993: 127)

The potential for movement into other high-growth areas was also hampered by what many commentators (including Hugh Sharp (1999), economic advisor to the chief executive of the city council) have seen as a 'large employer culture' in the city (see also Dabinett 2001: 21). This recognition and general abandonment of the short-term subsidy policy led to a re-focusing of the council's limited monetary resources. A more targeted approach on SMEs, where the council's limited budget could make an impact, was adopted. At the same time the aid focus shifted from crude monetary incentives to an attempt to utilize the council's expertise and resources in areas such as marketing and public-sector procurement, even to the extent of ground level product development (Strange 1993: 121, 131). Most elements were therefore in place of what we can see from other chapters in this Part became the standard recipe for former steel-dependent cities: move out of heavy industry and dominance by large Fordist employers; examine possibilities for high-skilled, preferably services-based, employment with entrepreneurial SMEs.

Meanwhile, while Sheffield city council had been running its affairs in what some Labour members affectionately called the capital of the 'Peoples' Socialist Republic of South Yorkshire', the Conservative national government had been growing increasingly frustrated with local authorities across the country challenging its economic strategy. As noted, through a series of measures in the early 1980s the government set about gradually reducing local councils' scope for autonomous action. The main instrument used to do this was 'rate capping', whereby the ability of local authorities to raise finance through local taxes was severely constrained. Sheffield was to endure rate capping twice, in 1985 and 1987, severely limiting the council's ability to apply its original strategy. Rate capping, continuing economic decline and the increasing likelihood of Conservative dominance of central government for the foreseeable future combined with the changed, more pessimistic, perspective for a revival of the steel industry to persuade the council to drop its ambitious and radical 'go it alone' regeneration plans. Quite simply the task was growing too large and resources dwindling too fast to permit Sheffield to turn its back on central government help, despite the conditions this would bring.

Partnership and Governance

Bache (1998: 5) and Strange (1993: 2) have both described the change as being one from a local *government* model of regeneration dominated by the city council to a local *governance* model represented by a range of organizations working in close cooperation with all levels of government. This usage of governance is consistent with our application of that term, except that we see 'government' or state governance as one form of governance rather than as a polarized contrast with it. At the empirical level, where we perceive elements from a number of different theoretical forms of governance combining together, it becomes particularly important to avoid conceiving a polemical relationship between government and governance, though we accept that for political actors in Sheffield (and many other places in the United Kingdom and elsewhere) the developments involved did appear contentious and polemical at the time of their appearance. In the Sheffield case, (local) state governance was joined by the associational form, as well as other levels of government, in the construction of a new urban coalition.

The first partner to be sought out by the city council, recognizing the limits of its own powers, was its traditional sparring partner, the local chamber of commerce. This was joined by local trade unions, personnel from regional government (in the British case meaning *central* government staff responsible for regional affairs), and the city's two universities. As Seyd (1990: 229) says: 'The civic political elite was extended for the sake of economic revival.' This new grouping was formalized in 1986 as the Sheffield Economic Regeneration Committee (ERC), but this was to prove only the first of many such partnerships. For the first time the business community was provided with an influential direct input on regeneration in Sheffield in a forum that encouraged it to promote the local economy as a whole rather than just seeking to promote the specific interests of individual firms (Strange 1996: 146). While the city council was slowly warming up to the idea of partnerships with a range of actors including those in the private sector, it was the incentive of central government funds that committed them to the approach. The government was keen to ensure that any new regeneration money was kept away from 'political tinkering' and given to entities comprising central state and private actors that could be given a clear mandate with specific renewal tasks (Strange 1993: 101–2; Bache 1998: 5).

What emerged in Sheffield was a particular form of compromise between national Conservative and local Labour authorities, though neither side ever acknowledged its terms (Sheffield City Council 1987). For its part national government tolerated a degree of engagement in economic planning by a radical left council which it would have preferred to exclude. (During this same period the government abolished levels of city-*region* government in London and four other major cities because they were dominated by the Labour Party, but it would have been difficult to abolish city councils like Sheffield without

considerable upheaval in local government structure across the country.) Sheffield socialists, for their part, accepted a degree of co-operation with business associations and individual firms that they would not have countenanced in the past. The key word to emerge from this at the level of the city itself was 'partnership'; a term that became used more frequently by political and business elites in Sheffield than anywhere else in the country. In terms of governance regimes, it implied various fluctuating forms of cooperation between the city government and different formal and informal associational actors. It constituted in itself a type of collective competition good, as it expressed a concentration on using political and business resources at the collective level of the whole city. And together these actors could then identify other needs for collective competition goods, though their capacity to deliver these would depend on both resources and the selection of appropriate action.

Accepting the unlikelihood of the steel industry ever returning to the city's industrial centre, the Lower Don Valley, the ERC determined that derelict land should be opened for renewal through a series of compulsory purchases and environmental improvement projects. Such a scheme left the committee with a major problem of finance. With the city council facing severe budgetary problems there was no prospect of significant local funds performing the task. This left the council in the position of having to ask for funds from a central government that the council leaders had vehemently attacked throughout the 1980s, and whose earlier Enterprise Zone policy—for the revitalization of local areas in a context of deregulation and domination of the planning process by private business interests—they had rejected because it would impinge on their autonomy of action.

While the government refused the council's request for new funding for a council managed project, it did recognize the need for regeneration. It proposed the creation of a quasi-autonomous Urban Development Corporation (UDC) with a £50 m. budget to redevelop the Lower Don Valley area over a seven-year period. British UDCs remove local planning powers from local government and place them into the hands of nominees of central government, primarily business persons from the private sector. Despite considerable reluctance and reservations over the necessity of such a body and the lack of direct political control of its action, the council accepted the government's proposals after the UDC's objectives were amended to include reference to wider social obligations for the whole city (Bache 1998: 6). Thus Sheffield was provided with regeneration funding, but funds were deliberately kept out of the direct hands of the local council whose oversight was limited to three seats on the UDC's board of directors. Also, though this was of less concern to Sheffield council, UDC representation was not so much of business associations as of individual entrepreneurs and corporations. This therefore marked a shift towards governance by corporate hierarchy rather than associations, though in combination with the other forms. In short, the UK central government had forced its model

of corporation-dominated regeneration on to the city council, who were left with little alternative but to accept.

However, from this point on the city council adopted the partnership scheme with vigour, both because of the information and expertise benefits of cooperating with other key local stakeholders, and perhaps more importantly to put it in a position to secure greater levels of central government funding. As Hugh Sharp expressed it: 'we *must* make the most of the [limited] financial levers which *are* available' (Sharp 1999).

The fact that these 'financial levers' increasingly held prerequisites for the applicants to be local partnerships rather than representatives of single public or private bodies left the council with little choice: if they wanted to influence how the funding was distributed they had to join the partnerships. One of the best examples of such a requirement came however, not from the UK government, but from the European Union and the Single Regeneration Budget (SRB). The SRB, established in 1994 and following a model of multiple governance, required multi-actor partnerships, diverse ranges of local public, private, and voluntary bodies, to apply for funding and manage the schemes. Where such requirements are present the city council still frequently takes the lead, as it did with the Sheffield SRB Partnership; however it was not allowed to dominate the debate as it had in the early 1980s.

The development of the EU's competencies in regional funding has provided it with an increasing degree of influence on the types of regeneration programmes pursued by local governments and the form in which they are applied. The European Regional Development Fund (ERDF) has gradually expanded over the last thirty years to its present total of €195 bn. for the period 2000–2006. The funds are distributed according to the level of need of a particular area, one of the key criteria being the per capita GDP of a region compared with the European average. In the last round of ERDF assessment South Yorkshire was granted Objective 1 (high priority) status largely because its per capita GDP was less than 75 per cent of the EU average. This status, which will last until the end of the programme in 2006, has rendered the region eligible for an additional £600 m. in investment if the required matched funding can be attained. Within this programme Sheffield has benefited from two specific priority zones, the 'M1 Strategic Economic Zone' alongside the M1 motorway, and 'Sheffield City Centre'.

Like many national government programmes, Objective 1 funding requires the city to develop a coordinated strategy with the clear input of a range of key stakeholders. To complete this task the Sheffield First Partnership was chosen to include all the city's bids and provide the required strategic overview prior to them being sent to the South Yorkshire Objective 1 Programme Executive. It should be noted that, while Objective 1 status was welcomed by all the regeneration partners, some (including the Sheffield Training and Enterprise Council) expressed concern that the label served as a negative indication to potential investors, making the Sheffield 'marketing task even more problematic' (Sheffield TEC 1999: 38).

EU funding held a particular attraction for British left-wing local governments from the mid-1980s until the late 1990s. It presented a public source of major funding possibilities that was relatively autonomous of the government in London. Furthermore, during that period the general policy approach of the Christian and Social Democratic political forces that dominated EU policy making was more congenial to the Sheffield left than was the strategy of British national government. Councils like that of Sheffield were therefore willing to follow EU demands on the kinds of policies which they should pursue, if only because they were not 'London'.

Pressure towards a partnership approach survived the change of UK government in 1997. The Labour government established three seven-year Urban Regeneration Companies (URC) around the country designed to focus on the implications of so-called 'joined-up' government, bringing together various public bodies engaged in regeneration activities within an area. Sheffield was chosen for one of the three. Its partnership, Sheffield One, established in February 2000, comprises the City Council, English Partnerships and Yorkshire Forward, and the Regional Development Agency for Yorkshire and the Humber. The company has the task of bringing together the approaches of all government levels and regeneration partnerships in applications for grants from both national and EU levels.

Present Problems and Projects

The city council has highlighted a number of ongoing issues that need to be addressed by the partnership strategy (Sheffield City Liaison Group 1995). First, all partnerships agree that while Sheffield's image has improved over recent years, it must do better if it is to attract its share of national and international investment (Dabinett, 2001: 18). Second, the structure of the local economy is seen to be too dependent on vulnerable and slow-growth sectors with a lack of representation in high-growth ones such as information technology, media, and finance (Sheffield TEC 1999: 21–4).

Labour employment figures by sector indicate that the Sheffield economy has diversified over the last two decades and now largely follows national trends in the major sectors of the economy (Dabinett 2001: 5). However, the city does still differ significantly from national trends in the dominance of the metals sector, which continues to employ around 8 per cent of the workforce against a national average of just over 2 per cent (see Table 11.1). It is important to remember that Sheffield is still a steel-making city. The table also shows some slight diversification within manufacturing, and some albeit inconsistent evidence of a move to more highly skilled sectors (e.g. the relative growth of optical instrument manufacture and decline of general engineering). As in most other parts of Britain (and indeed the industrial world), there have been major increases in all kinds of services—both those in relatively low-skilled sectors (distribution, catering) and in some with

Table 11.1. Employment by sectors, Sheffield, 1991 to 2000

Sector	1991		2000		% change	Change in % of total
	Employees	% of total	Employees	% of total		
Manufacturing						
Metals	23,291	10.97	18,348	8.09	-21.22	-2.88
Non-metallic mineral products	1,487	0.70	762	0.34	-48.76	-0.36
Chemicals and man-made fibres			688	0.30		
Other machinery and equipment	5,789	2.73	4,100	1.81	-29.18	-0.92
09 Manufacturing optical and electrical equipment	1,753	0.83	3,160	1.39	80.26	0.57
10 Manufacturing transport equipment			1,351	0.60		
11 Manufacturing food, drink, and tobacco	5,406	2.55	3,164	1.39	-41.47	-1.15
12 Manufacturing textiles/products, leather/products			881	0.39		
13 Manufacturing pulp, paper/products; printing, etc.	2,690	1.27	2,595	1.14	-3.53	-0.12
14 Manufacturing timber, rubber, plastic and other	3,259	1.54	4,472	1.97	37.22	0.44
15 Electricity, gas, and water supply						
16 Construction	9,956	4.69	9,037	3.98	-9.23	-0.71
17 Wholesale/retail distribution; repair	34,754	16.37	40,577	17.88	16.75	1.51
18 Hotels and catering	10,312	4.86	13,388	5.90	29.83	1.04
19 Transport, storage and communications	13,355	6.29	13,252	5.84	-0.77	-0.45
20 Financial and business services	27,745	13.07	41,155	18.14	48.33	5.07
21 Public services, admin., and defence	30,228	14.24	35,080	15.46	16.05	1.22
22 Health and social work	27,085	12.76	23,036	10.15	-14.95	-2.61
23 Other service activities	9,924	4.67	10,920	4.81	10.04	0.14
Total	212,289	100.00	226,890	100.00	6.88	

typically higher educational levels ('business' services and finance), though there is a surprising decline in employment in the health sector. The Training and Enterprise Council (TEC) argued that this would continue to have direct implications on overall job levels in the city: 'There is a broad agreement that Sheffield's over concentration on low employment intensity industries means that, on average, it has to achieve double the national GDP rate of growth to achieve the same level of employment growth' (Sheffield TEC 1999: 26).

At the same time, as the TEC acknowledged, many of the services sector jobs being created in the city, as elsewhere, are low-skill and insecure (Sheffield TEC 1999: 26). In particular many of the new jobs are in the relatively low-skilled activity of call centres, an increasingly important area of employment in low-wage regions of the UK, which now employ around 7,000 people in Sheffield. The city also continues to have a particularly low proportion of SMEs when compared with the national average; business start-ups similarly remain low, while investment in research and development is well below that of comparable regions (PriceWaterhouse-Coopers 1998). Present forecasts for Sheffield's labour market also remain bleak. While the city's GDP is expected to grow by nearly 20 per cent between 1997 and 2007 and its unemployment rate to fall by nearly 20 per cent, both these figures are inferior to national averages. Worse, the predicted fall in Sheffield's unemployment rate is largely due to a predicted decline in the city's working *population* over the period, with total employment expected to decline by 5 per cent compared with a predicted national rise of 4 per cent (Blackburn 1995; PRU 1996; Sheffield TEC 1999: 5–9).

Clearly, therefore, no major success can yet be claimed on behalf of the new institutional structures which were set up to equip Sheffield with a post-steel economic structure. Any economic growth there has been has hardly been of the kind that contributes to autonomous local development (Trigilia 1992 *a, b*). However, the new approaches have been in place for at most fifteen years, and frequent changes within them may have weakened their potential impact. Rather than seeking a transformation at the macro-level therefore it may be more useful to take a micro-perspective. What new developments, particularly those consistent with the model of autonomous and endogenous entrepreneurial SMEs are visible, even if not prominent, within the city's economic profile?

Towards a New Sheffield Economy?

Establishing such a model has clearly not been a goal of all attempts at revival taking place in the city. In particular, considerable effort has gone into attracting inward investment, which is neither endogenous nor likely to take the form of SMEs. However, given the city's mono-industrial past, very few endogenous capacities exist. Therefore, for many in the partnerships the

marketing of Sheffield as a good place to live and invest is essential if the overall regeneration strategy is to succeed (Sheffield TEC 1999: 20; see also Dabinett 2001: 18).

On the world stage Sheffield is today perhaps best known for two reasons: the past heritage of the steel industry and the film *The Full Monty*. Both have positive and negative implications for those engaged in building the city's new image. On the one hand, the aim is to utilize Sheffield's international reputation for quality steel and cutlery goods and extend this to a range of other economic activities, particularly including cultural activities (Sharp 1999). On the other hand, the negative aspects of the collapse of Sheffield's steel industry may come along as unwanted baggage, hence the various partnerships are placing a great deal of emphasis on merging the 'Made in Sheffield' quality image with high-profile 'modern' sectors, such as the E-campus and Cultural Industries Quarter (CIQ) projects to be discussed below. *The Full Monty* was similarly ambiguous, bringing welcome publicity and asserting the city's capacity for high-quality cultural production, but also projecting a negative image in two senses. First, it dwelt on the crisis of identity of the city's main male workforce, depicting as it did the way in which a group of redundant steelworkers solved their unemployment problem by becoming striptease dancers. It also stressed the poverty of the city's environment with the camera work focusing entirely on the run-down areas. Those engaged on Sheffield's image-projection believe that inward investors would be attracted by evidence that they are investing in a city that provides a pleasant living environment for their staff alongside such economic variables as available property and a qualified workforce.

To combat this problem, a range of projects has been established that focus on improving the physical environment of the city, funded from local, national, and EU levels of government as well as private funds. They include such initiatives as improving the entrance to the city from the M1 motorway, which one report stated was in its present state 'unacceptable for a City which is building an image of investment opportunity' (Crabtree 2000). Similarly, a partnership of the city council, the South Yorkshire Public Transport Executive, the former Railtrack organization and Midland Mainline has been seeking to redevelop Sheffield's run-down main railway station. There is also focus on the improvement of civic areas, such as demolishing the much-derided early 1970s extension to the town hall and improving the retail infrastructure of the city centre. This has been relatively stagnant since the out-of-town shopping centre Meadow Hall was built in the Lower Don Valley in the early 1990s—itself an example of how projects designed to mark a transition from industrial to non-industrial activities and sectoral diversification can in fact produce further problems. While all these new projects will no doubt benefit the present inhabitants of Sheffield, the major cases made for them in funding applications are for the positive impact they will have in shaping the decisions of potential inward investors.

In the late 1980s the city council took a major gamble both to improve Sheffield's international image and to upgrade its poor sporting facilities with a successful bid for the right to hold the 1991 World Student Games. The resulting expenditure on administering the games and building new sports facilities cost over £150 m. and was widely criticized at the time as a waste of money that would leave the city with a substantial debt burden for generations. The debate over the direct monetary costs and wider benefits of the games continues today. However, it is clear that, while the actual period in which the games took place did not bring the city the hoped for attention, the structural legacy has proved a significant asset. For example, such facilities as the Don Valley Stadium and the Don Valley Arena are now successful high-quality venues for sporting, conference, and leisure activities. Sheffield's recent success in persuading the UK government to site a significant proportion of its new Sports Institute in the city is largely due to facilities created for the Student Games. Plans are now in motion to take advantage of the Sports Institute's pull as a beacon for sports knowledge and talent to form a new economic cluster of sport-based firms. All this is clearly consistent with, and indeed forms a key part of, Sheffield's image make-over from old industrial city to energetic modern one. It is also one that features specialized clusters centred on focal structures and institutions, which we know from other research on institutions like universities can serve as 'serendipitous' governance institutions sustaining local collective competition goods (Crouch and Farrell 2001: 189–93).

Further projects have been established by various partnerships to aid those seeking to find investment space in the city and its surrounding area. For example, there is an EU Objective 1 project to create and maintain a comprehensive web-database holding information on inward investment opportunities, with a particular focus on the availability of land for development, including information on such issues as land contamination and noise levels. The aim is to reduce the resources that investors need to spend to place Sheffield on their list of possible investment areas. A major beneficiary of this approach should be SMEs, who have neither the financial resources nor the expertise to conduct detailed searches. This kind of city-based 'seller's pack' approach to attracting investment is intended, not only to uncover hidden investment opportunities for a range of investors, but also increase the relative costs of those investors considering other cities that have not established such schemes (Crabtree 2000).

None of the projects reviewed here seem to seek to stimulate any dormant entrepreneurial resources of the existing Sheffield population. Does the city run the risk of running from dependence on large but endogenous steel firms to large and exogenous services firms, with possibly also a decline in local skill levels as employment in call centres and shopping malls replaces the mix of industrial skills of the pre-1980s city? To some extent, this is precisely what is occurring. However, as implied immediately above, the city council planners

and their project partners are concerned to attract SMEs as well as giant corporations, and some of the new projects show considerable sensitivity to the need to find some high-skill activities. Particularly relevant here have been strategies, pursued since the late 1980s, to form 'incubator' and 'clustering' environments to help SMEs and new business start-ups. Both approaches have been applied through a range of projects such as the hoped for sports equipment cluster, the Sheffield Science Park, the CIQ, and the new E-campus.

The 'clustering' aspect of the city's approach has the same understanding of that concept as we have used here (Le Galès and Voelzkow 2001): high concentrations of firms from one sector in a single geographic area acting as a magnet to other firms from that sector, both to serve their business needs and to act in competition. The concept behind 'incubator' environments is to alleviate as many of the barriers to business start-ups as possible in recognition that the first few months and years of a business are generally the most critical. The Science Park, CIQ, and E-campus projects have aimed to provide low-cost and high-quality accommodation in a supportive environment for those making their first moves into entrepreneurialism and for expanding SMEs (Hockey with Wellington 1989). Sheffield Science Park, for example, enables new entrepreneurs to rent address and desk space rather than having to face the high costs of renting whole units. By early 2002, there were forty-two firms in the science and technology parks, most of which were concentrated in such knowledge-based sectors as information technology and consultancy (http://www.sci-tech.org.uk/content/tenant_frames.html). The high number of IT firms creates a potential point of overlap with the E-campus.

The Cultural Industries Quarter, between Sheffield's city centre and its main railway station, has been a relative success story, transforming a largely derelict quarter of a mile into a busy cultural industries centre. Presently home to over 270 organizations, the CIQ claims credit for helping generate over 2,000 jobs during the 1990s in areas such as audio and visual media production and broadcasting, education and training, arts, crafts, marketing and promotions, and galleries (Sheffield TEC 1999: 27; Sheffield City Council 2000). The basic idea was to attempt to entice a range of 'creative' businesses into one district in the hope that a clustering effect would take place whereby the initial businesses would act as virtual magnets for new start-ups and investment. The planners also believed that it would be more credible and cost effective to promote a dedicated area rather than a city-wide campaign that would lack focus. Not all the CIQ story has been a success. For example, a much publicized National Centre for Popular Music, created with the help of UK lottery funds, closed shortly after opening to much media attention, having failed to come even close to meeting its visitor targets. The Centre's slide into receivership brought Sheffield and the CIQ concept a great deal of undeserved negative publicity.

Sheffield cannot be said to have become a centre of cultural and media production on anything like the scale of Cologne (Baumann and Voelzkow

this volume, chapter 16). And it may be doubted whether, in a country whose cultural life is as centralized on the capital city as is England, any northern city could ever become such a centre. However, the CIQ has stabilized its existence and continues to grow. By 2002 there were about 140 businesses located in the quarter. (It physically overlaps and incorporates the science park, which might produce some interesting synergies, but for present purposes raises problems of double counting.) Of these, ninety-six operate directly in the 'cultural' sector: sixty-eight in the fields of film-making, popular music, and performance arts. It is notable that a further twenty-eight continue the long-established Sheffield traditions of design and craftsmanship in cutlery and other forms of metalwork, fulfilling the planners' vision that the city's reputation as a high-quality cutlery centre could be adapted to the CIQ concept. In addition to final producers, there are also the support and supply activities fundamental to any SME cluster: for example, consultancies and IT firms particularly oriented towards the cultural industries, related training activities, lighting engineers, etc.

The CIQ is certainly more than a Quixotic venture and, in its small way, fulfils many of the criteria of the concept of an SME cluster or even an industrial district within a new, growing sector capable of drawing on and developing the existing and potential skills of the local population. It is also firmly rooted in the provision of collective competition goods by the city council and its various partners. The failure of the popular music centre is in that context a negative note. Often museums and other celebratory institutions related to a sector are a feature of thriving and self-aware local production systems, constituting a collective good in themselves. (Another Sheffield example is the plan for a sports equipment cluster in the facilities that came with the World Student Games.) Was the Sheffield music centre subjected to unrealistically high visitor targets? Did those who imposed these targets think of the centre only as a profit-making site that needed adequate revenue from visitors—that is, did they overlook its role as a collective competition good? Or should such a centre be established at a later stage in a cluster's development, when there is an extensive local record to display, justifying the location? Liverpool and Manchester would both be more logical places for a celebration of British popular music, located in areas of creative activity themselves.

The final major sector that the city partners have been attempting to develop is information technology. While the CIQ is a distinctive idea, IT is a sector that every town wants to enter. Sheffield has performed quite well in the IT software field, though much of this success is down to one computer games company that started in the city in the early 1980s, Gremlin Interactive. The firm was subject to a £25 m. takeover in 1999 (Dabinett 2001: 17), but it continues to operate and provide employment within Sheffield. Another firm, Sanderson's, established in the early 1980s, has become a significant worldwide IT company tailoring communications

software to a wide range of clients. There are over 300 other IT companies in the city, the vast majority being small-scale enterprises with possibly significant scope for growth (Sheffield TEC 1999: 24). Their capacity for survival following the difficulties of Gremlin Interactive will demonstrate whether the sector has acquired a local autonomy from dependence on a single corporate hierarchy.

In an attempt to ensure that IT growth is realized, a major project involving Yorkshire Forward and Sheffield One has been created with the aid of European and national government finance to create an 'E-campus' in Sheaf Valley—a 60,000 square metre campus to house high-technology companies near the city centre. The collective competition goods provided to boost the project basically consist of a set of buildings with 'state-of-the-art' communications equipment to encourage investment from existing or start-up high-technology companies, and to provide an environment conducive for university spin-off companies. Again the geographical area marked for the E-campus has been designed with the incubator and clustering approach in mind, making it as easy as possible for new start-ups to be created and for businesses to move to Sheffield. Relating back to the promotion of the city, Yorkshire Forward has been selling the project on a world-wide scale with representation at IT events as far afield as Las Vegas in the USA and Bangalore in India. In terms of international investment the E-campus has already made a significant breakthrough in attracting Insight Enterprises, a US IT company, to place its European headquarters in the city, possibly creating around 1,700 jobs and possibly encouraging smaller start-up firms as suppliers.

The attempt to make use of the scientific resources of the city's two universities for its regeneration is a major new departure (Crabtree 2000; see also Sharp 1999; Sheffield TEC 1999: 22). Very little had been done of this kind by the old steel industry. Now there are attempts to use the universities as sources of collective competition goods, both by using their research-bases to attract large investors and by encouraging spin-out companies from their research. Since the 1980s the city council, the various partnerships, as well as the authorities of the universities themselves, gave high priority to these possibilities. Both Sheffield University and the newer Hallam University have become close associates of the incubator and clustering projects such as the Science Park. One high-profile success story has been the creation of an Aerospace Manufacturing Research Centre as a joint £15 m. venture between Sheffield University and the US Boeing Company. (It is notable that the British aircraft manufacturer, British Aerospace, established its equivalent centre in Hampshire, in the prosperous south-east of England, where it attracted a small but distinct cluster—Crouch and Farrell 2001: 194.) The Boeing project is designed to offer another sector-based location attracting a range of large industrial companies to invest in research at the site with the added hope that SMEs will be lured by the clustering effect.

Conclusions

Sheffield regeneration partnerships have now accumulated considerable experience and have drawn a range of lessons from the city's decline. There has been recognition of the benefits that can be offered to the local economy from SMEs, which has to a degree shifted the emphasis from promoting investment from the larger firms that dominated the local economy in the past. On the other hand, capacity to act consistently with these lessons is limited by the sheer and almost desperate need to attract external investment. This often means seeking out large, exogenous corporations, which may establish forms of low-skill employment which brings little spin-off in terms of entrepreneurial skills. Such firms might close their operations in the city at the next recession, leaving behind little acquired autonomous capacity.

On the other hand, the cluster and incubator concepts have been used seriously to create a range of centres in high-growth sectors. These form the centre of the city's regeneration plans, even if call centres and retail outlets account for considerably more job creation. While progress has been made in diversifying the local economy and encouraging SMEs, change is still relatively limited. As one Sheffield TEC report concluded: 'Sheffield has been at the forefront of this exercise, though not unfortunately at the forefront of success' (Sheffield TEC 1999; see also Sharp 1999). But even if they are to be highly successful, the ventures involved in the clustering and incubator projects that have been created will take many years to come to fruition. It would be misleading to judge their long-term viability now.

The city council's initial approach of applying sticking plaster subsidies to major structural problems and expanding its own activities in the local economy was, in hindsight, never going to work. Sheffield required a fundamental change of strategy both in the policies it was adopting to combat the decline and a fundamental change in the governance of the policies, and the change made was stark. The adoption of the partnership model of governance to replace the council dominated government model of regeneration was both embraced by and forced upon the city council. Initially there was certainly no great desire by the council to involve the private sector in its planning processes. However, a combination of a lack of financial power, funding regulations, failures to make inroads into the city's economic problems, and the incentive of attracting EU funds left the council with little choice. Eventually a flexible form of cooperative governance emerged which was initially remote from the preferred models of all actors involved, within Sheffield and in London (Bache 1998: 5). Sheffield local government entered an arena of ongoing economic governance otherwise dominated by the market, corporate hierarchies, and occasionally business associations.

12 Industrial Decline and Local Development Policies in the Steel Area of Piombino

ANNALISA TONARELLI

As Mény and Wright (1986: 5) outline in their study of European steel politics: ‘The crisis visited Italy rather later than elsewhere. Indeed, during the 1970s the Italian steel industry increased both its production and its workforce, and it was not until 1980 that the first clear signs of trouble emerged.’ There is a widespread consensus among analysts over the reasons for the delay (Mény and Wright 1986; Pichierri 1987; Balconi 1991). In Italy steel policy was closely involved in two highly political issues: the clientelistic role of the state, and the industrial development of the Mezzogiorno (Mény and Wright 1986: 29–30). Jobs created in the public sector have long been perceived as a disguised form of unemployment; besides, government parties used the public sector as an instrument of stabilization policy while left parties and trade unions always attempted to impose a veto on any cutbacks. It was only at the end of 1983 that Romano Prodi, then the chairman of Istituto per la Ricostruzione Industriale (IRI), produced a plan that involved 25,000 job losses in steel and a major contraction of capacity. By the early 1990s this led to the closure of some plants and the privatization of some others, including Piombino.

Piombino presents all the characteristics of a declining industrial area (Pichierri 1986*a,b*): the exogenous origins of the main industries; the tight link between them and the state-owned industrial sector; specialization in basic production. But it is also a case of particular interest for our investigation.

It is a small and socially homogeneous area. The social environment still exhibits many community features, and they can be related to the characteristics of local development. Piombino, located in southern Tuscany, has about 35,000 inhabitants and is the chief town of the Val di Cornia district (60,000 inhabitants). The area as a whole has a high degree of economic, social, and political homogeneity, even though each municipality maintains its own peculiarity—tourism in San Vincenzo, agriculture in Sassetta, extractive industry in Campiglia Marittima. This integration is due to the fact that the Val di Cornia represented the main source for workers employed in the big steel industries of Piombino.

Piombino has a long industrial history. While most Italian steel sites date back only to the postwar economic boom, in Piombino it started at the end of the nineteenth century. (In fact, traces of iron manufacture can be found before the Roman Empire.) Piombino grew from being a little village with about 4,000 inhabitants devoted to agriculture, fishery, and handcraft in the late nineteenth century to having 20,000 inhabitants and being one of the most important centres of the national steel industry by 1911. Then 72 per cent of the total industrial workforce, 4,495 people, were employed in steel. The rapid development of that period was due to the establishment of two new and advanced steel firms: La Magona d'Italia, of English origin and specializing in rolled sections, and the Società Anonima Altiforni e Fonderie di Piombino built by a Florentinian owner and comprising a smelting furnace for cast production and a foundry for water and gas pipes. There were several reasons for the choice of Piombino: the seaside location, which reduced the costs of transport and supply; closeness to the mineral mines of Isola d'Elba and the peat ones of Campiglia Marittima; and the presence of a penal establishment, which assured for almost a decade a low-cost workforce (Lungonelli 1991).

The steel sector dominated the city. Frequent changes in census data classification do not allow a precise analysis of the importance of steel industry employment in the city. However, data shown in Table 12.1 give an approximate indication.

In 1981, that is, seventy years after the first industrial census, the ratio of steel employment to the total industrial workforce had not changed significantly: 69 per cent of the 10,460 industrial workers were employed in steel

Table 12.1. Number of firms and employees in Piombino, 1951/1961/1971 censuses

	1951		1961		1971	
	Firms	Employees	Firms	Employees	Firms	Employees
Extractive industries	1	2	0	12	1	2
Manufacture	204	6,260	229	5,453	266	9,226
Construction	32	854	18	1,088	50	1,665
Electricity, gas, and water	1	56	1	61	—	86
Transport and communications	37	324	33	655	40	689
Commerce	593	1,354	1,130	2,186	1,012	2,531
Credit and insurance	6	56	10	96	22	141
Other services	41	156	84	262	111	527

Source: ISTAT.

plants, while another 10 per cent worked in engineering and in mining. For many years steel ensured job opportunities for the local workforce; unemployment was always very low, while income levels were always the highest of the region.

The big steel firms had not only long been hegemonic in the local labour market; they also prevented economic diversification, as they lacked the capability of generating a network of economic activities linked to themselves. In fact, around the large steel plants grew up neither small- and medium-sized enterprises (SMEs) nor an autonomous entrepreneurial spirit. This is the paradox of a highly industrialized area without any autonomous capacity. The big steel plants hampered the development of SME clusters in two different ways.

First, they limited any decentralization of different stages of production, which prevented them from playing the role of business incubator centres, except for some marginal functions such as the maintenance of machinery or packing. Second, their long-term ability to guarantee almost full employment and high incomes rigidified professional skills and reduced willingness to accept entrepreneurial risk. This is typical of areas of industrial decline (Pichierri 1986*a, b*). The small scale of the local society combined with its geographical isolation to increase the economic and social effect of the steel mono-cultural system. This is why Piombino stands out as an experimental area for research.

Another characteristic is the role of the large firms with reference to the strategies of re-qualification for the area itself. Steel did not disappear. A reorganization process, carried out both by the state and private initiative, caused a drastic reduction in the level of employment, but there were new plans of investment and re-qualification in terms both of productive capacity and sustainable development.

Starting from 1983 when Prodi launched his 'recipe' for balancing the accounts of Finsider (the state steel holding company), the two major public steel firms of Piombino have been subject to a tough reorganization, leading to a total loss of 3,000 jobs. In 1988 Finsider had been sold on and its activity passed to Ilva, a new public holding which accelerated the strategy of approaching the private steel sector. The final aim of this operation was to build the basis for privatization. It is in this context that between the end of the 1980s and the beginning of the 1990s first La Magona and then Acciaierie were sold to Lucchini, one of the biggest Italian steel owners. The change in ownership caused a new drastic cut in employment: eight years after the privatization, the Lusid (ex Acciaierie) workforce numbers about 2,000, while la Magona (sold on by Lucchini to French Usinor) employs more or less 800. But the reduction concerns indirect employment too, because the strategy of Lucchini was also to reduce subcontracting. Production itself, however, was not significantly reduced, and the steel sector still provides employment for more than 4,000 workers and maintains concrete possibilities of employment growth. This sustains the industry's continuing political importance.

There is a last aspect that we have to take into account in characterizing the Piombino area: the Val di Cornia is strongly marked by a 'red' political subculture. This has created a united and strong working class. Also the development of friendly societies, unions, and cooperatives which characterized mainly the 'red' Third Italy regions were, in the case of Piombino, directly or indirectly linked to the big steel firms. In a paternalistic way the plants founded clubs and promoted other activities for their workers' leisure time. The Coop Toscana Lazio, one of the first and still important consumer cooperatives in the country, grew up as an Acciaierie factory shop. The local Camera del Lavoro did not have its origins in mutual aid societies as in other areas of the region, but was founded in 1907 with the specific goal to be the representative body of steel workers (Carignani 1975).

Local government has been dominated by the left since 1902, when it was among the first cities to be won for the socialist party, and (apart from the Fascist period) it has remained under left control since. The political situation is similar in the other municipalities of the Val di Cornia. This political homogeneity of the area has played an important role in re-industrialization policy.

The Decline of the Steel Industry: Dimensions and Consequences

In the early 1980s, when the process of reorganization of both the European and American steel sector was an accomplished fact, employment at the Piombino plants reached its peak of 12,000, including indirect employment. Decline then came, and Table 12.2 shows its heavy and sudden impact.

This fall in the steel workforce had a significant impact on the general employment situation of the area (Table 12.3). Between 1981 and 1991 the general rate of employment dropped from 48.2 to 44 per cent, as the loss of 3,621 jobs in the industrial sector was only partly compensated by an increase in the service sector (+2,072).

As shown in Table 12.3, the industrial sector as a whole, which was still dominant in 1981 with 47.5 per cent of the employed population, had

Table 12.2. Employment in the major Piombino steel firms, 1981–1991

Firm	1981	1991
Acciaierie e Ferriere	7,702	4,500
Magona d'Italia	1,528	1,100
Tubificio Dalmine	1,008	500
Total	10,238	6,100

Source: Trade Union of Piombino.

Table 12.3. Employment by sector, Piombino and Tuscany, 1981–1991

Sector	1981			1991		
	No.	Piombino (%)	Tuscany (%)	No.	Piombino (%)	Tuscany (%)
Agriculture	2,445	9.8	9.3	2,016	8.8	5.4
Industry	11,782	47.5	43.0	8,143	35.8	35.0
Services	10,850	42.5	47.7	12,591	55.3	59.5
Total	25,077	100	100	22,750	100	100

Source: ISTAT.

by 1991 dropped to 36 per cent, close to the regional level. There was remarkable growth in services, with a rise from 42.5 to 53.3 per cent.¹³

This shift between different sectors affects other aspects of work: the percentage represented by manual labour fell (from 55 to 46 per cent) in favour of professional or entrepreneurial self-employment, which rose (from 24 to 36 per cent), thus approaching average regional levels. Male employment fell (by 17.6 per cent) in favour of female, which—although it displayed a considerable rise (19 per cent)—nevertheless continues to represent the lowest level in the region.

It seems that—in spite of the clear loss of employment—the crisis of the steel industries has contributed to modifying the labour market profile, rather than producing a visible employment crisis. This is also what emerges from the unemployment rate (Table 12.4). This rose from 10 to 15.2 per cent, well above the regional average, suggesting a direct link to the loss of employment in steel. In fact, the rise in unemployment was concentrated among women (from 21.9 to 23.8 per cent) and the young (from 29.8 to 36 per cent). Neither category had much employment in iron and steel, and both had a work participation which considerably *increased* in the decade concerned: by 5.6 per cent in the case of women, and by 3.3 per cent among the young.

Between the 1981 and the 1991 censuses, the rate of male employment in fact registered a fall of over 10 per cent (from 64.3 to 53.3 per cent), reaching the levels of the most backward areas of the region. This massive drop is largely determined by a huge increase in retirements (Table 12.5). By 1991, some 55 per cent of males aged between 45 and 64 were no longer working. This cannot be explained by the ageing trends of the population, first because there is no parallel increase in the female work component, and second because (as the data recorded in Table 12.6 show), there is no evidence of any similar phenomenon at either provincial or regional level.

¹³ The potentially innovative capacity for growth in the services sector nevertheless seems different when we monitor in detail which branches of services are revealed as most dynamic over the course of the decade. These are almost exclusively retail sales enterprises, hotels and restaurants, which rose by 29%, a growth in absolute terms from 4,712 to 6,090 jobs.

Table 12.4. Unemployment rates, Piombino (Pio) and Tuscany (Tu), 1981 and 1991

	Pio	Tu
Unemployment rate		
1981	10.0	9.2
1991	15.2	11.0
Female unemployment rate		
1981	21.9	14.0
1991	23.8	16.0
Youth unemployment rate		
1981	29.8	23.0
1991	36.0	24.0

Source: ISTAT.

Table 12.5. Percentage of retired (male and female) in total population by age, Tuscany, Piombino, and Livorno, 1981–1991

	Male				Female			
	45–54		55–64		45–54		55–64	
	1981	1991	1981	1991	1981	1991	1981	1991
Piombino	2.36	13.11	31.02	41.79	2.13	3.41	16.59	20.14
Livorno	3.42	7.92	30.19	34.49	2.57	3.47	16.57	18.16
Tuscany	4.85	6.18	32.65	35.71	4.15	5.02	25.18	28.08

Source: ISTAT.

Table 12.6. Dependent workers' income in the Piombino area (000 lire)

Income resulting from	Numbers	%
Work	110,000,000	36
Retirement payments	160,000,000	53
Redundancy payments (CIG)	829,000	0.3
Unemployment payments	2,358,000	0.7
Aid to families	110,000	0.9
Invalidity pensions	27,427,850	9.1
Overall income	300,868,85	100

Source: INPS.

It is therefore evident that the result of the strategy adopted by the major industries was an increase in early retirement, as has so often been the case in both public and private sectors.¹⁴ Managements have used the opportunities offered by Law No. 193 (1984), which lowered the retirement age for employees in the steel and allied industries.¹⁵

But in 1991 the process of de-industrialization had only begun. During the 1990s, 3,000 more jobs were lost in the Piombino steel industry; the former *Acciaierie e Ferriere* (now *Lucchini Siderurgica (Lusid)*), now employs no more than 2,300 people, while the entire iron and steel sector, including allied industries, employs 4,000. Data on the economy and employment in Piombino during the 1990s, though far less precise and reliable than census data, reveal continuing development along these lines. The number of registered unemployed increased, in 1997 reaching 5,816, again mainly among women and young people. This persisted even when—from the second half of the 1990s—labour demand regained some dynamism. There was in fact a continuing increase in jobs, especially in the service sector. Nevertheless, these opportunities are predominantly temporary: in 1997, about 89.1 per cent of new jobs were short term.¹⁶

However, Piombino experienced no *social* crisis, at least not to the extent that the international literature on industrial decline would lead us to believe. The massive recourse to early retirement has helped in two ways: on the one hand demand for work did not increase, because the redundant workers withdrew completely from the market. On the other hand, the pensions of the retired workers—redistributed within the family—enabled the young generation to wait for a job.

Data provided by the National Insurance Institute (INPS) are useful to gain an idea of the role of early retirement: between 1985 and 1995, some 4,117 requests for early retirement were accepted in Piombino, while in the much larger nearby area of Livorno there were only 3,521. Data provided by INPS can help us also to highlight the economic, and therefore the social, importance of the role played by pension income.

In 1996 the most consistent constituent of income (53.1 per cent) was pensions, a percentage considerably higher than that of the income resulting from dependent employment (36.5 per cent). This is an issue which has to be

¹⁴ The only exception was a single case of industrial dismissal which occurred at La Magona in 1992, when seventy workers who were actually close to retirement age, were laid off.

¹⁵ Between 1980 and 1995, some 5,251 workers left the iron and steel industries through early retirement: 4,240 from *Acciaierie*, 511 from *la Magona*, and 500 from *Dalmine*.

¹⁶ Data on the number of registered unemployed is only an imprecise indicator of actual unemployment. Short-term recruitment, although it entails the removal of the individual from the list of those in search of a first job, does not imply their cancellation from the employment lists, nor, in most cases, the loss of priority of registration. The number of people who, even while actually employed, maintain their registration at the employment office because of the temporary nature of their job, rose from 1,193 in 1991 to 4,383 in 1997, an exceptional increase for both the province and the region.

taken into consideration in the following analysis: the absence of social pressure has undoubtedly influenced both the timing and the methods of the policy adopted at local level.

The Management of Industrial Decline: Actors and Strategies

Financial Instruments

We can track the use of public funding granted to Piombino to tackle the crisis of the steel industry and to launch local redevelopment, by highlighting the main financial instruments used, their specific objectives, and impact (Table 12.7).¹⁷ The area received grants from a wide range of different programmes. Of course, not all were fully implemented; this is one of the reasons why it is almost impossible to measure the flow of financial resources that reached the area. Moreover, we do not have any definitive data on the projects implemented at different levels.

We do know that all Val di Cornia municipalities have been eligible for an abundant flow of funds, going beyond what can be explained by the severity of the steel crisis. Other areas within Tuscany have been hit by the processes of de-industrialization as much as Piombino, but they have not been supported by such consistent funding. Observers interviewed agree that an important role was played from the second half of the 1980s by the political activism of local institutions, as well as by their efforts to bring the case of Piombino to the attention of both the national government and the European Union.

The local political institutions could rely on two fundamental resources: political and personal relationships with strategic actors at regional, national, and EU level; and the strong support ensured by the left party¹⁸ having been uninterruptedly at the helm of local government since the end of the war. Political homogeneity between local and regional government (Tuscany has always been a region governed by a left coalition) has probably played an important role to make such synergies possible. We have to add to these two factors the individual capacities of the local political leaders themselves. It was thanks to the early attention paid by local administrators to the opportunities offered by EU institutions that Piombino was one of the first areas of the country to benefit from Community funding, at the beginning of 1980s.

¹⁷ The picture which we aimed to reconstruct proved to be much more complex and confused than we had imagined: from the mid-1980s on Piombino has benefited widely from public assistance, from both state and Community fronts. Furthermore, these have been managed by a number of different entities, not all of which have been able to make available a documentation which provided the information we were looking for.

¹⁸ PCI (Italian Communist Party), which at the beginning of the 1990s became PDS (Left Democratic Party), and later DS (Left Democrats).

Table 12.7. EU, national, and regional policies implemented in Piombino

<i>National programmes</i>
L. 488/92—modification to law 64/86 for aid to the Mezzogiorno.
L. 44/86—exceptional initiatives for the development of young enterprises in the Mezzogiorno.
L. 204/93—urgent support interventions for mining areas.
L. 236/93—urgent support interventions for employment.
L. 341/95—means of intervention aimed at finishing and promoting new initiatives in depressed areas.
L. 1329/65—interventions for the purchase of new tools.
L. 49/85—interventions for cooperative financial aids and employment protection.
L. 317/91—interventions for small enterprise development and innovation.
L. 359/92—urgent intervention for balancing state finances.
L. 237/93—urgent interventions for the economy.
L. 489/94—urgent fiscal provisions for economic and occupational renewal.
L. 598/94—provisions for the rationalization of public holding debts.
L. 181/89—initiatives for support and re-industrialization of steel areas.
L. 513/93—urgent economic and occupational interventions in steel areas.
<i>EU programmes</i>
Reg. 2981/93 Ob. 2—interventions for declining industrial areas.
Resider—interventions for the productive diversification of steel areas.
Interreg.—interventions for the development of border regions.
<i>Regional programmes</i>
L.R. 27/93—financial support for young enterprises.
L.R. 12/95—exceptional interventions for enterprises in Tuscany.
L.R. 36/95—financial support for the artgiano sector.
L.R. 11/96—exceptional interventions for enterprises in Tuscany.

This gave the area an advantageous position in terms of access to information and elaboration of concrete planning procedures. This was reinforced in 1990, when the town's former mayor became the Regional Commissioner for Community Policies.

But what exactly were the objectives which local élites aimed to achieve? At the start these were not clearly defined. The aim was just to draw in as many resources as possible. There are many reasons that can explain such a 'strategy'. First, it can be rooted in the cultural background of the area; the characteristic local development and the massive presence of state firms had created a strong dependence on public support which is difficult to eradicate.

Second was the delay with which the steel crisis was recognized at local level. As we were reminded in many conversations with local observers, even in 1991—ten years after the EC's declaration on the 'steel crisis'—local political bodies were wondering whether what they had to face was simply

a contingent and temporary phase, or an irreversible crisis. Given this difficulty of diagnosis, and the uncertainty of the role that the steel industry would continue to play in the area, the most immediate reaction was to ensure as much financial assistance as possible. To give an example of what this attitude meant in practice, we may recall that thanks to the broad interpretation of the law, Piombino—clearly located in *central* Italy—was granted aid by the EU through the Cassa per il Mezzogiorno. This was also the result of pressure exerted through personal links at EU level.

The Objectives

However, from the early 1990s—when the irreversibility of the de-industrialization process became evident—priorities among the objectives to be pursued were identified, though only in generic terms.

First, there was an attempt to *give back value to the environment*, which had been badly damaged by the presence of the steel industry, in terms of both pollution and resource exploitation. For the first time nature and archaeological remains were considered to be resources and not just patrimony to protect. Val di Cornia has a very rich and interesting landscape, made up of beaches along the coast, hills on the inland, hot water springs and many traces of ancient civilizations, from the Etruscans on. Even if the steel industry has deeply damaged the area close to Piombino itself, most of the environment has been safeguarded and still remains one of the most uncontaminated in the region. This is largely due to the policies adopted by the municipalities of Val di Cornia since the beginning of the 1980s, such as the general town plan approved in 1984. The aim of this plan was control of urban and industrial expansion and limitation of the uncontrolled tourist exploitation of the environment.

Second was *improvement of the infrastructure*. Piombino is not easily reached by either road or rail. Projects have been launched to reduce these logistic disadvantages by improving overland access and—through massive intervention in the port area—enhancing access from the sea.

The third objective was *economic diversification through a network of small firms*. Since the steel industry was no longer able to guarantee the employment levels of the past, it was a high priority to create new jobs in different branches. In the early 1990s the local trade unions estimated that 700–800 new jobs would be needed. This goal has still not been achieved. To stimulate the creation of new enterprises it is not sufficient to create structural and infrastructure conditions or to offer tax exemptions. What is really important is to stimulate an entrepreneurial capacity within the private sector. This is still lacking.

The EU, national, and regional programmes guaranteed to Piombino the financial resources for industrial restructuring and the creation of new small-firm networks. The opportunity was taken by the local political elite to get more resources, even though they were not well prepared to implement this

kind of policy. The target of creating a small-firm network was not even among the priorities of local development. We can quote two examples. In 1992 unions and other groups drafted a document with some proposals for the development of the Val di Cornia (*Proposte per lo sviluppo e l'occupazione della Val di Cornia*). They took into account different targets (tourism development, transport infrastructure, improving the historical area of the town, occupational training, etc.), but the need for productive diversification was never mentioned. Second, in 1995 the mayor of Piombino listed in his electoral manifesto eleven priorities: the development of SMEs ranked only the ninth and was not defined in concrete terms.

Main EU and National Interventions

We now analyse in more depth some specific interventions, concentrating on projects actually realized through public funding. One was implemented by national government and two by the EU. Starting from their aims and the results achieved, we shall try to establish some general conclusions.

Regulation 2081—EU Objective 2

The aim of this intervention is the redefinition of the economic profile of regions, border regions or part of regions seriously affected by industrial decline. The Multi-fund Operational Programme (MOP), which constitutes the executive document for such intervention, is divided into six different priority axes: (a) development and consolidation of small- and medium-sized enterprises (SMEs); (b) tourism; (c) technological innovation; (d) environment; (e) recovery and development of the territory; and (f) optimization of human resources. Both public and private bodies can benefit from the incentives offered. Piombino has been included among potential beneficiaries since the period 1989–1991; this was then confirmed from 1992 to 1999 (see Table 12.8).

We can note consistent financial support devoted to the recovery and development of the environment (about € 15 m. in all). Actions aimed at enhancement of the environmental and cultural patrimony were also significant. The efforts of institutions in the Val di Cornia for the creation of a range of parks and general improvement of the environment and the archaeological heritage were not mere conservation measures. As a result of the initiative taken by a regional political leader (the former mayor of Piombino Paolo Benesperi) in 1990 it was accepted—first at regional and later at EU level—that even interventions in the sphere of the cultural heritage should be considered as relevant to employment creation and therefore covered by Ob. 2. In order to enforce this action, the institutions of Val di Cornia¹⁹ promoted in 1992 a mixed public–private company

¹⁹ Already by the early 1980s this had been enacting a coordinated planning policy (see Benedettini (ed.) 1984).

Table 12.8. Projects implemented under Regulation 2081 in Piombino, 1994–1999

	Number of projects implemented	Total investment (€)	Public contribution (€)
Private projects for SME development	20	4,692,524	1,693,679
Private projects in tourism	9	6,125,079	1,098,101
Private projects for recovery and development of the environment	1	4,132,231	1,239,669
Public projects in tourism	5 ^a	4,799,021	3,122,705
Public projects for recovery and development of the environment	5 ^a	10,720,511	6,024,487
Total projects	40	30,469,368	13,178,643

^a Some of the projects concerning natural parks, systems for water purification, and waste disposal were by mixed public–private companies (Società Parchi; CIGRI and TAP).

Source: Own calculations based on data of Regione Toscana.

(La Società Parchi Val di Cornia), with the aim of promoting improvement of the environment and of productive activities within this sector. After eight years the Società had only partially achieved its goals. Six parks were instituted: the coastal park of Rimigliano, which includes a natural reserve; the archaeological park of Baratti and Populonia, a wide Etruscan necropolis located in front of the gulf of Baratti; the natural park of Montioni, a hilly inland environment; the archeo-mining park of S. Silvestro, which comprises an ancient mine and a medieval fortress; the woody park of Poggio Neri. Nevertheless, parks are often just protected areas with paying car parking. Only in the cases of Baratti and S. Silvestro did the creation of the park lead to significant additional interventions: a museum and tourist trails. A significant number of projects are still far from achieving their aims. The Società Parchi employs thirty persons permanently and thirty seasonally.

As regards the development of SMEs, in the 1997/1999 period thirteen projects were financed, for a total of lire 9,384 bn. These data could be considered fairly reassuring, especially in comparison with the previous period, during which only two projects of a productive nature were sponsored. Nevertheless, the data do not only include new enterprises, autonomously developed at local level. In some cases they are exogenous firms, in others they are linked to traditional sectors, including steel. In some of these plants

Lusid has shareholding interests.²⁰ Compared with the past we can identify elements of business dynamism, but it remains weak and does not constitute self-sustaining local development. Public support remains necessary.

EEC Regulation 328/88—Resider

The Resider programme is aimed at providing new opportunities for employment in areas where there is a predominant presence of the steel industry, and where the crisis has led to a critical situation in the entire production and social system. The specific aim of this plan is to support transformation of the steel areas through: development of new enterprises; creation and implementation of services to small industrial and handicraft firms; promotion of tourism. In this context, the Regione Toscana operating programme—which involves the areas of Val di Cornia and the Isle of Elba—had the following targets:

- to create conditions to strengthen SMEs, with the aim of diversifying product specialization in the area;
- to develop environmental and natural resources in Livorno province, with the aim of promoting a more balanced development of tourism, targeted in particular to improve the inland areas;
- to strengthen the infrastructure, as a condition for the achievement of a competitive system and for new economic activities.

The data in Table 12.9 confirm the hypothesis that most of the programme's efforts have been directed at strengthening infrastructures—mainly in the tourism and environmental sector—instead of supporting the creation of an SME network.

Implementation of law 181/89 for Crisis Areas

With the enforcement of law nos. 181/89 and 181/93,²¹ Piombino was included in the Crisis Areas and consequently received a € 36 m. government grant to promote re-industrialization of the entire area (Table 12.10). The SPI S.p.a. (an IRI firm responsible for enterprise promotion and development) was charged with this task.

If we examine each project in detail (Table 12.11), it can be seen that two of the planned new enterprises still have not settled in the area, while another is on the verge of bankruptcy. Since Bic cannot be considered a production firm, only four remain. Of these, two are from outside the area and two within. The latter, only one of which is newly formed, are closely related to the steel industry. Only two new enterprises (which operate in such different

²⁰ Both SICALP and B-PACK-DUE are enterprises which have been attracted by means of the incentives provided by Law 181/89 while in the case of Due Emme s.r.l. and Sider Piombino s.r.l. we are dealing with companies operating in the steel sector.

²¹ Law nos. 181/89 and 181/93: means of intervention aimed at re-industrialization within the context of a reorganization of the steel industry. The specific goal is to speed up economic and employment recovery in declining steel areas. The actuation of the means is delegated to SPI S.p.a, a public holding which has a direct shareholding in enterprises benefiting from the funds.

Table 12.9. Resider Financial Plan (1994–1997), Piombino (€ thousand)

Actions	Public invest. (A+B+C)	EU (A)	National (B)	Regional (C)	Private invest.	Total invest.
Recovery of polluted areas	5,600	2,800	2,800		22,400	28,000
Water supply for industrial use	2,800	840	508	512		2,800
Tourist infrastructure	15,600	6,000	2,200	3,400	30,400	46,000
Tourist parks	15,200	4,800	2,400	1,700	4,800	20,000
Harbour infrastructure	3,600	2,800	2,800		22,400	28,000
Aids for enterprises and co-operatives	3,600	2,800	2,040	760	22,400	28,000
Ordinary services	1,400	800	200	400	2,600	4,000
Economic revival and enterprise promotion	4,920	2,400	2,320	200	1,250	6,170
Total	56,720	23,240	16,268	6,972	106,250	162,970

Source: Regione Toscana.

Table 12.10. Entrepreneurial projects granted by law 181/89, Piombino

Enterprise	Main activity	Total invest. (€)	Employment increase
Agroittica Toscana	Fish-breeding	6,480,371	22
B-Pack due	Polypropylene film reels	6,076,446	36
CST Net	Printed circuit boards	37,898,760	220
GRCItalia industriale	Prefabricated buildings	3,924,070	57
GSI Lucchini	Milling balls	3,060,950	40
ONE Comm	Mobile terminals	8,733,987	200
SICALP	Mechanical and refractory materials carpentry	5,065,599	50
BIC Toscana	Business service centre	4,132,231	4
Total		75,372,417	629

Source: BIC Toscana.

sectors as the production of plastic materials and mobile phones) uphold the production diversification project.

Despite the apparent concreteness of the investment programme and its significant implications in terms of planned employment, the outcomes are

Table 12.11. Outcome of law 181/89 projects (Piombino, 2002)

<p><i>B-PACK DUE S.p.a.</i>: This is an external company which has decided to settle in the area due to the grants given for the purchase of land. B-PACK DUE produces polypropylene film reels. Its employees have increased from 22 (1997) to 31 (2000) and should reach 36 units when the firm will be in full operation. In 1998 SPI acquired share holds in the company and in this way B-PACK DUE had access to the incentives available for depressed industrial areas.</p>
<p><i>ONE COMM</i>: This company, again from outside the area, makes mobile phones. It began to build up its production range of Dual Bank mobile terminals in the Montegemoli PIP at the end of 1998. The planned investment amounted to lire 17 bn. and was expected to create 200 new jobs.</p>
<p><i>SICALP</i>: This is an old-established Piombino firm (founded in 1960), which covers two production sectors: mechanical and refractory materials. It currently employs a staff of only thirty, but plans expansion.</p>
<p><i>CST NET</i>: The project of CST Briton of Trezzo to set up a plant for the production of printed circuit boards in Venturina started in 1999. According to this project, the new firm should create 220 new jobs: however, at the moment the project is still not operative and its implementation is uncertain.</p>
<p><i>GRC Italia Industriale</i>. A firm from Lecco operating in the prefabricated buildings sector. The project envisages the creation of fifty-seven new jobs, but the settlement project is still not underway.</p>
<p><i>GSI—production of milling balls</i>: GSI of Piombino (a company of the Lucchini group, located in the same area of Lucchini Siderurgica), began its production in April 1997 with twenty-five employees, which increased to 40 at the end of 1998. Backed by SPI, it took on a 6 bn. investment. Its main production consists in steel grinding balls. For raw material, GSI uses round steel rods which are hot forged; this process is therefore a downstream of the Lucchini S.p.a. production cycle.</p>
<p><i>Agroittica Toscana</i>. Founded in 1993, Agroittica is a fish-farming firm and is part of the Lucchini group. It uses for its activity the waste water of the Lucchini plant. It has developed thanks to the collaboration with SPI, whose intervention ended in 1998, when the Agroittica itself bought the shares that belonged to SPI. The firm employs twenty-two people full time and has invested 12 bn. A bankruptcy procedure started during the early months of 2000 and will probably lead to the closure of the plant.</p>
<p><i>BIC Toscana</i>. Bic Toscana is a business services firm for new firms in various different sectors. It has also taken direct advantage of funds granted under law 181. The project, which has been approved and is now in the implementation phase, envisages the creation of a business service centre for thirty-two service firms and six production firms (as yet unidentified). This incubation centre for new firms will be the largest in Tuscany and was completed by December 2000.</p>

not encouraging. If we add the conclusions of our account of investments undertaken in the context of programme 2081, it can also be concluded that despite the heavy investment of public resources, Piombino is still far from achieving the development of new SME networks.

The Trend to 'Negotiated Planning'

In the late 1990s there was a change from the strategy of encouraging external investment to one of mobilizing local actors too. The main example of this new approach has been the territorial pact, though even before its institution in 1998, there were signs at local level pointing in this direction. The reasons for the change therefore lie in both the new legislative instruments and the local renewal of the Piombino political class together with the new role assumed by the steel industry.

In recent years Italian administrative procedures have been reformed to increase their efficiency (Laws 112/1998 and 191/1998). One aspect of this change is the introduction of various forms of negotiated planning (*programmazione negoziata*): programme agreements (*accordi di programma*), area contracts (*contratti d'area*) and, above all, territorial pacts (*patti territoriali*). The basic aim of those interventions is to make possible a new form of governance at local level. As noted by Le Galès (1996: 90) local governance is, on one hand, the capability to integrate and organize local interests, and, on the other, the capability to represent them outside, to develop more or less standardized strategies in relation to the market, the state, and other government levels. Thanks to the new legislative instruments of negotiated planning, local and regional authorities, firms and their organizations, unions and chambers of commerce, are encouraged to work out public-private agreements for development, especially in declining industrial areas.

In Piombino this new trend has been facilitated by two facts. First, the national success of the political left in 1996 created for the first time a political homogeneity between the state and local government. In particular, the important role in Parliament of a Piombinian PDS leader (Fabio Mussi) eased the relationship between the two institutional levels. Second, after initial tension, relations between the new private owners of steel firms and the local polity improved: Lusid demonstrated with a lire 100 bn. investment its commitment to maintain and even increase again steel production and hence employment.

There are recent examples of the ability of local actors to 'cooperate' thanks to negotiated planning and administrative instruments. In 1998, the collaborative relation among the municipalities of Val di Cornia, which dated from the beginning of the 1980s, was formalized by the creation of a Circondario, a sub-district institutional body with some autonomy in environmental and infrastructure management.

The Società Parchi Val di Cornia could also be considered as a form of negotiated planning between public and private partners mentioned above. Again, in the second half of the 1990s Siderfor s.r.l, a company specializing in professional and distance training, was created. It represents the first experiment in cooperation between big private steel firms and the local political class. Both Lusid and Piombino municipality are partners of Siderfor, along

with trade unions (without Confederazione Generale Italiano del Lavoro CGIL), the Livorno Chamber of Commerce, Livorno Business Association, and some others Italian enterprises, as well as large number of different public and private partners.

The Territorial Pact²²

The Agreement Document on which the Val di Cornia Territorial Pact is based aimed to identify a new concept of development for the area. It was approved in February 1999 and has three main objectives: the improvement of the environment; the promotion of SMEs; and the development of tourism. All resources addressed to the area from the EC, the government and the region, as well as local funds must be directed through it. The priorities mentioned are almost identical to those pursued in the past through the funds allocated by Ob. 2 Resider and law 181 for the crisis areas. As the document states: ‘The agreement is a balanced set of actions. The strategic objective pursued by the Agreement, through the practice of local collaboration, is economic and social development, by mobilizing all actors involved in the local economy and society.’

In some cases it enforces and formalizes existing collaborations (e.g. between the Val di Cornia municipalities); in others it creates new synergies between different actors (e.g. credit institutes, unions). However, the most significant fact is that Lucchini—the major private firm in the area—is not among the signatories.

So far the pact has been operating for only a short time. It is therefore impossible to evaluate its results, and we shall just consider its assumptions. Three specific objectives concerning three spheres of intervention have been singled out:

1. *Tourism and archaeological heritage.* This envisages an integrated tourism, with seaside tourism linked to cultural, environmental, sport, rural, and gastronomic tourism, to promote private initiatives in various sectors. These initiatives are centred around the Val di Cornia Cultural and Environmental Parks System. Although it started several years ago, the programme has now become an integral part of the pact since the parks system is one of the key features of tourist development in the area. Furthermore, tourist activity linked to the parks system is considered a leading force for the general development of the area. Therefore, each objective included in this activity is devised in such a way as to involve the economy of the whole

²² Territorial Pacts were launched by the Essen European Council of 9–10 December 1994 and confirmed at the Florence Council of June 1996. In Italy they are mentioned in the Pact for the Employment (*Patto per il lavoro*) signed by the government and the social partners, and are regulated by Law no. 662/1996 and CIPE resolutions of 1997 and 1998. The pacts are identified as territorial agreements for the creation of employment and local economic development. They are based on co-financing by EU regional funds and the Italian state.

territory, in particular enterprises operating in the tourist accommodation and farm holiday fields, bars and restaurants, agricultural estates with high quality production, etc. Conditions of achieving the objective are that protection of the environment is respected and a new entrepreneurial culture in tourism is developed.

2. *Agricultural industries, fish breeding, and agro-tourism*: Agriculture is an important economic sector, with prospects for future expansion. The pact therefore aims to create strong economic integration between environment, tourism, farm accommodation, and agriculture as a fundamental element for local development.
3. *Strengthening the SME structure*: The pact aims to stimulate the creation of new SMEs and/or self-employed craftsmen's businesses not dependent on large industrial firms. The new enterprises should be oriented towards innovation and should adopt production systems and methods based on new technology respectful of the ecosystem.

Table 12.12 summarizes the projects approved for each of these objectives. That of stimulating re-industrialization has been largely ignored, since only a few projects involve new activities, and these are far from those sectors traditionally considered to be innovative. Public actors have almost all given way to private enterprises: the only public works are those needed by the enlargement of the industrial zone. There was a weak response from private actors in the secondary sector, not so much in terms of quantity (14 projects out of 47 submitted and 12 out of 38 approved) as in terms of new activities. Only one project was submitted by a new firm: a plant for the production and sale of bamboo. The other projects concern the rebuilding of obsolete plants or the extension of already existing activities, particularly in the engineering sector.

The second objective of the project plan seems to have been pursued more efficiently: protection of the environment and landscape. A certain dynamism is seen in both public and private subjects (37 projects out of a total 53 concern the tourism sector, with overall investments amounting to €115 m.).

Table 12.12. Territorial Pact projects and investments proposed, granted, and not granted, Piombino (investments in €)

Projects	Proposed	Not granted	Granted
Private (number)	47	9	38
Private (investments)	139,617,768	24,741,735	114,876,033
Public (number)	16	1	15
Public (investments)	38,016,528	51,652	37,964,876
Total (number)	63	10	53
Total (investments)	177,634,297	24,793,387	152,840,909

Source: CE. Val. Co.

The projects presented by public actors are almost all directed to implement services and infrastructures for the development of the tourist sector. Private actors submitted 27 projects for €87 m. of investments expected to create around 300 new jobs.

Conclusions: A Missed Opportunity?

How successful have been the revitalization strategies activated in the Piombino area? Have they kept faith with the original objectives? With regard to the latter, undoubtedly an important objective was to bring the case of Piombino to the attention of public opinion at regional, national, and EU levels, in order to promote the collection of funds and assistance initiatives aimed at overcoming the effects of the crisis in the steel industry. Both the scientific literature and the concrete examples of other regional and national areas point out that the possibility of identifying crisis situations—and therefore of mobilizing the necessary resources for intervention—depend on the diagnostic capacity of local bodies, and on their ability to plead the local cause at national or EU level. This has been fully achieved; the entire area of the Val di Cornia has benefited from a large number of Community, national, and regional initiatives.

At least two factors have played a decisive role in the achievement of this objective. First was the early attention given by the local political class, on the one hand in picking up the first signals of crisis in the steel sector, on the other in seizing the financial opportunities offered by the European Union and other institutions. Part of this success can be explained by the personal capacities of public administrators, but there was also the privileged relationship between the local political class and national government. This was mainly due to the presence of a major public industry and can be partly characterized as dependence on the input of public resources. But most influential were certain characteristics of the local policy network itself. The fact that some local public entities were well positioned within the vertical networks which—either directly or indirectly, through national or regional government—connected Piombino to Brussels, meant that timely information first, and resources and possibly influence later, could be reached here more easily than elsewhere.

The capacity of the local political class to attract resources and to elaborate projects to be funded was undoubtedly another factor. Here, the peculiarities of the entire policy network played a decisive role. On the one hand, the continuity with which first the PCI and later the PDS administered Piombino and the other municipalities of the Val di Cornia, and on the other the ramifications of the party which was always directly present with ‘its men’ in the major local institutions: the Coop Toscana Lazio, the port authorities, the Società Parchi Val di Cornia, the waste disposal company (ASIU), the water supply

consortium (CIGRI), and Siderfor. These have contributed enormously to the compactness of the horizontal policy network. The consequent homogeneity of perspectives and interests between the various institutions involved certainly facilitated the cooperation which is indispensable for the definition of projects to be submitted for funding. To give just one example, it was certainly the close collaboration and common planning policy of all the municipalities of the Val di Cornia that made it possible to activate such a wide range of projects in the spheres of environment and culture.

But what specific objectives were pursued? Did they change over time? And again, what was the strategy behind them? The crisis of the steel industry, always a major factor in the economic and social development of the area, meant that Piombino and the entire Val di Cornia had to undertake new approaches to local development. These had to aim at the diversification of production, which on one hand should have filled the employment vacuum created by the decline of the major steel factories, and on the other should have broken dependency on those factories themselves.

There were essentially two strategies, neither of which underwent significant change over time. First were initiatives on structures and infrastructures which would improve the local environment by both tourist and business enterprises; second was the diversification of production through the creation of a network of SMEs. While the first was substantially achieved, the second was not.

The task of production diversification was entrusted to public structures or mixed external bodies, but so far the results are not remarkable. Recently, specific agencies have also been created for establishing business enterprises. Nevertheless, dynamism continues to be very limited, at least outside tourism, the sector where most new enterprises operate. The objective to create a network of businesses has indubitably failed, and we are still very far from reaching the objective of the creation of 700–800 new jobs in sectors outside steel. Even a new instrument such as the territorial pact has to date favoured only the expansion of existing firms, or the creation of small-scale enterprises in the tourist field. The attempt to attract business from outside has also largely failed; this is undoubtedly due to the fact that the relocation advantages offered by Piombino are also offered by other areas. It is also possible that, directly or indirectly, the continued presence of heavy industry discourages the settlement of other firms.

As a result of lire 1,000 bn. of investments the Piombino steel industry appears like a phoenix rising from its own ashes. At the base of the new strategies of negotiated planning—which involves a significant interaction between the local public institutions and the major private enterprises—there seems to be a sort of tacit agreement that any diversification of production must be led by Lusid itself. Therefore, the new initiatives will remain within the same sector and subordinate to the big steel industry. Around the central nucleus of the blast furnaces, within the boundaries of the factory itself, Lusid is promoting the development of an archipelago of small companies in

which it has the major shareholding. And consequently the objective, albeit not very clear, of creating a network of businesses has fallen through, while what actually seems to be taking place is, on the contrary, the creation of a networked steel enterprise. In the frame of this tacit agreement other local institutions will be able to pursue strategies of production diversification, but only in tourism and environment. The public sector sticks to what it knows best—investing in the creation of new employment in the sector of environment and culture. In exchange Lusid, within the limits of its competence, commits itself to environmental protection, which represents the essential requisite for the success of the strategy activated by the public entities.

This strategy can lead to significant results: the small number of employees recruited by tourism and environmental protection, if added to the consistent increase (300 new employees by the year 2000) in the steel industry, becomes relevant. Nevertheless the risk is that the territory and its institutions have lost the opportunity for undertaking a process of diversification, which would have placed them in a position of independence from steel.

Why was the political class most able to promote infrastructure interventions and to stimulate private initiatives in tourism? First, this kind of intervention gives them more visibility. Second, because of the large use of shock absorbers, there was not so much social pressure for a quick solution of the employment problem. Finally, perhaps public institutions do what they know how to do best, in a context of limited rationality. The limits were given especially by the lack of entrepreneurial attitudes, by the long-term impossibility of predicting the destiny of the big steel plants and, later, by their persistent presence.

13 After Steel: Some Minor Emergence of Local Production Systems Based on SMEs

PATRICK LE GALÈS

Long gone are the days when steel was considered an essential priority for European governments, when large triumphant firms in steel cities symbolized the economic and military power of the state. Steel cities, once the embodiment of the industrial modernization avant-garde, have gradually become symbols of deindustrialization and decline needing public support, in particular from the European Union, to face the collapse of large firms.

Meanwhile, ideas about local industrial systems, support to small- and medium-sized enterprises (SMEs), and embeddedness of local economies have gradually permeated European policy spheres. Our first volume on the political economy of local economies (Crouch et al. 2001) provided evidence of policy initiatives, whatever the level and whatever the coherence and the effectiveness, aiming at developing clusters, local industrial systems, and SME networks. Last but not least, in cases of failures of mainstream industrial policy and market mechanisms alike, the need to support local firms and to create networks of firms became a new *Leitmotiv* among European policy makers. Our analysis in terms of local collective competition goods, types of local industrial systems, and governance of local economies to produce those goods has policy implications. We have developed a governance framework to analyse the production of collective competition goods, which combines the state, the market, large organizations, associations, and the community.

In deciding to examine the economic change in steel cities in crisis, we have chosen difficult cases. We are testing the impact of funds provided to support an economic transition and to create the soft skills and the collective competition goods that are supposed to lead to economic development. To what extent have attempts to create local industrial systems and to produce relevant local collective competition goods (LCCGs) proved successful? In each of our cases the governance of the economy had been organized along hierarchical lines, around the large steel firms in close relation with the state, which structured and organized the labour market and a particular type of industrial relations. LCCGs were mainly provided *and captured* by the large firms within a hierarchical structure, often in close

association with the state. That legacy did little to foster the rise of an educated workforce, entrepreneurship, local SME networks, or the diffusion of technological innovation. In all cases, the industrial crisis led to severe restructuring from the late 1970s onwards, slightly later in Italy. Steel has not completely disappeared from these cities: either the historic main producer is still in operation, as Thyssen Krupp in Duisbourg; sometimes under a new name as Corus in Sheffield; or a new owner as Lusid in Piombino. St Etienne is the exception: the leading firms have gone and there remain only some specialized plants with a limited impact.

Public policies and funds from all levels of government from local to the European Union were put forward to help the restructuring. All four cities experienced unemployment, marginalization of the working class, grey or black landscapes, poor industrial relations, lack of services, unemployment, polluted environments, and ghost factories. All this became quite dramatic and was seen as such from the 1970s onwards. They gradually benefited from extensive public funds and programmes: from the region or the *Land*, from the nation state, or from the European Union. Most of the time, restructured large steel companies also contributed by creating *ad hoc* agencies aiming at reinforcing economic development. Most programmes had both a social and an economic component aiming at generating collective competition goods to nurture the diversification of the economy and the rise of SMEs to allow the transition towards a more diversified and dynamic economic development. Many economic programmes specifically aimed at providing those cities with the kinds of goods they lacked due to the importance of the steel legacy: universities, research training, technology, financial institutions, organizations to provide firms with diverse networks, and all the soft skills of economic development.

For us the key questions were: To what extent can public policy provide and organize the use of LCCGs productively? To what extent could the ambition of those programmes to go beyond the steel heritage and create dynamic groups of innovating SMEs be fulfilled? Which LCCGs proved to be effective and easily organized? To a large extent, the steel studies aimed at pushing our analysis into the policy corner: what are the policy implications of our LCCG analysis and the modes of governance of local economies? *If* policy makers did encompass some of the views put forward about local economies during the last two decades, how successful were these in regenerating local economies?

Our group of researchers went to the case studies with these questions in mind. In all cases, our aim was to follow two paths: first to look at firms, at what remained in terms of SMEs, to examine the collective competition goods they used; and second to look at the governance of the local economy, the interdependence with other levels, and the production of collective competition goods. We also tried to identify what was left of steel, and what sort of economy was emerging.

A brief overview of the cases in terms of convergence brings the following points to light:

1. The four cities were politically 'red' company towns, where the large firm model dominated the local economy.
2. In all cases we witnessed a strong assertion of workers' rights by political representatives.
3. Sophisticated LCCGs were not produced for small firms; the functions of local policies were more or less limited to the provision of social services, the usual infrastructural tasks, and so forth. Here the German case may diverge to some extent, since the overall system of collective goods provision, like the apprenticeship system, was in operation in Duisburg, which means that the usual standards for apprentices and so forth could be maintained.
4. In all cases the large firms went through a period of severe crisis followed by a large increase of unemployment.
5. In all cases European agencies offered funds to deal with this problem.
6. Key actors in all cities realized at some point that steel could not survive in the old form. In all cases this induced a change of behaviour in exogenous actors; and local representatives realized the need for local and regional development policies. Here Italy might be singled out as an interesting case, because relationships with staff from supporting agencies have been very personalized, while local actors seemed rather undecided on what to do with the financial resources they acquired.
7. However, in all cases endogenous development emerges as a new responsibility for exogenous actors.
8. In all cases, new versions of public-private partnership have been established to deal with this new responsibility.

In other words, the convergence between the cases is first at the macro and mesolevel: common patterns of steel decline, EU support, and local elites' adaptation to a new set of political constraints and opportunities.

Policies and Governance

The four chapters (Chapters 9–12) provide a wealth of evidence of the changing modes of governance of the steel cities. The severe decline of the large firms also led to their retreat from the cities; as market actors they had no interest in supporting them. Markets are good at destroying firms, jobs, and to some extent cities. As Harvey (1985) has shown, if capitalist dynamism requires creative destruction, the creation of new economic development usually goes together with the destruction of values of existing infrastructures. The transformation had two key dimensions: the actors involved and

the pattern of cooperation and conflicts were profoundly modified; and a new strategy was designed and implemented.

We have argued before (Crouch et al. 2001) that ‘the state’ cannot be analysed solely in terms of hierarchies and domination. In European multilevel governance the vertical and horizontal dilation of the state is illustrated by the institutionalization of the European Union together with decentralizing trends and the creation of many new agencies. In our steel cities financial and political support from all levels of government were the most important factors to launch a restructuring process. At first classic national patterns of state intervention were obvious, except in Britain. In Piombino, Tonarelli shows the mobilization and support that came both from a state-owned conglomerate and the local and regional councils. In Duisburg, Glassman and Voelzkow bring to light the policy initiatives and coordination organized by the *Land*. During the first and worst years of the St Etienne crisis, the French local branches of the state took over the management of the crisis. The United Kingdom is unusual because the steel crisis developed while Mrs Thatcher was pushing through her neo-liberal revolution. No large-scale state support was provided to Sheffield, hence the strengthening of the local new urban left, which gained control of the city council and attempted to implement an ambitious recovery strategy. In all cases the initial responses were reinforced by large EU funds provided by the ‘Plan Acier’ that aimed at restructuring the EU steel industry together with easing a transition for steel cities.

However, initial responses progressively led to the combination of modes of governance and hybridization, leading to forms of more or less coherent partnership and institutionalized collective action. It is not easy to identify the precise factors leading to that change. There were:

1. a recognition that the steel crisis was not short term, hence the delegitimation of the former cognitive framework within which local actors had organized their interactions and their strategies;
2. the destabilizing effects of EU funds bringing in new criteria for spending (on soft skills instead of infrastructure, for instance), and for the design and implementation of a recovery strategy (partnership model);
3. the increasing resources, and mobilization, of urban and regional governments; and
4. the emphasis put on channelling funds to the area, hence the need to define a collective strategy and the making of a new common good for the transformation of the city.

Most of the literature on public policy, economic development, and governance emphasizes territorialization processes by contrast to top-down policies and implementation processes. Despite similar EU programmes and strings attached to spending the money, the four cases reveal very different strategies and outcomes flowing from similar policy instruments and hybrid

modes of governance. The EU is providing money and setting the parameters and constraints to spend it, but requires matched funding, partnership, and a local strategy. 'Aide toi et l'UE t'aidera' is the new mantra, which is coming from Brussels. A rapid analysis of the four strategies point to similar goals: diversification of the economy, creation of local clusters, new skills ... but that masks profound divergence among the four cities.

In Sheffield, Crouch and Scott Hill find a brave city council, which defied central government and engaged in a risky strategy around the World Student Games. As the city went close to bankruptcy, bringing in money and funds in the most entrepreneurial way gradually became the main ambition. Because of the success of Leeds (the other major Yorkshire city) and the centralization of Britain around London, Sheffield could not attract many private sector services. As central public investment remained at a relatively low ebb, it could not count on a major rise of public sector services either. Also, the British government did not play the EU game: instead of matching EU funds, it unashamedly substituted UK by EU spending, hence a non-existent additionality effect. The low level of state support probably explains why Sheffield remains the most severe case of restructuring among the four cities.

However, two points are to be stressed: first, two local concentrations of firms have appeared—the cultural centre, planned and supported by the local council and its partners, and the IT centre, which appeared without much public support. Second, the governance of the local economy has been deeply transformed. Beyond the large firms and the city council, which used to face each other without much contact, a new range of actors has now appeared, from the universities to business associations, and various regeneration agencies. Quite early in comparison to other UK cities, business organizations played a dynamic role in Sheffield. By contrast to most cases where these took advantage of state support to undermine local councils and control resources and policy programmes, business organizations in Sheffield entered a coalition with the modernizing council—in part against the state, resisting policy initiatives coming from London. When the concept of partnership, in the British sense, was proposed as a policy instrument by central government in the early 1990s, Sheffield was ready to use it at its best, because of cooperative mechanisms established between business organizations and the council. The slow recovery of the city has been enforced by the dynamism of this partnership, and business organizations have played a key role in helping to promote and implement the regeneration programme, contributing to inward investment or legitimizing council policies. Its governance now explicitly aims at providing LCCGs, for instance through university research in support of firms. Sheffield remains a case of partnership under market pressures and rules mixed with politics and a strong sense of belonging to the city.

Piombino is in many ways in the opposite corner. Tonarelli provides ample evidence of the clever mobilization of political actors to channel funds to the

area. She demonstrates that however significant EU funds are, national programmes and solidarity mechanisms remain essential. Much to the surprise of outsiders who know about the Tuscan model, the creation of local firms and their networks has not been a major priority; and not much took place beyond tourism. Politics prevail here and governance is under the control of politicians. Economically speaking, Piombino is now a mix of surviving steel plants, some tourism and lots of welfare ... but nothing like entrepreneurs and new industrial districts. The local economy has become a Keynesian one with a good level of income deriving from public funds and pensions. The European Union in particular has helped make a smooth social transition. Its main impact has been to instigate a spirit of partnership very much in line with new Italian regional policy, but Piombino is not a 'Tuscan story' of industrial districts. Even in central Italy, the model of the steel company town developed by exogenous investment can ruin local entrepreneurial capacity and the basis for SME development. Fascinatingly from our point of view, external pressure, funding, and policy initiatives have failed here to replicate endogenous capacity.

In St Etienne, Le Galès and Tirmarche show how the state first took control of the regeneration process as early as the 1960s. St Etienne was characterized by a weak and fragmented level of local government. Fragmented economic governance prevailed until the mid-1990s, though state representatives provided clear leadership to use the EU and national funds in order to develop training and skills, together with implementing a massive programme of landscape cleaning. This reached its goal: St Etienne is no longer the 'dark city'. Economic programmes and the provision of LCCGs were at the forefront of a provision competition between various agencies when there were few projects. New actors appeared such as the chambers of commerce and industry and intercommunal government. At the same time, more or less independently from public policy but still taking advantage of available LCCGs, the economy went through a profound transformation. This had three aspects. First, foreign investment bought local industrial SMEs and helped them to reach foreign markets. Second, a new range of SMEs were successful in contrasting industrial sectors (from water to engineering). Finally, the progressive orientation of the engineering milieu enabled it to take advantage of the concentration and diversity of its SMEs. This last trend has been supported by SME leaders, research centres created by state funds (CETIM), and universities. Gradually, the new economic development agency of the St Etienne region, organized around a partnership, is bringing more coherence to policy programmes to provide LCCGs and at least limit competition among actors. Simultaneously, and despite constant pressure from competitors and job losses, SMEs in the engineering and metalworking sector are adopting the rhetoric, the instruments, and the LCCG production mechanisms of industrial districts. Those types of SME existed before, alongside the large steel and coal firms. Provided the production of LCCGs does respond to their needs,

they may well signal the reviving economic fortune of the area, despite weak political leadership.

Finally, the Duisburg case analysed by Glassman and Voelzkow shows the power of the German model. The creation of the logistics cluster is the outcome of a determined strategy organized by the *Land*, massive public investment, and the cooperation of large firms and SMEs, and of local governments and various agencies. A goal was set after much elaboration; partners were associated; funds were channelled; and the whole project was implemented at relatively high speed. There is no serendipity here but massive mobilization and planning with some economic success—though it is still too early to judge whether the LCCGs provided will be sophisticated enough to give a unique advantage to the Duisburg area. Germany is the only country here that has mobilized exogenous actors together with local and regional ones in a coherent way, within a clear ambitious strategy. Duisburg is the institutional success story by contrast to Sheffield (high level of territorial coordination but little vertically), St Etienne (fragmentation), and Piombino (high level of political coordination but no strategy). The robustness and effectiveness of the institutional framework and strategy of the Duisburg case is remarkable. It is worth noting that Germany is the least centralized country and, as argued by Glassman and Voelzkow, the *Länder*, the intermediate level of government, plays a major role coordinating and implementing strategies. There is a link between the capacity to develop and implement a strategy for a city in crisis and the existence of a powerful mesolevel of government. There is no determinism here, but it works for Germany.

Local Collective Competition Goods: The Dynamics of Specialization

In terms of LCCGs, the contrast between the cases is very strong. This is a logical consequence of the role played by politics and policies by contrast to supposedly convergent market mechanisms. In Piombino, naming LCCGs is not so easy as little effort was made to create them. However, environmental programmes and the creation of agencies to support firms count. To our surprise, the Italian case this time was the less involved in the creation of a local diversified economy, networks of SMEs, or the provision of LCCGs. This is not the case of Sheffield, even if the constraint on finances did not leave much room for manoeuvre. Beyond call centres and large retail investment, evidence of some market-led economic renewal, serious attempts were made to provide LCCGs for specialized clusters from information technology (IT) to culture. Attracting investment and funds in an English environment organized around a competitive logic has proved very demanding. LCCGs are therefore mainly provided by the market, with the support of local business associations, and not often on a local base. Beyond the market, efforts were

made to create incubators, to improve the image to attract investments, and to invest in skills (with the support of business associations).

This underlines the basic LCCGs that are provided in cities facing serious industrial transition: training to improve and reshape the skill structure of the area; marketing to change the image and attract inhabitants and investment; and information/cooperation, for instance within public–private partnerships. These are the basic elements that are found in many contexts, though less in Piombino.

Beyond that basic level, LCCG provision in Duisburg is far more widely organized and attuned to the needs of the logistics sector represented by leader firms elites and business association. That includes information and experience concerning technologies and logistics projects, highly specific skill-raising programmes, R&D, and land cleaning for new projects. Again, the strength of the German model relies on the combination of a structural policy initiative, the scale of public funding, and the detailed LCCGs that are provided within that framework. LCCG production has been planned and organized in a sector-specialized way. That level of specialization is greater than anywhere else.

St Etienne is gradually moving along the same lines, though in a less organized fashion. Around engineering and metalworking, innovation networks, finance, R&D, and training have been provided specifically for industrial SMEs in a variety of sectors, including water and optical industries, a major break with the past. Slowly, the production of LCCGs has become more relevant for existing and developing SMEs.

Once the provision of LCCGs is identified, there is a need to identify the mechanisms through which they are provided, and at what level. The territorial embeddedness of firms that emphasise some forms of flexibility, including SMEs, is a major concern for all levels of government.

It is worth emphasising the extent to which the creation of LCCGs depends far more on the legacies of the past than on EU policy. Territories such as industrial cities have their own time dimension; change does not take place over night. Surely, everywhere, EU money has been used to develop some kinds of collective goods for the whole area, but not always crucial for SMEs. Despite similar exogenous, EU incentives, the production of LCCGs remained very much rooted in the existing settings of firms and institutions. In Duisburg for instance, the strong legacy of the port and the large firm system has led the public authorities to concentrate the production of LCCGs along more or less the same model, with a clear emphasis on the logistics cluster of firms rather than other SMEs. In St Etienne, new uses of past legacies have also been a dominant feature, though it does not mobilize the immediate past but a more ancient one. Mechanics and metalworks were important industries in St Etienne, which became used as subcontractors for large firms. The creation of LCCGs in other parts of France by contrast does not follow the road of local government but rather either local networks or

international firms. Piombino is an exception as there is no clear new use of past legacies. In Sheffield we already emphasized both the territorialization of the LCCGs provided for the cultural quarter and the importance of market mechanisms in relation with partnership.

Can External Policy Stimulate SMEs?

The restructuring of former steel cities' economies requires, first, it seems, heavy public policies and investments to overcome the destructive creativity of markets. Second, in all our cases, the requirement for forms of partnership to implement programmes and the involvement of business organizations in particular has been noted, but not without limits. Third, except in Piombino, the concepts, rhetorics, and strategies associated with networked SMEs, governance, and local clusters are widely used, implemented, and instrumentalized. The hard way to renewal seems to go through a gradual improvement of the job situation, thanks to the services sector (public and private) plus the future of the dynamics sectors of industrial SMEs, more concentrated and organized in Duisburg than in Sheffield or St Etienne. In other words, to return to our initial questions, there has been in the four former steel cities some creation of local production systems based on SMEs, but to a very limited and varied extent.

Despite incentives, despite the importance of exogeneous factors, our conclusion rather points to the strength of legacies. The capacity of political actors to organize collective action for the provision of LCCGs appears therefore unequal. First, in Piombino local political elites did not seem to perceive the urgent need to provide LCCGs to enhance economic development. In Sheffield and in St Etienne it has taken them a while to follow that path, though some other partners and agencies have been working quite consistently in that direction. Specialization was not the priority until the last five years where in both cases, more collective efforts have been organized to produce systematically LCCGs for a given set of sectors in the city. Duisburg is the exception, where incentives have been used consistently to take the risk to put all the eggs in the same basket, but with a lot of institutional support and robust structure of implementation. Although it does rely on existing firms and agencies, and is largely governed by the *Land* in partnership with private sector firms, this is the most consistent policy initiative, which brings together a sophisticated mix of external and endogeneous factors, of market and public authorities. It is the case of policy-led recovery engineered by public funds and private investments. It is still early days to assess the overall success of the strategy in terms of economic development, but the implementation has been steady.

Part III New Local Production Systems: High-Tech Sectors

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14 High-Tech Districts

CARLO TRIGILIA

In our analysis of local production systems, we are especially interested in those based on small- and medium-sized firms (SMEs), because they are more dependent on local collective competition goods (LCCGs). We assume that their dynamism is more secure for local communities because it is more embedded in their ability to sustain and reproduce specialized know-ledge in the production of certain goods or services. Single firms—especially the largest ones—may stay or go, may grow or decline, but strong local competencies will provide a kind of insurance against the risk of economic decline. Within this framework, in our previous study (Crouch et al. 2001), we discussed the prospects of rise or decline for local production systems based on SMEs, and we encountered a sort of paradox. Some old industrial districts, or other systems based on small firms, continued thriving, while others seemed to decline or change their original features. Curiously enough, however, in all the countries studied there were clear signs that new high-tech local systems based on SMEs had developed in the last decades. And this trend is confirmed by a wide literature referring both to Europe and the United States (Storper 1997; Swann, Prevezer, and Stout 1998; Keeble and Wilkinson 1999; Scott 1999).

How grounded is the hypothesis that new high-tech firms tend to form local systems largely based on SMEs? What factors can help explain their territorial concentration? And to what extent does the role of LCCGs influence this trend? Are there significant differences from more traditional industrial districts in the kind of LCCGs on which the high-tech local systems are dependent, and in their models of governance? What is the role of public policies, at the local, national, and European level, in the development of these productive systems?

It is not easy to give a precise definition of high-tech industries. Many different sectors are included, such as information and communication technology, biotechnology, media industry, and several others. It is usually assumed that these sectors can be considered as ‘technology-based’ insofar as they embody new technologies strictly related to scientific advances. This, in turn, entails a high rate of R&D expenditure and/or employment. The contrast with more ‘traditional’ sectors, however, runs the risk of being misleading. There can be considerable innovations in products and processes

in traditional, non-high-tech sectors, but these are not as strictly dependent on scientific advances and technological innovation as high-tech ones (Porter 1990).

Two main bodies of literature try to explain the origins and development of high-tech industries. The first is more focused on the national dimension and considers the 'national system of innovation' and the national models of capitalism. The second is more orientated towards local systems of innovation and the study of industrial districts and innovative milieux. Although these literatures developed quite in isolation from each other, we assume that both can provide useful insights to respond to our questions about high-tech local systems based on SMEs.

National Innovation Systems and Varieties of Capitalism

Theorizing about the influence of the national institutional context on the sectoral specialization and 'technological trajectory' of a particular country originally emerged from the evolutionary theory of economic growth (Nelson and Winter 1982; Dosi et al. 1988; Nelson 1993). This approach gives particular importance to technological advances for explaining economic growth. Technological innovation, in turn, is rooted in long lasting processes in which the capabilities of single firms are strongly shaped by the institutional environment. Particular attention is given to the interaction between firms (user–producer relations) and between firms and public and private institutions that promote the development and dissemination of knowledge, as well as labour training. In this framework, several scholars developed the idea of a systemic coherence at the national level, binding together sectoral specialization, capabilities of innovation, and economic and cultural institutions. This approach has been applied in explaining the industrial specialization of certain countries, variations in rates of growth of single countries or wider continental regions.²³

More recently, the ideas put forward by the national innovation system school have been developed into a wider institutional approach, which aims to analyse the varieties of contemporary capitalism. According to these studies, the situation of developed countries can be traced to two ideal types. Soskice (1990, 1999), for example, distinguishes between 'coordinated market economies' and 'liberal-market economies'. The first type features a regulation system in which the market role is more limited *vis-à-vis* the state or associations. Although there are differences between them,

²³ See, for a recent account of the origin and development of the innovation system approach, a special issue of *Research Policy*, 31 (2002), with articles by Chris Freeman and Richard Nelson. See, also, for the idea of a 'societal effect', which cuts across technological or market features, the sociological work by Maurice, Sellier, and Silvestre (1984).

northern European countries, as well as Japan, can be singled out as forming part of this group. Non-coordinated economies, in which the role played by market regulation is more extensive, include the Anglo-Saxon countries, in particular the United States and the United Kingdom. In the same vein, the essay by Michel Albert, *Capitalism against Capitalism* (1991), has been remarkably influential, with the distinction he makes between the 'Anglo-Saxon' model and the 'German-Japanese model' (this last is also known as the 'Rhine model'). Studies of the varieties of capitalism originally aimed to show that coordinated economies, or capitalisms of the Rhine-Japanese kind, had given rise to institutional contexts that were more favourable to innovation by firms. They mainly attempted to clarify the institutional bases of the economic success of Germany and Japan during the 1980s. As is well known, the situation changed in the ensuing decade. Anglo-Saxon capitalism, and especially the United States, exhibited higher economic dynamism in comparison to both Europe and Japan. How can these trends be explained within the original framework of the varieties of capitalism?

In a more recent contribution, Soskice (1999) underlines that the comparison between capitalisms can help us understand different forms of specialization of industry that over time may provide particular advantages and disadvantages in dealing with economic competition. American industry shows several strong points in the field of high-technology and these seem to have been further consolidated in the last few years (aerospace industry, computer and communication industry, biotechnology, and so forth). This specialization is linked to several specific factors in the US institutional context that were underestimated in earlier studies—and which can also be found in the United Kingdom, even if high-technology sectors are less strong than in the United States.

The importance of the American military–industrial complex should be considered first here, since this stimulated substantial spending flows for research and innovation in high-technology sectors. High-level university structures and high-level research centres, closely connected with the world of firms through research contracts and frequent personnel exchanges, also contributed to the development and local concentration of high-tech firms. The role played by another institutional factor was extremely important—the presence of venture capital, namely, of institutions that are equipped and competent to provide risk capital for the financing of innovative projects and start-ups, often carried out by small firms with Schumpeterian entrepreneurship. In addition, one has also to consider the role of labour relations and professional careers. In the high-tech firms, innovation takes place through project teams of researchers and highly skilled specialists. These teams are continuously recombined to pursue new projects in sectors in which innovation is very risky and a technological trajectory is not yet consolidated, such as is typically the case of biotechnologies. Therefore, careers are not usually

based on long commitments to a particular firm. Labour mobility is high and skilled specialists build their careers on reputation and recognition provided by external technical communities. They often leave their job to set up new firms on their own or to participate in other project teams organized by new firms (Whitley 2002).

On the whole, this peculiar institutional environment may explain why US firms are more successful in economic activities based on 'radical innovation', and strongly dependent on science and technology advances. The same context, however, seems less able to sustain adaptation and utilization of radical innovation in large-scale manufacturing production, that is, the development of flexible and high-quality production. This implies incremental adaptations and innovations requiring the long-term involvement of researchers, skilled labour, collaborative relations between management and the workers, and between the parent company and suppliers. In other words, an institutional context more typical of coordinated market economies is necessary.

The approach based on the study of national systems of innovation is certainly useful to understand different trajectories of technological development followed by diverse models of capitalism, but it entails two major limitations. While it makes possible the formulation of sound hypotheses on the influence of the national institutional context on the development of high-tech activities, it remains to be explained why high-tech firms tend to cluster in particular areas. Second, local systems of high-tech activities can be found in countries whose national model of innovation is not particularly favourable to their development and diffusion. This means that we need to consider a set of specific factors that may foster high-tech local systems independently of the national setting. For these reasons, it may be worth considering another branch of literature more orientated towards the study of local systems of innovation. This includes several approaches related to each other in various ways: the study of industrial districts, innovative milieux, and localized technological change.

Industrial Districts and Local Innovation Systems

As it is well known, the model of industrial district was originally proposed by Alfred Marshall (1919). The British economist pointed out that whenever the productive process was divisible into separate stages, it was possible to organize the production of goods through a high number of small firms localized in the same area. These industrial districts could achieve productivity rates that were not lower than those obtained by large firms. This outcome was largely dependent on the existence of external economies. On the one hand, industrial districts can rely on tangible resources such as skilled labour and specialized suppliers of intermediate goods or services. On the other hand, intangible resources are also available, related to the diffusion of information

and knowledge for innovation, and on the development of an 'industrial atmosphere'. The latter refers not only to skills but also to values and attitudes more favourable to particular kinds of production. The combination of these different resources in a local setting allows the development of extensive forms of division of labour among firms. Strong horizontal integration and cooperation favour increases in productivity and competitiveness.

This general framework has been developed to analyse the more recent growth of industrial districts based on small firms (Piore and Sabel 1984; Brusco 1989; Becattini 1990). Two factors were underlined to explain their success. First, changes in the market, with the increase of fragmentation and volatility in the demand of consumer goods, required more flexible productions. Second, new technologies, especially computer based technologies, allowed for a reduction in the costs of flexible production. Changes in the market and in technologies created general opportunities for a re-emergence of industrial districts, in a situation in which mass production was declining and new post-Fordist models of productive organization were emerging. However, these new opportunities could not be seized everywhere. If industrial districts are strictly related to external economies, it is crucial to explain the origins of such positive externalities. But where do they come from?

Marshall did not elaborate on this point. He insisted more on geographical proximity among small firms rather than on institutional and socio-cultural factors. As in other parts of his work, he seems more interested in investigating how the material conditions of production influence the formation of skills, values, and attitudes that favour innovation. Contemporary scholars of industrial districts have focused more on the institutional setting. Among them, Giacomo Becattini (1990) has particularly emphasized the role of the local institutional context in providing both normative resources (trust, cooperative attitudes, and social networks) and cognitive endowments (productive traditions and skills). In this perspective, external economies are therefore the consequence of a peculiar cultural and social milieu. History matters for industrial districts, institutional resources formed in the *longue durée*. They could remain latent and then be exploited when external conditions related to markets and technologies became more favourable. Obviously, the growth of geographical proximity reinforced, in turn, the development of positive externalities and the need for cooperation. In this framework, attention has been drawn not only to the role of community ties, but also to business associations, industrial relations, and public policies. Cooperation among local collective actors and specific policies were considered particularly important for the continuous enrichment of external economies through new collective services and resources necessary to increase productivity and competitiveness. However, the formation of industrial districts cannot be seen as the effect of purposive public policies; it was rather a spontaneous process, based on the combination of several favourable conditions at the local level.

New High-Tech Districts?

To what extent can the framework developed to analyse industrial districts be useful for the study of local systems of high-tech small firms? Research on this phenomenon has usually underlined some similarities between local productive systems based on high-tech activities and industrial districts, which are usually specialized in consumer goods such as textiles, clothes, footwear, furniture, machine tools, and so forth. This means that the role of external economies is considered crucial for the growth of high-tech activities. However, attention has been drawn to specific forms of externalities and to the social and political processes that are involved in their production and operation.

The literature on innovative milieux (Aydalot 1986; Aydalot and Keeble 1988; Camagni 1991) has particularly emphasized the role of external economies related to intangible resources. In this case, proximity is important because it favours the development and sharing of a localized technical knowledge. Therefore, a distinction is usually made between codified and tacit knowledge. While the first is easily accessible and readily transferable, the second is specific to a certain context, such as an organization or a certain locality. Actors involved in these contexts share particular codes and develop common routines and conventions that help them in absorbing and interpreting codified knowledge and in using it to generate new technological knowledge. Another way of looking at this process is to distinguish between technological information and the generation of new technological knowledge (Antonelli 2000). While the first can be considered a public good for its features of non-excludability and non-rivalry in use, the generation of new knowledge is a collective good, in the sense that it is based on the indivisibility and complementarity of inputs: 'it is the result of a process that combines pieces of information and knowledge that are owned by a variety of parties and cannot be traded as such' (Antonelli 2000: 537).

Therefore, we can assume that proximity is important for the development of high-tech activities, because it favours the formation of tacit knowledge and its use through direct, face to face interactions among local agents for generating innovation. The growth of tacit knowledge and the enhanced chances of participating in innovative networks are important externalities that may help explain the territorial concentration of high-tech firms. Obviously, this does not mean that other external economies should be neglected. The availability of highly qualified labour and the presence of specialized services and dedicated infrastructure are important conditions that influence localization choices. However, externalities related to the generation of new technical knowledge seem more important for high-tech local systems. In this respect, we can hypothesize that the influence of such externalities—or 'untraded interdependencies' (Storper 1995)—grows for activities more based on the continuous generation of new knowledge and on scientific advances.

This leads to another aspect that needs clarification. Why does the size of many firms in high-tech local productive systems remain small?

We have already mentioned that changes in the market and in consumers' tastes brought about a need for greater flexibility in the productive process. This trend was crucial for the re-emergence of industrial districts in the production of consumer goods. Flexible and quality productions are based on extensive division of labour and horizontal integration among small firms that could fully exploit external economies at the local level.²⁴ To what extent is flexibility sufficient to explain the role of a small firm in high-tech local systems? Our hypothesis—which we wish to test with our case studies—is that flexibility is not always as crucial for these systems as for traditional districts, and greater sectoral variability can be found. Insofar as production is very customized, such as in the media industry or in certain software productions, the need for flexibility is higher, and this can explain the presence of many small firms that collaborate at a local level, taking advantage of external economies. But in other activities, different trends seem to be at work. Whenever the technological trajectory is still open and uncertain, and the role of scientific advances and the generation of new knowledge are more important for innovation and competition, the need for collaboration among specialized units, which control single crucial pieces of knowledge, becomes crucial. In this case, the collective feature of new technological knowledge tends to influence the productive model, favouring the emergence of networks of small firms embedded in local systems with more sophisticated and intangible external economies.

What processes create the kind of externalities that are more important for high-tech systems? In this respect we can also assume some peculiarities. The institutional context is as crucial as for traditional districts, but some social and political factors seem more specific to high-tech systems. As for the normative side, trust and social networks play an important role in lowering transaction costs in productive interactions exposed to moral hazard and opportunism in sharing valuable information. However, we can hypothesize that trust is less embedded in local identities and more rooted in professional links. These are developed by local agents in their careers through different firms and research and university institutions. At the same time, community ties and industrial relations seem less important for providing flexibility in the labour market and in work organization than in the traditional districts. This is also related to the less labour-intensive features of these productive systems, and to the stronger presence of a highly educated labour force.

On the cognitive side, a key role in the institutional context is played by research and university structures. These provide LCCGs of various kinds, which enrich positive externalities. While in industrial districts long-lasting

²⁴ In the previous volume, we also stressed that industrial districts were one of the possible flexible models, together with other ideal types such as the networked firm and empirical clusters of small firms.

productive traditions and institutions such as technical schools are more important, in high-tech systems university and research institutions, together with the R&D facilities of large firms, provide qualified labour and chances of formal collaborations and informal exchange between specialized actors. The role of dedicated financial institutions and other specialized business services is also important. This means that local and regional government can influence the formation of high-tech systems with appropriate policies that enhance the chances of developing a localized technical knowledge. The fine-tuning of an adequate infrastructure of communication between research institutions and productive activities is crucial. However, in this respect, the creation of rich positive externalities seems more dependent on national policies and choices. In other words, high-tech local systems might be less autonomous from the local context and informal regulation. National choices of localization of research facilities and national trajectories of technological development could influence the creation and development of these systems more than traditional districts. Therefore, we would consider the hypothesis that they might be more politically constructed than other local productive systems, through an effective interaction between local and national policies. The role of non-market institutions and of social and political regulation seems particularly important for the governance of high-tech systems and deserves specific attention.

In conclusion, we hypothesize that high-tech systems may be considered as a distinct type of local production systems. They are sustained by specific LCCGs which, in turn, are produced through peculiar governance institutions. Reference to the governance dimension can help analyse the relationship between national conditions and local factors. This perspective allows us to combine useful insights coming from the national innovation systems approach with those offered by the studies of industrial districts, innovative milieux, and localized technical knowledge. To discuss these hypotheses we selected some well known success stories of high-tech local systems: the media industry in Cologne (Germany), the biotech sector in Oxford (UK), software activities in Pisa (Italy), and the ICT sector in Grenoble (France). We chose to analyse different kinds of high-tech activities in various countries better to evaluate the existence of a specific logic of development for high-tech clusters of small firms, which cuts across productive sectors and national systems of governance. Obviously, the limited number of cases, and the character of our research design, do not allow strong generalizations. However, following this path, we hope to gain useful exploratory insights, enabling us better to understand the formation and development of high-tech local systems and the role of public policies in these experiences.

15 The Biopharmaceutical Cluster in Oxford

NEILL PROUDFOOT

Suppose that an agent comes to possess new knowledge that does not accord with core aspects of existing technological or commercial practice in a particular industrial sector. Insofar as current practice imposes a cognitive constraint on incumbents' activities, the agent's belief about the potential economic value of this new knowledge will likely diverge. Such informational asymmetries create an incentive for the agent to start its own firm in order to appropriate the expected economic value of the new knowledge, provided the costs of start-up are not prohibitive (Audretsch 1995). In these circumstances, the new entrepreneur may calculate that greater returns can be earned from direct product market competition with incumbents, as in the Schumpeterian vision of new enterprise as creatively destructive. Alternatively, he or she may expect greater future return to flow from cooperation with incumbents in some markets for ideas, perhaps because they lack the full range of capabilities necessary to engage in downstream competition. For example, they may design their research-oriented start-up to be an upstream supplier that earns rents from licensing arrangements, joint venturing, and so on (Gans, Hsu, and Stern 2000). In this case, innovative start-up will not necessarily disrupt incumbents' *ex ante* conception of the market. This latter story reflects the impact of entrepreneurial biotechnology entrants on the global pharmaceutical sector during the last two decades.

During the postwar Golden Age the structure and conduct of pharmaceutical incumbents yielded well above average margins, acting as barriers to new entrants and removing the necessity to compete on price. The minimum efficient scale in drug research, manufacturing, and marketing was high, stringent patent and approval regimes created long product exclusivity periods, and prescription drug markets afforded considerable latitude over pricing. Incumbents were also successful at managing demand in national healthcare markets by encouraging physicians to limit their prescribing practices to branded goods. Commercial pressures have constrained incumbents' profitability in recent decades. Cost containment measures in public healthcare markets have been ongoing; exclusivity periods for products in new therapeutic markets have diminished following increased use of 'me-too' compounds,

generics, and parallel imports; and new product flow from traditional discovery pipelines has diminished. However, despite these downward earnings pressures, incumbents have maintained a basic stability in their downstream operations.

This contrasts with the upstream disruption caused by emergent biotechnologies. Previously, most therapeutic agents were small molecular compounds, discovered by randomly testing in series libraries of natural and chemical derivatives against animal screens (Weatherall 1990). From the early 1980s, advances in molecular biology began to signal a new set of product concepts and discovery technologies. Initially, incumbents hesitated in pursuing these options in-house because they were unwilling or unable to restructure existing pharmacological programmes focused on shifting from random- to mechanism-based screening (Galambos and Sturchio 1998). In their absence, *de novo* entrants took a leading role in early stage biotech development. The first tranche of these dedicated biopharmaceutical firms (DBFs) was formed during the early 1980s in the United States and focused on the development of proprietary recombinant replacement factors, which 'big pharma' incumbents brought to the market on licence. Subsequent entrants in the US and elsewhere, frequently spun-off from the public research base (PRB), have originated rational drug discovery platforms to identify potential targets²⁵ and have pioneered novel biotherapeutic product concepts with the potential to outperform smaller synthetics.²⁶ DBFs have tended to rely on private equity to develop viable proprietary product candidates and platforms, before seeking additional funding from the public equity markets and generating cash revenues from deals with big pharma and other DBFs in an upstream market for ideas. These transactions—usually licensing arrangements or R&D ventures—have typically been long-term and relational, although some platform-based DBFs increasingly find themselves operating in more conventional price-competitive markets for commoditized intermediates. Rather than forward integrate into downstream operations in any significant way, larger DBFs have generally preferred to maintain core R&D activities on their home site and establish subsidiaries in overseas markets to generate new licensing opportunities.

An extensive literature is emerging on this new division of innovative labour in drug development (e.g. Powell 1996; Orsenigo et al. 2001). A common theme is the asymmetric spatial distribution of DBFs within national economies (Prevezer 1998; Shohet 1998; Fuchs 2001). DBFs seem likely to co-locate in particular clusters, as shown below for the United Kingdom. One

²⁵ Broadly, these are based on improved structural knowledge about human and antigenic genomes, and the functional application of this knowledge in rigorous predictions about potential therapeutic targets. They have also shifted screening towards the parallel analysis of larger compound populations, based on greater automation and the increased use of *in silico* experimentation.

²⁶ For example, during the 1990s, the search for recombinant therapeutic proteins has extended beyond relatively straightforward replacement factors to include chimaeric or fully humanized monoclonal antibodies. Various gene-therapeutic product categories have also been established across the last decade, from DNA vaccines to antisense oligonucleotides.

such location is Oxford. All contributions to this volume hold that sectoral agglomeration is caused by the ready availability of local collective competition goods (LCCGs). The present chapter tests two hypotheses derived from this framework against the biopharmaceutical cluster in Oxford.

First, DBFs can be expected to co-locate where they can economize on transaction costs in the market for ideas, where they can exploit untraded localized knowledge externalities, and/or where they can economize on the costs of start-up. I contend below that, because both the market for ideas and the scope of non-pecuniary knowledge spillovers are likely to be deterritorialized, DBFs agglomerate in Oxford as start-up resources are available there at a more convenient set of relative prices.

The second hypothesis concerns the institutions providing these goods in the Oxford cluster. Pure market mechanisms are expected to provide inadequate investment in start-up resources because the informational asymmetries that encourage entrepreneurship will discourage investors. I shall contend that local actors in Oxford have therefore relied on endogenous and informal forms of coordination to supplement what they could achieve through anonymous markets. The section also considers a more recent trend towards the exogenous and substantive provision of local start-up resources to overcome perceived congestion in their supply. The concluding part of the chapter compares the findings for Oxford to the governance of LCCGs in other established or embryonic clusters of biopharmaceutical activity in the United Kingdom. The British governance model that emerges is more complex than received assumptions in the ‘varieties of capitalism’ literature about Anglo capitalism.

The Dedicated Biotech Sector in the United Kingdom

Estimates of the scale of national biotechnology sectors are prone to variation, given that there is no standard industry statistical classification. However, it is broadly accepted that in late 1999 Germany replaced the United Kingdom as the country with the largest dedicated biotechnology sector in Europe, measured by aggregate number of firms. However, the more mature UK industry has retained innovative leadership in biopharmaceuticals within Europe. This is based on a core of firms founded during the 1980s and early 1990s, focused on the early stage development of proprietary therapeutics. This type of highly innovative start-up is almost entirely absent from the first-generation German sector (1980–1996), where most entrants provided generic biotech applications and consumables across a variety of industries: pharmaceuticals, agricultural, food and environmental, and so on. Differences in the technological profile of the national industries have persisted across the second generation (1997–2000), with highly innovative product-based and drug delivery firms accounting for a greater proportion

(38 per cent) of UK entrants than in Germany (24 per cent). The much discussed growth of the German biotech industry since 1997 is skewed in favour of firms founded around platform technologies, either specifically intended for drug discovery (35 per cent) or with more generic industrial applications (37 per cent). Although the UK industry was not immune to the funding boom for structural genomics companies during the second growth generation, British start-up investment between 1997 and 2000 has been less forthcoming for drug discovery firms (31 per cent) than in Germany and has drifted away from generic biotech applications (21 per cent).

The technological profile of the United Kingdom's biotech sector has been a relative competitive strength since the hi-tech downturn began in the latter part of 2000. Drug discovery firms have come under pressure in the equity markets and on the market for ideas, partly because their platforms are proving less fruitful than expected, and partly because the sheer number of such firms formed in recent years has commoditized their offering.²⁷ This explains why platform-led public companies in Germany lost on average 45 per cent of their value in the first six months of 2001. In contrast, losses in the UK listed sector across the same period averaged 10 per cent. The comparatively strong performance of the UK biotech sector in bearish markets for equity and ideas is rooted in the scale and maturity of its biopharmaceutical product pipeline (see Table 15.1). Several of the core product innovators founded in the 1980s and early 1990s are now involved with therapeutics in or near to final healthcare markets.²⁸ The increased revenue flow from licensing deals involving these products has raised the prospect of core DBF innovators in the United Kingdom making profits in the near term. Moreover, the UK product pipeline looks sustainable in the long term. British core innovators and second-generation entrants together account for a far higher number of proprietary therapeutic candidates than any other European industry. This should ensure the United Kingdom's continued innovative leadership within Europe as a proportion of these leads move into pre-clinical and clinical trials.

²⁷ 'Commoditization' is used here to indicate what happens when a market moves from the status of a differentiated good/service to a commodity (undifferentiated good/service). The process is characterized by falling prices and slimmer margins. As the cost advantage of high volume commodity components becomes compelling to consumers, it becomes relatively less attractive for them to take on non-mainstream solutions. As a result, it is increasingly difficult for producers to be different and to introduce value-added, premium priced goods/services. This should not be confused with the more sociological (Marxist) term 'commodification', the process by which things not previously regarded as economic goods are given prices and traded in markets.

²⁸ For example, the first launched product was a recombinant blood clotting factor (Factor IX) that BTG plc acquired from a PRB research group in Oxford and licensed out for final stage clinical development to the American firm, Genetics Institute, who launched it in 1997 as 'BeneFix'. The second launched biopharmaceutical with UK DBF involvement was an anti-CD33 monoclonal antibody, called Mylotarg. This was driven to market by the US pharma firm American Home Products in March 2000, having been humanized by the Celltech group in the United Kingdom.

Table 15.1. DBF biopharmaceutical product pipelines United Kingdom, 2001

Product	Near	Ph 3	Ph 2	Ph 1	Pre-clinical
Recombinants+	1	1	3	4	10
Recombinant vaccines	2	0	7	6	8
Mabs, immuno-conjugates+	2	4	6	8	34
Gene therapy	0	0	7	5	37
Other biotech	0	0	1	1	12

Ph=phase of product development.

Source: Own calculations.

A notable feature of the first-generation product innovators in the United Kingdom is their asymmetric spatial distribution. Of the total product-focused DBFs formed through to 1996, disproportionate numbers were founded in Oxford (18 per cent), Cambridge (13 per cent), and Greater London (17 per cent). These were also the locations with the highest levels of first-generation biotech firms across all technological categories: Cambridge was home to 17 per cent of total first-generation start-ups, Oxford to 10 per cent. During the second generation, some embryonic biotech clusters began to emerge, notably in Manchester and Edinburgh and to a lesser extent, in Leeds, York, and Dundee. Oxford and Cambridge remained preferred locations for second-generation start-ups, accounting for 12 and 14 per cent of total entrants between 1997 and 2001, respectively. However, only 11 per cent of the product-focused DBFs founded during the second generation were located in Oxford, whereas Cambridge (15 per cent) and Greater London (33 per cent) became proportionately more important.

Oxford's Biopharmaceutical Cluster

Dedicated Biopharmaceutical Firms

On the narrowly defined audit reported here, the entrepreneurial biotech sector in Oxford comprised approximately thirty-six firms by 2001, ranking it third in aggregate scale within the United Kingdom, behind Cambridge and Greater London. This contrasts with an alternative survey that estimated the local sector in Oxford to have reached forty firms by 1996. This adopted a much broader definition of the sector, for example, including non-entrepreneurial start-ups and in-movers such as the subsidiary marketing and distribution operations of overseas firms (Mihell, Kingham, and Stott 1997; Lawton-Smith 2000). Updating these figures to mid-2000 suggests that during the second generation, on this broader definition, some thirty-five new biotech ventures have entered the greater Oxford area.

Oxford is a node of particular biopharmaceutical innovation within the UK entrepreneurial biotech industry. For example, its technological profile has tended to be more product-focused than the larger and more heterogeneous Cambridge sector. Nearly half the Oxford biotech start-ups included in the audit are engaged in the early development of proprietary therapeutics, as opposed to one-third of the Cambridge cluster. Although approximately 60 per cent of start-ups based in Greater London are product-oriented, many of these were formed after 1997 and are still engaged in establishing product concepts prior to commencing pre-clinical trials. This comparative youth means that whereas 1.6 products have moved into pre-clinicals or beyond for every product-focused start-up in London, Oxford can claim 2.5 products per start-up. Moreover, nearly half the products involving Oxford firms are novel biotherapeutic concepts, even if they are yet to advance a biopharmaceutical product past phase II clinical trials. In contrast, novel biopharmaceutical concepts account for just a third of the products involving London firms. It seems that DBFs in Cambridge and London that have products at (pre-)clinical trials are more likely to have brought their biotech expertise to the development of conventional pharmacological therapeutic concepts.

The strength of the Oxford cluster in biopharmaceutical product innovation is based upon a core of firms formed across the decade before 1997. Despite a well-publicized setback involving British Biotech plc,²⁹ these firms have on the whole performed well in the public equity markets and in the market for ideas. Six of these founding firms have been traded at some time on the FTSE, the most recent addition being Oxford Biomedica plc, which upgraded its listing from the AIM in early 2001.³⁰ Although a number of second-generation Oxford entrepreneurs are continuing in this vein by working on developmental biotherapeutics, the technological profile of entrepreneurial bioscience in the cluster has diversified since 1997. Rather in the style of Cambridge, a substantial portion of recent start-ups has been formed around proprietary discovery platforms, instrumentation concepts, or analytical services. Although these firms largely intend to service healthcare companies, they have brought a more heterogeneous technological focus to the Oxford biotech cluster. Concomitantly, Oxford has become less attractive for product-focused entrants, losing ground in particular to Greater London, where the second-generation upturn in therapeutic DBFs has been the most marked in the United Kingdom.

²⁹ The firm has had to rebuild its reputation with investors after a whistleblower scandal in 1997–1998 in which an internal scientist exposed flaws in clinical trial procedures for its MARIMASTAT anti-cancer product.

³⁰ Currently, just four Oxford DBFs are listed. Oxford Molecular plc ceased trading on the FTSE in September 2000, with its operations passing to the US firm Pharmacopeia Inc. In the same month, the German firm Evotec Biosystem AG acquired Oxford Asymmetry plc.

The Public Research Base

Figure 15.1 shows the geographic distribution of the bioscience-focused centres of excellence in the PRB across England, Scotland, and Wales. It highlights the location of two types of indicator: those higher education institutes (HEIs) with bioscience-related departments³¹ receiving the highest quality recommendation in the 1996 universities' Research Assessment Exercise (RAE) and other bioscience-related research institutes. On these indicators, Oxford is a particular focal point for the UK bioscience PRB, together with London, Cambridge, and Edinburgh.

According to the RAE in 1996, there were approximately 1,000 academics engaged in basic bioscience and clinical research in the city's two universities: Oxford and Oxford Brookes. Medical science research within Oxford University involves 53 different units in hospitals, departments, and specialized units (Lawton-Smith, Mihell, and Kingham 2000). Six departments in the university were top-rated in the biosciences. In addition, there are six national Research Council centres engaged in the life sciences in and around Oxford: the Centre for Molecular Medicine, Functional Genomics Unit, Mammalian Genetics Unit, Molecular Haematology Unit, Mouse Genome Centre (MRC), as well as the National Environmental Research Council's Institute of Virology and Environmental Microbiology. The Wellcome Trust Human Genetics Centre was established in 1994 at the University's Clinical School, supports 250 scientists researching the genetic bases of human diseases, and holds grants with an overall value of about £56 million.

Why Do Biopharma Firms Cluster in Oxford?

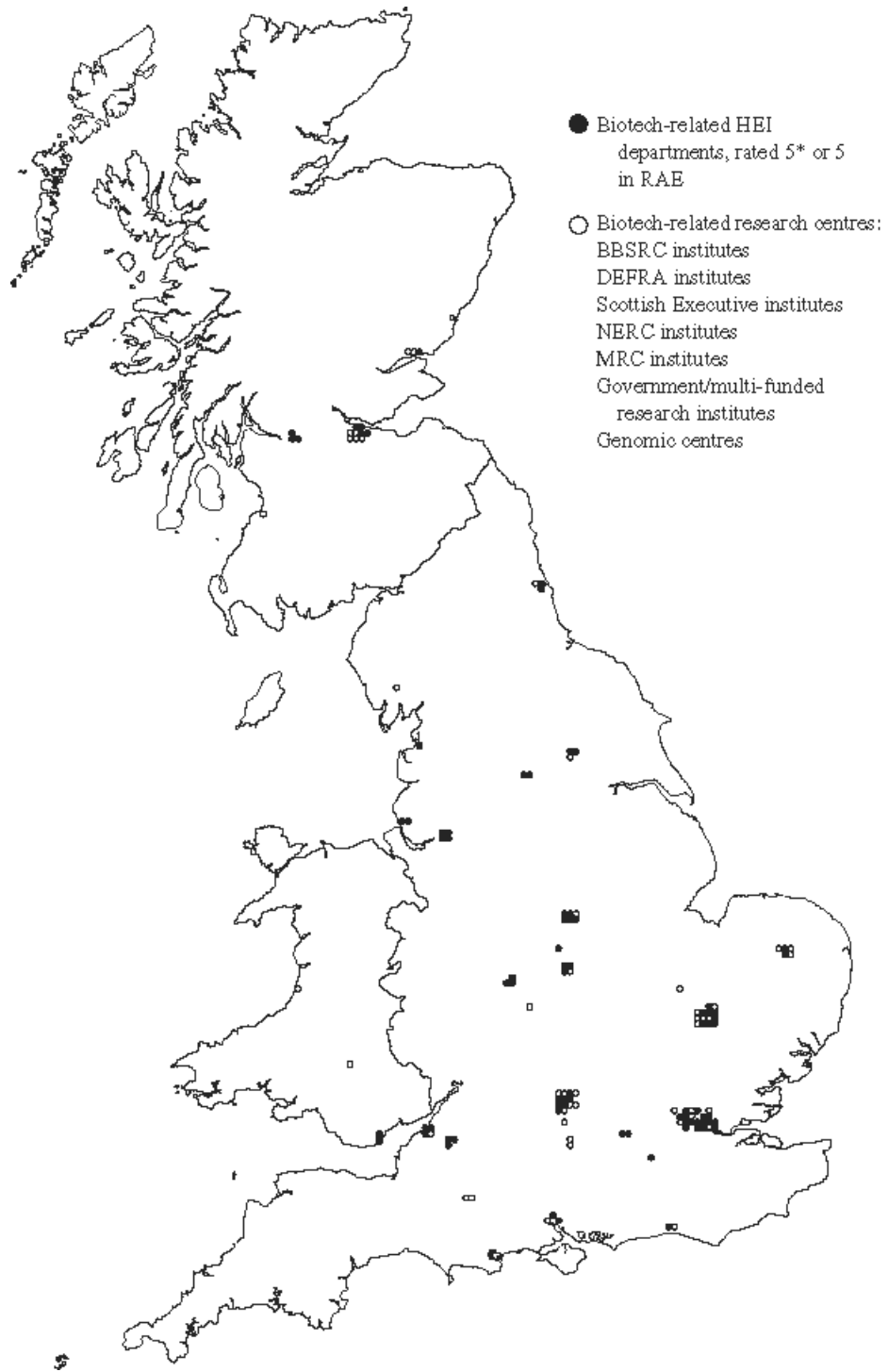
This section examines the influence of three potential causal mechanisms on the emergence and consolidation of the Oxford cluster. First, attention is given to the formal contractual ties in competitive markets, which characterize the new division of labour in drug development. The pattern of firm location may reflect the participants' desire to save on the costs of these formal transactions. The second potential mechanism is the incentive firms have to locate where they can best exploit untraded localized knowledge externalities that may arise from the PRB or other cluster incumbents. The final potential mechanism is a function of the costs of start-up. DBF founders can be expected to locate where they economize on these costs.

Formal Contractual Ties

The pattern of spatial agglomeration apparent in the UK DBF sector is not caused by considerations of the cost of transacting in

³¹ 'Bioscience-related' departments are taken to include: clinical laboratory sciences, pre-clinical sciences, physiology, pharmacology, pharmacy, biochemistry, biological sciences, agriculture, food technology, veterinary science, environmental science, chemistry, chemical engineering, and computer science departments with bioinformatics capabilities.

Figure 15.1. PRB centres of excellence, United Kingdom, 1996



the market for ideas. This is because the market for bioscience ideas is largely deterritorialized: the marginal cost of transmitting proprietary knowledge does not seem to increase unduly with distance from the locus of its creation. This is clearly seen in the formal deals secured by Oxford's DBFs.³² The most common deals are those in which Oxford DBFs are contractors either to overseas DBFs, usually located in the United States, or to the geographically dispersed research groups of large pharmaceutical multinationals. On the more limited occasions when Oxford DBFs have been the clients, engaging another firm for some purpose, the contracting organization is also likely to have been located overseas. Furthermore, spatial proximity has only a limited impact on the substantive content of the deal. Its main effect in the case of Oxford DBFs is to make it more likely that the deal will be structured around basic research; although this may be as much a function of the fact that a high proportion of formalized local deals in Oxford involve PRB institutions. For the rest, there are seemingly few gains to be made in collaborative networking from co-location. Also DBF–DBF or DBF–PRB licensing behaviour is more or less immune to spatial considerations. The only significant influence on whether a deal contains a licensing element is the involvement of pharmaceutical multinationals (MNCs), it being likely that MNC–DBF deals will involve the latter outlicensing intellectual property (IP) to the former.

Non-pecuniary Knowledge Spillover

Other mechanisms that may influence the location of new sector entrants are localized non-pecuniary knowledge externalities, with firms located to maximize their exposure to these positive spillovers. There is some doubt about how adequately these non-pecuniary effects can be measured.³³ The approach adopted here is limited and survey-based,³⁴ focused specifically on untraded spillovers from the PRB. The results come from a postal survey conducted in the Oxford cluster.³⁵ This asked first-generation DBFs in Oxford about the geography of their informal links with individual academics and academic institutions. Responses were received from 82 per cent of Oxford's first-generation start-ups and these are shown in Table 15.2. They show that nearly all respondents maintain at least some informal links with the local PRB, with nearly a quarter exploiting exclusively local knowledge sources. However, the more common picture is one in which firms informally network with a range of indigenous and external academic sources, with local PRB players being just one (albeit an important)

³² This analysis is taken from a database of biotech deals involving UK and German DBFs constructed by the author from various commercial sources: Recombinant Capital, Pharmaprojects, Scripp Report, and personal industry intelligence (Proudfoot forthcoming).

³³ 'Knowledge flows are invisible ... leaving no paper trail by which they may be measured and tracked, and there is nothing to prevent the theorist from assuming anything about them' (Krugman 1991).

³⁴ Some scholars have begun to use patent citations as a proxy measure for knowledge spillover in more formal analyses. See, for example, Jaffe et al. (1993).

³⁵ This survey was conducted by the author in the winter 1999/spring 2000.

Table 15.2. Informal links maintained by Oxford DBFs^a

	Not in the least	Not particularly	To some extent	To a considerable extent	Fully
Local	0	0	8	2	4
National	0	3	6	3	2
Overseas	1	2	7	3	1

^a Question: To what extent are the informal links that you maintain with individual academics and academic institutions located locally, nationally, or overseas?

Source: Own calculations.

constituency of informal partners. However, given the limited nature of the evidence, conclusions about the significance of untraded knowledge externalities on the pattern of DBF clustering should remain agnostic.

Start-up

Both the consolidation of the United Kingdom's established clusters (Oxford, Cambridge, London) and the emergence of other embryonic clusters in places such as Edinburgh and Manchester during the second generation were a function of spillover from the local PRB in the form of entrepreneurial start-ups. Local academic start-ups accounted for nearly two-fifths of first-generation entrants in Oxford, roughly in line with the national average (35 per cent of UK pre-1996 start-ups were PRB spin-offs). Cambridge in contrast was somewhat below this average, its earliest movers being more likely to be independent start-ups, founded by entrepreneurs with backgrounds in national (pharmaceutical) industries. The growth of the Oxford cluster from 1996 was based more decidedly upon PRB spin-offs, which reflected the broader trend across the UK sector as a whole. PRB spin-offs represented about 70 per cent of second-generation start-ups in the UK sample, with the majority of such firms focused on biopharmaceutical product concepts or discovery platforms. Most of these ventures chose to locate near their home institution. That said, an interesting feature was the (albeit slight) trend towards the more mature clusters attracting PRB start-ups from non-local academic institutions.

It seems that a strong local bioscience PRB is a necessary condition for the sustained entry of firms into bioscience clusters, with the local PRB acting as the major source of potential new founders. However, a strong local bioscience PRB is not sufficient to guarantee sustained clustering. For example, in the United Kingdom the presence of bioscience PRB excellence in Norwich, Nottingham, and Leicester has not attracted firm entry. Presumably the costs of start-up remain prohibitive in these places. In this way, it is to be expected that firms will enter in locations that are both near founders' home PRBs and in which the costs of start-up are sufficiently low.

Furthermore, in certain core locations, more footloose academics and independent entrepreneurs will be attracted by the low local costs of start-up. It is these latter places that become the key clusters of bioscience activity in the national economy.

To complete this line of reasoning, it is necessary to address the institutional incentive mechanisms that condition a low local cost of start-up in particular areas. This could be a standard Marshallian story in which ongoing agglomeration makes necessary start-up goods (technology transfer services, seedcorn and follow-on equity, specialized business infrastructure) locally available at a convenient set of relative prices. Alternatively, the capacity for start-up costs to be sufficiently reduced within particular locations might require a more institutional explanation. In this connection, it is an open and interesting question whether, in addition to providing much of the basic science, the PRB is also a non-market centre for the coordination of start-up LCCGs. The next section identifies how start-up goods have been provided within the Oxford cluster of entrepreneurial DBF activity.

The Governance of LCCGs in the Oxford Cluster

First-generation Local Initiatives

The entry of first generation DBFs in Oxford was largely a ‘serendipitous’ consequence of local PRB strengths (Crouch and Farrell 2001). The provision of necessary LCCGs to the emergent biopharmaceutical sector relied on endogenous and informal forms of coordination to supplement what could be achieved through anonymous markets. Insofar as formal institutional oversight existed in the first generation, it was provided more convincingly by the charitable Oxford Trust than by the University, local authorities, or central government.

Until the mid 1980s most revenues generated by university research activities were from contracts for commissioned research or related services with large established international firms, managed by a single part-time administrator in the Research Services Office. This policy reflected the national regime for IP created in UK universities. The fact that the British Technology Group (BTG)³⁶ had a right of first refusal on all such IP discouraged universities from investing resources to facilitate other forms of technology transfer (licensing or academic start-ups). Reflecting this regime, between 1959 and 1987 there were only three Oxford University start-ups, none of them in the emergent biotechnology sector.³⁷ However, in 1985, the ownership of IP was fully transferred to individual universities, mirroring a practice established in

³⁶ BTG succeeded the post-war National Research Development Council.

³⁷ These were Oxford Instruments (1959), Research Machines (1959), and Oxford Lasers (1977).

the United States with the Bayh-Doyle Act in 1980 (Argyres and Liebeskind 1998; Kettler and Casper 2001). Under the new rules, the improved transfer of research into emergent high-growth sectors promised universities increased revenues, either from directly licensing IP or holding equity in academic start-ups. These additional revenue streams were welcome given the real spending cuts in higher education in the United Kingdom from the beginning of the 1980s.

To exploit these new opportunities, Oxford University founded Isis Innovation as a fully owned technology transfer company in 1988. The university would assign IP generated by its researchers to Isis, which would then patent it and make it available to potential licensees.³⁸ Any revenues created by the licence would be split between the individual researcher, Isis, and the university.³⁹ On occasion, the licensee would be a start-up company founded on the initiative of the researcher. In these cases, the university also expected to be a significant shareholder and would have to give its permission before the researcher could take up a position in the firm. In the event, the university tended to require that the founding researcher take on a non-executive directorship, given its strict rules on employees' external appointments. Furthermore, the university, trading as the Oxford University Press, had trademarked the word 'Oxford'. If a spin out wanted to use the word in its name it would need to enter a standard licensing agreement with the university. Isis was available to facilitate negotiations with the university and assist founder scientists with finding external investors and executive/managerial expertise.

The model technology transfer offices established by American universities in the 1980s had initially been financed by large endowment funds, enabling them to establish a significant presence on campus from the start. In contrast, British universities were unwilling or unable to commit sufficient resources to their new technology transfer offices. This meant that the offices were unable to generate the revenues they needed to become self-sustainable operations. Isis typified most such offices, remaining a minor presence staffed throughout much of the first generation by a single official on a miniature budget. When the university convened a review of its technology transfer arrangements, the resulting report, published in 1995, was highly critical. In particular, it noted how Isis did little more than formally represent the university in start-up negotiations with academics. Contemporary analyses of technology transfer in Oxford also emphasized that the university was not engaged with the local

³⁸ In 1990, Isis founded the Oxford Innovation Society. It circulated details of University IP to registered members who might be keen to license it a month before making it more public.

³⁹ The precise nature of the split depended upon the size of the revenue. Currently, Isis always takes a 30% share to fund its further activities. For example, for revenues under £72,000 the inventor receives 63% and the general University fund 7%. For revenues to £720,000, the inventor takes 31.5%, the general fund 21%, and the inventor's department 17.5%. Over £720,000, the split is 15.75, 28, and 26.25%, respectively.

economy, being more successful at international and national contracting through the Research Services Office than at local academic entrepreneurship (Bell, Stott, and Kingham 1994; Lawton-Smith 1997). Isis added no particular value to the start-up process and provided little support in addressing the commercial and technological feasibility of proposed projects, attracting external investors or finding relevant managerial expertise. It was not proactive in the search for research with commercial value within the university.

Given these institutional failings, the academic founders of Oxford's first-generation PRB start-ups drew from an untraded pool of local entrepreneurial expertise that was informally coordinated. For example, in 1992 Professor Brian Bellhouse from the Medical Engineering Unit relied upon his daughter, a medical physicist, to assess the commercial feasibility of the needleless injection technologies that were to give rise to Oxford Biosciences, the predecessor of Powderject Pharmaceuticals. He attracted Paul Drayson as its managing director and major initial investor, a local healthcare consultant with previous experience of a management buyout backed by the 3i private equity group. Similarly, Oxford Molecular developed out of research by Professor Graham Richards from the Physical and Theoretical Chemistry laboratory. But Tony Marchington, a previous student of Professor Richards, who also had prior experience of starting his own local entrepreneurial venture, supplied the start-up commercial expertise. Non-PRB start-ups in the Oxford area also relied upon this informal pool of expertise. For example, Searle's UK operations near High Wycombe were acquired and subsequently closed by Monsanto in 1985. Using their redundancy payments, senior managers Brian Richards and Keith McCullagh raised £2.5 m. for a DBF venture. British Biotech was located in Cowley (a suburb of Oxford), which enabled the easy recruitment of ex-Searle employees and offered informal access to Oxford's PRB (Shohet 1998).

That said, the emergent Oxford industry was not devoid of formal, substantive institutions. Sir Martin and Audrey Wood formed the Oxford Trust in 1985. He was the founder of Oxford Instruments and had been an engineer in Oxford's physics department. With charitable status and independence from the university, the Trust aimed to promote a science-based development agenda in Oxfordshire. It emphasized in particular the concept of business incubation: providing specialized mentoring and premises to early stage ventures. The Trust's earliest project was the STEP centre incubator, formed in 1986 at Osney Mead. It provided access to government STEP funding and office space. Sir Raymond Dwek from the university's Biochemistry department located a fledgling commercial project there for six months in 1986. The people and funds that he assembled eventually led to the formation of Oxford Glycosciences.

The Trust proved adept at encouraging private investors to commit to small-scale incubation centres, and during the first generation it founded the Oxford Centre for Innovation in 1994 (the renamed STEP centre), the Milton Park

Centre in Abingdon (1992), and the Cherwell Centre in Heyford Park (1995). Oxford Innovation Ltd was founded by the Trust in 1991, to provide commercial management to this expanding range of innovation centres and consultancy to local enterprises. Other first generation networks were also formed under the aegis of the Trust. The Innovation Forum was founded in 1987 to encourage informal exchange between local entrepreneurs and the Oxford Investment Opportunity Network began in 1995, enabling entrepreneurs to present their proposals to a large number of potential investors at the same time.

Through its role in the provision of business incubation services and introductions to investors, the Trust was a pivotal institution in the first DBF generation in Oxford. For example, Oxford Asymmetry was founded on the science of Professor Steve Davis from the Dyson Perrins laboratory, originally commissioned by BP plc. After refocusing its research priorities in 1991, BP suspended the programme. Davis was introduced to local investors by the Oxford Trust and the resulting start-up was located in the Milton Park incubator. The Trust also facilitated the appointment of Tim Cook as the managing director. He was a one time Oxford doctoral student, divisional manager at Oxford Instruments and local business 'angel'.

The initiatives of the Trust were complemented by the Oxford Science Park development. This opened in 1992 as a private concern with backing from the Prudential Assurance Company and Magdalen College. It provided both independent units for established enterprises, such as a research outpost for the Japanese pharmaceutical firm Yamanouchi and more flexible premises for recently incorporated bio-businesses. Fifteen Oxford biotech firms are currently based on the expanded site.

These efforts notwithstanding, by the second half of the 1990s the feeling was widespread amongst Oxford's bioscience elite that the level of private start-up investment was suboptimal. They perceived ongoing inefficiencies in the supply of necessary start-up LCCGs. Without correction these would prevent fledgling local projects from accessing the United Kingdom's relatively well-functioning larger scale private equity market. A more active local institutional agenda emerged to address this congestion, focused in particular upon the Oxford Trust and a bolstered Isis Innovation.

Second Generation Central Government Initiatives

New Directions in UK Innovation Policy

This local activist institutional turn is being encouraged by intervention from central government. Although a good deal of UK industrial policy remains essentially competition policy, increasingly during the second half of the 1990s both the Treasury and the Department of Trade and Industry (DTI) have advocated certain 'new growth' solutions to the United Kingdom's ongoing productivity problems. In contrast to neoclassical orthodoxy, these assume that the policy to influence endogenous investment decisions can have permanent and not just transitory

effects on the rate of technological change, and thereby the growth rate. This new productivity agenda has focused less on raising the rate of fixed capital formation, especially in manufacturing, than it has on raising human capital accumulation and encouraging innovative activities in knowledge-intensive sectors. The range of initiatives taken by central government to achieve the latter objective include policy-based attempts to improve upon the supply of equity, infrastructure, and technology transfer resources.

One set of mechanisms builds on a fairly consistent policy tool in the United Kingdom towards SMEs in recent decades: easing their tax position and assisting them with access to investment funds (Assimakopoulou 1998). Tax breaks have been developed specifically to help highly innovative firms, such as the DBFs. The problem is that such firms' technologies often have long lead times before they become profitable, meaning start-ups do not tend to have taxes payable. However, they are keenly focused on fund-raising and cash flow, elements which tax policies can influence. For example, the Enterprise Investment Scheme, Venture Capital Trusts, and capital gains tax taper are designed to encourage private investors to commit to smaller unquoted and high-risk firms. Similarly, under the R&D tax credit, companies not yet paying taxes due to accumulated losses can claim repayment of tax credits for expenditure qualifying as R&D.

An emerging policy form, and one slightly removed from conventional UK policy practice, is to distribute a limited amount of centralized public money to encourage the creation of heterogeneous local coalitions to provide particular innovation goods. Partly led from the centre, this 'institutional seeding' relies on local endogenous coalitions to contribute personnel, ideas, and matching funds. The approach is typified by the 'University Challenge' funds provided in the science budget. Since 1999, local or regional PRB coalitions have been able to bid for public investments to establish seed-corn funds to address a significant obstacle for all embryonic academic spin outs: finding the initial funds to cover feasibility studies or market research and developing prototypes or a business plan.

An even more distinctive departure for policy within the current productivity agenda is the use of central public funds to pump prime regional development agencies. The agencies will use these funds to generate private matching funds and allocate them according to regional strategic business plans (e.g. Regional Venture Capital funds and Regional Innovation funds). It is still early days for the English RDAs, which have also taken on various regional marketing and networking functions. This policy mechanism is better established in Scotland and Wales, where the regional economic development agencies have taken a more active role for longer.

Sectoral Policy

Leaving aside regulatory issues, the initial form of government support for the biotech sector focused largely on developing new markets by informing all industries how they could benefit from the application of

biotechnology. The DTI established a Biotechnology Unit for this purpose as early as 1983. This strategy has deepened in the recent past. For example, the Unit's four-year awareness campaign 'Biotechnology Means Business' was succeeded in 1999 by the larger 'Biowise' programme, again aimed at increasing the home market for UK industrial biotechnology by encouraging the industrial use of biotech advances.

In keeping with its recent development of a broader productivity agenda, the DTI has hosted various strategic reviews to consider how to extend the government's approach towards the biotech industry. For example, Lord Sainsbury convened a review of Biotechnology Clusters, which reported in August 1999 and sought lessons from the United States and Germany. The DTI also established the Genome Valley Steering Group in April 2000, named after a report (December 1999) that had outlined how the UK could remain at the forefront of the European biotech industries. These consultations sought to build on a series of national initiatives during the second generation to address the inefficient flow of start-up goods to bioscience entrepreneurs, especially to those employed in the PRB. The main biotech initiatives reflect the emergent 'institutional seeding' policy approach that the central government has learned in recent years.

For example, the DTI wanted to improve the provision of specialized infrastructural and advisory services to all fledgling DBF projects through its 'Biotechnology Mentoring and Incubator Challenge' (BMI). Funds are distributed as contributions (not in excess of £500,000) to the costs of establishing dedicated incubation projects. These might be bricks and mortar initiatives that provide specialized premises to recently incorporated businesses at subsidized rates and on flexible leases. Or they might provide mentoring services to facilitate start-up at little or no cost. Bids were submitted by various coalitions in four competitive rounds between 1997 and 1999, which brought the award of twelve grants. Three of these resulted directly in physical infrastructure, the others creating 'virtual' mentoring agents with local or national remits. The BMI platforms also serve as models for a broader programme of planned investment into local incubation infrastructures (e.g. Business Incubation Funds and Regional Innovation Funds).

The DTI has also initiated a scheme to enhance the provision of specialized technology transfer services to academics whose research has commercial potential. To this end, twenty 'Biotechnology Exploitation Platforms' (BEPs) have been established across the United Kingdom since 1998. These platforms aim to provide something more than the classic university-industrial liaison offer by combining syndicates of PRB institutions and bringing in individuals with dedicated biotech IP or DBF academic spin out experience. Again DTI funds are distributed to the most promising consortia in rounds of competitive bidding, the latest of which was in December 2001. The BEP concept seems to be favoured over the BMI by the DTI, with further bidding rounds planned. In particular, BEPs have come to be regarded as a good way to

encourage National Health Service trusts to consider their IP potential and to encourage 'thematic' national consortia with particular IP skills in delineated scientific disciplines, for example, Diagnox (diagnostic biotech), UK MicroBEP (microbial science) and Bio-Thrust (micro-systems/micro-fabrication).

In these biotech-focused institutional seedings, the DTI has used competitive bidding procedures to reward the formation of inclusive coalitions of local notables. These tended to include private sector and PRB professionals as opposed to the local government or the regional development agencies. The intention has been for public money to promote rather than 'crowd out' endogenous initiative. The relatively small sums received through the Biotech and University Challenges schemes required these coalitions to raise private matching funds when establishing the new institutions. The DTI hoped that good institutional practices learnt in the short term during these programmes would be continued by the coalitions in the long term on the basis of private investment into the new support architectures.

Second-generation Local Initiatives

The maturity of such coalitions of entrepreneurial bioscience notables varies widely across the country. In some cases they were forged more or less from scratch, in response to the bidding process. In others, such as Oxford, central strategic intervention has galvanized extant coalitions and supported their own strategic thinking about ameliorating the provision of local collective start-up goods.

For example, the university bolstered Isis Innovation early in the second generation.⁴⁰ Since 1997, Tim Cook has reinvigorated Isis, having moved from Oxford Asymmetry after seeing it through its initial public offering. The staff at Isis has grown during the second generation from three to eighteen, and its project managers are much more proactive in seeking promising research projects to either license out or spin-off commercially. For example, Isis now maintains a permanent desk in the university's John Radcliffe hospital. The Isis Angels Network was also established as a vehicle for the introduction of potential investors and managers to founder academics. Since 1998 there have been 24 Isis spin outs, including ten biotech firms. Strategic DTI funding should consolidate the self-reformation of Isis Innovation. It received a £300,000 grant from the BMI challenge in July 2000 to establish Oxford Bioform. This focuses on optimizing mentoring processes in the university during the stages up to and including

⁴⁰ The University also set up Oxford University Consulting Ltd to assist its researchers in providing consultancy services to industry. This complements the Research Services Office that continues to manage external and commissioned research contracts for University researchers.

incorporation.⁴¹ It is also a leading partner, together with Oxford Innovation, in the diagnostics BEP Diagnox.

In addition, Isis manages the Oxford University Challenge Fund, in conjunction with Questor Capital Management, an independent venture capital business. In March 1999, Oxford received a £3 m. DTI award to establish a £4 m. seed capital fund to invest in the very earliest stages of start-ups.⁴² The fund does not invest in existing companies, but aims to support early stage projects: initial proofs of concept, pre-patent research, reduction to practice, commercial demonstration, and spin out. The fund also expects an allocation of any revenues generated by the investment, be it a share of licensing income or an equity holding. In this way, the fund aims to become self-sustaining in the medium term. Investments under £25,000 are made on the recommendation of Isis and Questor. Larger investments involve the Investment Advisory Board, comprised of six cluster notables including Professor Richards (Oxford Asymmetry), Paul Drayson (Powderject), and Sir Peter Williams, former chairman of Oxford Instruments, then Master of St Catherine's College, and also chair of Isis.

In a complementary initiative, the University and twenty-seven colleges formed in 1999 the Isis College Fund, with Questor as fund manager. The fund aims to provide second and third stage funding to develop projects emerging from University Challenge seedcorn. Excepting Magdalen, colleges were significant absentees from first-generation activities. By providing follow-on funding to proven University start-ups, the £11 m. should offer them a more secure financing opportunity. Questor is not the only local private equity firm with particular interest in early stage investment opportunities. In 1997 Lucius Cary established the Oxford Technology Venture Capital Trust.⁴³ In two funding rounds, it has raised £10.8 m. from investments to sink funds into 43 technology businesses around Oxford. Unlike larger scale venture capital providers, the fund provides a relatively small investment on a typical time horizon of between five and ten years and has invested in numerous local DBFs. For example, it invested £150,000 in Synaptica, an Isis DBF founded by a professor of pharmacology at the University. The latest Oxford Technology VCT was announced in February 2002.

The Oxford Trust has extended its role as a pivotal institution in the supply of start-up goods to the biotech cluster. For example, the Oxfordshire BiotechNet was a significant second-generation initiative to encourage recent local start-ups. The project was conceived during 1997 by the Oxford Trust

⁴¹ It is worth noting that Oxford Brookes University has also become engaged in the provision of LCCGs to the biotech cluster. For example, it recently started a degree course in biopharmaceuticals: twenty firms are represented on the steering group overseeing the course, many of them local.

⁴² Precise contributions to the fund are: £1.4 m. HMG, £1.6 m. Wellcome Trust, and £1 m. Oxford University.

⁴³ Cary is a senior figure in the United Kingdom's private equity industry, having set up the country's first formal network for raising funds from angel investors, the Venture Capital Report (1971).

(Bradstock 2001). It received a £400,000 award from the BMI in 1998. This was more than matched by 3i, Barclays Bank, Oxford Instruments, and the Yamanouchi Research Institute with the result that the Oxfordshire BiotechNet Ltd was formed under the chairmanship of a former research director at British Biotech. Soon afterwards in August 1999, the Oxford BioBusiness Centre was opened at the Littlemore Park development, on a site provided by Yamanouchi. Currently, 12 bioscience start-ups are taking advantage of its serviced laboratory space at reduced cost and on flexible leasing terms. The incubator has taken small equity holdings in some of its resident firms and its general manager may sit on their board. The BiotechNet can additionally call upon interim managers and secretarial services through its links with Oxford Innovation.

Through Oxford Innovation, the Trust has also extended its range of innovation centres, with 25 per cent of tenants being involved in healthcare or biotechnology. For example, in 2000 it opened a centre on Harwell Park, a major infrastructural development to the south of Oxford, transforming the site of the old UK Atomic Energy Authority. The Trust also provided £75,000 to set up a dedicated business incubator unit on the Begbrooke Science and Business Park. This is a £23 m. development opened in June 2000 that houses both the University's Department of Materials and accommodation for Isis spin outs.⁴⁴ In the past year, Oxford Innovation has been involved in founding centres elsewhere in the South East of England, with its network of ten innovation centres now including the Portsmouth Technopole and the London BioScience Centre. A proposed new chemistry research building may also bolster the DBF sector in future. The University has struck a novel deal with the investment bank Beeson Gregory to acquire funding for this site. They will contribute a third to the £60 m. price tag and receive in return half of the University's equity stake in any start-ups emerging from the building.

In addition to the increased provision of specialized 'wet' laboratory premises in the second generation, there have also been attempts to improve the availability of post-incorporation mentoring services to Oxford bioscience entrepreneurs. Various initiatives have structured the informal pool of start-up advice that characterized the first generation in Oxford into a more formal collective good. For example, the BiotechNet has developed a 'Mentoring Network' to which 45 expert organizations contribute. Free or heavily subsidized advice is available to second-generation start-ups via the network from British Biotech, Oxagen, Oxford BioInnovation, and Oxford Instruments. Similarly, the Oxfordshire BioLink was established in October 1998, initially under the auspices of the BusinessLink Heart of England at the Abingdon Science Park. Its chairman is Peter Nolan, director of operations at Oxford BioMedica and one-time head of the DTT's Biotechnology

⁴⁴ £8 m. towards the development comes from the government/Wellcome Trust Joint Infrastructure Fund.

Unit. The BioLink organizes regular seminars and social events that are well attended by local entrepreneurs. Local firms often host these events, frequently British Biotech. In addition, the network has made some efforts to create a unified brand for the cluster: 'Oxfordshire Bioscience'. For example, in 2000, it represented second-generation Oxford start-ups at the Bio2000 trade fair in Boston, Massachusetts and at Achema 2000 in Germany. Finally, the Oxford Trust represents all local hi-tech industries in the European KREO network (founded 1998). This aims to exchange best practice for encouraging local entrepreneurship and links Oxford to Karlsruhe, Grenoble, and Bologna.

To assess the impact of these developments, Table 15.3 reports the findings of a recent Oxford postal survey carried out by the author, in which

Table 15.3. Rating of LCCGs by Oxford DBFs^a

	Not in the least	Not particularly	To some extent	To a considerable extent	Fully
Quality research staff	0	2	2	5	5
Quality management staff	0	3	7	3	1
Appropriate premises and leasing opportunities	0	0	5	8	1
Informal access to innovative ideas	1	0	6	6	1
Amenable local living environment	0	0	2	10	2
Contact with first round funding sources	1	7	3	2	1
Quality advice for start-ups	0	3	8	2	1

^a Question: To what extent do you judge each of the following to be currently available within the local Oxford area?

Source: Own calculations.

first-generation DBFs were asked to rate the current availability of necessary start-up goods within the Oxford area. In particular, incumbent DBFs appear content with the provision of suitable premises and specialized laboratory space, a clear advantage over other areas of the United Kingdom. The ready availability of research staff on local labour markets is another local asset. However, there are still slight concerns about the availability of business start-up advice, specialized management, and, particularly, first round equity in the Oxford cluster, although these are much improved during the second generation.

Reflections on the British Model

During the 1990s, British manufacturing remained vulnerable to overseas competition, partly due to the strength of sterling and partly due to ongoing productivity and innovation problems. At the same time, however, the United Kingdom followed the United States into a new economy boom in high- and information-technology development. According to stylized 'varieties of capitalism' models these hi-tech successes were rooted in the comparative institutional advantages of the liberal market economy (Hall and Soskice 2001). According to this model, in sectors where technological standards are disrupted or emergent, liberal market economies are adept at creating environments for private equity holders to hold tournament games among initially funded firms for subsequent staged financing. While losers exit, winners can complete projects, access public equity markets, and, in the case of biotech, shift proprietary technologies out as revenue earners in the market for ideas. The fluidity of asset and labour markets also encourages these developments, by making it straightforward for entrepreneurs to release or take on assets as new opportunities arise or fade.

The common features of the first generation of entrepreneurial bioscience in the United Kingdom broadly agree with such a stylized model. Particular individuals, both academics and those with prior industry experience, had to take the initiative with promising projects to advance them beyond a certain point, when they might be cherry-picked by national venture capitalists. Many such initiatives remained isolated, although in a few places (Cambridge and Oxford), the agglomeration of individual efforts created localized economies that improved the relative price and local availability of necessary start-up goods. However, these local markets did *not* always operate at arm's length: their coordination was rarely anonymous; and most individual initiatives were able to draw upon untraded pools of expertise.

This was the case in Oxford where, in addition, the Oxford Trust played a varied role in the local cluster: formalizing the delivery of untraded goods, offsetting the costs of anonymity in local markets, and itself substantively providing a range of start-up goods in lieu of an under-resourced Isis Innovation.

The University in Cambridge was *laissez-faire* in technology transfer. It adopted looser employment contracts, enabling researchers to take on any additional external position provided their academic tasks were completed satisfactorily. Similarly, it made no claim on the IP developed by its employees. Individual academics were under no obligation to share revenues from inventions.⁴⁵ In return, the university had no obligation to provide substantive technology transfer resources. Unlike in Oxford, there was no significant alternative formal institution to the university in coordinating the delivery of LCCGs, meaning they were largely market-mediated. The agglomeration of innovative electronics, instrument engineering, and computing sectors in Cambridge from the late 1970s meant that entrepreneurial LCCGs were readily available on the local market. Again, local entrepreneurs relied on endogenous and informal forms of coordination to supplement what they could achieve through anonymous markets. In addition, many cognitive LCCGs, notably early stage management expertise, were available as untraded external effects of these local hi-tech sectors (Segal, Quince, and Partners 1985).

For all its successes in creating a robust core of biopharmaceutical high innovators in the United Kingdom, this serendipitous innovation architecture created some inefficiency. Finite market resources were focused exclusively on a very limited range of locations, to the detriment of promising science elsewhere in the country, and the overall level of investment in start-up seemed sub-optimal. In particular, private equity tended to focus on post-seedcorn stages, meaning there were barriers to establishing a workable business plan for highly innovative science. Similarly, British universities for much of the 1990s devoted more resources to the narrow notion of technology transfer, in which proprietary IP was used to earn revenues from contracts with large (international) firms, rather than licensed out to PRB spin outs that can participate in tournament-based innovation games.

Nevertheless, there was a marked uplift in the entrance of dedicated DBFs during the second generation. An element of this can surely be explained by the improved conditions for hi-tech investment during the second half of the 1990s, which expanded the range of available start-up resources and improved their relative prices, particularly in the established clusters. However, the upturn also stemmed from institutional innovations that improved the availability of important resources (bricks and mortar space, seedcorn, and specialized IP advice) and directly determined the more complex clustering pattern that defines the UK dedicated biotech industry today.

Although the second-generation governance regime in the United Kingdom remained largely market-driven, a bundle of exogenous initiatives began to encourage behaviour not immediately determined by market incentives. These

⁴⁵ Although, in practice, many founder academics in Cambridge tended to make a voluntary contribution to their home departments.

represented a new approach for the latter day DTI: a shift towards greater substantive involvement. The initiatives were designed to address perceived inefficiencies in the supply of LCCGs to biotech entrepreneurs, paying particular attention to potential academic founders. In established clusters such as Oxford and Cambridge, the level of first generation academic biotech start-up was regarded as sub-optimal, largely as a consequence of the weakness of formal technology transfer regimes. For example, it is noticeable that in Cambridge, a cluster largely devoid of formal institutions, PRB start-ups were under-represented in the early development of the sector (Shohet 2000; Segal, Quince, and Wicksteed 2000). In these clusters, the DTI challenges ran with the grain of contemporary endogenous efforts to upgrade LCCG availability, as shown by the Oxford story recounted here. To take just one example from many in London, Imperial College formed a wholly owned technology transfer company (IC Innovation) in 1998. Shortly thereafter this operation profited from a BEP award to establish IC Company Maker, a specialized team that has been behind several Imperial College biotech start-ups.

In more embryonic clusters, first-generation entrepreneurial bioscience also suffered from under-resourced technology transfer offices. But neither did it obtain the critical mass necessary to create sustainable local markets for specialized LCCGs nor did it obtain pools of untraded cognitive resources. In some areas, there were *ad hoc* local projects to improve the substantive provision of these goods from the mid-1990: for example, the Manchester biotech incubator or the Bioscience York brand.⁴⁶ These actors have been encouraged by the DTI initiatives to extend their efforts and have usually taken leading roles in the bidding coalitions. In other places, the coalitions have been formed more or less from scratch in response to the various challenges, for example, the White Rose Biotech Exploitation Platform (from 1997).⁴⁷ Although the precise exogenous mechanisms are different in Scotland, where Scottish Enterprise has taken an overall lead, the themes are similar.⁴⁸ Exogenous initiative in the second generation has encouraged the development of local coalitions to improve LCCG availability in the major cities (Edinburgh and Glasgow) and some more isolated provincial centres such as Dundee.

These exogenous initiatives have been successful insofar as they have helped to raise the aggregate scale of entrepreneurial biotech start-up since 1997, a phenomenon based largely on academic DBFs. However, it is too early to tell

⁴⁶ The idea for a biotech incubator near to Manchester University was in gestation from 1994 to 1999 and involved a variety of investors: the University, the Wellcome Trust, the European Union through the structural funds, and a local community input from the Hulme Regeneration Group. Bioscience York originated in 1995 with the city council, the University, and local business interests. It successfully bid for BMI challenge funding.

⁴⁷ This involves placing three specialized Biotech Exploitation Managers in the Universities of York and Sheffield. ULIS, the technology transfer office in Leeds, drove the bid and persuaded its PRB partners in Yorkshire that the notion of a regional platform was operable.

⁴⁸ It is worth noting that in contrast to Scottish Enterprise, the Welsh Development Agency has been far less involved in developing entrepreneurial bioscience.

convincingly whether these second-generation structures are doing anything other than raising the sectoral headcount. There is a marked difference between creating growth in sectoral scale and creating firms with the capacity to grow. This is seen very clearly in current concerns about the sustainability of the new industry in Germany. Its expansion in the late 1990s was based on much larger exogenous contributions in the form of substantive local institutions to provide specialized LCCGs (the 'Bioregio' offices) and significant injections of public risk capital. With their exclusive focus on promoting start-up, the German programmes have tended to spin out firms formed around lower-risk and more generic platform technologies that, given their numbers, are prone to commoditization. Admittedly, second-generation UK DBFs are more likely to be involved in the proprietary development of product concepts and delivery technologies with more enduring growth prospects. The challenge for the future in the United Kingdom seems to be to ensure that further public funds target very precise local market failures. The danger would seem to be that the more abundant funds promised under the new regional development architecture will create equity in search of projects, which could result in less sustainable businesses. Of equal concern in the United Kingdom is that without an established record of endogenous provisioning in some embryonic British clusters, exogenous attempts to jump start local sectors will have insufficient multiplier effects in local markets for LCCGs.

16 Recombining Governance Modes: The Media Sector in Cologne

ARNE BAUMANN AND HELMUT VOELZKOW

The audio-visual media industry⁴⁹ in Germany constitutes a new sector that resembles a local production system of the kind defined by Le Galès and Voelzkow (2001). The local clustering of this industry has been observed consistently across countries and in such diverse places as Los Angeles, London, and Paris (Storper 1989; Scott 1996, 2000; Pratt 1997). In Germany, Cologne, like Munich, Berlin, and Hamburg, represents such a local clustering, but it has developed more recently than these others. We here describe how the economy of the city and its neighbouring municipalities is characterized by a large number of media companies. We demonstrate that Cologne offers a large number of collective competition goods for the media industry and argue that the exceptional local growth of the industry results from the availability of these goods. We conclude, however, that in retrospect their availability is a secondary consequence of a set of political decisions, with the Cologne-based public broadcaster Westdeutscher Rundfunk (WDR) as the original starting point for the cluster.

The analysis reveals that the governance of the local economy diverges in many respects from the established mode of governance in the German economy (Glassmann and Voelzkow 2001), in particular, in relation to production structures, industrial relations, and corporate finance. These differ from traditional German industries as they are typified in the literature on the 'varieties of capitalism' (e.g. Kitschelt et al. 1999; Hall and Soskice 2001). This deviation is caused by sectoral specificities of the industry.

On the other hand, Cologne's media cluster confirms findings on other German local economies in traditional sectors like motor vehicles and steel: regional governments and their ministries, as well as corporatist arrangements between governments and business, are of major importance for the provision of collective competition goods. The resulting 'new governance for the new economy' fits in well with the traditional institutional environment of the

⁴⁹ The term audio-visual media industry, or media industry, will be used in this chapter as designating all economic activities that are occupied with the non-artistic areas of producing and broadcasting sound and imaging signals (i.e. motion picture and video production; production of radio and TV programmes; radio and TV broadcasting; organizationally affiliated parts of multimedia).

German political economy. The conclusion—in contrast to current arguments in the literature—is that Germany's political economy allows for innovation and the success of new industries by way of recombining institutional patterns. The flexible specialization of the many small media firms within a local production system that is reminiscent of Italian industrial districts is combined with a support infrastructure financed and organized by the *Land* government and corporatist arrangements typical of the German model.

The media industry is classified as a new industry in this paper. We want to set it apart from traditional industries like engineering, electronics, or cars and show that local production systems are significant not only in these areas but also in the new growth industries. There may be objections to this approach, because the media industry has already a history; movies and broadcasting are not new. But events in the media industry's recent history justify its classification as a new, and perhaps even as a 'high-tech' industry. The first event was the break-up of the public broadcaster monopoly in the mid-1980s and the introduction of private broadcasting and multi-channel television. This has completely changed the industry's size and character. The growth dynamic of private broadcasters has made the audio-visual media an industry with considerable economic significance and has set off a whole new branch of private production and service companies, which supply the broadcasters with content. The second event is technological. Since the beginning of the 1990s, the media industry has been digitalized, and the new information and communication technologies have changed both the demand and the supply side. Both events together have transformed the industry completely and make it a prototype for a new industry in the information society (cf. Mai 1998).

Industry Structure and Labour Market

Publishing and printing houses, film, television, radio, and multimedia companies constitute a spatial concentration, which has become known as the 'Medienstandort Köln', the media location Cologne. At times, it has even been called 'Hollywood am Rhein', Rhenish Hollywood (Peters 1998). Labour market and industry data show the growth of a local economy with the emergence of some big and numerous small media firms over the last twenty years. The media industry has increasingly gained in importance for the wider economic and labour market performance of the region.

Publishing and printing houses. Many of the well-established book publisher and printing houses have a history of several hundred years. More than 70 printing houses and publishers and 10 newspapers with around 8,600 employees characterize Cologne's print media (IHK Köln 2000). In addition, there are setting and graphics studios, marketing and public relations agencies, print and picture archives, public and specialized libraries, as well as

various specialized publishing houses. Well known are the art books published by Benedict Taschen and Könemann (Stadt Köln/IHK 2000: 12–13). However, more important than these for today's media location in Cologne are radio, television, and multimedia services.

Radio. The most important provider of radio services is the WDR, broadcasting 144 hours of programme every day on several channels. In addition, there is the *Deutsche Welle*, the German world-wide radio service, producing radio programmes in thirty-five languages focused on politics, economy, and culture in Germany. The *Deutschlandfunk* is a culture and news programme broadcasting nationwide. With three public radio stations, Cologne has the highest concentration in Germany. There are also numerous private regional radio services, which combine information on regional matters with entertainment programmes.

Television. In terms of broadcasting, Cologne and its region rank above the other German media locations Munich, Hamburg, and Berlin/Potsdam. In public and private radio and television broadcasting companies it has 8,600 permanent employees, compared to 4,900 in Hamburg, 4,500 in Munich, and 3,600 in Berlin (1997 numbers) (IW Informationsdienst 1997). Of central importance is the WDR. It employs 4,350 people permanently, and around 22,000 yearly on a freelance basis. After the break-up of the public broadcasting monopoly in the mid-1980s, the private broadcaster (Radio Television Luxemburg (RTL)) opened its German headquarters also in Cologne and has continuously expanded its network since then. It employs around 900 people on permanent contracts and approximately 1,200 on a freelance basis every year. During its fifteen years of existence RTL has managed to take the top position of all broadcasters in terms of audience share. In addition, Cologne has a number of smaller broadcasters as, for example, the international service Deutsche Welle tv, the politics and history channel Phoenix, private broadcaster Vox, and music channels VIVA, VIVA Zwei, and OnyxTV.

In addition to broadcasters, Cologne hosts a considerable share of Germany's film production capacity. In 1997, 590 production companies were located in Cologne and the larger area, employing 1,450 permanent employees (DIW 1999: 20). As production companies' freelance personnel usually make up 60–70 per cent of their entire staff, at least another 1,500–2,500 freelance professionals work regularly for these companies. Although coming second in employees after Munich and third in sales after Munich and Hamburg, Cologne displays the highest growth dynamic of all four German media cities in terms of production capacities: more than 40 per cent of all production companies are younger than five years old, and compared to the other three cities its companies have the highest sales expectations for the future (DIW 1999: 20, 23). More than in other cities, this growth dynamic is linked to the increasing volume of productions for television. Programme volume has grown continuously over the last twenty years as a result of both

the increase in channels and of daily programme hours broadcast by each channel. The volume of domestically commissioned and produced material as opposed to the buy-in of licences for predominantly US productions has also steadily increased during the last decade (European Audiovisual Observatory 1997: 153). Private broadcasters have commissioned the majority of their programmes from outside producers from the start, while public broadcasters have outsourced production to an increasing yet varying degree (Isadi 1999; Reiter 1999; Seidel 1999). The result of commissioning, outsourcing, and increasing programme demand has been the emergence and massive growth of production companies during the last fifteen years. By the same token, allied specialized service companies like camera equipment, audio and post-production studios, lighting, props, costumes, and special effects have settled in the Cologne area. The example of RTL is illustrative for the involved knock-on effects in media production: it commissions its programme from independent producers and subsidiary production companies. While the subsidiaries alone employ 640 people on a permanent basis, it is estimated that approximately 3,100 people are employed through independents working on programmes for RTL.

Information and communication technologies (ICT), multimedia. Growth effects can also be observed in the new information technology and communications industry. The industry is a close neighbour of the traditional media sectors like television and radio. On the one hand, computer technology like, for example, virtual studios, has promoted new production and work organization in the traditional media. On the other hand, the need for content in online services has led traditional media to establish themselves in the internet market and become multimedia players. The RTL subsidiary RTL New Media, for example, develops the growing online services of its broadcasting parent. RTL's reality soap opera 'Big Brother' was not only broadcast on television but also via the internet, which drew as many viewers as the televised version. With respect to the combination of traditional media and ICT, Cologne with its strong position in traditional broadcasting and production has an obvious advantage over other locations. Numerous companies engaged in network technology and communication hardware, like Colt Telecom, Deutsche Telekom, Dolphin Telecom, Vodafone, and NetCologne, add to Cologne's profile in the new economy sectors (Stadt Köln/IHK 2000: 3).

Local Concentration of the Media

In a first summary, we can identify a strong local economy of the new media in Cologne. This concentration has grown over the last 15–20 years and has compensated, at least partially, for job losses in the traditional industrial sectors of the region. From 1985 until 1997, employment in the media industry has grown twice as much as the average of all industries in North Rhine-Westphalia

(13.5 per cent compared to 5.4 per cent). For the period 1990–1998, Cologne displays the second highest employment growth in the media industries nationwide, after Munich but ahead of Hamburg, Berlin, and all other cities (DIW 2000: 5). According to Cologne's city council and the chamber of industry and commerce (IHK Köln), every fourteenth job (6.8 per cent) in Cologne is by now in the media industry (IHK Köln 2000).

Why Do Media Firms Cluster in Cologne?

In Cologne, companies have access to an institutional environment that externally supplies relevant resources, which companies, because of their average size, cannot produce for themselves. Accordingly, the availability of competition goods is a support for the industry's local economy and can be seen as one possible explanation for its local concentration and above average growth.

Specially Developed Sites

The Cologne region hosts several specially developed sites for the industry. They provide technical infrastructure for media companies in general and for production companies in particular. There are three sites: two within the city limits of Cologne, another one in Hürth, a municipality bordering the city.

The *MediaPark*, the most famous of these sites, is located in the centre of Cologne and covers 200,000 square metres of land. It hosts broadcasters VIVA and VIVA Zwei, Onyx, radio stations Radio Köln and EinsLive, a cinema complex, and numerous production companies and event agencies. A number of training centres specialized in qualifications for the media industry have also set up business there. The *MediaPark* has consumed investments of more than a billion deutschmarks. The companies offer permanent employment for approximately 2,200 people, and another 750 work there on a freelance basis. Its *KölnTurm*, an office tower, rivals the cathedral as Cologne's new landmark building.

The *Coloneum* is a recently developed site on a former military airport on the outskirts of Cologne. Over an area of 370,000 square metres over twenty studios offer their services for film and television productions. A qualification centre for training in media occupations will host private training providers and the public Cologne vocational school for media-related trades. The necessary investments of more than a billion deutschmarks were financed by a privately established fund. The state of the art equipment of the studios is supposed to attract not only German but also international productions. The Magic Media Company (MMC), a private company specialized in studio services and already a studio provider on the Hürth site, has taken a lease on the majority of studios. If investors' expectations materialize, the *Coloneum* will employ up to 8,000 people when used to full capacity.

The *Medienareal* in Hürth was the first of the specialized sites. It has grown in a piecemeal fashion mainly as a result of studio investments by MMC and the Netherlands Broadcasting Services Corporation (NOB), the production arm of the public Dutch Broadcasting Association (NOS). More than twenty production companies and service providers have set up business on the same site as a result of the proximity to the studios. Today, approximately 800 people work on the *Medienareal* on a permanent contract with more than 1,000 on a freelance basis (Geschwandtner-Andreß 1999: 49).

Enterprise and Project Finance

Film and television productions require capital. This is reflected in the growth of specialized services from Cologne's banks and insurance companies for the media industry. Private banks like Deutsche Bank and Dresdner Bank have formed separate departments specializing in entertainment finance in both traditional and new media. Deutsche Bank has two teams for the media industry that operate in Cologne and also service the rest of Germany. Dresdner Bank has a special Financial Engineering Team in Cologne, which offers capital market products to media companies, issues shares, and assists in initial public offerings (IPOs). The Cologne-based Gerling insurance group also increasingly focuses on the local media cluster and now offers specialized policies in order to reinsure creditors engaged in film and entertainment projects.

More interesting in terms of collective competition goods, however, are the services of the Stadtparkasse Köln, the public savings bank controlled by the City of Cologne, which has been at the centre of the city's activities in the media industry from the beginning. It serves as a promoter of investments in the media industry, either as a creditor and partner for company, project, or investment fund finance or as a shareholder in companies active in media and entertainment. Its SK Entertainment Finance department was formed in 1991 and has a portfolio volume of DM 1.8 b. (Wand 2001: 54). A separate subsidiary offers consulting services especially for the mainly small enterprises of the media industry. Its share holdings include a 25 per cent stake both in MMC and the telecommunications provider NetCologne, and its chairman is a member of the supervisory board of Brainpool TV AG, a production company now famous for its comedy shows and a symbol of the success of Cologne's media industry.

The Stadtparkasse Köln also holds an 83 per cent share in the Multimedia Support Center, founded in 1998, which offers consultancy services and venture capital for start-ups in the media and multimedia industries. It is backed by more than DM 30 m. of funds from the regional government of North Rhine Westphalia (NRW) and the German federal government. Its activities span the provision of office space for start-ups in Cologne, investment in start-up companies nationwide, the drawing up of business plans,

and global networking with universities and companies for promoting technology transfer and strategic alliances. Its headquarters are located on the *Coloneum* site described above.

Research and Development

Research and development are mediated mainly through the universities of the greater Cologne area. Relevant especially for the media industry are the Kunsthochschule für Medien, the film school, and the Audiovisuelles Medienzentrum, the audio-visual media centre, of the University of Cologne. Special research for props and lighting is done in the Institut für Licht- und Bautechnik, the institute for lighting and building technology, of the Technical University of Cologne. In St Augustin near Cologne, the GMD (Gesellschaft für Mathematik und Datenerarbeitung) research centre for information technology, part of the Fraunhofer research institutes, has developed virtual studios where specialized camera equipment and computer facilities allow for television shows with any kind of background. Private technology firms specializing in production-related hardware and software add to the research and development potential in the region.

Qualifications and Vocational Education and Training

There are close to forty courses at universities, technical universities and art schools in NRW offering specific media degrees, and another thirty courses that are of relevance for the industry. On the national level, eleven new training programmes in Germany's dual system of vocational education and training have been introduced for the media and ICT industries since 1996. Programmes for further training are offered by private providers as well as by adult education centres.

Especially relevant for the media cluster are those qualification and training schemes that have been established directly in Cologne. Partly, these are publicly funded, partly they are the result of private initiatives. The NRW Schreibschule, the NRW writing school, was established in 1995 and is fully funded by the regional government. Its purpose is to train talented young people to become script writers for film and television. Courses are conducted by experienced directors, authors, and script writers in order to guarantee the practical orientation of the training. By now, graduates from the Schreibschule have a good reputation with producers and see their scripts regularly made into movies, TV productions, or comedy shows. The Filmschule NRW, the film school NRW, founded in 1996 and also located in Cologne, is based on the same concept. Its focus is on training for such film crafts as costumes, make-up, and props. It offers twelve-month courses where workshops and theoretical seminars are combined with short spells of practical learning inside production companies. Practitioners from the relevant crafts are responsible for the teaching. Both schools were merged in 2000 into

the Internationale Filmschule (the International Film School), with a view to offer qualifications not only in the region but also for the greater area of NRW, Belgium, and Luxembourg.

The so-called KoordinationsCentrum Ausbildung in Medienberufen (AIM) is another project funded by the regional government. It was founded in 1995 and serves to establish transparency in the initial and further training activities in the Cologne area. At the time, the numerous routes into the industry (e.g. through work experience in companies, only partially relevant apprenticeship schemes, or various university courses) and the multitude of job titles used produced a confusing scene for individuals trying to enter the industry as well as for companies looking for qualified young staff. It offers a number of services: for industry entrants, it has a database in which approximately 150 jobs in the media industry are described in terms of job contents, required qualifications, and training possibilities. For established freelancers, it offers individual consulting for determining training needs and career possibilities. And for media companies, information on contents of training courses and the substance of professional titles is provided to enable them to judge what is behind certain training certificates or titles. The training institutions themselves can obtain information on what kind of qualifications are needed in the industry and how best to design their courses so as to provide marketable skills.

The Medienschule Erftkreis, a privately run media school in the suburbs of Cologne, offers training courses in production management, post-production and camera, sound, and lighting. It was founded in the early 1990s by private broadcaster RTL, studio provider MMC, and a number of prominent production companies like NOB and Endemol. The Kreissparkasse Köln and the Cologne chamber of industry and commerce (IHK Köln) are also members of the holding association. Courses are for employees of the supporting companies and also for external and freelance workers who are willing to pay the fees. Broadcaster RTL together with Bertelsmann and the Stadtsparkasse Köln has recently also opened up a journalism school in the *MediaPark* which offers a two-year training course for young television journalists.

Trade Fairs and Events for the Industry

Numerous trade fairs and media-related public events provide Cologne and its media firms with the opportunity to present themselves to the public and to interact with each other. Specialized events like, for example, Orgatec, Photokina, and Infocamm are held at Cologne's exhibition centre. The yearly Medienforum NRW brings together companies, broadcasters, individuals, and institutions engaged in media production and is known as a hotbed for new film and television projects. The PopKomm is a multi-stage, four-day concert cum trade fair covering most of Cologne's centre where numerous national and international pop acts perform. It has a nationwide reputation

for its concentration of stars and the identification of new trends in pop music. Of increasing importance for self-presentation of Cologne's media industry are awards ceremonies like, for example, the Deutscher Kamerapreis Köln (the German Camera Award Cologne), the Deutscher Fernsehpreis (the German Television Award), and the Kölner Medienpreis für Journalisten (the Cologne Media Award for Journalists).

How Did the Cluster Emerge?

In the beginning of the 1980s, Rhenish Hollywood or the existence of a media cluster in Cologne were far from a realistic prospect. Cologne's transformation into a media location demands an explanation beyond a simple factual description. Except for the WDR, Cologne had no significant resources supporting a strong local media economy. Consequently, our hypothesis is that the origin and success of the cluster requires a political explanation. The *Land* government of NRW, which directed its attention early on to supporting the media industry, has been a particularly key player. Political initiatives have taken two forms. On the one hand, today's growth is a result of the break-up of the public broadcasters' monopoly, though these latter offered collective competition goods for other firms in the formation period of the regional cluster. On the other hand, the regional government has supported associational actors of the growing media and information industries in their attempts to provide such goods. A condensed historical account identifies a multi-stage genesis of the cluster.

Until the late 1980s the WDR was a vertically integrated broadcaster that performed all functions in the value chain of producing and broadcasting programmes (for this typology, see Tunstall 1993: 6–7). As a large organization, it had enough internal resources to produce its radio and television programmes autonomously. What are now collective goods were then private goods the broadcaster provided for itself. The public broadcasting monopoly allowed for the necessary organizational capacities that made an autonomous provision possible. The collectivity of firms that would consume collective goods was also not yet in existence.

Meanwhile, in its search for new and promising economic sectors that could compensate employment losses in the declining traditional metal industries, the *Land* government identified the media industry as a potential candidate for bringing renewed prosperity. Decision makers having to deal with the social and economic consequences of the traditional industries' decline did this even before the break-up of the public broadcasting monopoly.

Land NRW and the existence of the WDR were important for the success of the second stage of the growth process. As part of the constitutional competencies for cultural policies, broadcasting policies lie with the regional states in Germany, not with the federal state. Consequently, with the break-up

of the public broadcasting monopoly, the *Länder* were responsible for drawing up the regulatory framework for private broadcasting. Each *Land* licenses those private broadcasters that locate their physical offices in its territory, though the firms are then able to broadcast nationwide (Hoffmann-Riem 1996: 128). In times of terrestrial broadcasting, this regulatory competency was used to enforce cultural or other content standards through control over the limited number of frequencies (Mai 1998: 106). With the arrival of satellite and cable broadcasting and the increasing economic importance of the audio-visual media, however, it became the regulatory basis for an ongoing competition between the German regional governments for attracting media businesses to their states through regulatory incentives, the so-called *Standortwettbewerb* (Hoffmann-Riem 1996: 349). What has its roots in the cultural autonomy of the regional states has thus become a means of competing for the economic potential of media businesses. In NRW, the social democratic (SPD) government, and especially the initiative of the then cabinet minister and later minister president Wolfgang Clement, were instrumental in using the regulatory framework for attracting one of the two big private broadcasters in Germany, RTL. The government's longstanding relationship with the NRW-based Bertelsmann media group that owns part of the RTL holding CLT-UFA proved vital in convincing RTL to come to NRW. It led to what is now called the SPD/Bertelsmann media coalition in the *Standortwettbewerb* (Humphreys and Lang 1998: 192).

Within NRW, Cologne was then almost a natural choice for both broadcasters and production companies. The WDR traditionally employed a large contingent of freelance employees that provided a personnel pool to which RTL, and later on also others, could have recourse. This was also true for prominent presenters and journalists working for WDR who were heavily recruited by the private broadcasters during their formation period. Neither the capital of NRW 'Düsseldorf' nor any of the other cities in the *Land* offered comparable conditions (Michel and Schenk 1994: 73). Once RTL had settled in Cologne,⁵⁰ the WDR and RTL in combination constituted a constantly growing potential as customers of independent production companies. In the beginning, the broadcasters had satisfied their demand either through bought-in American productions (especially RTL) or through commissioning to companies at other German media clusters, especially Munich. It was the vital interest of Cologne to alter this situation and establish a local production scene that would provide employment and tax revenue. In an interview, a city official described what then took place as informal lobbying towards RTL, and also WDR, to make them pay attention to commissioning local production. As a result, established production

⁵⁰ Another important reason for RTL's choice of Cologne in 1988 was Stadtparkasse Köln's favourable offer of a suitable office building (Kurp 1999: 17).

companies and service providers from other clusters opened local branches in the city, and new companies were founded. In a prominent example of this process, WDR asserted its influence as a shareholder in a major Munich-based production company and convinced it to open up a branch in Cologne; it is now one of the backbones of the Cologne cluster. Further politically induced support came in 1991 when the *Land* government and WDR founded the Filmstiftung NRW, a foundation that funds film productions and other media-related projects; and, by doing so, attracted new production companies and helped to develop the local production scene (Lutz et al. 2001: 8).

Corporatist Resolution of Bottlenecks

In a third phase, the growth of the media cluster had induced a need for collective competition goods that went beyond the surplus resources of the WDR and which the public broadcaster alone could not satisfy anymore. The many small production companies were not able autonomously to provide such required goods as: skilled employees, project finance, and production locations. Hence, the deregulation of public broadcasting and an overall growth of the market produced a bottleneck in the supply of collective competition goods.

The demand for qualified labour in particular had soon consumed the slack in WDR's internal and freelance labour market. In this phase, the support of the *Land* government and the City of Cologne was crucial. In search for experts in the process of policy formation, the regional government approached business organizations in media production for practical advice and the identification of the central problems of companies. These associations were the Federal Association of German Film Producers and two regional associations, the Association for Television, Film and Video Production in North Rhine Westphalia (VFFV) and the Association of North Rhine Westphalian Film Producers (Verband Spielfilm NRW). As will be described in detail below, together with these associations and the city, the regional government established a policy network that has produced numerous LCCGs for Cologne's media cluster. The resulting infrastructure provides the small and medium sized companies of the media industry with the required 'institutional thickness' (Amin and Thrift 1992) to thrive.

What is Different from the 'German Model'?

Had the protagonists of the flexible specialization school of the 1980s (Piore and Sabel 1984) known about the media industry in Cologne, the case would have quickly become an example of post-Fordist production in

neo-industrial districts.⁵¹ In contrast to traditional sectors of the German economy, the media industry displays production characteristics that tend to result in a local economy. This follows from the need for undistorted information flows between producing companies and broadcasters on the one hand, and companies and their freelance personnel on the other. It will first be explained how the media cluster in Cologne is locally bound because of the limits in communicating information. Next, the industry's corporate finance and industrial relations are described.

The Production Structure in the Media Industry

The market in which the many small production companies operate with their products, that is, fiction films, documentaries, series, talk shows, soap operas, and so forth, is dominated by the public and private broadcasting companies, which, in the case of non-cinema productions, are their sole customers. As opposed to the period until the mid-1980s, when the public broadcasting monopoly still held and the WDR was a vertically integrated broadcaster, today the WDR and the RTL network are mere publisher-broadcasters (Tunstall 1993: 6–7). To a large extent they are only publishing, that is, assembling and transmitting, a programme that was commissioned and acquired from outside producers. This puts the relationship between the industry's productive and its broadcasting branch at the centre of discussion about market and production structures. Production companies are subject to vertical market pressures much more than to horizontal competition within the production branch. This results from the asymmetrical relationship between the commissioning broadcasters and the production companies. The fixed sales prices for programmes and the bargaining power of the broadcasters are the decisive factors that enforce cost competition. The dualism of big broadcasters and small production companies reminds us of the large firm model of governance that can also be found, for example, in the German car industry (Glassmann and Voelzkow 2001: 100–2).

There are also important differences, however. While local proximity of suppliers and customer firms in the car industry serves mainly purposes of organizing production in an efficient, just-in-time mode by reducing the distances for transporting the supplied goods, local proximity in the media industry is a result of the need for uninterrupted information flows and for project coordination. The product market for production companies is marked by the dominance of creation as opposed to production.

⁵¹ The data on which the description of the production structures is based consist of structured personal interviews with production companies and broadcasters in all four German media clusters, including Cologne (Baumann 2000a). The sample was made up of twenty firms that are representative of the industry in terms of size and activity. Interviews lasted on average 45 min and were either with the owner, the production manager, or the head of the personnel department. They were conducted in the period July to September 1999.

Shapiro et al. (1992: 189) note: '[...] what is called production in the culture [that is media] industries is much closer to what is called research and development in other industries'. This has three implications. First, media products, especially fiction and entertainment, resemble a fashion item more than a technical product and are in constant demand for innovation with respect to content and format. Second, every product for broadcasting is produced only once and can then be reproduced at will and without the physical effort of going through the initial production process again. Third, this means that, in contrast to other industries where the reproduction technology is mainly as capital intensive as the initial development of the product and usually far more employment intensive, in the media production industry the initial development and, most of all, its one-off production, is the main source of capital investment and employment. This dominance of creation as opposed to continuous reproduction has two consequences for the production process: a strong dependence on current tastes and trends on the one hand and a reliance on freelance professionals in short-term project networks on the other hand.

Knowledge about current tastes and trends in programme formats and contents are important in order to gain a commission from the broadcaster. As a publisher, the broadcaster has control over the kind of programmes that are produced and develops the programme schedules that the production companies fill. To the extent that a broadcasting channel has established a reputation for a certain kind of programme, this profile provides the continuity and predictability on which the productive branch of the industry is dependent. It has been argued that broadcasters have managed to sell channels as a brand, which allows them to present new programmes as parts of a familiar programme profile in order to fulfil the audience's demand for new material while, at the same time, creating stability in the market (Shapiro et al. 1992: 189–90). This 'simulated innovation' (Shapiro et al. 1992) of the broadcasters minimizes the risk of potential failure of new productions, which are caused by their unknown popularity with the audience.

The initial development of a production is normally launched within production companies, which submit programme proposals to the broadcasters. There is then a period of mutual adjustments to the initial project between the broadcaster and the company before the production starts. As there are no invitations for tender, this process of submission and development of ideas for programmes relies heavily on informal links between the editors of the broadcasters, who are responsible for giving out commissions, and the submitting production companies. Consequently, competition between companies is not directed at the marketing of a finished product, as is the case in traditional industries, but at the attention of editors for proposals. Production companies have to find out about their preferences and will try to tailor their submissions to the current trend in the broadcaster. Social events, fairs, and informal contacts are decisive for establishing the necessary links. In

Cologne, the media fair Medienforum NRW, the numerous public events such as the Deutscher Fernsehpreis, and the lively bar scene and nightlife are the focal points for this networking. The mere geographical presence of a broadcaster is thus an important endogenous factor that helps to produce the local agglomeration of production companies. In order to utilize social events for establishing contacts with their customers, production companies need to be geographically proximate and take part in the information network.

Volatility and uncertainty about kind and type of future demand have repercussions on production patterns and company structures. In contrast to the continuous production and regular staff of traditional industries, production companies tend to work in a project pattern, which is the result of the short-termism of media production. They eschew long-term commitments in terms of capital investment and permanent staff and instead rely on specialized firms and freelance staff for technical and human resources for productions. A production company oscillates in an ever-repeating cycle between a slimmed-down status where the core staff, usually a three to ten person team of creative producers and calculating accountants, develops programme ideas, and an expanded status where thirty or more people, depending on the kind of programme, work for the company in order actually to produce the programme in a project.

These projects last days, weeks, or months, depending on the size and the kind. While documentaries need relatively less time, fiction productions need the most. Participating actors, for example, script writer, director, casting agencies, lighting and sound professionals, props, and costume and make-up professionals enter at various stages and split up again after the project's completion. If the project and hence the team was a success, the various actors may meet again in the same constellation in a new project. The reliance on project networks (Jones et al. 1997; Windeler 2001) produces a tendency for a locally organized labour market. Information on available and skilled staff and on service and equipment providers such as camera equipment, catering, lighting, and post-production facilities must be easily available to production companies as each project requires renewed contracting for all positions and services. Such an endeavour is easier the smaller the geographical distance between the various potential participants, and the more often they meet informally in order to be able to coordinate their timetables and negotiate commitments. Consequently, recruitment patterns in the media industry rely heavily on personal contacts and recommendations of third parties, and the transportation of professional reputation is crucial for freelancers to find jobs (Baumann 2002).

These structures impinge on firm size and inter-firm relations. Many small and mostly specialized companies work in projects based on the principle of division of labour. The resulting project networks are marked by an extremely high number of participants who are either self-employed or freelancing individuals or small specialized service companies. Vertical integration into

a complex company structure is only of minor importance. Instead, project networks pool resources for a limited time. These specific production structures are different from the traditional German production regime, which is normally characterized by a higher degree of vertical integration and a larger firm size. This is illustrated by the fact that the average size of German industrial companies is significantly bigger than their Italian counterparts, which form the Third Italy's industrial districts and are comparable to the firms of German media clusters (Voelzkow 1999).

Corporate and Project Finance

The business of media production displays a company finance model that is different from Germany's traditional and long-term house bank approach. More common are investment and project funds that display the characteristics of venture capital, or publicly subsidized funds such as the Filmstiftung NRW. The specific risks of media production and the division of property rights between production companies and broadcasters make the house bank approach difficult. For granting the commission, the broadcaster usually demands exclusive transmission rights by which it will be able to secure the recurring income that results from the programme's audience success. The producer, in contrast, receives only the income from the one-off sale of the programme to the broadcaster. The broadcasters usually also refrain from taking over any of the variable development costs and leave the producers on their own with the risk of potentially exploding costs for the development of the programme through various pre-production and production stages. For any lending bank production companies offer little collateral in terms of property rights and little physical capital to secure a loan.

Although producers have been lobbying hard to change this property rights regime, it is still the exception rather than the rule that they can keep part or all of the rights to their productions. Public funds and publicly backed lending, as in the case of the Stadtparkasse Köln, are thus of extraordinary importance for them. Alternatively, project funds in which several projects are pooled and an institutional lender backs part of the risk are a way for companies to offer investors a diversified investment that detaches the prospects of these specific productions from the long-term fate of the company. Increasingly, firms that do hold rights to their own productions or have licences for foreign productions transform from partnerships into joint-stock companies that can tap the financial resources of the stock market for new technology companies. By doing so, companies reduce the risk of any individual failed production jeopardizing their whole existence, and use the stock market to gain independence from the broadcasters. This, however, also allows for consolidating moves in the independent production branch, which has generated a trend towards increasing firm size in recent years (Pätzold and Röper 1999).

Industrial Relations

Institutionalized industrial relations in the media industry are largely confined to the broadcasters. The fourteen public broadcasters have individual pay and working time agreements with trade union Ver.di, which cover permanent and freelance workers alike. Private broadcasters have a collective agreement with the union that covers only permanent employees, however, and which, according to the head of the media section of Ver.di, comprises considerably lower conditions than the agreements of public broadcasters. Negotiations between Ver.di and public broadcasters have traditionally been consensual and cooperative due to the affluence of broadcasters during their monopoly, a tradition that is still largely intact. With private broadcasters, in contrast, negotiations are non-controversial because the union, according to its own assessment, lacks the organizational strength credibly to threaten industrial action and is constrained to accept whatever the broadcasters negotiate between themselves. Union membership is at approximately 5 per cent in private broadcasting and is not expected to grow. This expectation is confirmed by findings of a survey of German camera and set coordination professionals, which found a decreasing propensity to organize among the younger respondents and, at the same time, a tendency of the relatively newer profession of set coordinators to organize, if at all, in professional organizations instead of the union (Baumann 2000*b*). Within the production branch, that is, for the majority of freelancers working for independent production and service companies, union standards with respect to pay and working time are of only marginal importance and individually negotiated contracts dominate. In line with bargaining patterns, industrial democracy structures are negligible in the production branch. According to a union estimate, only about 40 of a recorded total of 1,499 production companies in Germany have a works council (Völker 1997). Industrial relations in the industry therefore do not resemble traditional German patterns. Even the structures that do represent genuine industrial relations however, like broadcasters' internal wage bargaining rounds, do not correspond to the traditional German model, where the company level works council and the industry level wage bargaining combine to give industry unions a strong influence.

In conclusion, the production structures of the Cologne media cluster correspond more to Third Italy's successful industrial districts than to the traditional German production regime. A spatial concentration of small companies supplies the market through cooperation and access to institutionally and locally provided collective competition goods, like for example, publicly provided or backed corporate and project finance. Industrial relations are institutionally weak and do not conform to the traditional German patterns. However, the institutional support structures through which collective competition goods are supplied resemble traditional German governance modes.

Continuities of the ‘German Model’? Industry Support Structures

The Cologne cluster displays a policy pattern for the provision of collective competition goods, which is different from the Third Italy. As in the case of support infrastructures for traditional industries in Germany (Glassmann and Voelzkow 2001), the two pillars of the German Model are important: the ministries of the *Land* governments on the one hand and corporatist arrangements on the other, combining for regional economic development.

For an industry that is characterized by the production patterns described above, the provision of LCCGs is paramount. Especially in the areas of skills and qualifications, where individual production companies cannot privately produce the needed goods because of their size, a non-private provision is called for. Traditionally, the German model of supplying such goods is through the *Land* governments and corporatist actors. In fact, the importance of these governments in supplying these goods is often the only reason for a territorial dynamic in traditional German industries (ibid.). We have now seen that the media industry has by itself a tendency to cluster locally and tends to produce a dense network of informal and personal contacts. Does this affect the German model of supplying competition goods, possibly by producing stronger associational actors and, in turn, requiring less local government action?

The answer is twofold. On the one hand, associational action is strong at the local level in Cologne, but is almost exclusively restricted to business associations as opposed to trade unions, which play only a negligible role. On the other hand, the *Land* government of NRW and the city of Cologne do play a substantial role. Not only do they provide critical financial support for projects developed by associational actors, but they also actively promote Cologne as a media hub by massively supporting the industry through the provision of infrastructure, project finance, and marketing events. In the following, the examples of the KoordinationsCentrum (AIM), the Internationale Filmschule and the *Kölner Modell* of dual vocational training will serve to illustrate the roles of associations, the city and the Land in supplying collective competition goods.

KoordinationsCentrum Ausbildung in Medienberufen

The KoordinationsCentrum originates from an initiative of the VFFV, the regional association for the cinema, television, and video producers, which demanded an information brokerage for training and qualifications in the industry. The VFFV started talks with all relevant actors to found an association to that end. These talks resulted in an organization, KoordinationsCentrum AIM e.V., which has fifteen members on its board, including VFFV, Spielfilmverband NRW, Ver.di, the city of Cologne, and the Filmstiftung NRW.

The main part of its funding comes from the *Land*, which has committed itself for an initial period of three years with the option for renewal. In addition to the funds from the regional government, the KoordinationsCentrum also receives funding from the European Union to develop a network of modular qualifications that are compatible and exchangeable on a European scale in cooperation with British and Italian organizations. It also receives funding from taking over event management and research commissions.

The KoordinationsCentrum has taken shape as a response to very distinct labour market problems of the media industry, namely the lack of transparency in training and job classifications. In contrast to other industries in Germany, the large amount of freelancers and the multiple possible routes into the various jobs create uncertainties for employers as well as for employees and young industry entrants in terms of the real substance behind job titles and training courses. In addition to social mechanisms such as reputation and the creation of small insider circles (Baumann 2002), an information brokerage such as the KoordinationsCentrum serves an important function to enhance labour market mobility. Its founding was an endogenous initiative from the local industry in Cologne. Its structure is corporatist in the sense that it is an organization based on a consensus between social partners and public institutions, which are all present on its board. The representation of companies and producers far exceeds that of employees and freelancers, however. The presence of the union must thus be seen as a result of the tradition of the German model with its social partnership approach more than of the genuine representativeness of Ver.di for the interests of freelancers and small-firm employees in the industry. The funding provided by the *Land* government displays the eagerness of NRW to support the industry in the region. Although it was the VFFV that initiated the KoordinationsCentrum as a competition good (it is really a national good, as its 1,000 or so internet pages are consulted throughout Germany), the financial commitment of the *Land* solved the crucial collective action problem of financing it. Any alternative for financing the centre, as for example through a levy paid by companies or their associations, would have failed in the face of the small-firm structure and the lack of enforcing trade union power. It can thus be argued that the German model of associational and *Land* governance applies, albeit in an altered mode if compared with traditional industries: the local aspect of associational action is far more significant than, for example, in the car industry, and the union role is replaced by a highly committed and affluent *Land* government.

Internationale Filmschule

The Internationale Filmschule, or rather its predecessors, the Schreibschule NRW and the Filmschule NRW, have emerged from a perceived deficit in certain professional areas such as props, costumes, and script writing, as well as from the perception that many freelancers lack theoretical background

knowledge needed for tackling non-routine situations. In contrast to the traditional apprenticeship schemes in Germany, which allow young school-leavers to enter the labour market through a broad and intensive training period in their occupation, the concept of the Internationale Filmschule takes account of the particularities of the film industry. On the one hand, apprenticeship schemes are a very recent innovation in the industry (see below), and are still largely restricted to broadcasting companies, big equipment providers, and studio companies, which can offer the variety of tasks, the resources, and the continuity of production that is needed for sustaining three-year production apprenticeships. On the other hand, the film industry's freelance population has entered the industry predominantly through work experience and unskilled jobs, and thus has gone through a learning-by-doing rather than a formal training (only around 25 per cent of camera and set coordination professionals have concluded an apprenticeship scheme or university studies, which are relevant for their occupation (Baumann 2000b)).

Three regional associations, the Spielfilmverband NRW, the Cologne branch of the Bundesverband Deutscher Fernsehproduzenten, and again the VFFV, in 1993–1994 decided to initiate training courses on their own by recruiting senior professionals from the industry to teach courses to young entrants for one year. The programme was designed to respond to the current training needs of the industry. The course design replicates exactly the traditional job classifications of the industry, which, in contrast to the broad and polyvalent vocational apprenticeship schemes, are narrowly defined along specific tasks and thus guarantee a maximum fit between trained qualifications and their application in the production process. In addition, a number of bigger production companies in Cologne, which are members of the above associations, cooperate with the Internationale Filmschule by supplying practical in-house training opportunities to the participants and by asking their experienced staff to take over teaching responsibilities at the school. The funding comes mainly from the *Land*. The Filmstiftung NRW (itself funded through the *Land*), industry sponsors, and course fees make up the rest of its budget. The Filmschule is thus another example of a local and associational initiative, but governmentally funded. It is interesting to note that the Filmschule lacks any kind of union representation. In contrast to the KoordinationsCentrum AIM, tripartite corporatist structures are not even pretended here. With the Filmschule, the German Model is reduced to one of pure partnership between company associations and the government, with the aim of improving the supply conditions for the media production industry.

New Apprenticeship Schemes: The Kölner Modell

The third example for illustrating the local dynamics of supplying competition goods in the media industry in Cologne is the development of two new apprenticeship schemes, the so-called *Kölner Modell*, which follow the

German dual system training tradition and are geared to the needs of the industry. These schemes have emerged from two initially separate local initiatives in Cologne and Hamburg, which were later fused by the Bundesinstitut für Berufsbildung (BIBB), the federal institution responsible for developing and updating apprenticeship schemes. In Cologne, the VFFV and the *Land* commissioned a research report in 1990 on the industry's local structure (Michel and Schenk 1994). This report included a section on the workforce of the industry, which predicted an increased need for qualified personnel in the future due to the expected growth of the industry, and a lack of core competencies in the existing workforce. As a result of this report and the problems of its members to find qualified staff, the VFFV decided to take action and start an initiative for establishing new training schemes. In 1991–1992, it approached the Chamber of Commerce (IHK) in order to ask for assistance. The Chamber suggested a little used but already existing training scheme that had lost its appeal on the labour market and only attracted marginal numbers of trainees, that for laboratory assistants for film and video processing. To this scheme, which was aimed at handling film material, an additional qualification element was added for media production. Here various new elements of the sought-after occupation were introduced. The majority of trainees were in the smaller production facilities of VFFV members, though WDR also participated during this experimentation phase. A similar procedure was applied for developing an apprenticeship scheme for the more commercial and managerial tasks. Eventually, after lengthy negotiations on the federal level of the BIBB between social partners, two apprenticeship schemes, the *Mediengestalter Bild und Ton* (media designer) on the production side and the *Bürokaufmann für audiovisuelle Medien* (office manager for audio-visual media) on the managerial side, were adopted in 1996.

Production patterns in the media industry do not easily lend themselves to the implementation of the German three-year dual training scheme. Because of the small size of companies, discontinuous production, and the fairly high degree of division of labour, even companies that want to take on trainees face considerable obstacles. There are problems of which personnel could take on the function of a trainer, the prescribed variety of training contents, and the difficulty of firms committing themselves to a three-year training period. Because of this, the VFFV had already in the initial stages of developing the apprenticeship schemes conceived of training within the dual system, especially for the media designer, as a collective, coordinated effort of all its members. Through the pooling of its members' resources, it could guarantee that all training contents were covered and the required personnel commitments did not overburden any individual company. After the official adoption of the apprenticeship schemes in 1996, the VFFV started the first of, by now, three *Ausbildungsverbände* (training cooperations), in which around ten companies are collectively responsible for training 15–20 trainees. These cooperations receive substantial financial support through the *Land*

that has introduced a special assistance programme for such cooperations (not only in the media industry), which grants 10,000 DM to every trainee position within a training cooperation. Consequently, the association VFFV organizes and coordinates the cooperation of companies in training, and the *Land* provides substantial financial incentives.

The Cologne cluster is not based on family bonds or local identities, factors which were hypothesized to be important for regional economies in general, and Italian industrial districts in particular, by some authors (Piore and Sabel 1984; Putnam 1993). In contrast, the local and, even more so, the regional government play a prominent role. Associative actors of the media industry and the regional government combine in corporatist policy formation structures to design supportive development policies and collective competition goods for the small companies that are typical of the industry.

Conclusion

The analysis of Cologne's media industry and its governance leads us to express some reservations about the 'varieties of capitalism' literature, which has condensed the complexity of institutional configurations into two national models of innovation and production. In the current literature, the distinction between a liberal market economy and a coordinated market economy as its opposite polar type is influential (Hall and Soskice 2001). This literature subsumes real types of national political economies into one of these two ideal types of innovation and production systems according to their specific institutional configuration. The basis for this are studies of national variants of corporate governance, corporate finance, work organization, industrial relations, or the system of vocational education and training. These combine into a complex but coherent overall type of national innovation and production. The theoretical core of these analyses is the concept of complementarities. 'The concept of complementary institutions is based on multilateral reinforcement mechanisms between institutional arrangements: each one, by its existence, permits or facilitates the existence of the others' (Amable 2000: 656). The German model is thus not only marked by institutional specificities but, above all, by their complementarity: the system of corporate finance, characterized by public savings banks and some large private banks, allows long-term investments as firms receive funds through credits and not through the stock-exchange or in the form of venture capital. Industrial relations are marked by strong trade unions with a high degree of organization and comprehensive pay and working time agreements on the industry level. Through high minimum wages and a condensed wage spread they force companies to engage in quality competition. The dual system of vocational initial training supplies the needed qualified workers with standardized skills and practical experience. Firms engage in

long-term relations of mutual cooperation and trust, mediated and supported by business associations.

Despite the theoretical plausibility and elegance of these studies, a closer look provokes the question whether they do not exaggerate the coherence of national models. The assumption of complementarities generates institutional rigidities that appear rather deterministic. The assumption helps formulate ideas of path-dependence, lock-in and institutional stability, but it fails to identify or explain institutional change. In this perspective, change must have an exogenous cause and is only conceivable as a parallel shift of the entire national model from one state to another, as the institutional parts are interlinked through the supposed complementarities. A resulting weakness is the rigid determination of national institutional pathways and the absence of concepts of endogenous change.

The Cologne media industry is an example of a local production system that does not fit well with the varieties of capitalism stereotypes. It provides evidence for the possible survival of a local production and innovation 'island', which differs in its institutional set-up from the surrounding national system. The existence of such an incoherence suggests that the alleged complementarities of national systems can break open to provide creative solutions for needed collective competition goods.

The empirical analysis of the institutional order of the media cluster has shown that the German production regime can provide new combinations, or at least re-combinations, of its institutional variants in order to provide an industry of the 'new economy' with collective competition goods. This should make us cautious towards overly strict statements of a path-dependence of the German model. Although the 'anything goes' of under-institutionalized theories of convergence may not apply either, national systems of innovation seem to be able to permit far more variability than is commonly hypothesized. The example of Cologne's media industry demonstrates that the German innovation system is able to set up an institutional infrastructure for an industry, which displays the features of Italian-style flexible specialization by means of German federalism and corporatism. The case shows how institutional innovation is possible in circumstances where actors have access to and experiment with heterogeneous institutional resources. Change does not necessarily result from a switch of the whole 'model' or major exercises in imitation, but can also come from reworking existing, but latent or formerly under-emphasised institutional patterns. Institutional incoherence may thus even be an advantage in the competition for innovation.

17 Between Cities and Districts: Local Software Systems in Italy

ANDREA BIAGIOTTI AND LUIGI BURRONI

We here seek to integrate the insights of studies of both national⁵² and local⁵³ innovation systems. Looking specifically at the Italian software industry, we highlight the presence of certain national features that distinguish the Italian case. We also note that high-tech activity tends to concentrate in certain locations because of the presence of specific local external economies. Concentrating on the case of Pisa, we shall also outline the differences that distinguish local systems of software production from other local production systems.

The category ‘information and communication technology’ (ICT) used in many comparative studies refers to activities that range from call centres to sophisticated technological activities.⁵⁴ We therefore need a more specific definition: we here concentrate on the development and production of software and the support services necessary for its distribution.

Dynamics, Organizational Structure, and Competitive Strategies of Firms

Although important differences exist among European countries, there is a European model of information technology distinct from American and

⁵² This broad and heterogeneous field of study can be divided into two main camps: those who follow a comparative political economy approach, focusing on the role of institutions and national policies (Streeck 1992; Soskice 1993; Zysman 1994), and those who start from a Schumpeterian or ‘evolutionary’ approach (Nelson and Winter 1982; Archibugi and Michie 1997; Dosi et al. 1998; Mowery and Nelson 1999).

⁵³ See Storper (1994, 1998), Morgan (1997), Keeble et al. (1999), Braczyk, Cooke, and Heidenreich (1998), and Antonelli (1999, 2000).

⁵⁴ The Organization for Economic Co-operation and Development, for example, though using a highly detailed definition of activity in the International Standard Industrial Classification field that distinguishes between tangible and intangible production, bases its reports on a definition of high-tech activity that includes the following International Standard Industrial Classification categories: 3000—office, accounting, and computer machinery; 3130—insulated wire and cable; 3210—electronic valves and tubes and other electronic components; 3220—television and radio transmitters and apparatus for line telephony and line telegraphy; 3230—televisions and radio receivers, sound or video recording, or reproducing apparatus and associated goods; 3312—instruments and appliances for measuring, checking, testing, navigating, and so forth; 3313—industrial process control equipment; 5150—wholesaling of machinery, equipment, and supplies; 7123—renting of office machinery and equipment (including computers); 6420—telecommunications; 72—computers and related activities.

Japanese ones. Small- and medium-sized enterprises (SMEs) specializing in products for local and national markets rather than for export predominate in Europe. Innovation is typically incremental rather than radical, and is driven by newer, smaller enterprises (Gambardella and Malerba 1999; OECD 1999, 2000*a, b*; Eito 2000). Loosely structured but intense relationships among firms is also typical. The resulting organizational model is oriented towards niche markets in which the relationship between software producers and clients counts as an important competitive advantage (Torrise 1996; Raffa and Zollo 1998; Gambardella and Malerba 1999).

Comparative studies reveal a wide range of contributing factors to this European model. First is the highly fragmented European software market. Regulatory problems, language barriers, and variations in technical standards seem to have favoured production for regional and national markets. These, together with labour market regulations that obstruct the kind of cooperation that exists between university personnel and industry in Anglophone countries, probably contributed to firms' specializing in the 'customization' of software programmes rather than in the development of completely new products and processes. Institutional factors, such as the prevalence of public policies aimed at supporting only a select few national large companies, are no less important, contributing to the formation of a dual system of production. In addition to the SMEs, there are large firms that have weathered processes of crisis and restructuring. Finally, in contrast to the United States, military spending and research have played very weak roles in European high technology.

The Italian case is a particularly strong example of the European model. Firms are even smaller. As Table 17.1 illustrates, nearly half of all workers in the Italian information technology sector work in firms composed of less

Table 17.1. Size of firms in computer-related activities, 2000

	Average number of employees per firm	Percentage of total employment in firms with less than 10 employees	Percentage of total employment in firms with more than 250 employees
Italy	4.2	48.3	16.8
Germany	8.8	20.0	25.1
France	12.0	22.5	30.3
United Kingdom	3.3	47.7	24.5
European Union	5.4	29.8	23.9

Source: ISTAT (2001).

Table 17.2. Added value and employment growth in service activities, Italy, 1992–2000

	Added value	Added value per unit of work	Employment
Computer-related activities	71.9	28.2	35.7
Service activities	15.8	9.5	6.7

Source: ISTAT (2001).

Table 17.3. Export of commercial services related to software (total services = 100)

	1992	1999
France	0.2	0.9
Germany	0.8	3.4
Italy	0.6	0.6
United Kingdom	1.8	3.1

Source: ISTAT (2001).

than ten employees. The percentage of high-tech workers employed by very large firms is also lower than the European average.

Italian firms registered very good performances during the last decade, recording higher figures for both total value added and for value added per unit of work than services in general. Furthermore, while the number of jobs in all services grew at 6.7 per cent between 1992 and 2000, occupational growth in the computer-related activities grew at about 35 per cent (Table 17.2).

The strong dynamism of this sector also emerges from data on informatics start-ups, especially since the mid-1990s. While service sector enterprises in general grew only by about 17 per cent, the total number of active enterprises in informatics increased by 47 per cent between 1995 and 2000.⁵⁵ In 2000 alone, the product market grew by nearly 13 per cent (Eito 2000). Exports from the sector constitute only a very small share of total service activity exports—a contrast with traditional Italian industrial districts (Table 17.3).

Within the overall total of the sector, software provision and data analysis account respectively for 42.3 and 39.8 per cent⁵⁶ (Table 17.4).

⁵⁵ In 1995, there were 42,357 enterprises active in this sector, while in 2000 there were 62,416 (processed data from Movimprese database).

⁵⁶ This refers to category 72 of the ATECO 91 classification system.

Table 17.4. Percentage of employment in different informatics activities, Italy (1996)

Consultant Services	Software production	Data elaboration	Database set-up	Maintenance and repair	Other	Total
2.3	42.2	39.8	1.1	8.7	5.9	100.0

Source: Processed data on ISTAT database.

Distinguishing between these two types of informatics activity is important, because their organizational and market logics are extremely diverse. Software houses are dedicated to the production, marketing, and installation of software programs and packages, while data analysis and storage services firms are not necessarily involved in writing the programs needed for the management of data archives.⁵⁷

Among software houses, there appear to be two main competitive strategies (Raffa and Zollo 1998). The first is to offer software programs directed either at automating a series of simple operations, or at simplifying specific functions or tasks. Here, firms are extremely active from the outset in diffusing and publicizing their services through marketing and commercialization activities. Start-up costs are very high, and success often depends on the degree to which firms can convince hardware distributors to promote their products. This was the strategy taken by the big software houses in the United States.

The second strategy is more in line with a model of flexible specialization. Firms adapt to the needs of niche markets, producing very specific services for projects of fairly limited scope. Their products are subject to continuous adjustments and improvements. Though start-up costs are relatively low, the informal and direct relationships between firms and end-users assume greater importance and are instrumental in product design. This strategy is extremely diffuse in Italy. New developments are more likely to be seen in the products themselves, rather than in production technologies and programming. Indeed, open-source technology now allows for the complete reformatting of standardized software to better meet the specific needs of users. The definition of *artigianato tecnologico* (artisan technology) (Bellini, Bonaccorsi, and Varaldo 1997) is particularly fitting, as the incremental innovation style strongly resembles that of more traditional styles of production. In addition, these enterprises are also less likely to have highly articulated organizational structures, and closely follow the less structured but highly flexible forms

⁵⁷ In other words, distinguishing between category 72.1 (consulting services for the installation of electronic systems), 72.2 (software provision and informatics consulting), and 72.6 (other informatics activity).

associated with artisan production. The producer–client relationship is of utmost importance in every phase of production, from conceptualization to commercialization. Furthermore, the ties with clients/users also constitute a principal means of contact between firms and their final markets.

In Italy, spin-offs of products developed in universities are much less likely to be diffused than in other European countries (Torrìsi 1996; Capello 1999), despite the fact that informal and fluid networks with universities and research centres often constitute competitive advantages for many SMEs (Raffa and Zollo 1998). The relational aspect, therefore, is extremely relevant and, as we shall see, even serves to shape the features of the software itself. Producers develop and fine-tune their products to the specifications of customers through ongoing communication and feedback. The exact composition of the final product is rarely defined at the outset (Antonelli 1999).

There is thus a wide range of external economies that favour territorial concentration and competitiveness. These may be tangible (e.g. universities and other local research centres) or intangible (e.g. trust networks among producers, or between producers and clients, and shared or tacit knowledge) (Storper 1994; Granovetter et al. 1999; Rullani 2001).

Local Software Systems in Italy

Analysis at the level of traditional administrative units, such as provinces or regions, risks missing an entire series of important processes that become evident only through close examination on a more local level. For this reason, we adopt as units of analysis local labour market areas (LLMAs).⁵⁸ Their smaller dimensions facilitate the identification of specific productive specializations, even within restricted categories such as software production, which are often located within a very small geographic range, and would not be observable in aggregate data at the provincial level.

Our unit of analysis, therefore, consists of local software systems (LSSs), and we have selected those in which there are at least 500 workers and in which the concentration of workers is above the national average.⁵⁹ With this definition we have identified eighteen such systems. Only 2.3 per cent of the

⁵⁸ For discussions of the advantages of this unit of analysis, and for information on the methodology behind its definition, see ISTAT-IRPET (1989), ISTAT (1997), and Crouch et al. (2001).

⁵⁹ There are some LSSs that, though having a higher concentration of workers than the national average, still have an extremely limited number of workers. The local system of Nocera Tirinese, for example, has a territorial concentration of workers in this activity above the national average that includes only nine workers. It is for this reason that we set the threshold at 500 workers for a local system to be included among our sample of local systems specialized in this activity. We thus exclude 16 local systems for a total of about 3,000 workers. The database used here includes aggregate information at the level of local systems of work in 1991 and 1996 (see <http://cens.ISTAT.it>).

Table 17.5. Employment and resident population in LSSs, Italy, 1996

	Number	Percentage of total (Italy = 100)
Number of LSS	18	2.3
Resident population	15,832,205	27.5
Total employment ^a	4,356,636	31.6
Employment in software production	71,268	69.1

^a Employment in agricultural activities and in public services is excluded.

Source: Processed data on ISTAT database.

national total of local systems 'explains' 27 per cent of the population and 31 per cent of employment⁶⁰ and nearly 70 per cent of the national total of workers in software activities (Table 17.5 and Fig. 17.1).

They are more or less equally distributed across the various macro-areas of the country, though the majority are found in the north-west and south.⁶¹ We should note, however, that most workers found in the south are actually part of Rome's LSS, which employs 22,206 workers (70 per cent of software employment in the South) (Table 17.6). Most firms are medium-sized, though small firms also constitute an important nucleus.

Strong similarities between LSSs and the model of traditional industrial districts emerge from this analysis. In fact, software production exhibits an even higher level of territorial concentration than does manufacturing.⁶² Another shared characteristic is the strong contingent of small enterprises that successfully coexist with medium-sized ones. Finally, LSSs exhibit a strong mobilization of local entrepreneurial resources.

At the same time, it is also important to emphasize that LSSs have a number of unique characteristics (Antonelli 2000). In particular there does not appear to be any overlap between the location of local manufacturing systems and the LSSs. As Table 17.7 demonstrates, the territorial concentration of software activity in areas of dense local manufacturing systems is lower

⁶⁰ The LSSs identified here are: Rome, Milan, Turin, Naples, Bari, Bologna, Genoa, Padua, Verona, Parma, Ivrea, Pisa, Modena, Treviso, Trieste, Cosenza, and Caserta.

⁶¹ In this chapter, the territorial division of macro areas deviates somewhat from the traditional ISTAT definitions. The North-west includes Piedmont, Liguria, Valle d'Aosta, and Lombardy; the North-east includes Veneto, Trentino Alto Adige, and Friuli Venezia Giulia; the Centre includes Emilia Romagna, Tuscany, Marche, and Umbria. The remaining regions are part of the South. This different territorial agglomeration has already been used to identify local pathways of development in Italy (Burroni 2001; Burroni and Trigilia 2001).

⁶² The greater intensity of territorial concentration emerges, for example, in comparisons of the distributions of territorial concentration indexes of manufacturing with those of software production: the value of the index of the difference of the distribution (standard deviation/mathematical average) of software production is nearly triple that of manufacturing.

Figure 17.1. Local systems specializing in software activities (Italy, 1996)

Source: Processed data on ISTAT database.



than the national average, and the presence of manufacturing specialization in LSSs zones is likewise minimal. These data confirm the conclusions of some recent studies that suggest a low integration at local level between the informatics industry and traditional manufacturing (Censis 2000).

Another distinguishing factor of LSSs is the high concentration of activities tied to public administration, the traditional tertiary sector, and the banking

Table 17.6. Employment in LSSs, Italy, 1996

	LSS (absolute value)	Employment in software production
North-west	4	31,753
North-east	5	5,402
Centre	4	4,615
South	5	29,498
Italy	18	71,268

Source: Processed data on ISTAT database.

Table 17.7. Local production systems and LSSs, Italy, 1996 (mean values)

	Lq (M)	Lq (S)	Lq (P) ^a	Lq (T) ^a	Lq (B) ^a	Population	Population density per km ²	Percentage of graduates (1991)
LSSs	0.82	1.83	1.14	1.03	1.26	879,567	829.0	5.1
LPSs	1.38	0.27	0.72	0.88	0.58	72,088	194.1	2.2
Italy	0.88	0.26	0.94	0.96	0.64	73,292	184.3	2.3

The index Lq is the location quotient, calculated as $Lq_i = (e/E)/(n/N)$, where e and n represent local and national employment in the activity i , while E and N represent local and national total employment. M = Manufacturing, S = Software services, P = Public services, T = Traditional services, B = Banking and insurance.

^a Estimation based on active population.

Source: Processed data on ISTAT database.

and insurance sectors (Table 17.7). The employment rate in these sectors is higher than the national average in the LSSs, while lower than average in traditional manufacturing districts. As we have noted, Italian informatics is mainly oriented to meeting the needs of local customers, who are often engaged in commerce, banking, insurance, and public administration (ISTAT 1999). Also, unlike manufacturing, the software industries tend to be concentrated in urban and metropolitan areas. LSSs typically have higher than average populations and greater population densities than do manufacturing areas. Seven of the twelve local metropolitan systems identified by ISTAT are classifiable as LSSs, and seventeen of the eighteen LSSs we identified are provincial capitals.

The urban and metropolitan character of LSSs also emerges in Table 17.8. Here, Turin, Milan, and Rome, which represent about 18 per cent of total national employment, are the three main metropolitan systems specializing in software activities with nearly 50 per cent of the employment in the software production industries.

Differences in the quality of human capital also differentiate LSSs from manufacturing systems. The quota of individuals with a university degree in

Table 17.8. Metropolitan local systems and employment in software and total activities, Italy, 1996

	Employment in software production given as absolute value (percentage on total national)	Total employment ^a given as absolute value (percentage on total national)
Turin	10,125 (9.8)	505,713 (3.7)
Milan	18,688 (18.1)	1162,330 (8.4)
Rome	22,206 (21.5)	780,853 (5.7)
Total	51,019 (49.5)	2,448,896 (17.8)
Italy	103,121 (100)	13,792,968 (100)

^a Employment in agricultural activities and in public services is excluded.

Source: Processed data on Istat database.

LSSs exceeds both the average for local manufacturing districts and the national average. This seems to confirm the importance of training institutes, research centres, and universities in supporting the territorial agglomeration of software activity (Asheim 1996; Powell 1996; Zucker 1998, 1999; Capello 1999; Keeble and Wilkinson 1999; Keeble et al. 1999). This argument is also strongly supported by authors working on 'learning regions' and *miliuex innovatives* (Asheim 1996; Braczyk, Cooke, and Heidenreich 1998; Antonelli 1999; Keeble et al. 1999). Of the twenty-two LSSs that host computer science departments, twelve specialize in software production. Eight of these also have Consiglio Nazionale delle Ricerche (CNR—National Research Council) informatics research centres.

Our emphasis on the local supply of codified knowledge should not be read as disregard for the role of tacit knowledge. One of the main factors contributing to the localization of high-tech activities is the mix of codified and tacit knowledge. According to Keeble et al. (1999), it is this mix that gives rise to the 'local attitudes and rules of research behaviour' that constitute the competitive advantage for territorial agglomerations of high-tech production. Tacit, informal knowledge opens the door to the use of more codified knowledge, especially when the primary market outlet is usually local.

In industrial districts the main specialized activities are an important component of the local socio-economic fabric, and shifts in industry can have significant economic implications for local populations. In contrast, the production activities of 'software districts' employ only a marginal share of the local work force and do not penetrate as deeply (Becattini and Rullani 1993).⁶³

⁶³ In the local system at Rome, the LSS with the greatest territorial concentration, employees engaged in software production activities are only about 3% of the total local employed workforce.

In these contexts, the exchange between tacit and codified knowledge, like the reproduction of technological know-how, happens within specialist communities (Zucker 1998; Castilla et al. 2000). The high level of uncertainty makes networks of these kinds especially important, encouraging trust and the fast and informal diffusion of new knowledge and information among specialists. The high level of uncertainty also renders 'local' networks all the more important than their virtual and deterritorialized counterparts (Rullani 2001). The local interactions are the site where codified knowledge is reinterpreted and integrated with the less formalized tacit knowledge that springs from the individual know-how of the actors. The process through which this type of knowledge is exchanged does not emerge from an analysis of secondary data, and a closer, more qualitative approach is called for. For this reason, we now concentrate on an individual LSS.

The Local Software System in Pisa

Between June 2000 and June 2001 the number of workers in the Pisan LSS grew from 548 to 641, that is, by 20 per cent. The number of productive units increased from 182 to 239 (30 per cent).⁶⁴ As Table 17.9 demonstrates, there is a strong concentration of employees in small and very small units. While more than half of all workers are employed by units of fewer than fifteen employees, less than 20 per cent of them work in units involving fifty or more.

This structure is also reflected in the fragmentation of productive activity that mainly is concentrated among the many smaller units. As shown in Table 17.10, there are very few large software houses, and none with production units that employ more than 100 workers.

Table 17.9. Employees by size of unit in the Pisa LSS, 2001

	Number of employees						Total
	1–5	6–9	10–15	20–29	30–49	50–99	
Number of units	197	89	80	89	68	118	641
Percentage	30.7	13.9	12.5	13.9	10.6	18.4	100.0

Source: Processed data from Chamber of Commerce database.

⁶⁴ The most recent data available, furnished by the 1996 *Censimento Intermedio dell'Industria e dei Servizi*, demonstrate an LQ (level of specialization with respect to the national average) of 2.3. The software production represents an important component of the local ICT activity, involving 690 workers against 2,230 workers in the entire ICT sector. Data on growth in the number of local entities and workers come from the *Archivio delle Camere di Commercio* (Archives of the Chambers of Commerce).

Table 17.10. Local productive units by number of employees in the Pisa LSS, 2001

	Number of employees							Total
	Not available	0–5	6–9	10–15	20–29	30–49	50–99	
Number of units	70	142	12	7	4	2	2	239
Percentage	29.3	59.4	5.0	2.9	1.7	0.8	0.8	100.0

Source: Processed data from Chamber of Commerce database.

The average Pisan software production unit employs less than three workers. These data demonstrate an industrial structure that reflects the typical size dimensions of other economic activities in the region. However, they deviate strongly from the well-known Tuscan model of industrial districts, where production is usually situated in small- and medium-sized urban centres. The urban dimension of software production is striking, 75 per cent of employees and more than 70 per cent of units being concentrated in Pisa itself.

The Local Context of Software Production

Positioned on the Tuscan coast about 100 km from Florence, Pisa has about 85,000 inhabitants. The local economy has a strong white collar and tertiary character, and there is significant activity in research, education, and training (Falorni and Poli 1998). These latter traits are the result of a historic tradition of academic institutions that started with the establishment of the first university of Pisa (the current Università degli Studi) in 1343. In 1813, the prestigious Scuola Normale Superiore, founded on the model of the *École Normale* in Paris, was created by Napoleonic decree. Finally, the Scuola Superiore di Studi Universitari e Perfezionamento Sant'Anna has been open since 1987. The activities of these three institutions have had a strong influence. The university has more than 45,000 enrolled students and at least 2,000 faculty members (Bellini, Lazzeroni, and Piccaluga 1998).

A number of important research centres have also flourished in the area, including several operated by the CNR. These are mainly located in the research area on the eastern limits of the city. Other public and private institutes include laboratories of the National Institute of Nuclear Physics; the National Agency for Energy and the Environment (ENEA); and ENEL, the national electricity company. These research and development activities must be remembered in any analysis of computer science in this region (Varaldo 1991).

The debut of computer science around Pisa was tied to a windfall of funding in 1953 that enabled local academic authorities to approach Nobel

prize winner Enrico Fermi, who had been a student at the Scuola Normale Superiore, for advice on how to best use the money.⁶⁵ Fermi advised them to build an electronic computer, and so was constructed the first Italian device of this kind, the Calcolatrice Elettronica Pisana (CEP). This had not only great symbolic value, it also brought together an original group of scientists. It also inaugurated a new phase of cooperation between university and industrial world, with a leading role for Olivetti, involved in this first experience, and IBM, who established tight links with the local scientific community.

The university extended and consolidated its commitment over the years, developing extremely close relations with major actors from the private sector. During the 1960s, the creation and operation of the CEP project gave rise to two important institutes that would later be taken over by the CNR. One of these, the Istituto per l'Elaborazione delle Informazioni (IEI), launched a number of collaborative scientific research projects, and undertook the evaluation and quality certification of hardware and software. The other, the Centro Nazionale Universitario di Calcolo Elettronico (CNUCE) started from a collaborative project with IBM to provide advanced computing services to the national scientific community. It was primarily concerned with research on computer networks, data bases, and more general problems. In 1969, the university and the IEI together designed Italy's first degree programme in computer science, an initiative that would, as we shall see, have a determining influence on the dynamics of this sector that persist up to this day. The Istituto di Linguistica Computazionale, the third 'historical' organ of the CNR in informatics, was created in 1978.⁶⁶

During the 1980s, the computer science research coming out of Pisa played a leading role in important national and international projects. Scientists there were involved in the Italian 'Progetti Finalizzati Informatica', and with the European Union's *Esprit* projects. Pisan scientific expertise soon showed its capacity to attract informatics industries to the area from elsewhere in Italy and abroad, with some firms opening research centres and production sites. However, the economic crisis that hit the informatics sector in the late 1980s and early 1990s had a significant impact, producing some strategic changes among the enterprises involved. There followed a vast restructuring, including downsizing and closing many research centres.

⁶⁵ With the assistance of deputy Maccarrone and the Province of Pisa, Lucca, and Livorno, the funds were obtained to finance the construction of an *elettronsincrotrone*, already in the planning stages at the Faculty of Science at the University of Pisa. This device was eventually constructed at Frascati, near Rome. The financing requested for the project, however, was still granted to Pisa, thus allowing for its entrance into the field of computer science.

⁶⁶ The 1990s were also marked by new activity in the techno-science branch of the CNR with the creation of two new research institutes concerned with computer science. The Istituto di Matematica Computazionale (IMC) was created in 1993, and the Istituto di Applicazioni Telematiche (IAR) was created in 1997. The two institutes are currently being merged and will later become the Istituto di Informatics and Telematics (IIT).

The crisis was in fact the prelude to a new phase of growth in the number of firms and employees from the second half of the 1990s, with locally rooted SMEs as the key protagonists, rather than the large firms of the earlier period. These software houses are oriented towards niche markets of the kind discussed above. They have benefited from the software boom associated with the diffusion of the internet and the so-called new economy.

The Characteristics of Informatics Production in Pisa

A large number of the entrepreneurs involved in this recent growth come from outside Pisa, but they are often students and ex-students of Pisa's university system; their first work experiences started during their training course and this first collaboration often precedes the creation of a new enterprise. The university's courses directly tied to ICT, including the degrees in computer science, electrical engineering, computer science engineering, and telecommunications engineering, are relevant here. Such courses are also offered at the Scuola Normale and at the Scuola Sant'Anna. The acquisition of specific expertise is also favoured by the plethora of informatics activity that takes place in the area. The CNR institutes and the Pisa Research Consortium (CPR) are probably the most important research centres in operation today.⁶⁷ The local economic context was also a major determinant. After completing their education, the founders of the firms increased their own competence through collaboration or subordinate jobs in local informatics SMEs, or through supplying their own clients with software and informatic services.

In addition, we noted entrepreneurs coming from subordinate jobs with a marked technical specialization but within traditional sectors. They are professionals from industrial electronics, or with previous job experience in manufacturing outside Pisa. In Pisa they could use competence and contacts previously acquired for entrepreneurial activity. Also, as a consequence of the diffusion of the internet, there has been a rise in entrepreneurial initiatives in which technical skills are combined with deep knowledge of contents for niche services.

Technical expertise in informatics often constitutes the principal start-up capital of new firms. The declining costs of hardware and connections have lifted many of the barriers to entry into this sector. These new enterprises often start in private apartments or basements, with finance from the entrepreneur himself. Individual and family savings, severance packages, and early profits are used to sustain the new firm, and entrepreneurs often take on

⁶⁷ The CPR coordinates collaborative research projects bringing together researchers from the public and private sectors. The Consortium was established in 1987 as part of a project sponsored by IRI (the main public agency for industry) and CNR with the participation of local agencies, the University in Pisa, and a number of national and local firms. The objective of the Consortium is to facilitate the circulation of information and the transfer of technology from the academic world to the industry. The Consortium is active in a variety of scientific sectors and has established independent research centres on some sectors of activity.

extremely heavy workloads to raise money for the enterprise. The dependence on self-financing is partly a result of the difficulty that the traditional banking system has in appraising activities in these innovative sectors. They are characterized by structural uncertainty, and the principal assets are the expertise and competence of the aspiring entrepreneurs. Other more sophisticated instruments recent to the Italian scene—that is, venture capital funds—also encounter a number of serious obstacles. The organization of the Italian financing and investment systems, the particular production characteristics of these small firms, and the reluctance of entrepreneurs to give up the autonomy they enjoy running their own businesses hinder important infusions of external financing (Bologna and Fumagalli 1997; Becattini 2000).

As already noted for the general Italian case, the Pisan informatics SMEs offer highly personalized products, sophisticated applications, and services developed for specific customers and select market niches. Here, the interaction between producer and client often has an extremely important role in identifying customer needs, defining the characteristics of the product, and organizing the range of services, such as training, updating, and maintenance, to be sold with the application. Often, the long-term experience developed with a certain client or within a particular sector leads to the development of ‘common components’ that can be used in more than one application or adapted to the needs of more than one client through the integration with other components, made by the same firm or bought from outside. Furthermore, some firms have used their experience to develop products that incorporate a series of user-defined options and adaptations and that became useful across a number of diverse contexts, extending their marketability (though these usually remain niche products).

These characteristics explain the low rate of patenting on these products. Producers generally pursue patents only as they begin to develop applications less tied to specific needs. The tight connection between the application produced and the services necessary for its effective implementation show some of the strategies centred on the flexibility and quality of what is offered. Effectiveness here depends on technical skills and the capacity of the firm to build relationships. For small firms in particular, the local context is the favoured site. On a cognitive level, Pisa offers the resources necessary to confront the uncertainty and technological evolution typical of this sector. The realization of flexible productive assets tailored to the characteristics of the client's needs involves normative resources. While large firms with strong footholds in particular markets can employ flexibility strategies based on the internal organization of production, smaller enterprises, subject to greater variability in demand, must try to promote activities that are complementary with those of other firms. Though firms in the new economy have similar starting points, they eventually specialize in certain applications.

An example of this kind of relationship emerged from the analysis of a firm specialized in multi-media and virtual reality productions. A part of

its activity consists of computerized creation of cartoons, carried out in collaboration with some other local firms. The whole audio applications development, complementary to that of graphic animations realized in-house, is contracted to a small specialist firm. Another local firm supplies the integrative software for the final products. It is also engaged in a long collaboration with a third local firm, this time specialized in computer graphics. While potentially competing, both involve each other in the implementation of some orders they cannot execute individually. Recently they have started to discuss merging.

Both the decomposability of the productive process and the quantitative and qualitative variability of the demand, lead firms to activate their local relationships for exploiting the complementary competencies and executing orders.

Thus we have seen different examples and ways of collaboration, which turn into mutual involvement in planning a product. For example, in some cases the development of the graphic and multimedia components were assigned to external programmers while the firm itself concentrated on developing specific applications. Various components of some products were furnished by separate providers, with, for example, the part related to internet connection and services taken care of by one entity, and the part related to its management taken care of by another. When the firm is not able to satisfy a specific demand individually, informal relationships—based on the knowledge of the competencies available locally—start working. Sometimes the ties between these complementary firms would be reinforced by more long-term agreements. After having collaborated for years, some of the firms we investigated placed their products on the market under a single trademark.

A similar dynamic—often supported by formal agreements—involves local firms in relationships with external actors. Even here, partnership agreements seem to answer to two principal needs. On the one hand, they connect different competencies, allowing productive flexibility and an increase in quality. On the other hand, these agreements permit privileged access to markets and clients, thus favouring marketing and distribution of own products on enlarged markets. This exploits the trust connections established by the partner or the credibility of a trademark.

Collaboration is particularly important for small firms that confront a variable demand and that have a distinctive competence. Collaboration integrates the autonomous supply of products for the market and is often based on the adjustment of products furnished by different partners. However, external networks are important to structure larger scale productive processes. In this case the involvement of Pisan firms derived from the supply of some specific product; this is their way to reach wider and external markets. Finally, fewer firms maintain their autonomy. Some small software houses, with their own clients, are incapable of connecting with other firms, and so maintain a narrow business. Successful firms, able to compete on specific market segments, are externally autonomous but flexible in internal organization.

Local Collective Competition Goods in the Pisa Context

Access to a collection of local collective competition goods (LCCGs) serves as an important advantage for Pisan software producers. Research on local economies has demonstrated the importance of access to external resources for SMEs. These resources, the availability of which is strongly related to local levels of economic activity, are both material (infrastructure and services) and non-material (trust, tacit knowledge, shared vocabularies, and other cognitive and normative elements). These are mainly addressed to local firms. The advantage offered by access to these resources is tightly linked to both the technological exigencies of this sector, and the market strategies followed by the firms involved, which are not unlike those followed by more traditional entrepreneurs in the area.

Pisa's scientific environment offers many obvious opportunities to firms in the high-tech sector, first and foremost through structured collaboration with local university and scientific institutions. In general, however, the kinds of firms that manage to activate this kind of cooperation usually have more resources to begin with. Establishing such relationships is difficult for most SMEs. Their main advantage is instead related to the availability of a large pool of skilled workers who transport new and broader expertise to the firms. By hiring from the local labour market, small software houses absorb the innovative skills and techniques encountered through thesis work on university projects or with local research institutes. Newly hired workers rarely bring knowledge or experience that can immediately be integrated into the productive activities of the firm. The quality of their training, however, generally allows for a rapid assimilation to the tasks they will be asked to carry out. These workers quickly adapt to the small firm environment and the practical skills rooted in the new place of work. They also acquire proficiency in the formal programming techniques that circulate outside the academic environment—that is, in the internet and specialist publications—and to which small firms frequently refer.

Local training and research institutes also contribute intangible LCCGs. Not only do they ensure an adequate supply of knowledge, they also support the creation of informal relations that favour the productive activity of these firms. A number of factors, such as the firms' origins in these same academic institutions, participation in group research projects, and cooperative local initiatives to promote entrepreneurship in high-tech sectors, sustain the establishment of informal ties. On a cognitive level, these relations facilitate the firms' access to the innovative stimuli that circulate in the scientific and entrepreneurial communities. In terms of the organization of production, they minimize the uncertainty that typically characterizes transactions within this sector.

This uncertainty is also tied to the so-called software crisis and to the programming techniques, which make it difficult to predict the exact time, costs, and qualitative level of the production of software applications

(Fuggetta 1995). These unknowns emerge during the production process at the level of horizontal coordination among firms working together on the same product, and at the level of cooperation in production within single firms. They are also felt at the moment of the sales transaction, which is often characterized by an imbalance in the amount of information known by each of the parties. In a market in which quality and security are essential, trust relations and reputation provide important collateral for the economic activities engaged in by the enterprises.

In terms of size, reference market, and territorial concentration, the growth of software enterprises in Pisa followed a fairly typical trajectory. On the one hand, one sees the aggregation of firms around established sources of research and scientific training in the sectors related to computer science. In these areas, the offering of high-profile, cutting-edge formalized expertise is greater, and firms can establish networks, even informally, that favour their establishment and activity. On the other hand, the industrial structure of the sector, in particular the average size of the firms and the market strategies they follow, appear consistent with the institutional characteristics and historical facts of Italian capitalism (Regini 2000). As in other sectors, larger firms seem to encounter obstacles in establishing themselves, leaving space to SMEs. The characteristics of growth in the informatics sector suggests an analogy with other national sectors of greater weight that grew following patterns of flexible specialization.

Initiatives to Support Local Software Production

For some time, the main political and scientific actors concerned with Pisan local development have focused on high-tech activities. The post-industrial transformation of the city in the 1970s and 1980s led to a series of reflections on what opportunities the important educational institutions and scientific research centres in the area might offer. These were identified as potential magnets for attracting external companies interested in opening new research and production centres in the territory and reinforcing collaborative arrangements among the institutions already in the area. Moreover, the hope was to bolster internal development and the multiplication of entrepreneurial initiatives in the sector, with associated spin-off industries. Finally, the academic and research institutions were seen as vehicles for facilitating the absorption of new technologies into traditional industrial production sectors, such as mechanics, leather, and furniture.

The first issue was the absence of any promotional tools to gather and coordinate all the main high-tech initiatives. In reality, although policies for high-tech industry had been actively pursued in earlier years, they seemed to have been set aside in favour of more circumscribed initiatives, promoted by various coalitions of actors. To shed light on how these initiatives favoured the activity of small software houses, it is useful to reconstruct the strategies

of the main actors who either directly or indirectly contributed to providing a more favourable context for software production. In particular, we turn to the methods used by the informatics department of the University of Pisa, the Polo Tecnologico di Navacchio (a high-tech research park located nearby in Cascina), and the CPR.

Since the early 1990s, the department of informatics at the University of Pisa had been rethinking the relationship between university training and the needs of the productive world. While debates on university reform contributed to the department's reflection on this issue, most of the impetus came from the more generally difficult conditions faced by the informatics sector during those years. The depression manifested itself through decreased course enrolments and a vast reduction in the number of job opportunities for new graduates. The reaction was a substantial revision of the curriculum. The department made efforts to integrate professional practice into the students' training curricula, bringing their instruction profiles closer to the needs of the labour market. A three-year diploma was introduced alongside the five-year degree, and both were conceptualized with reference to the employment needs of students.⁶⁸ For example, in their last years of study, students are now required to do an internship in a firm or agency dealing with informatics technologies. To support this initiative, the university created a network of around 100 external entities to provide practical specialization and training. This not only favours the exchange of skills and information, but also provides institutional support to the local labour market.

The university's efforts to key into informatics production has also included inviting individuals from private industry to teach courses, and offering seminars and training on specific themes that are open not only to university students, but also to unenrolled individuals working in informatics industries.

With the passing of the informatics crisis and the expansion during the boom years of the new economy, the university is now operating under very favourable conditions. Enrolment has dramatically increased, and the university finds itself meeting the demands of a very tight labour market. The transformation of the last decade permitted the individuation of training strategies, defined in relation to the needs of the productive world (especially, but not exclusively, local). The main objective and challenge of this strategy, aside from the key role it plays in sustaining informatics entrepreneurship and growth in the local sector, is the definition of courses of study in which students participate in the world of production without sacrificing the theoretical preparation necessary for assuring a quality education. The university, in fact, cannot limit itself to providing only the expertise demanded by firms, nor can it take the firms' place furnishing the professional and technical competence necessary

⁶⁸ The university diploma, *Diploma Universitario*, was inserted into the Campus project that finances initiatives to promote professional orientation in these courses of study.

for the immediate placement of programmers. The rapid evolution of programming techniques obliges the university to balance the professional component with a solid background in the fundamentals of the discipline. It is this foundation that guarantees the capacity of trained individuals to learn and apply new materials, preparing them to confront the changes that they will inevitably encounter working in this sector.

These initiatives propagated traditional ways of local economic management within the newer sectors. The same collective actors involved in promoting local development in traditional sectors—local agencies, unions, and trade associations—are also called on to participate in the innovative activity. The supports are allocated in ways that are particularly suited to the type of growth characteristic of software houses. Although the involvement of high-tech firms in policies to promote local development probably reinforces the isomorphic tendencies we have already discussed, local entities do not ignore the unique features of high-tech activity, and often propose unique strategies to support its development.

A number of local *ad hoc* initiatives have also emerged. These have culminated in the creation of the Aurelia Society, established through the cooperation of local agencies and other scientific and entrepreneurial actors. This society, a joint-stock company, was created to organize and manage the Scientific Technologies Park of western Tuscany. Currently, the main focus of this organization is to favour and promote the match between specific local demands for innovation and the scientific and technological resources offered by local research institutions. The result is the creation of a multipolar park, with territorial support structures for firms in which initiatives to transfer technology throughout certain sectoral environments are guided by 'bottom-up' principles.

It is in this framework that the municipality of Cascina, the Province of Pisa, and the Aurelia Society created the Polo Tecnologico di Navacchio, a technological complex that pursues initiatives to promote informatics and telematics production. These initiatives have been funded by the above mentioned local institutions and by the European Union with funds for the recuperation of abandoned industrial areas. The result is a structure that offers easy access to a series of spaces and services explicitly designed to meet the needs of the new economy firms seated there. Locating a firm inside the Polo Tecnologico is highly advantageous because infrastructure problems, such as adequately equipped offices, good internet connections, and large conference rooms, and the technological problems related to the firm's specific activity are taken care of by the facility.

It should be underlined that Polo operates through the promotion of consortia, open to guest firms, that provide a range of advanced services. Polo New Tech, for example, manages the computer resources of the structure, while Polab, a collaborator with the Department of Telecommunications Engineering at the University, deals with electromagnetic compatibility problems. Polo also offers other services tailored to the needs of informatics firms, such as a quality

assurance centre for software products, managed in collaboration with the Department of Computer Science. They also collect and furnish information to resident firms on possible sources of funding for new projects. In addition to these and other initiatives, Polo is currently planning a kind of high-tech firm incubator. Here, Polo will collaborate with university experts and business and finance professionals to provide a range of integrated services and assistance to help get new enterprises off the ground.

Thus, although the Polo originated from the same kind of interests that motivate public strategies to support other kinds of productive enterprises, it also demonstrates some important innovations specifically related to the demands of the sector in which it operates.

A final important actor in the territory is the CPR. This organization works in tandem with private industry on research projects in a number of high-tech sectors and fields related to ICT. It is organized in centres of expertise, including the Multimedia and Telematics Application Centre (META), the main internal branch concentrating on informatics research. The sectoral specialization and the application ends of their activities have clearly had a positive influence on informatics activity in the territory, though not always in the direct ways one would expect. In fact, many of the activities of META, for example, are part of larger EU funded research projects that limit the participation of other local firms in two significant ways. First, international research networks are favoured over local ones. Second, these projects often require substantial co-financing by the private partners, thus making participation prohibitive for the small and very small firms that characterize the local system of software production. Obviously, however, there is no shortage of larger firms ready to take advantage of the CPR's access to these international networks.

It should be noted, however, that direct involvement such as this is only one of the ways that the CPR benefits local entrepreneurship. High-tech SMEs also benefit indirectly. For example, the CPR depends on a local network of collaborators and students to realize its projects, and the valuable experience gained on these creates important spill-over for the local labour market. Next, the CPR promotes spin-off enterprises from the specific research conducted in each research centre. META, for example, recently launched a new software house. Finally, the CPR hosts the local site of the European network for the transfer of technology, TETRIS (Technology Transfer for Sectoral Innovation). TETRIS has recently initiated a number of projects to promote technological exchange and innovations in local firms, including informatics enterprises. Another European project, Actions for Investment Readiness for e-content Enterprises (AIRE), is also aimed at facilitating the access of local firms to sources of venture capital by organizing meetings between investors and local software houses. AIRE works to promote the sector in other ways as well, often in collaboration with a recently formed association of local new economy firms, the Arno Valley Community. Behind

the formal action of cooperation with larger firms, CPR plays an important role enriching the property of scientific knowledge available for the local smaller enterprises.

Conclusions

A number of important aspects of the development of software production in Italy emerge from our analysis. First, production in this sector is concentrated primarily among SMEs: 48 per cent of all firms in this sector employ less than ten employees, and only 17 per cent of the number of jobs provided in this sector are in firms with more than 250 employees. This is in contrast with European averages, where only 29 per cent of all firms employ less than 10 workers, and more than 24 per cent of jobs are provided by firms with more than 250 employees. Pisan SMEs are furthermore characterized by economic dynamism and high levels of specialization in niche markets and the production of custom-made goods. However, these firms generally develop their products for local and national markets, with little export activity.

We have also emphasized the territorial dimension of software firms in Italy, which is strongly influenced by the organization of production and by the models of local governance. Contrary to what one might expect for a sector based on the use and production of new communications technologies, production activity is geographically highly concentrated. Perhaps because of the comparatively weak national regulation of these sectors in Italy (OECD 1999, 2000*a, b*), some 'peripheral' areas have managed to develop the local software industry to the level of actual production systems (Regini 2000; Trigilia 1998). These zones host a large number of firms and employees: more than 70 per cent of all workers engaged in software production are placed in only 2 per cent of all local software systems in Italy.

In order to work out the unique characteristics of technological districts, we found it useful to identify the specific LCCGs that favoured the more innovative activities. National data and the Pisa case study alike reveal that while some local external economies in the area do constitute a 'competitive advantage' for both manufacturing and software systems, there are others relatively unique to software production.

For example, the development of the Pisan high-tech sector seems strongly related to the longstanding tradition of engagement with informatics research. As we have seen, a number of important events and processes contributed to its success. These features contributed to the development of a strong web of highly specialized knowledge, as in industrial districts. The more innovative role has been played by the research centres and vocational training institutes that contribute to the diffusion and reproduction of codified knowledge necessary for the development of these types of activities.

The case study also suggests other ways that the universities and training centres have supported—sometimes unintentionally—the development and competitiveness of local firms. Most important are their contributions in terms of the human resources development and expertise necessary for the development of high-tech activity, and the dissemination of specialists throughout the local system. The universities have also favoured the realization of less tangible LCCGs, such as the development of informal networks and what appears to be a local software ‘community’. This in turn sustains the diffusion of both codified and uncoded knowledge, and provides the foundation for local trust relations that are especially important in a sector where customers demand the highest quality and security, and transactions are characterized by a high level of uncertainty. We should also underline the importance of the ties that exist between universities, research centres, and some of the larger firms in the area.

The role of public agencies is also notable in the development of local software production systems. The agencies directly support firms by promoting policies and measures that increase their competitiveness. They also work through indirect means, such as by facilitating the creation of local technological infrastructure. On the one hand, the model of LCCGs brings to mind the traditional model and those defined as ‘real services (Brusco 1992). We also see the introduction of innovations to promote local and long-distance networks among firms, and between firms and universities.

Finally, the proliferation of local promotion and research and training initiatives have given rise to what we define as ‘unintentional external economies’. The high mobilization of public and private local actors has attracted investment and supported the production of applied research and innovative knowledge to the degree that they are now independent of the success or failure of any single initiative. The sector receives significant support at local, regional, and national levels through local governments, private firms, and state-level funding. These factors in turn guarantee the continued presence of a highly specialized local labour force and a surplus of intellectual expertise that stimulates local innovation and the creation of small, dynamic start-up firms. Finally, contrary to what one would expect, the piecemeal, uncoordinated character of efforts to promote this sector seems to have become a positive feature. Local policies demonstrate high levels of flexibility and adaptability in accordance with a model of governance that has maintained a ‘quasi-experimental’ character.

In summary, this study indicates that the competitiveness of high-tech firms is increasingly dependent on their capacity to tap into a range of external resources that facilitate their establishment in specific areas characterized by abundant supplies of LCCGs. These external economies and local collective goods are distinct from those that favour the development of other, more traditional economic activities. The weakness of national policies supporting this sector has in part been compensated for by the consolidation of regional

and local models of governance, that in many cases have adequately sustained the competitiveness of high-tech firms.

A number of important questions still remain open, especially in relation to recent trends in the European software market. As recent studies have demonstrated (Eito 2000), this is moving towards greater internationalization, which tends to increase competition between countries and regions. The inevitable question is whether or not Italian firms can remain competitive without certain improvements in the local models of development. For example, the financing system for innovative activities remains relatively undeveloped, and needs to be expanded and reinforced. The industry would also benefit from a closer coordination and better articulation of national, and, above all, regional and local regulations. Finally, the consolidation of the relationship between these innovative industries and more traditional sectors could encourage further expansion of the software sector and an increase in the competitiveness of activities that are more and more vulnerable to international competition.

18 Grenoble Valley

VALERIA ANIELLO

Grenoble is the leading 'high-tech city' in France. It gained industrial prominence thanks to electricity, a major public research centre in physics, the university, and local entrepreneurs. Self-defined by city leaders as a 'high-tech valley', Grenoble has based its model of local development on activities stemming from the micro-technology revolution: electronic bugs and tiny microprocessors with a great capacity of storing information. This has changed the local labour market, as well as consumptions and social lifestyles. The high-tech sector is, with more than 23,000 employees, the main work source in the whole area, with microelectronics playing the leading role.

However, Grenoble is not a local industrial system. Analysis of the enterprises located in the Grenoble region shows that small- and medium-sized enterprises (SMEs) supplying services dominate the high-tech sector. The technological pole is mainly composed not of industries but of service suppliers whose activity developed thanks to the public and private research centres (linked to major multinational firms) in the area. There is now considerable concern to transform ideas into entrepreneurial goods through new SMEs, to reduce the current imbalance towards conceptual activities.

The area has both tangible and intangible competitive collective goods. There is a large potential in terms of research, development, and availability of skilled manpower in the regional labour market (Grenoble may also be defined as 'engineers' valley'). At the same time, the development policies adopted—as in the case of the creation of a technological pole, the Zone pour l'Innovation et les Réalisations Scientifiques (ZIRST), in the 1970s and, today, of the micro-nanotechnologies pole (MINATEC)—have taken into account the need for infrastructures and services for development.

The Grenoble case confirms how extremely heterogeneous governance models can be. Different actors, both local and global, participate in the production of a single competitive collective good, implying diverse adjustment mechanisms. For example, public research centres, local universities, and multinationals' private research centres contribute to the potential of R&D. Its increasing importance in the area derives from interaction between different actors and different methods of adjusting production and using a single competitive collective good.

The Grenoble Coalition

Grenoble is located within the Rhône-Alpes region which has been over time a dynamic industrial region in France, comprising classic old industrial cities such as St Etienne, but also Lyon which has a large and varied industrial base, and Grenoble. Grenoble is the high-tech modernist industrial complex within a dynamic industrial region while St Etienne was the steel, coal, and textile city (see Le Galès and Tirmarche, Chapter 10, this volume). There are therefore other large firms in addition to the ones established in the Grenobloise pole which contribute to the creation of a competitive environment, for example in the production of electric and electronic components.

A couple of centuries ago, the economy of the Grenobloise region—an extremely peripheral region of France, being surrounded by the Alps—was mainly based upon agriculture and handicrafts. Enterprises, encouraged by gradual improvements in communication routes as well as by their own dynamism, began manufacturing products which had to be light, with high added value, in order to cover the transportation costs to outlet markets; gloves, paper, and liqueurs were examples.

But the real driving force behind its development was the discovery of hydroelectric energy (so-called white coal), which derived from the Alpine streams. This started the modern industrialization process. In addition, in the second half of the nineteenth century, a railway line was built. The two combined encouraged the transformation of some businesses from handicrafts to industries, for example glove manufacturing. At the same time a special type of engineering skill developed, aimed at producing the tools needed in hydroelectric plants, such as those to convey electricity and employ it for industrial use (electrochemistry). Within a few decades, this large-scale industrial transformation of the whole area was reinforced by the creation of new firms, the diffusion of banks, and the development of tourism as well as the subsequent hotel trade.

After 1945 universities, research centres, and enterprises were involved in close interactions. The creation of large industrial firms benefited from the participation of research and industry engineers. However, close interaction between universities and enterprises had begun long before then: an industrial electricity laboratory was set up at the science department of the University of Grenoble a century ago. The university extended its specialized courses and research to electronics, nuclear engineering, radioactivity, and the physics of metals, developing the old disciplines based on hydraulics and electricity. The emergence of leading industrial firms and a very strong scientific base has therefore been a long term process relying upon major business and university leaders, with local associations bringing together parts of the two worlds, within a mountain urban area with a strong sense of identity (Grossetti 1995).

Grenoble scientific elites gained influence in Paris. The alliance of the university, firms' leaders and, after the 1960s, local political elites was sufficiently powerful in Paris to secure major public–scientific investments such as

the Grenoble Centre of University Studies in 1956, the Langevin Institute in 1971, the Research Centre of the Commissariat à l'Energie Atomique, or more recently the Synchrotron in 1984. These are large scale investments which have reinforced the scientific basis, created research jobs, and developed world class research capacity. In contrast to other French cities, local industrial elites and leaders of the universities had common interest and long-term cooperation within other business partnership or within organizations bringing together representatives from those different worlds. Although French scientific policy has long been centralized, the Grenoble scientific complex had both autonomy and power to develop its own development strategy. Leading firms such as Neyrpic and Merlin-Gerin were the pilot-enterprises of the 1960s, typical examples of an industrial production model. The creation of a network of engineering schools (the prestigious *Ecoles d'ingénieurs*) and the development of the university related both to the scientific community and the large local industrial firms progressively organized a major asset for the area: the production of researchers, first class engineers, and good technicians.

The location of the 1968 winter Olympic games in Grenoble, with the leadership and massive investments of the French state, combined with the scientific and industrial base to attract inhabitants and national or international investments. The rise of the 'new' white collar middle classes was important in Grenoble and paved the way for what was then seen as a 'modern' and original form of local politics. The election of a new mayor, H. Dubedout, in 1965, marked a turning point as he tried to break away from the 'old' left. Himself a scientific engineer within a public research centre, he pioneered a form of local government based on public participation, a commitment to scientific and economic development, and culture and innovative social policies. He articulated the rise of the 'Grenoble myth', of the modernist city, the base for high-tech engineers enjoying skiing every weekend. Grenoble became the reference for the 'modernist wing' of the Socialist party in the 1970s (Motte 1985; Bruneteau 1998).

This dynamism culminated in 1971 with the creation of the ZIRST, that is, a science park based on the technological spin-offs of the university. That was seen as a major breakthrough and a remarkable local innovation in the French context.

Grenoble Today

As in most urban areas, the economic dynamism does not reflect the administrative boundaries. Socio-economic data suggest the following units within the valleys surrounding Grenoble:

1. *The metropolitan area of Grenoble (Grenoble Alpes Metropole)*, which includes twenty-three municipalities, is a real independent institutional level. It is situated at the centre of an urban area with 500,000 inhabitants.

Four of these municipalities have more than 20,000 inhabitants: Grenoble, Echirolles, Saint-Martin-d'Hères, and Fontaine. There is an inter-municipal administrative structure which is gradually taking over the strategic planning and management of the area.

2. *The urban area of Grenoble* which includes 101 municipalities.
3. The '*Grenobloise*' urban region (*Région Urbaine Grenobloise*), which includes 157 municipalities.

The boundaries of the technological pole start from *Grenoble Alpes Metropole*, extend to a relatively large neighbouring area called the '*Y Grenoblois*', which includes the regions Voiron to the north-west, Vif and Vizille to the south, and part of the Grésivaudan (Villard-Bonnot and Domène) to the north-east. It is, therefore, an area situated between the urban area and the *région urbaine*.

Employment in Grenoble is characterized by the diversity of an urban labour market, the importance of the public sector (as in most regional capitals in France), the role of the university and scientific community, and a remaining industrial tradition (Table 18.1). With about 50,000 jobs, industry accounts for 30 per cent of employment in the private sector. This is rather high for France; these firms are characterized by the highest technical organization in the Rhône-Alpes region, and by the highest number of employees. The development of the industrial sector is based on a high investment rate.

Until 1975 the main driving forces of demographic growth in the area were the creation of new jobs in the industrial sector, the development of research and universities and urban planning innovations. The combination of these elements made the town dynamic. Some years later, especially from 1982 onwards, the population began to decline and move to other towns in the urban area, in the Grésivaudan valley, or to the towns to the west of the conglomerate, along the Drac and Isère rivers. A third of the population even moved to the south, to other regions such as Provence-Alpes-Cote-d'Azur and Languedoc-Roussillon. In general, they were managers who moved with their families. However, many young people between twenty and

Table 18.1. Main industrial sites in the Grenoble metropolitan area, 1998

Name	Municipality	Employees	Activity
Schneider electric	Grenobloise metropolitan area	6,700	Electric equipments
ST Microelectronics	Crolles and Grenoble	2,300	Semiconductors
Caterpillar	Grenoble	2,000	Excavator machinery
Hewlett-Packard	Eybens	1,900	Informatic products and services
Rhodia Chimie	Pont-Le-Claix	1,400	Organic chemistry

Source: Unedic (1998).

twenty-nine years old, studying at the university or working nearby with high or medium level positions, began to move into the area, a pattern which is still continuing (INSEE 1998). While more than 80 per cent of employment is concentrated in the metropolitan area, there are other areas which developed further away, but still close to the communication lines, as with, for example, the site of ST Microelectronics in Crolles. Outside the Isère and Drac valleys, on the Alpine and pre-Alpine massifs, the population is sparsely concentrated and there is less industry, even though there are some big high-tech enterprises.

The first resource which allowed the development of the technological pole was the highly skilled labour force. The strategic choice made around the 1970s and the encouragement of local production with a high rate of experienced and skilled labour, depended upon the fact that all other economic activities were experiencing a crisis due to competition from low-cost developing countries. The number of researchers and of teaching-researchers in the private sector today is 7,680, that is 13.7 per cent of the national total. They include: 19.7 per cent in small industrial plants, 20.7 per cent in medium-sized ones, and 44 per cent in large, 3.2 per cent in the industrial technical centres, 12.5 per cent in engineering and consultancy firms. Private research produces 16.4 per cent of the patents deposited in France, or 2.5 per cent of those in the European Union as a whole. The pole takes part in 130 European framework programmes, representing 11.6 per cent of all French participation. The number of researchers and of teaching researchers in the public R&D sector in the region is 7,620 (13.6 per cent of the total in France).

The economic tissue of Grenoble consists of both the high-tech concentration, the show-case of Grenoble (highlighted and backed by local policies), and the diversified urban economy comprising an industrial tradition and commerce (Table 18.2). However, industry has been in decline for nearly three decades. In the 1970s, most French industrial firms, whether SMEs or large firms, went through a restructuring crisis particularly in the electrical sector. Traditional industrial employment collapsed, headquarters moved from Grenoble to Paris, firms were integrated in larger holdings.

Table 18.2. Employment by sectors in the Grenobloise region, 2002

	Région Grenobloise		Région Rhône-Alpes		France	
	Number	%	Number	%	Number	%
Industry	2,633	11.5	20,990	11.5	185,506	10.1
Construction	1,698	7.4	13,750	7.5	145,339	7.9
Commerce	9,199	40.2	78,088	42.9	791,905	43
Services	9,378	40.9	69,257	38.1	719,036	39
Total	22,908	100	182,085	100	1,841,786	100

Source: Information économique—Fichier des entreprises CCI Grenoble—juillet (2002).

The high-tech local productive system comprises a few large firms, networks of SMEs, and a myriad of services to enterprises, mainly focused on computer consulting, technical engineering, and software development (e.g. Cap Gemini, Sogreah Ingénierie). In this sector there is also a great experience in deposit and distribution platforms at European level. As for spatial distribution within the centre, 55 per cent of the enterprises are concentrated in the city of Grenoble and within the metropolitan area.

The city hosts a larger number of smaller firms specialized in services sectors, especially business services and consultancy, a number that has doubled in twenty years (from 1975 to 1995). This increase is due to an original process in the evolution of the Grenoble high-tech cluster backed by a great tradition of industrial innovation and localization of applied research centres. This evolution was based on conception, research and development whose main actors have been and still are the French and foreign groups as well as the major public research institutions. The activity of these large and strongly internationalized groups supported and encouraged the development of many business services enterprises (Champ and Rousier 1997).

SMEs Between Large Firms and Public Research Centres: The Grenoble Puzzle

Grenoble is not a local production system in the industrial district sense of SMEs with a dense network of horizontal interaction. This is an original combination of a local productive systems (LPS) profoundly rooted within the French state (in terms of research policy and investments in particular) and now more open to international markets. Despite our research, we still find difficult to assess the exact importance of local interaction between different pillars of Grenoble's economy.

The constant presence of scientists—initially attracted by the study of hydroelectric energy—led to the creation of competences which are essential for the future development of the city. Grenoble was therefore encouraged to develop an economic pattern based essentially on research, unlike other areas in the region. This is how conceptual activities, studies, services, information technology, research and teaching actually developed. The process of internationalization' took place thanks to three main elements: immigration, trade, and circulation of capital (Beauviala-Ripert and Rousier 1999). These elements also contributed to the formation of the economic-cultural substratum which lies behind the creation and development of the future technological pole of Grenoble.

Immigration is the oldest way of opening local economies to the rest of the world—it took place along two main routes. The first comprises the immigration of workers, who mainly came from Italy especially during the inter-war period, also due to labour scarcity. The second is the immigration of

tourists and foreign students attracted by Alpine winter sports and by the scientific and technological centres in the area.

Trade across the Alps dates back a long time, but only some districts of the Rhône-Alpes region such as Isère, Savoie, and Haute-Savoie are involved in foreign trade. Isère is one of the four main exporting districts in the whole region, selling mainly professional equipment, products characterized by a high added value and technological innovation. Partner countries change according to imports and exports. In 1998 Isère mainly imported from and exported to the United States, Italy, and Germany. The main exporting company was Hewlett-Packard.

The circulation of capital has especially characterized the past two decades, with an important role for foreign investment in the creation and development of enterprises; in the 1990s these investments were mainly allocated to high-tech enterprises. US firms have been established, becoming the driving forces of the city's dynamism with their growth and their technology. Some of these enterprises was established in the 1960s and 1970s (Caterpillar, Necton Dickinson, Hewlett-Packard). Others arrived during the 1990s, to take part in the development of the information technology and microelectronics poles in Grenoble. This latter group is composed of a few industrial plants, mainly R&D branches (Sun Microsystems and Xerox).

The Grenoble local production system is based upon four pillars. The first comprises the scientific research centres and the university (around 60,000 students in Grenoble). It has accumulated over the years a significant share of the most important scientific research institutes in France: the Institute of Information Technology and Applied Mathematics of Grenoble; the Laboratory of Electronics and Information Technology (LETI) which is part of the Centre for Atomic Studies for Innovation in microelectronics, optronics, information technology, microsensors and instrumentation of the Atomic Energy Commission (CEA); the CNET of France Telecom specializing in microelectronics on silicon and in the production of integrated circuits applied to telecommunications; the new National Institute of Research on Information Technology. There is also the scientific University J. Fourier and the National Polytechnic Institute of Grenoble, which account for 14 per cent of French electronic engineers and computer professionals. There is also a great potential of research poles with many large international centres: the CERN, the ILL, the ESRF, the Laboratory of Intense Magnetic Fields, the IRAM, some foreign organizations (Max Planck Institut, EMBL) and many public and private research teams. The development of conceptual activities was therefore due to different factors, which have already been partly analysed. First, being a confined area from the geographical point of view, the Grenoble region gradually developed a tendency to specialize in the production of goods with a high added value, creating an atmosphere of 'technical culture' supporting production. This was based on a local system built on the relationship among research–training–production which found fertile

ground in the Grenoble area, where we witnessed a great level of interaction between research, training, and enterprises (de Bernardy 1997).

The need to overcome geographical isolation was one of the driving forces behind the local specialization. A tangible example is Grenoble University, a well-known European university and scientific pole, which attracts many foreign scholars and students. This 'selective' mobility favours the development of an economy increasingly based on research and on technological innovation. As mentioned above, the role of the state is crucial in that story, and the capacity of Grenoble scientific elites to remain at the forefront of research has been remarkable over time.

The second pillar of the Grenoble system used to be dynamic industrial firms in electric equipments in particular. However, most of those firms, now part of Merlin-Gerin or Schneider, have either collapsed in the 1970s or have been restructured and absorbed by larger holding or firms whose headquarters were either in Paris or abroad.

The third pillar was the result of a local initiative, the creation of a science park by an association bringing together business leaders and research centres/university representatives, with a major influence from the public sector. The creation of the ZIRST, the poetic name of the science park, in 1971 seemed to mark a new step in the triumphant development of high-tech Grenoble which would benefit from university spin-offs. SMEs started to be created and to grow. This again raised the profile of Grenoble. The ZIRST was meant to raise profile and to develop the fledgling local high-tech economy. The municipality of Meylan, a small town near Grenoble, has also offered an area that has been fully equipped to help establish enterprises and research centres nearby, in order to encourage applied research. The same area was later made available to private enterprises. The double nature (public and private) of the park management has been an element of success. It saved the park both from excessive bureaucratic restraints—thanks to private actors—and from anarchy, thanks to the state regulatory power (de Bernardy 1988).

Nowadays, the ZIRST hosts 160 enterprises with 4,000 employees and 10 research centres. About 100 enterprises have been created in the park, and 60 are parts of major industrial groups. These enterprises are generally small- or medium-sized: 100 of them have between 1 and 10 employees, 56 have between 10 and 50, and only 5 have more than 100 (DATAR 1990).

Among the fields of activity, computer science ranks first (31 per cent of enterprises) over electronics (16 per cent) and multimedia communication (11 per cent). Seventy of the SMEs almost exclusively work in the services sector: production and building of prototypes, specific products upon request. There is no real industrial production here: therefore ZIRST has contributed more to the strengthening of scientific skills within the technological pole than to its industrial development. As was to be the case elsewhere in France, major French firms would locate a research centre of a subsidiary near Grenoble to be part of the development, for instance Thomson, P echiney, Val eo.

The fourth pillar comprises foreign investments in the electronics, micro chips, and computer sectors. From Hewlett-Packard, whose arrival was decisive in the growth of Grenoble, or Caterpillar to Sun Microsystems, Rank Xerox, and lately ST Microelectronics, Grenoble has been able to attract international high-tech firms. As mentioned before, high-tech services to firms started to grow and a major success story, that of Cap Gemini (now Cap Gemini Ernst and Young) led by a group of far reaching engineers under the leadership of Serge Kampf, became the leading firm in Europe. However, once the regional SMEs became leading European firms, they took the headquarters from Grenoble to La Défense in Paris.

On the surface, all the ingredients were there for the development of a successful local production system, which occurred to only a limited extent. Despite a significant development over the years, and new investments, there are limited examples of SMEs' success over the years and little local endogenous development. Our analysis in terms of local collective competitive goods (LCCGs) and local governance, points to the limited production of these and a weight of hierarchical relations, which have over the years destabilized horizontal interactions among firms and probably prevented more significant developments. The public research centre led strategy has however clearly assisted both large firms and SMEs specializing in R&D activities and has given the city a favourable position at European and maybe even at a global level. However, this has been at the expense of production activities. There are very few cases of SMEs growing over time; Cap Gemini is the exception. Production is usually developed elsewhere in France or beyond because, according to local observers, local labour costs are too high. On the one hand therefore one can praise local initiatives, the success in attracting private and public investment, the rise of SMEs, and the making of an apparent local industrial system. On the other hand, there is not so much evidence of local development initiated by networks of SEMs despite long-term support and investment.

Local Governance and the Production of LCCGs

Grenoble's technological pole is renowned for its many world-famous public research centres and universities. These institutions also attract private research centres—Péchiney, Rank Xerox, Schneider Electric, Hewlett-Packard, ST Microelectronics, Sun Microsystems Caterpillar, Calor, HP France, Rhodia Chimie, Tecumseh, Valéo—in the digital sector, in the new IT and communication technologies, in microelectronics and nanotechnologies, optics and multimedia, even reaching on-line services, and biotechnologies.

While reviewing the French economy, Salais and Storper (1993) underlined one feature of Grenoble: the number of research centres which were not developing close interactions with local SMEs. They particularly stressed the

importance of research centres from industrial firms with hierarchical links. Many came to Grenoble to benefit from the 'atmosphere', but without long-term commitment. Endless restructuring, industrial 'Meccano' or strategy change at a time of industrial crisis more than once jeopardized local long-term strategies and horizontal forms of cooperation with local SMEs. The case of Thomson illustrates this behaviour. Unstable hierarchies in other words seemed to have damaged the potential for the making of a dynamic local production system. One can generalize from this. At one level (see above) there is a powerful production system of LCCGs, particularly in terms of R&D, skilled labour force, and the image of the high-tech city. Beyond this, basic LCCGs corresponding to the needs of SMEs in terms of business and market development seem to be missing and were not seen as a problem.

Firms, whatever their size and research centres, have mainly come to Grenoble to benefit from the following LCCGs: (1) a scientific community around research centres and the university; (2) a highly skilled labour force, a real 'scientific milieu' within which to recruit; and (3) in a different way, the image of the city and the presence of the mountains which is a major asset to attract and keep highly skilled engineers. Those three are the result of a long-term local mobilization of scientific elites and local business leaders, but also of national public policies and investments. In the first two cases, there are some fragile but positive dynamics of development: more concentration of research centres encourages the state to invest again in Grenoble to sustain and reinforce its excellence.

The emphasis on R&D at the expense of business developments is a long-term issue in Grenoble. This strategy has been strengthening over the years, far from market logic and consumer pressure. Sometimes innovative products have no easy access to the market. We were given the example of a video assistance system invented by France Telecom: it is a highly advanced machine to help ill people who are not self-sufficient. This product is having market success only in Canada, because it did not take into account the psychological and social characteristics of the customer. Even if the product is technically excellent, ill people have not accepted it as a replacement for a human carer. This had not been studied in the product conception phase. The presence of highly qualified engineers and technicians is not enough to ensure the commercial success of a product, since research and high technology must go with a careful study of the customers' real needs.

The tendency to concentrate excessively on conceptual activities is the symptom of an exhaustion of the technopolis model. The continual research of highly sophisticated technologies risks becoming remote from customers' real needs (de Bernardy 1997). CNET, a public research centre in telecoms, is an example of an institution that does little to encourage its researchers to meet enterprises' requirements and consumers' needs. It keeps designing technologies that appear to be too complex and too sophisticated, and the performance features go beyond what is needed and beyond what a consumer might pay.

Moreover, it has triggered a dangerous mechanism with ZIRST small enterprises, in that as soon as it grants research contracts to them, they soon abandon all commercial activities and become dependent. As one interviewee said:

Il y a toujours de la production à Grenoble, qui n'est pas destinée au consommateur final. L'ingénierie informatique bénéficie de liens immatériels qui produisent de la valeur ajoutée. Beaucoup d'entreprises installent ici leur Division Recherche pour bénéficier de cette "atmosphère". Rank Xerox a décidé d'installer son centre de recherche ici et pour nous c'est de la notoriété. C'est celle là la déviation du modèle: cette année au lieu d'installer une entreprise on installe un centre de recherche.

Even large high-tech firms which have come to Grenoble have not developed links with local production firms, only with conception firms. In our survey, no relationship has been found between multinationals' production sites and the few examples of local production firms. These, instead, have many links with the service enterprises. The presence of so many small enterprises, and so few larger groups, does not, as one might think, create any problem within the centre. There is an equilibrium, further to which different types of cooperation links have been established, and the smaller units perform important and never subordinate tasks.

In Grenoble, collective competitive goods (CCGs) represented by skilled labour are produced with the governance mechanisms typical both of hierarchy (skilled labour is trained working in different departments within the same enterprise) and of the market (the workforce's training takes place in different enterprises), as well as of the state (universities and public research centres train the labour force). Therefore, the training and employment of the labour force is both a local and an international phenomenon.

New Developments: Policies to Increase Specilazation and Competitiveness

The government of Grenoble metropolitan area has been for a long time fragmented and piecemeal, structured around well established political rivalries. Change is taking place, but the corruption charges against the former mayor, and difficulties of the current socialist mayor have prevented local political elites from playing a leading role in the governance of the local economy. However, policy initiatives have been started bringing together business leaders, local authorities, and the centre of the Grenoble world: universities and research centres. Building on the relative success of ZIRST, they tend to enhance local horizontal cooperation between those actors, in particular in the field of public policy and applied research.

For instance, Grenoble is fast becoming a centre for 'micronanotechnologies'. The MINATEC (Microélectronique Nanotechnologies) centre aims at becoming a European leader in basic and applied research in the field of

'infinitely small' technologies. More than €150 m. have been invested in this scientific and industrial centre over a period of four years. The centre will host 1,200 research engineers, 1,000 trainee engineers, and from 500 to 1,000 representatives of industry. The two partners promoting the project since 2001 are Institut National Polytechnique de Grenoble (INPG) and CEA (Centre d'Etudes Atomiques). Along with policies aimed at promoting enterprise creation, the state interventions have been and still are concentrated on the establishment of infrastructures and major works aimed at constructing technological poles. The centre represents a typical example of local image renovation policy implementation in order to produce LCCGs. The prevailing local governance model is therefore typical of the 'state' and in full compliance with the new type of French standards in that matter (Aniello and Le Galès 2001).

That strategy of integration of local partners to become more competitive in one segment has received a major boost with a series of large scale industrial investments by ST Microelectronics, Philips, and in 2002 Motorola (€2.8 bn. investment, about 6,000 jobs overall). Those investments were made because of the available labour market in Grenoble, the density of engineers, and the large networks of SMEs (both services and suppliers) available in the region and the research centres. Major public research centres such as CEA and LETI have already increased their research effort in that domain to become a close partner in the technological developments of that fast moving area.

Among the other public bodies there are the regional technological agencies, aimed at mobilizing, stimulating, and coordinating the competence centres, and at spreading scientific and technical information among regional enterprises. A new incubator called 'Grain' (Grenoble Alpes Incubator) has been recently set up thanks to the synergy of higher education and research.

The fact that Grenoble specializes in concept analysis reflects the development of the industrial organization of the large groups, which tend to outsource the manufacturing of components while managing some stages of the local production process as well as research, the devising of new products, and the coordination of the different manufacturers. This trend of big industrial enterprises—that is, the shift from production to conception activities—has also deeply changed the nature of employment. The above explains why the conglomerate of Grenoble has a decreasing need for a non-skilled labour force. For this reason the nature of skills and employment is totally changing: non-skilled workers have decreased by 42 per cent from 1975 to 1990, while skilled workers have increased by 36 per cent (Champ and Rousier 1997).

A final example of Grenoble's development comes from the biotech sector. Following the regional biotech strategy (with a strong base in Lyon), leading research centres in Grenoble have concentrated on research about genes. It was announced in 2003 that the government would create a new institute for proteomics science (a combination of genetic research, protein structure, and computer science related to biology) in order to finance massive investments for research, links with various research centres in Grenoble, and soon the

development of biotech start-ups. The strategic capacity of Grenoble scientific elites to innovate, work together, and then obtain resources from the central state for pioneering technologies and research is once again successful.

The creation and employment of this CCG, such as by R&D activities, takes place thanks to the presence of private multinational research centres, universities, and public research centres. The links between these three actors are very strong. For private research centres, the creation of CCGs takes place according to the hierarchical mode: the good is not bought from the market but produced within the company itself. The presence of both public and private centres and their interaction make it possible to reduce production and employment costs of this CCG.

Local policies tend to increase Grenoble's excellence in research. At the same time there is an attempt to reinvigorate its industrial activities. If enterprises—no matter where they are situated—need research, research needs to devise products which are appreciated on the market.

For instance, the new mission of the LETI of the CEA is to transfer innovation to industries in the sector of microelectronics, encouraging its 800 researchers to set up their own company. The expression used by a privileged local witness during an interview is significant:

Grenoble a une grosse tête (la recherche/conception) et des petites jambes (la production)! On essaye de passer de la recherche à la production avec l'incubateur d'emploi. Le chef du LETI, par contre, dit qu'il faut revenir à la recherche fondamentale!

In twenty-five years, the research centre has encouraged the creation of eighteen start-ups, among which Soitec is an example of entrepreneurial success.

In order to facilitate the creation of enterprises, the state has also played the role of 'business angel', creating new incubators and making funds available for start-ups. By the end of 2000 there were twenty-nine incubators in the area. Their aim is to support young entrepreneurs, especially with training, consultancy, and financial problems. In addition, to encourage the change from the status of researcher to the status of entrepreneur, a law was passed to authorize and encourage researchers to set up an enterprise. It came into effect in July 1999.

One of the strongest points of the Grenoble system is that different forces share in the production of the same collective good. They work together in a synergy, often but not always on a local scale. Particularly important is a strong public or state presence.

Conclusion

Table 18.3 summarizes the situation of governance and CCGs in the Grenoble high-tech sector. It is a dynamic model, which nevertheless has many weak points that undermine its very future and create the grounds for

Table 18.3. CCGs, manufacturing procedures, and actors in Grenoble

CCGs	Governance mode	Parties involved	Local/non local
Skilled labour on the regional market	Market	Enterprises (design, manufacturing)	Local and non-local
	State	University and public research centres	Local
To facilitate access to R&D to develop new products	Hierarchy	Private research centres of multinational enterprises	Particularly non-local
	State	University and public research centres	Local
Enterprise establishment incentive policies	State	State, public research centres	Local
Policies directed to establishment of infrastructures or to supply of services to enterprises	State	Government, region, department, municipality	Local

a series of risks of deterioration which must not to be underestimated—such as the large-scale dependence on public funding. Clusters of SMEs, a major resource of the area, are nevertheless not its driving force.

We have shown the existence of an unparalleled research centre in the field of high technology, but the spearhead on which the whole installation rests—the presence of public training and research structures—is also a problematic factor. Research, if funded mainly with public resources, risks a kind of ‘addiction’ and does not seem able to always sustain itself. Research centres concentrate their efforts on the creation of extremely sophisticated products, whose costs of design and realization are very high. Excessive presence of research as a propeller of local development could therefore become a weakening factor should public funding decrease.

Some LCCGs are still lacking. The presence of R&D activities, and also of a skilled engineering labour force represents a weakness when it is remote from the manufacture and sale of products. It would be better if the research centres were more integrated with the multinational manufacturing and sales sites, and that the public research centres were more market-oriented. It would also be important to diversify the recruitment profile beyond engineers to promote a higher sensitivity to market and sales dimensions. Moreover, the lack of some typical CCGs like information on market and demand evolution, is also a problem. Grenoble Chamber of Commerce, for example, does not produce specific information about high-tech market trends.

The priority given to highly sophisticated products, especially in the field of microelectronics, creates two direct negative consequences. The first is the risk of not selling the product: an enterprise does not need a technological masterwork if production costs remain too high or if potential customers are forced to make massive investments to adapt their machinery or some phases of their production process. The second is that, since the electronics market is undergoing a phase of constant technological change, a mechanism has been triggered that may lead to failure for the many start-ups that have recently been created. These do not have enough funds to invest in a changeover. The high quality level required by production, and the training costs of the highly qualified personnel represent heavy burdens for the young start-ups.

The development model followed by the Grenoble technological pole, beginning with metallurgy combined with electricity, extending then to electronics combined to computer science and telecommunication, contributed to the building of an economic identity. Throughout the twentieth century Grenoble has established itself as the economic capital of the Alps, chiefly thanks to its exports, all over the world, of technologically innovative industrial products. Today its international renown comes also from the presence of many multinational groups. Sometimes the image is stronger than the system's capacity of self-sustenance. Our analysis point both to the limits of horizontal networks except around the scientific communities and networks, and the lack of governance of the economy to produce LCCGs that SMEs need.

19 The Governance of High-Tech Districts

CARLO TRIGILIA

What are the main features of local systems specialized in high-tech activities? Are there significant similarities in the origins and operation of these systems that can explain their territorial concentration? To what extent is their governance influenced by public policies? In the following remarks, we shall address these questions and shall try to assess whether a distinct local high-tech system really exists, cutting across productive sectors and national and regional systems of governance. Obviously, our conclusions can only be tentative and exploratory. In fact, our case studies are too limited in number and were chosen with the intention of ‘maximizing differences’. In addition, they vary to a considerable extent not only in their size but also in their degree of development. The number of firms involved in biotech activities in Oxford or in software productions in Pisa is much lower than in the Cologne media industry or in the ICT sector in Grenoble. Moreover, it is true that high-tech activities usually tend to have a weak impact on employment, because they are based on goods that are easily reproduced; but differences in employment among our cases are even wider. They clearly distinguish again the British and Italian systems from the others, whose activities involve a larger part of local employees. Therefore, caution is required in reading the research findings. We intend to use them only to formulate some hypotheses on the specific features of high-tech local systems, which should be developed by more extensive research.

External Economies and Local Collective Competition Goods

Despite all sectoral differences, there are striking similarities in the conditions that may explain territorial concentration in our systems. These involve the role of external economies and the provision of local collective competition goods (LCCGs). What are these goods and how are they produced? We may point to three basic types of LCCGs.

First, one has to consider *access to research and university facilities*. In all our cases, this is a crucial resource for the local systems, which provides advanced technological knowledge together with a highly qualified labour supply. Three basic institutions—strongly interdependent—contribute to

these outcomes: public universities, public and private research centres, and large firms with their R&D structures. The mix of these resources may vary in individual cases, but they are crucial for the local development of high-tech activities in which small firms always play an important role.

As for the technological inputs, these are related to the chances of developing formal relationships between firms, and clusters of firms, and research institutions. These may involve formal contracts and joint ventures. Although the importance of this kind of link seems greater for the biotech sector in Oxford and for the ICT in Grenoble, it is also considerable in Pisa and Cologne. In this respect we can hypothesize that the role of this factor grows with the dependence of product innovation on scientific advances, as is typically the case in biotech activities.

However, there is a second, even more important, way in which the research and training infrastructures influence the local system. This includes informal ties and networks that involve local agents on both sides: research and industry. Local professional communities develop through these networks. This kind of relationship is important for the exchange of ideas and information, the development of tacit knowledge and local trust, the recruitment of qualified labour, the formation of new firms and support for their activities. All our cases show a considerable diffusion of this favourable factor related to the research and training base, and also to the concentration of firms induced by this infrastructure. In other words, a feedback process developed in all our cases. The public research base, as in Oxford, Grenoble, and Pisa, or the presence of an important private centre, such as public television in Cologne, triggered the growth of small firms. These, in turn, favoured the creation of formal and informal links, which strengthened local relations and networks.

A second factor refers to *the availability of specialized suppliers of goods and services*. A pool of dedicated resources tends to grow around the research and training base. This allows the cooperation that is necessary for a production based on networks of small firms or of large and small units. In this respect, our case studies show a certain degree of variability. Insofar as production is organized through project teams, as in the media system of Cologne, the proximity of specialized agents is crucial and more widespread. This is also the case, to a lesser extent, of software production in Pisa and ICT in Grenoble, while the process seems less pronounced in the Oxford biotech system. Productive networks are not autarchic. In many cases, they involve non-local firms (sometimes, as is typically the case for the biotech sector, foreign firms), but the availability of local partners, linked by formal and informal ties, is an important condition for both small firms and large units located in the system.

In addition, the presence of specialized suppliers of services is also crucial in all our systems. Apart from the research and training services already mentioned, these include financial services, mentoring and assistance to start-ups, marketing, and technological information and transfer. Dedicated finance is

particularly important for the new high-tech activities, since their performance is more uncertain and risky. Therefore, local structures with specialized skills in this field are present in all systems, though their role varies according to sectors. The embedding of financial institutions in local activities enables the sharing of information and better evaluation of new investment proposals.

The final kinds of collective competition goods (CCGs) have to do with *the quality of local context*. The availability of favourable and well-equipped premises at lower costs is crucial for small firms. In all our cases the creation of industrial parks and other specialized sites for firms is present. No less important is the development of a good system of physical infrastructure and communications, which allows the local system to be connected with national and international centres rapidly and at low costs. But social features are also influential. The amenities of localities, in terms of social and cultural life, and of social services and educational resources, play an important role in attracting highly qualified specialists with their families, and therefore influence the formation of professional communities in high-tech systems. This is why all our systems are centred on the role of medium-size cities with a rich endowment of urban functions. It seems that for high-tech activities this may be a viable alternative to location in large capitals. In any case, the local context shows particular features, different from those of more traditional productive sectors centred on small firms or large networked firms. Since the direct occupational impact of high-tech activities is very limited, the diffusion of more labour-intensive business and social and services is fundamental for the development of these local systems.

In conclusion, we may say that, as for more traditional industrial districts, external economies related to LCCGs strongly influence the process of territorial concentration of high-tech activities. However, two differences are worth mentioning. The first has to do with the kind of LCCGs that are more important for high-tech systems. These seem more related to the creation of new products rather than to their reproduction. While reproduction is a time-consuming and labour-intensive activity for traditional districts and other local productive systems, in high-tech activities the generation of new products through strong links to scientific advances is the crucial process. Reproduction is relatively easy and less expensive in terms of capital and labour resources involved. This logic is particularly strong in the more science-dependent sectors such as biotechnologies, but it is also at work in other sectors where creativity is important, such as in the media industry or in certain software productions, as the cases of Cologne and Pisa show. Therefore, the external economies that have to do with the generation of new knowledge are more important than the sheer presence of specialized units as sub-suppliers in the productive process, or the abundance of skilled labour. In our cases, small units are diffuse, not so much because they help a flexible adjustment to the market in the reproduction of new goods, but because they favour the creation of new products. These may be related to sectors where

scientific advances are important and technological trajectories are uncertain (biotech in Oxford), or where the creation of new goods that meet consumers' tastes is a key resource, such as in the media industry in Cologne, or in some software productions in Pisa.

This leads to a second difference. The crucial role of new knowledge for the generation of new products—and their easier reproducibility—also help to explain why cities with a rich supply of cultural and social services are the usual base for high-tech activities. However, high-tech activities do not permeate the local environment as happens for the sectors on which traditional districts or networked firms are based. This also means that the role of strong local identities is less important for the operation of these 'high-tech districts'. Tacit knowledge and shared attitudes are crucial, but they develop and are reproduced through professional communities rather than through territorial identities. This does not mean that a good endowment of local social capital, in terms of relations and networks among collective actors, is not important for the governance of these systems (we will come back to this in the next section). However, an effective local governance seems less dependent on local identities and communities.

The Production of Local Collective Competition Goods

How were the LCCGs that favoured high-tech systems produced? And is there a specific model of governance that cuts across sectoral and national differences? Our cases studies suggest that public policies are important for the development of local systems. However, there are differences in the intensity and operation of this. In Grenoble and Cologne political decisions were crucial for the origins of local systems, while in Oxford and Pisa the process seems more spontaneous, serendipitous, and incremental, although specific policies intervened to sustain growth.

In Grenoble, as in the other cases, the development of a high-tech system took place mainly during the past two decades. It was prepared by incremental processes related to the local specialization in hydroelectric projects, which also involved university structures and intermediary organizations between research, training, and industry. This context favoured the location of a few large firms. But it was the planning decision of the French central state to locate in the area some important institutions for research and technological transfer, which had a decisive impact on future high-tech developments since the 1980s. This massive concentration, in turn, attracted large firms' R&D facilities and was backed by local public policies, which strengthened the supply of LCCGs in terms of industrial areas and other specialized sites, of training infrastructures, and business and social services. Therefore, public policies played a key role, with a strong influence of exogenous, central decisions.

A different equilibrium between central and regional and local interventions seems to operate in Cologne. Central choices were important here insofar as they affected the regulation of public broadcasters. The public television WDR was located in Cologne and favoured the growth of local activities related to the provision of services and products for its operation. With the break-up of public monopoly (a central decision), the regional government saw the opportunity to support the media industry as a viable alternative to declining traditional industries. Therefore, the role of regional and local government in providing LCCGs to attract new investments and activities was more important in this case. This was mainly done through the creation of a policy network based on local intermediary associations in which business actors were involved. Contrary to German traditions, however, unions did not play a significant role.

In Oxford, the first moves towards the development of a biotech system were much more spontaneous and serendipitous. They relied on informal networks between scientists involved in the public research base and managers and investors. There were also some intermediary institutions (such as the Oxford Trust with a charity status, and university institutions for technological transfer). Central policies were indirectly important here, insofar as they affected the regime for intellectual property in the UK's universities. This was crucial for the biotech sector, given the role of scientists in the growth of the industry. With the transfer of the ownership of intellectual properties to individual universities, a strong incentive was created for their commercial exploitation of scientific discoveries. At the same time, one has to consider the indirect influence of national regulation affecting financial activities and therefore the creation of dedicated venture capital activities by private actors. Later the role of the central government became more proactive: new policies were undertaken, with the aim of favouring the formation of local networks and institutions for the provision of LCCGs, largely funded through public resources. Public investments in research infrastructure were also increased. Here, therefore, the public policies were more important in sustaining the growth of the local system than in influencing its origins. It is also worth noting that central policies were more influential than local ones, although they mainly operated through intermediary institutions in which university and private actors were involved.

Unlike the British experience in the biotech sector, local and regional policies were more important in the Pisan software activities. True, the original development was spontaneous and serendipitous, as in Oxford, but growth was later supported by more proactive local and regional policies. In this case, the origins of high-tech activities can be traced to the decision—sponsored by local university actors—to locate the first Italian electronic computer in the area, in the 1950s. This triggered the development of other related activities and research and training institutions. As a result, national and foreign large private firms decided to locate their R&D facilities specialized in computer science

(Olivetti, IBM). Some productive activities were also created by these actors. With the crisis of ‘industrial informatics’ in the 1980s, many of these previous initiatives declined, and large firms closed their R&D facilities and their productive sites. The weakness of national research policies is also visible here.

However, as a consequence of the crisis, new small firms, more oriented towards software production and ‘new economy’ activities, emerged. New small firms were mainly founded by professionals, previously employed in large firms’ research and productive activities. Another source of new entrepreneurship for small firms came from former students of local universities, highly specialized in computer science. University researchers also became involved in the new activities. It was at this point that a vast bulk of local and regional public policies started to be pursued. They provided LCCGs that were very important for sustaining the take-off of the local system based on new software productions. Again, the role of intermediary organizations was crucial, but here these were mainly formed by local governments and business associations—a model which shows similarities with the German experience in Cologne.

Therefore, we can conclude that public policies matter for our high-tech systems, although in different ways. In some of them (Grenoble and Cologne) they were crucial both for the origins and the consolidation of the local system. In the other cases (Oxford and Pisa) they were more influential in the consolidation stage (Table 19.1). The role of central and local actors also varies. Central policies were more active in Grenoble and in Oxford, while regional and local initiatives more strongly shaped the development in Cologne and Pisa. On the whole, however, we learn certain differences between our high-tech cases and more traditional local systems. The former seem much more dependent on public policies than are other local productive clusters. This may be an important hypothesis to explore further. However, the means through which public policies intervene in high-tech activities deserve particular attention.

In this respect, it is worth noting that in all our cases, despite the variable intensity of political intervention, policies are not mainly pursued by traditional means, that is through direct regulations or distributive measures, such

Table 19.1. Public policies and LCCGs in high-tech districts

Actors	Origins	Consolidation
<i>Role of public policies</i>		
Central government	Grenoble	Grenoble
		Oxford
Local and regional governments	Cologne	Cologne
		Pisa
		Grenoble

as incentives to firms. As the case studies clearly show, the role of intermediary institutions is crucial for providing LCCGs. Policies work through such institutions. Sometimes they stimulate the formation of these structures; in other cases they involve pre-existing associations in the implementation of new initiatives. This means that the mere presence of qualified research and training institutions and well-established university structures is not sufficient for the local growth of high-tech activities. As the case of Oxford shows, intermediary organizations are crucial to favour communications between the public and private research base and industrial activities, and to mobilize scientific and technological knowledge for productive applications. Public policies cannot play this role without the specialized collaboration of actors who possess key information for an effective allocation of resources. At the same time, they have to avoid the risk of collusive coalitions among the beneficiaries of public resources. Therefore, the provision of LCCGs is a difficult job. It requires a complex equilibrium between the involvement of private actors and the protection of public interest. It seems that a crucial prerequisite for the success of public policies—whether central or regional and local—is the availability of a good endowment of collective social capital. This implies an appropriate capacity of coordination between local public and private actors in shaping and sustaining a coherent path of local development.

Our case studies demonstrate that the role of intermediary organizations is always crucial at the local level. However, different models of operation can be detected. They vary according to two main dimensions (Table 19.2). The first has to do with the associative nature of membership: intermediary organization may involve associations or single actors (individual firms or public institutions such as local government or public research centres). The second dimension refers to the internal composition: members may be mainly public, mainly private, or mixed, when both public and private actors are present.

Combining the two dimensions, we can see that in the case of Oxford the intermediary structures are prevalently private and comprise individual actors, especially firms, though university and charitable institutions are also present. In Grenoble, intermediary organizations are mainly public and include individual public actors, especially research centres and institutions for technological transfer. However, the important role of ZIRST (Zone pour l'Innovation et les réalisations scientifiques), which is a mixed body, should

Table 19.2. Intermediary organizations

	Mainly private	Mainly public	Mixed
Associations			Cologne
			Pisa
Individual members	Oxford	Grenoble	Grenoble

not be neglected. In the case of Pisa, and even more in Cologne, intermediary organizations are mainly mixed and include associations of private actors and public institutions. However, it is worth mentioning that even in these cases, which recall the corporatist structures of interest intermediation, the role of associations is quite different than in traditional regional and local models of governance that we may find in Germany and Italy. In fact, business associations more frequently represent firms of the involved sectors rather than more general industrial interests. In addition, unions are usually excluded and their role in the regulation of high-tech activities is quite marginal. Actually, union affiliation seems very low or absent in the high-tech sectors, and industrial relations do not play a significant role.

The Governance of High-tech Industrial Districts

Despite these differences, we may draw a more general conclusion: in high-tech systems, the role of intermediary institutions is more important for the provision of LCCGs than in other local productive settings. If we take into account the major role of public policies and intermediary organizations, we can propose the hypothesis of a distinct model of governance that regulates high-tech activities and provides LCCGs, cutting across sectoral and national differences. This may be contrasted with the more traditional industrial districts considered in Part I of this volume.

Although the governance of high-tech districts seems more dependent on public policies than that of other small- and medium-sized enterprises (SME) systems, this does not mean that the origins and operation of high-tech systems are more based on direct financial incentives or other financial and tax benefits. Some of these measures are present, especially in Oxford, but the main influence is related to the ability of public policies—whether through central or local and regional resources—to provide substantial LCCGs, in various forms. In order to get these results, the collaboration of local public and private actors through intermediary organizations is crucial. Their ability to coordinate efforts and resources is even more crucial for high-tech systems, because their growth is dependent on more complex and sophisticated LCCGs, whose production requires explicit and formalized coordination between different actors (Table 19.3).

The role of central policies and regulations deserves qualification. These may be more involved in the governance of high-tech systems in two ways. First, as the literature on national innovation systems suggests, high-tech activities are more dependent on national policies and regulation that affect the development of scientific and technological research. No less important are financial regulations and their impact on the availability of dedicated venture capital, whose role is again particularly important for the new activities. A second kind of influence has to do with proactive, purposive policies

Table 19.3. Models of governance

Traditional industrial districts	Local community ties	Associations and Industrial Relations	Local and regional policies
High-tech districts	Professional community ties	Intermediary organizations	Local and regional policies/central policies

towards the new sectors. We found clear examples of these policies, especially in France and the United Kingdom. They are motivated by the importance that is given to high-tech activities for national economic development. In this respect, one could say that, in comparison to other productive systems, governance is more exogenous, in the sense that it is more directly or indirectly dependent on external actors and resources.

Another interesting aspect has to do with the role of community ties in the regulation of economic activities. We have already mentioned the importance of informal relations as a kind of positive externality that favours innovation in the generation of new knowledge and new products; it also fosters the formation and reproduction of trust that lowers costs of complex and risky transactions. In comparison to traditional districts, two differences can be pointed out. The first refers to the greater importance of the conception process in high-tech activities. Informal links and good social capital mainly affect this aspect, while in traditional districts, the reproduction of goods in the productive process is more central. This means that in these better labour relations and organization are a crucial aspect of governance, which is partly regulated by informal links between employers and workers. A second difference has to do with the nature of informal relations. It is well known that the governance of industrial districts, and of other local systems based on SMEs, is shaped by community ties. These often precede economic development. In these cases, territorial identities cut across various social groups and feed informal relations that are important for the reproduction of cognitive and normative resources: skills and trust. As we saw, in high-tech systems the role of territorial community seems less important than that of professional communities. Informal ties are mainly formed and reproduced through careers and experiences that pass through universities, research centres, large and small firms. Therefore, community relations and forms of reciprocity are no less crucial, but they are less based on territory.

In conclusion, we may contrast the hypotheses on high-tech districts with those that we proposed at the end of our previous volume for industrial districts (Crouch and Trigilia 2001). First, the idea of a distinct model of 'high-tech districts', with a specific governance, seems plausible. Despite all differences, it is possible to single out some particular features in the

organization of high-tech systems. While the national innovation systems influence the diffusion and development of these activities, when high-tech systems grow, they seem to be shaped by a similar logic. Small high-tech firms tend to concentrate their activities in localities that are able to produce particular LCCGs. This process involves a specific governance that cuts across national models and varieties of capitalism.

In comparison to traditional districts, the governance of high-tech systems seems more exogenous—better, more based on a mix of exogenous and endogenous resources—more formalized, but no less substantive, although the kinds of substantial LCCGs that need to be provided are partly different. This also implies that the path of development of high-tech systems tends to be more politically constructed. However, our case studies also suggest that public policies may be successful insofar as they rely on the capacity of local actors to recognize hidden or latent resources that might be usefully exploited for starting a new path of development, and on their ability to pursue a coherent effort of coordination. This is an important lesson for public policies for local economic development.

20 Conclusions

PATRICK LE GALÉS AND CARLO TRIGILIA

The aim of this project on local productive systems (LPSs) in Europe was to analyse the form and role of locally embedded manufacturing activities. Is the role of LPSs based on small- and medium-sized enterprises (SMEs) rising or declining? Are there ideal-typical models of LPSs that cut across national economies? How are local economies changing? In the first volume we pursued this goal by introducing the concept of local collective competition goods (LCCGs). We assumed that LPSs grow and reproduce themselves over time by relying upon external economies. These, in turn, are based on LCCGs—the production of tangible and intangible collective goods—that create particular advantages for single firms localized in the LPSs. LCCGs are even more important for SMEs, because these are more dependent on external economies for their performance. We tried to assess whether there was a relationship between types of local systems based on SMEs, particular kinds of LCCGs and modes of governance, that is modes of regulation of local economies that influence production and delivery of local collective goods.

We assessed that local production systems of SMEs continue to be important in manufacturing industry, in all our countries. They are not declining, but rather increasing. However, their weight is variable (some countries like Italy or Germany seem to rely more on LPSs than Britain and France). Second, only in some cases do they take the well known form of ‘industrial districts’; ‘networked firms’ and ‘empirical agglomerations’ of SMEs seem more on the rise. Third, we considered that new LPSs based on high-tech activities are developing, with a significant role for SMEs; they are usually closer to the industrial district model. Fourth, there is a relationship between models of local systems (industrial districts, networked firms, empirical agglomerations of SMEs), kinds of LCCGs that are important in each model, and modes of governance that regulate production and delivery of such goods. Fifth, therefore, local systems based on SMEs show patterns of organization and governance that cut across national economies. National systems seem to influence the overall diffusion of LPSs based on SMEs (higher in Italy and Germany) and the model that prevails in each country (industrial districts and networked firms in Italy, networked firms in Germany, empirical agglomerations in Britain, empirical agglomerations and networked firms in France).

In the second volume, we intended to analyse in more detail, though in only an exploratory way, through comparative case studies, some features of traditional and well known cases of local production systems based on SMEs, together with some other recognized cases of high-tech LPSs, and attempts at establishing such systems where they have not existed before. How are the local economies changing? Are there differences between the 'old' and 'new' cases of LPSs based on SMEs? What is the role of public policies in the development of new high-tech LPSs? What lessons can we learn from the story of old and new cases for policies to support local economic development? To what extent can the experience of success cases be reproduced in backward areas or in areas of industrial decline?

Main Findings from the Cases

Let us briefly review the main conclusions from the different groups of case studies.

Machinery: Old LPS and Weak National Models Converging Towards Models of Networked Firms

To assess change in the 'old' cases, and to evaluate whether LPSs are still dynamic, we selected two well known local systems in the machinery industry (in Emilia-Romagna and Baden-Württemberg). We chose a sector that has been structurally organized over time around SMEs, not large vertical firms. We contrasted them with trends affecting the same sectors in France and Britain, where local productive systems of SMEs were traditionally weaker or absent.

The contrast between the two pairs confirmed the advantages of more localized forms of organization. Local systems could benefit from external economies and the availability of LCCGs. However, it is difficult for firms in France and Britain, where hierarchies and markets prevail, to adopt a localized model. Rather, they have relied on foreign firms to escape the rigidities and failures of national sectors. Path-dependence seems stronger in the organization of old sectors (we shall return to this later).

There were always differences between Bologna and Stuttgart: the first system was closer to the industrial district model, while the latter was closer to the networked firm model. The average size of small units was higher in Germany. However, changes in both cases tend to strengthen the role of networked firms. This outcome seems to be related on a changing balance between flexibility and quality. More competition in international market reinforces the need for more quality. The latter, in turn, requires more co-ordination, more stable interaction between customer firms and subcontractors. Therefore, a push towards the networked-firm model prevailed. That is also true, to a lesser extent, for British and French firms. However, small subcontractors still maintain a degree of autonomy and tend to work for more than one firm.

The viability of this model of networked firms with relatively autonomous subcontractors seems to rely on changes in the composition and production of LCCGs. Changes implied a retrenchment of the machinery sector in both cases. Survivors among SMEs had to upgrade their structure and organization. To do that they could rely on two kinds of external inputs: club goods offered by the large customer firms (technological information and co-operation in developing new machines and new process); and new LCCGs provided through more formal corporatist arrangements for technological improvement and training. These involved business associations, local and regional governments, and a more limited presence of unions (especially in the provision of training). This latter trend is stronger in Germany, but seems present in Bologna too. In the Italian case, the role of relational contracting and informal relations between subcontractors and customer firms are more important than that of associations and local and regional governments in supply-side corporatist forms of LCCG production. A similar pattern is slowly emerging in France after several failed state policies to develop or rescue the sector. This could endanger the role of autonomous subcontractors, also because of the new drift in regional policies in favour of larger final firms.

High-tech Cases and Media: A New Generation of Districts?

To explore what is happening in new high-tech activities, we selected different productive specializations: biotech in Oxford, media industry in Cologne, software production in Pisa, and ITC at large in Grenoble. This research design based on ‘maximizing differences’ proved to be of interest for assessing whether a common pattern is at work in these new local systems. In fact, it seems that this pattern exists and cuts across sectors and countries. Especially in some sectors—biotech, media, software more than hardware—the logic of organization resembles that of industrial districts. Therefore, a paradox emerges, though we must remember that our cases are too few and our research design too exploratory to support strong generalizations. While traditional districts in traditional sectors seem to go towards the networked-firm model to survive (Crouch et al. 2001), new district-like forms develop in some high-tech activities. However, some differences emerged between the old and the new districts.

SMEs are important in some high-tech activities because the technological trajectory is open and uncertain (see biotech); or because final products are subject to strong variations in demand, and therefore flexibility is particularly important (see some kinds of customized software or media productions). In the latter cases, production tends to take the form of a project-team subject to continuous recombination.

External economies and LCCGs are particularly important for SMEs in both old and new districts (by contrast, in the networked-firm model hierarchy and relational contracting are stronger). However, the kind of external

economies and LCCGs on which SMEs mainly rely are different in high-tech districts. In general terms, one could say that in old districts external economies related to the physical reproduction of goods are more important, while in high-tech activities the generation of new knowledge and new products are more important.

This calls for a different mix of LCCGs. Technological information and transfer, as well as training, are obviously important in both cases. However, in high-tech activities continuous access to, and formal and informal relations with, good university and other research facilities are even more important for SMEs' performance; this kind of collective good cannot be completely replaced by inputs provided by large firms in a networked model. Dedicated financial resources, based on locally embedded financial actors able to evaluate new uncertain and risky entrepreneurial projects are also crucial. At the same time, LCCGs more related to industrial relations are less important for the new districts.

These trends are related to modes of governance. Local community ties are less important for high-tech activities, while professional communities based on career paths that pass through local research institutions and local large and small firms count more. In some cases, concentrations of high-tech firms also exist within larger urban areas like London and Paris, where market relations prevail. At the same time, supply-side corporatist institutions seem less relevant vis-à-vis new intermediary associations that involve various combinations of university and research centres, local and regional governments, private foundations. The primary goal of these institutions is to favour innovation through effective cooperation among local actors. Politics counts in this respect, but it does not act through traditional regulative or distributive policies, but rather through new interventions aimed at stimulating cooperation between private and public institutions in highly inter-dependent projects.

Steel Cities and Beyond: Difficult Rise of SMEs Despite New Governance Patterns

The analysis of old and new cases of LPSs aims at exploring what is happening in situations where local development grew up incrementally and without a clear ex-ante policy design. However, in recent decades there have been various attempts at stimulating the growth of LPSs based on SMEs in backward areas, or in old industrial areas affected by problems of decline. Both national and European policies for local economic development have tried to pursue this goal, largely relying on financial incentives to promote partnerships between public and private actors on local development projects. What were the outcomes of these policies? Was it possible to promote LPS based on SMEs through exogenous stimuli? What factors influenced these processes? And to what extent is the lesson that we can learn from these cases consistent with what we know about the more incremental cases of

local development (old and new)? To answer these questions we selected four cases of former steel areas: Duisburg in the Ruhr, St Etienne in the Rhone-Alpes region, Sheffield in Yorkshire and Piombino in Tuscany. Again, our study is exploratory and does not allow for strong generalizations. However, by comparing these cases—all affected by similar EU regional policies—and by contrasting them with the old and new cases of successful local developments based on SMEs, we can get some useful insights.

First, our findings show how difficult it is to promote systems of SMEs in areas shaped by Fordist industrialization and later by industrial decline. This trend may be related to the erosion of local competences and productive traditions in non-Fordist sectors, but also to the lack of a cultural and social environment favourable to flexible specialization and entrepreneurship in SMEs. Despite strong rhetoric, the achievements in our cases were rather weak. Even in Duisburg, apparently the most successful case, few SMEs have been created so far (although an additional growth is expected when the cluster of large firms specialized in logistic will strengthen). Little growth was found in St Etienne and even less in Sheffield and Piombino. This does not mean that public policies for dealing with industrial decline were a failure; on the contrary, they were more or less successful (and expensive) in terms of social assistance.

Second, it is interesting to note that in the two cases in which there was a more significant trend towards the growth of SMEs, old productive traditions and the previous presence of some SMEs in sectors other than steel can be detected: mechanics and metalwork in St Etienne and logistics in Duisburg (related to the role of the harbour and of other communication infrastructures). The cultural sector in Sheffield and parks and tourism in Piombino are completely new activities for these areas—though even here it is notable that cutlery plays a role in the Sheffield cultural industries quarter. Therefore, we could hypothesize that in contexts of serious industrial decline, such as former steel areas, it is unlikely that policies for SMEs would be successful—at least in the short run—in manufacturing. They could have some positive effects in industry wherever previous non-Fordist manufacturing traditions were still present (St Etienne, partly Duisburg). Otherwise, the effort to build up new activities seems more dependent on large firms (Duisburg), and on SMEs in activities that are closer to services and are more dependent on the provision of collective goods, such as parks or restoration of cultural goods for tourism (Piombino) and infrastructures for cultural activities (Sheffield, Duisburg). In theoretical terms, this is not a case of path dependence in the deterministic sense, but traces of the past, which are used as a resource and mobilized in due course. In other words, as suggested by Crouch and Farrell (2002), actors embedded within a locality are able to modify their repertoire by using ‘hidden or dormant alternatives’, by reactivating past alternatives, which had been marginalized or instrumentalized during the period of domination by large firms.

Third, although it is difficult to stimulate the growth of new SMEs in old industrial areas through LCCGs, other interesting hypotheses can be drawn from former steel areas. First, the Duisburg case—the most successful so far—shows the importance of a clear strategy based on the provision of dedicated LCCGs. This requires, in turn, a careful analysis of hidden and potential local resources that may become attractive for local as well as for external initiatives. In the other cases, the design and provision of such goods seem more fragmented. Of course, to point to a strong specialization may run the risk of putting all eggs in the same basket. Competition between similar strategies and projects, however coordinated they might be internally, has often proved a recipe for failure. A strength of the Duisburg project relies upon the scale of the investment, the absence of obvious competitors in the sector, and coordination with key private actors. Therefore, if local private and public actors converge and share a common project, the advantages for local development could be significant; and the chances of a good coordination with firms that have to invest in the area can be higher. This leads to a second important prerequisite for sound strategies of local development: the existence, or the construction, of a solid institutional infrastructure that can support the project through the participation and cooperation of public actors and associative private actors. Both conditions—clear and good project and adequate institutional infrastructure—are strongly interdependent. This means that policies for local development should take care not only of favouring the preparation of good projects, but also of stimulating effective forms of cooperation between local actors (and between local and external actors).

Governance Modes and the Production of LCCGs

Table 20.1 summarizes these conclusions. A few observations follow. One should not be surprised to see markets everywhere; after all we are analysing market economies. Our ideal types of LPSs and modes of governance are, we believe, very useful from an analytical perspective. On the ground, however, our key finding could be summed up in two words: combination and hybridization. Combination is important because, even within an LPS, differentiation processes are at play. Particularly in cities, there is a mix of different types of firms with complex interrelations. The form of an LPS also changes over time. Forms of networked firms are increasing in most of our cases. Combinations of modes of governance are, as expected, the dominant characteristics of our cases.

The case studies confirmed the general hypothesis that we discussed in the first volume: the growing territorial embeddedness of manufacturing activities throughout Europe. There is not a decline but rather a rise of territorialization, despite the growth of globalizing trends in product and financial markets. The direct contribution of manufacturing activities to employment is

Table 20.1. Local production systems and modes of governance

Cases	Type of LPS	Mode of governance	Production of LCCGs
<i>Machinery</i>			
Bologna	Industrial districts, networked firms	Market, community, state (local, regional) hierarchy, associations	Strong
<i>(Comments: A dynamic case, more formal and institutionalized relations)</i>			
Stuttgart	Networked firms,	Market, hierarchy, state (regional) associations	Very strong
<i>(Comments: Role of university, which is different from the state; importance of Land in providing collective goods)</i>			
Birmingham, Coventry	Networked firms, empirical clusters	Market, hierarchy	Weak
<i>(Comments: weak local production of LCCGs, use of collective goods produced by large firms and the market)</i>			
France	Networked firms	Market, hierarchy	In the making?
<i>(Comments: will foreign investment and the new policies supported by business organizations be sufficient for the development of this industry?)</i>			
<i>Ex steel cities</i>			
Duisburg	Empirical clusters	State (regional, EU), hierarchy, market, associations	Very strong
	Networked firms		
<i>(Comments: A fascinating case of coordinated supply side corporatism, long term strategy)</i>			
St Etienne	Networked firms	Market, state, associations, community	Strong
<i>(Comments: Emerging mode of governance to produce LCCGs for old metalworking sector)</i>			
Sheffield	Empirical cluster, industrial district	State (local), market	Medium
<i>(Comments: strong local mobilization despite central state)</i>			
Piombino	Empirical clusters	State, hierarchy	Medium, weak
<i>(Comments: soft landing?)</i>			
<i>High-tech cases</i>			
Oxford	High-tech district	Market, university, state (local and central)	Very strong
<i>(Comments: role of professional community and networks, and university)</i>			
Grenoble	Networked firms, high-tech district	State (local and central)	Strong
<i>(Comments: role of university and professional community?)</i>			
Pisa	High-tech district	Market; state (local and regional)	Strong
<i>(Comments: role of university and professional community)</i>			
Cologne	Networked firms	State (regional), market, hierarchy	Strong
	High-tech district		
<i>(Comments: role of professional community)</i>			

decreasing, but the same activities become more concentrated geographically through local productive systems. Old local systems in more traditional sectors resist better, even if they shrink, while new systems develop in some high-tech activities.

Why is this so? The basic reason is that European economies are forced to follow the 'high road' of economic development. This means that they cannot compete on low prices and low labour costs. They have to strengthen product

quality and the flexibility of production. To use a well known category, they have to pursue a ‘diversified quality production’ (Streeck 1992). But this, in turn, means that they require an organization of production—in both old and new activities—that is more dependent on external economies and on what we call LCCGs. The ability to produce the ‘right’ LCCGs becomes even more crucial, for the development not only of an individual area but also of an overall national economy. A second reason might be that, despite globalization and mobility trends, many SMEs have a mix of regional and wider markets. Beyond regional or local SMEs as such, which mainly interact with other firms of clients within a region, many firms we analysed have kept firm roots in the city of the region. This involves cooperation with both other firms and customers, in very similar ways to international firms that retain their base within their original national system.

However, three qualifications are necessary, which are suggested from our findings. First, to talk of a growing territorialization and of an increasing importance of LPSs does not mean that the role of large firms is declining vis-à-vis small ones. In the majority of our cases, SMEs, whether in local productive systems or not, have access to globalized large firms in one way or another to get collective competition goods (CCGs) (sometimes as club goods). This is true in the case of new high-tech LPSs, ex-steel cities, and even machinery SMEs avoiding the constraints of their national systems. As we saw, post-Fordist large firms play a crucial role in quality production, especially insofar as the market is relatively stable. In these cases, there is room for incremental innovations in products and processes that can be pursued through more stable forms of cooperation and co-ordination with SMEs. In cases we examined, in particular machinery and old steel cities, large foreign firms (by contrast to national ones) have been a prime mechanism in bringing CCGs to SMEs. In other cases, especially in some high-tech activities in which technological trajectories are open and uncertain, or in which radical forms of flexible adjustment to market are required, networks of SMEs seem to play a more important role. Therefore, the relationship between large and small firms is not a zero-sum game. There are robust examples of hierarchies of large firm domination, but the whole picture suggests more interdependence and autonomy for groups of SMEs.

This leads to a second aspect. To talk of territorialization does not imply that industrial districts are a growing model. In the first volume, we discussed three types of local production systems: the industrial district, networked firms, and empirical clusters. On the basis of our cases, the networked firms seem to be gaining ground in different environments. Actually, in traditional sectors we found a rise of the networked firm model, even in countries such as Britain and France with a previous record of lower territorialization. However, a new kind of industrial district based on cooperation among SMEs seems to emerge in some high-tech activities. Again, it is

interesting to note that this form of organization tends to cut across national differences, though national institutions and resources may influence the degree of diffusion of such activities.

This finding probably calls for a more precise analysis of networked firms. For instance, in his stimulating essay on the 'new industrial world', Veltz (2000: 174) suggests differentiating among six models of networked firms: (1) large firms disintegrating into a series of cores surrounding by subcontractors; (2) networks of SMEs organized around value-added networks without a leading coordinating firm; (3) the hollow corporation coordinating production and sales; (4) loose networks of large firms involved in different cooperative projects although they remain in competition for different kinds of goods and services; (5) holdings of SMEs; and (6) at the extreme, communities of self-employed professionals within cities interacting with firms, for instance in the cultural industries. Rather than networked firms as such, he suggests that large firms are reorganizing towards a '*modèle cellulaire en réseau*' within which myriads of SMEs have very different statuses. Our own research was less concerned with the firm as a unit of analysis, and we have singled out the dynamics of territorialization in relation to the production and use of LCCGs.

Third, there are the features of embeddedness. Economic activities related to the high road of diversified quality production appear more locally embedded. However, this does not mean that they are encapsulated in networks of strong community ties. Although the role of informal ties is not to be neglected (we found an important role of professional communities in high-tech activities), embeddedness involves more dependence on LCCGs. Our study shows that these goods are increasingly produced through formalized mechanisms of governance, in which cooperation among public institutions and private actors is crucial, and in which a growing role is played by associative actors. We have found how LCCGs are indeed a missing link to understand local economic development. Our major conclusion here is that in our case studies embeddedness is more about LCCGs than about community ties, though they can reinforce each other.

Indeed, the classic representation of embeddedness of local production systems within dense and wide social relations was not the dominant pattern within in our cases, even in Italy. The packaging machinery cluster in Bologna is a possible exception, but even there Farrell and Holten emphasize a gradual shift towards more hierarchical relations between leading firms and subcontractors—the networked firm model identified by Burroni and Trigilia (2001). Instead of relying on the more comprehensive sociological analysis, they insist on the importance of individual actors' preference and power relationships. Focusing on individual firms and entrepreneurs, they erase any indication of informal interaction between a long-standing community of equals. This does not mean that interactions depending upon community resources have disappeared altogether, but they do not play the leading role.

That conclusion is not contradicted by the findings of the two other Italian cases. In Piombino, Tonarelli sees politics embedded within social networks, but political entrepreneurs, not the community, are central to explain the making of LCCGs. In Pisa, Biagiotti and Burrone find what could be seen as an example of the 'new version' of the Italian local industrial system: dynamic concentration of small firms, dense interaction, not much politics but organizations and some important elements of professional community. The same is true for the German cases. Here too, instead of a classic industrial district and community regulation we found robust federal and corporatist arrangements, supply-side corporatism exemplified by strategic investments by the *Länder* on the one hand, and networked firms where (especially during a crisis) large firms become dominant on the other hand (in particular in Cologne and Duisburg).

In more traditional sectors, this recalls supply-side forms of corporatist governance, while in the new economy new intermediary institutions and actors emerged (unions and traditional business associations are less important or even absent). Therefore, while growing embeddedness may seem in contradiction with globalizing trends, in fact it is not. Single firms may move from one place to another more easily than before, and may organize their business connecting different locations through better infrastructures for communication. However, pursuing the high road seems to involve strategies of localization in systems in which good external economies and/or LCCGs are present. This is not a permanent and encapsulated choice. It lasts insofar as a single system is able to produce and reproduce the right mix of LCCGs for a particular productive specialization. Globalization might reduce the risks of lock-in, and certainly increases competition among LPSs, but it paradoxically seems consistent with territorialization.

Fourth, national models are not dominant. Our cases do not fit well within stylized types or coherent national models of capitalism (e.g. Hall and Soskice 2001). In the first volume we shed some light on the structure of national models. Our case studies have enriched our understanding by underlining the productive incoherence within national systems. We find that if national models still constitute the institutional framework for local economies, our analysis in terms of LCCGs shows both these and the autonomy of modes of governance of local economies. We have shown the loose coupling of local innovations and national systems. National models are important but less dominant; sectors and localities enjoy a good deal of autonomy and have some room to manoeuvre in a world of multilevel interdependence. Paradoxically, the case of federal Germany probably appears as the most homogeneous because of the strength of the *Länder* as LCCGs providers and of supply-side corporatism. It proves highly effective in the three German cases. By contrast, and more surprisingly, according to our research both Britain and France are characterized by a great deal of local differentiation. Indeed, despite the constraints and the conflicts over time,

local elites in Sheffield have pursued a commitment to the making of local clusters, to foster local innovations, with some results not exactly in line with the classic British story. Conversely in France, diversity prevails as shown by the cases of St Etienne, where business associations and elements of the state apparatus are trying to reinvent a local productive system. In Grenoble local and state modernizing elites associated with the scientific community have achieved remarkable growth over three decades. In terms of sectors, both high-tech and machinery are organized by the type of LCCGs they required, and that proves true beyond national frontiers. Failures of British and particularly French machine-tool firms eloquently make the point.

Fifth, there have been significant changes in governance modes. A first point to emphasize is the diversity of combination we found. In all cases, our analysis of the production of LCCGs, local actors and outsiders show the role of markets, hierarchies, state, sometimes associations. However, large organizations do not just operate in terms of hierarchies. The restructuring of large firms often leads to more interdependent networked firms rather than blunt hierarchies. In other words, the classic view of relationships between subcontractors and large corporations should not be taken for granted.

The same applies to the state. In the state regulation that we presented in the introduction of the first volume, hierarchies and sanction were key components. Elements of the state clearly operate as such, for instance German *Länder*, or British central government. In the mosaics of overlapping power, sanctions and hierarchies are less dominant but remain important resources of coercion. However, in other cases the state does not operate that way. First one should disentangle the state as suggested by the public policy literature. We have encountered the European Union, national governments, various state agencies, *Länder*, local and regional government. The frontiers between public and private organizations are also blurred in relation to LCCGs. A new population of organizations seems to be emerging (Pichierri 2003). This may involve a form of 'competitive isomorphism' (Powell and DiMaggio 1991) between those new organizations, which have strong mobilization capacities. In relation to the EU partnership norm, Pichierri sees the development of a new form of governance where local actors are bound to be brought together to produce, for instance, LCCGs and to extract resources from outside.

This insight may require more specification, but we see elements of it in our cases. From old steel cities to high-tech districts, we see less differentiated pattern of governance and rather elements of convergence. Everywhere we see local authorities, local agencies, firms, some associations, state agencies, all involved in a process of institutionalizing the production of LCCGs (among other things). Fragmentation may still prevail and coordination mechanisms fail, but our transnational comparison does provide ground for this thesis. In theoretical terms that suggests that the concept of state regulation is useful in ideal type terms but does not prove very helpful to analyse the modes of

governance of LPSs and localities. Politics does not so much operate in terms of sanction and hierarchy (though this has not disappeared of course) but rather as mobilization, capacity for action, and legitimation process. This calls for a more precise political dimension within the governance framework.

Policy Lessons

What policy lessons can we draw from these findings? First, policies for promoting economic development should take into account the trend towards territorialization, especially to move along the highway. This means that economic development is less dependent on macroeconomic policies. Obviously, these are always important, and require particular institutional mechanisms, but a low rate of inflation, low interest rates, and a moderate growth of labour costs are less sufficient by themselves, and less able to influence overall economic growth. For pursuing the high road of diversified quality production it is necessary to strengthen the ability of individual LPSs to deliver adequate LCCGs, and to stimulate the formation of new systems. These two objectives may require different policy measures, but in both cases a major role of decentralized levels of government is crucial.

But this is a necessary but not sufficient condition. The involvement of territorial governments in new forms of multilevel governance with private actors, as well as with European Union and national institutions, becomes crucial. Various experiments along this direction are taking place throughout Europe. It would be important to know more about these trends in comparative terms. However, our findings suggest that two conditions are particularly important for the new forms of territorial governance. First, an adequate institutional infrastructure is necessary at the local level to stimulate the co-operation of local actors in developing and sustaining highly interdependent projects. Actually, these projects require a high level of coordination and commitment of various private and public actors for their success in providing the right mix of LCCGs. Information and support from locally rooted actors is important, and it is a prerequisite for the effective involvement of external firms and investors. Second, this is not a mere recipe for localism. Higher governmental tiers can—and should—play an important role. They have to stimulate the commitment of local actors in developing sound projects to take advantage of local manifest and hidden resources. This means that, on the one hand, they should avoid mere policies of social subsidies, separating social or training policies from economic interventions. On the other hand, they should not rely on generic incentives to firms.

In backward areas, or in situations of industrial decline, these measures may attract external firms, but if a good endowment of LCCGs is not provided, mere financial or fiscal incentives will not be sufficient in keeping investments in the areas. Certainly, they are not sufficient to sustain the

growth of new high-tech activities that are embedded in rich institutional environments, as our cases clearly show. At the same time, financial and fiscal benefits to single firms may compensate the loss of competitiveness in developed areas that are challenged by globalization and increasing competition. However, without a careful upgrading of LCCGs the future is at risk. In this respect, for instance, some findings appear of particular interest. While in more mature LPSs networked firms are playing a growing role (e.g. Bologna and Stuttgart), without an upgrading of LCCGs, the role of subcontractors runs the risk of becoming 'too' dependent on large firms for the provision of inputs. This, in turn, may impoverish local SMEs and reduce the overall advantage of large networked firms in investing in the area.

In sum, territorialization of economic activities requires more local governance, but this does not mean mere localism. It rather seems to require new forms of multilevel governance in which the higher governmental tiers are able to stimulate cooperation on the part of local actors on well-integrated projects rather than pursuing fragmented interventions subsidized from above. For instance, competition between cities does matter, as the cases of Sheffield (versus Leeds) or Duisburg show. The success of Duisburg is more likely if there is some regulation to prevent other German cities and *Länder* from developing comparable projects. This has also clear implications for the reform of EU regional policies: less incentives to individual firms, less fragmentation among various policies; more policy integration around territorial projects. Territorialization calls for more multilevel territorial governance.

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Index

- Acciaierie 199
Acma 25
Advanced Machine Tool research Institute (AMTRI) 87, 90
Agence pour le Développement de la Productivité et de l'Automatisme (ADEPA) 107, 115–16
Agenzia per lo Sviluppo Tecnologico dell' Emilia Romagna (ASTER) 29, 30, 34, 34–5
Albert, Michel, *Capitalism against Capitalism* 231
Aldini-Valeriani Institute 29, 30, 36, 125
Alfred Herbert 83
Amada 109
Arno Valley Community 302
association, and governance 3, 64, 70–1, 87, 88–90, 90–1
Association for Television, Film and Video Production in North Rhine Westphalia (VFFV) 271, 277–8, 280
Association of North Rhine Westphalian Film Producers 271
Associazione di Piccole e Medie Imprese (APE) 37
Aurelia society 301
Baden-Württemberg 4, 8, 14; industrial districts 6; *see also* Stuttgart
Bayh-Doyle Act (1980) 248
Bellhouse, Brian 249
Benedict Taschen 263
Benesperi, Paolo 207
Benz & Cie 48
Benz, Karl 49
Berlin, Technical University of 51
Bertelsmann 270
Bioscience York 259
biotechnology industry ; dedicated biopharmaceutical firms (DBFs) 238–9; Grenoble 317–18; impact on pharmaceutical industry 237, 238; local collective competition goods 239; United Kingdom 239–41; *see also* Oxford, biotechnology industry
Birmingham 81, 83, 92; machine-tool industry 22; *see also* West Midlands, machine-tool industry
Birmingham Employers' Forum 88
Blunkett, David 182
BMW 84
Böblingen 53
Bologna 14, 24; governance characteristics 28; industrial districts 6; local productive systems 332–3; machinery industry 27–8; manufacturing sector 27; population 27; *see also* Emilia-Romagna
Bologna, Commune of 36
Bologna, University of 29, 30
Bosch 59, 62
Bosch, Robert 48
Brandt, Willy 143
British Biotech plc 242, 249, 256
British Leyland 83
British Technology Group 247
Bundesinstitut für Berufsbildung 280
business organization, as model of governance 3
Cambridge 241, 242, 243, 246
Cambridge, University of 258
Camera del Lavoro 200
Canstatt 48
Cap Gemini 314
capitalism ; Anglo-Saxon model 231; German-Japanese model 231; national models 340–1; varieties of 230–2, 281
Carpi 35
Cary, Lucius 254
CATO Group 109, 112
Central Office for Commerce and Trade 47
Centre d'étude et de recherche de la Machine Outil (CERMO) 107

- Centre for Innovative Technologies (ZFS) 61–2
- Centre technique des industries mécaniques (CETIM) 107, 113, 114, 115, 169, 171
- Centro di Informazione Tessile dell'Emilia-Romagna (CITER) 34
- Centro Nazionale Universitario di Calcolo Elettronico (CNUCE) 294
- Centro Regionale di Ricerca, Verifica Qualità Prodotti, Processi e Certificazione Sistema Qualità (CERMET) 34, 35, 113, 114
- chambers of commerce ; France 167; Germany 62, 64, 280; Italy 30, 38; United Kingdom 87, 185
- Chambon 162
- Cherwell Centre 250
- China 27
- Clement, Wolfgang 270
- Cluses 169
- coercion, the state 3
- Cologne, media industry 149, 260–1, 277, 281–2, 322; business associations 271; Coloneum 265; development of cluster 269–71; employment in 264–5; film production 263–4; finance 266–7, 275; industrial relations 276; information and communication technologies 264; Internationale Filmschule 267–8, 278–9; KoordinationsCentrum Ausbildung in Medienberufen 277–8; local collective competition goods 271, 277–81; MediaPark 265; Medienareal 266; production structure 272–5; publishers 262–3; radio 263; reasons for location 265–9; regional policy 267–8, 269–70, 278, 325; research and development 267; special sites for 265–6; structure of 262–4; television 263; trade fairs 268–9, 272; training 267–8, 278–81
- Cologne, Technical University of 267
- Cologne, University of 267
- Colt Telecom 264
- Commissariat à l'Energie Atomique, Research Centre of the 308
- Commission on Economic and Social Change 50
- commoditization 240 n3
- communitarianism, small firms 39–40
- community, and governance 3, 39–40, 63, 87, 90–1
- company towns 1
- Confartigianato 37, 38
- Confederazione Nazionale dell'Artigianato edelle Piccole e Medie Imprese (CNA) 36, 37, 38
- Confindustria 34, 37
- Cook, Tim 250, 253
- Coop Toscana Lazio 200, 215
- cooperation ; German machine-tool industry 57, 58, 59, 62, 63, 68; small firms 39–44; West Midlands machine-tool industry 96
- corporatism, Germany 46
- Corus 219
- Courtaulds 83
- Coventry 81, 83, 92; machine-tool industry 22; *see also* West Midlands, machine-tool industry
- Coventry Centre for Investment 88, 89
- Creusot Loire 176
- Daimler-Benz AG 48
- Daimler, Gottlieb 48, 49
- Daimler-Motoren-Gesellschaft 48
- DaimlerChrysler 62, 65
- Davis, Steve 250
- De Montford University, Manufacturing Research Centre 90
- Deckel Maho 56
- dedicated biopharmaceutical firms (DBFs) 238–9
- DEMAG 143
- Democentre 30, 34
- Desjoyaux 162
- Deutsche Bank 266
- Deutsche Telekom 264
- Deutsche Welle tv 263
- Diversified Quality Production (DQP), Germany 47, 50
- Dolphin Telecom 264
- Dortmund 143, 152

- Drayson, Paul 249, 254
- Dresdner Bank 266
- Dubedout, H 308
- Dudley 81
- Duisburg 9, 335; Duisburg-Ruhrorter Häfen 147, 148; Duisport 148, 149; employment in 149; Emscher Landscape Park project 146; European Union funding 151–8; governance of local economy 224; harbour 147; Landschaftspark Duisburg-Nord GmbH 146; logistics industry 139, 140evolution of 146–7investment in 1489local collective competition goods 157–8, 225local production systems 140, 147–50marketing 157regional policy 147, 150–1, 158training 157, 158; Logport Center Duisburg GmbH 148, 149, 150; redevelopment 148, 149; restructuring 139; steel industry employment in 144production 139productivity 144rise and decline of 141–6vertical integration 143; unemployment 146
- Duisburg-Ruhrorter Häfen 147, 148
- Dundee 241
- Düsseldorf 147
- Dutch Broadcasting Association (NOS) 266
- Dwek, Raymond 249
- Ecoles Nationales Supérieures des Arts et Métiers (ENSAM) 107
- economic development ; differentiated form economic growth 1; policy lessons for 342–3
- Edinburgh 241, 243, 259
- embeddedness 6, 9, 126, 127, 336–8, 339–40; disadvantages of 14; limitations of 4
- Emilia-Romagna 8; industrial districts 6, 121; *La Regione Globale: L'Emilia-Romagna nell'Europa del Duemila* 33; machinery industry 13; mechanical engineering tradition 24–5; packaging machinery industry 13, 22communal administrations 36consolidation of 43economic performance in 1990s 27evolution of 25–6growth of small firms 26industrial unrest 26information on foreign markets 30–1international success 26–7local collective competition goods 28, 34, 36marketing 124regional policy 32–5Sezione speciale per l'Assicurazione de Credito alle Esportazioni (SACE) 32small firm cooperation 39–44technology transfer 29–30, 123trade association 29, 37training 28–9, 35, 125; regional policy 32–5, 119; small firms' associations 36–9
- endogeneity ; exogenous policy 8; governance forms 4, 120
- ENEL 293
- enforcement mechanisms, cooperation 42
- Ente Bilaterale Emilia-Romagna (EBER) 38–9
- Ente per la Valorizzazione del Territorio (ERVET) 29, 32, 34–5; marketing 124; technology transfer 123
- Enterprise Zones 186
- Ernault Somua 109
- Esslingen 53
- EUROFER-Cartel 133
- EUROFER-II-Cartel 134
- European Coal and Steel Community (ECSC) 133, 134
- European Commission 7, 136; First Steel Plan 133; Second Steel Plan 133
- European Community (EC) , *see* European Union
- European Monetary System, collapse of 19–20
- European Regional Development Fund (ERDF) 135, 151, 152, 170, 187

- European Union 8; 'Accelerate' project 88–9; Actions for Investment Readiness for e-content Enterprises (AIRE) 302; collective competition goods 3; convergence 127; Council of Ministers 136; European Regional Development Fund (ERDF) 135, 151, 152, 170, 187; European Social Fund (ESF) 135, 151, 152; Fifth Framework Programme 34–5, 86; funding from 221–2; Innovation Relay Centre 86; Multi-fund Operational Programme (MOP) 207; Objective 1 funding 187; Objective 2 Programmes 151–8; regional policy 34, 135–7; RESIDER Community Initiative 135, 209; steel policy 134; Structural Fund 134–5, 149, 151–2, 159; Technology Transfer for Sectoral Innovation (TETRIS) 302
- Exchange Rate Mechanism, impact of collapse of 20–1
- exogeneity, governance forms 4, 120
- Federal Association of German Film Producers 271
- federalism, Germany 46
- Fédération des Industries mécaniques (FIM) 113
- Federazione Impiegati Operai Metallurgici (FIOM) 38
- Fermi, Enrico 294
- Finsider 199
- flexible production 233; high-tech industry 235; Italian software industry 286; media industry 271
- Ford Motor Company 79, 84
- formality, governance forms 4, 120
- France 4, 8, 102–3, 120; chambers of commerce 167; Commissariat au Plan 102; industrial policy 160; industrialization 103; machine-tool industry 22automobile industry 101business associations 113–15clustering 101, 111, 116–17collapse of 104–5collective action 107–8community 104compared with Germany 102–3, 105cooperation 116cross-frontier partnerships 112defence industry 100–1development of 102–3employment in 105, 109failure to build 99foreign owned firms 109, 111–12governance failure 108hierarchy 104high-speed machine-tool project 115Hirsch plan 102holding companies 112local collective competition goods 101, 103–4, 106, 108, 111–17NUM 108, 113polity elites 102–3, 106protection of 101regional policy 115–16research and development 103, 107, 112, 114as residual sector 109–10restructuring 105–8revival of 109–11small-and-medium-sized enterprises (SMEs) 100, 103, 106, 108, 109, 111, 112, 116state agencies 101–2, 104, 105, 113–16structure of 100technology transfer 123training 107, 113vertical integration 104, 108, 112weakness of 100; machinery industry 14, 15economic performance in 1990s 17, 18; *Pôle productique régional* 174; regional policy 115–16, 174, 176; small-and-medium-sized enterprises (SMEs) 99, 100; *see also* Grenoble; St Etienne
- France Telecom 315
- Frankfurt 59
- Fraunhofer Institute for Production Technology and Automation (IPA) 51, 64, 65
- Friedrich-Alfred-Hütte 141
- Full Monty, The* 191
- Future Commission 70
- GD 25
- GEC 91

- General Motors 79, 84
- Germany 4; biotechnology industry 239–40, 260; chambers of commerce 62, 64, 280; corporatism 46; Diversified Quality Production (DQP) 47, 50; employers federations 71; European Monetary System 19–20; Federal Ministry for Research and Technology (BMFT) 50; Federal Ministry of Education and Research (BMB + F) 62; federalism 46; government policy 51–2; industrial associations 64–5; industrial districts 6; innovation 261; local collective competition goods 3, 15, 46, 122, 140, 220, 277–81; local production systems 139; machinery industry 14economic performance in 1990s 17, 18; media industry 260–1; networked firm model 121–2; public policy *Ordnungspolitik* 50*Strukturpolitik* 50; regional policy 69–70, 147, 150–1, 158, 269–70; small-and-medium-sized enterprises (SMEs) 46; technological change 50; technology transfer 123; trade unions 50, 64, 69, 70–1; *see also* Cologne; Duisburg; Stuttgart
- Gewerkschaft Deutscher Kaiser 141, 146
- Gildemeister 51, 56, 103
- global networks, Italian regional planning 33
- globalization ; embeddedness 340; impact on governance 126; small firms 122
- Göppingen 53
- governance ; association 64; changes in patterns of 9; community 39–40, 63; complexity of 125–7; concept of 2; corporatist 340; hierarchical form 42; ideal-typical models of 3; industrial districts 24; local collective competition goods 336–42; multilevel 342–3; political nature of change 45; public policy in steel cities 220–4; value of approach 44–5; variation of forms of 4
- Greater London Enterprise Board 183
- Gremlin Interactive 194
- Grenoble 10, 161, 341; divisions of 308–9; economic development 307–8; economy 310; employment in 309; high-tech sector 306, 318–20, 322biotechnology 317–18Centre d'Etudes Atomiques 317employment in 317enterprise creation 318foreign investment in 312, 314, 317Institut National Polytechnique de Grenoble (INPG) 317local collective competition goods 306, 314–16Micro-électronique Nanotechnologies (MINATEC) centre 316–17public policy 324regional policy 317research and development 306, 315research centres 312, 313, 314–15, 318scientific tradition 307–8skilled labour force 310small-and-medium-sized enterprises (SMEs) 306, 313, 314structure of 311technical culture 312weakness of conceptualisation 315–16Zone pour l'Innovation et les Réalisations Scientifiques (ZIRST) 306, 308, 313; immigration 311–12; local government 308, 316; population 309–10; public investment in 307–8; service sector 311; trade 312
- Grenoble, University of 307, 313
- Grenoble Centre of University Studies 308
- group working, machine-tool industry 66
- Hahnsche Werke 142
- Hallam University 195

- Harrison, Bennett 42
- Hewlett-Packard 314
- hierarchy 181, 186; business organization 3; characteristics of 5; corporate hierarchy 91, 181, 186; governance 91; growing importance of 125
- high-tech districts ; external economies and local collective competition goods 321–4; governance of local economy 328–30; intermediary institutions 327–8; local collective competition goods 333–4; access to research facilities 321–2; informal networks 322, 329; local context of 323; specialized suppliers 322–3; local productive systems (LPSs) 333–4; production of local collective competition goods 324–8; public policy 324, 324–6, 328–9; small-and-medium-sized enterprises (SMEs) 333
- high-tech industry ; definition 229–30; industrial districts 234–6; local collective competition goods 236; local production systems 229; national system of innovation 230, 232; research and development 235–6; varieties of capitalism 230–2
- IBM 62
- IG-Metall 64, 69, 70–1
- Ilva 199
- individualism 40, 63
- Indonesia 27
- industrial districts 1; decline of 6; embeddedness 4; governance modes 24; governance of 42; high-tech industry 234–6; Italy 4, 23–4; change in 42–4; decline of 42; small firms' associations 36–9; vertical disintegration 41; local collective competition goods 24; local innovation systems 232–3; local productive systems (LPSs) 331; networked firm model 43, 49, 52, 56–65; new industries 7, 9–10; small firm cooperation 39–44; sources of success and failure 23–4; variation of forms of 9
- Industrial Reorganization Corporation (IRC) 76
- informality, governance forms 4, 120
- information access, local production systems 4–5
- information and communication technologies (ICT), definition 283
- information technology industry , *see* software industry
- innovation systems 283
- Insight Enterprises 195
- Institution of Mechanical Engineers' Rapid Prototyping and Manufacturing Association (IMERPMA) 90
- institutions ; industrial districts 233; informal 41–2
- Intelautomatisme 109
- interdependencies, untraded 140, 234
- International Standard Industrial Classification 16
- International Standards Organization (ISO) 33
- Isis Innovation 248–9, 253–4
- Istituto nazionale per il Commercio Estero (ICE) 30
- Istituto per il Lavoro (Institute for Labour), Italy 38
- Istituto per l'Elaborazione delle Informazioni (IEI) 294
- Italy 4; chambers of commerce 30, 38; communal administrations 36; *enti bilaterali* 38–9; finance systems 296; government organization 32; impact of European Monetary System 27; impact of Exchange Rate Mechanism collapse 20–1; industrial districts 6, 23–4; change in 42–4; decline of 42; vertical disintegration 41; industrial unrest 26; labour relations 38; local collective competition goods 15; small firms' associations 36–9; local economic development 31–2; machinery industry 14, 22

- economic performance in 1990s 17, 17–18, 27; negotiated planning 212–15; provincial government 36; regional policy 32–5; regulation 36–7; small-and-medium-sized enterprises (SMEs) 206, 207, 208–9, 214, 303; software industry 284–7, 294, 303–5human capital 290–1local software systems 287–92service sector 289–90territorial concentration 288–9, 303; state, the 32, 197; steel industry 197; technology transfer 123; trade unions 38–9, 213; *see also* Bologna; Emilia-Romagna; Piombino; Pisa
- Jaguar 83
- Japan 231
- Kampf, Serge 314
- Könemann 263
- KoordinationsCentrum Ausbildung in Medienberufen 277–8
- Korea 77
- Krupp, Alfred 141, 142
- Krupp Rheinhausen 142, 143, 146
- La Magona 199
- Landesgewerbeamt* (LGA) 47, 51
- Langevin Institute 308
- lean production, concept of 66, 67
- learning economies 140
- Leeds 183, 222, 241
- local collective competition goods 2; biotechnology industry 247–57; dedicated biopharmaceutical firms (DBFs) 239; France 101, 103–4, 122, 166–72, 306, 314–16; Germany 15, 46, 122, 140, 157–8, 220; governance modes 336–42; high-tech districts 236, 321–8; industrial districts 24; Italy 15; local productive systems (LPSs)

- 331; machine-tool industry France 101, 106, 111–17 Stuttgart 51, 59, 63–4 United Kingdom 79; machinery industry 13, 14, 21; marketing 124; media industry 277–81; misleading benefits 4; national provision of 3; neo-liberalism 120; networked firm model 121; packaging machinery industry 28, 34, 36; public policy and creation of 218–20; role of the state 31–2; small-and-medium-sized enterprises (SMEs) 229, 333–4; small firm cooperation 39–44; small firms' associations 36–9; software industry 298–303; steel cities 224–6; technology transfer 123
- local economies ; explaining success of 3; governance 3
- local innovation systems, industrial districts 232–3
- local labour market areas (LLMAs) 287
- local production systems 1, 126, 131, 331; crisis of 14; embeddedness 336–8, 339–40; exogenous stimulus of 334–6; France 311; Germany 139, 147–50; high-tech industry 229, 229–32, 333–4; information access 4–5; machinery industry 21; media industry 260; national models 4, 340–1; public policy and creation of 218–20; responding to exogenous change 17; small-and-medium-sized enterprises (SMEs) 81–2, 229; the state 341; territorialization 336–9; vertical disintegration 131–2
- logistics industry , *see* Duisburg
- Logport Center Duisburg GmbH 148, 149, 150
- Lombardy, machine-tool industry 22
- London 241, 243
- Lucchini 199, 213
- Ludwigsburg 53
- Lusid 212, 216, 217, 219
- Lyons 161, 169
- McCullagh, Keith 249
- machine-tool industry ; France 22; Germany 22; industrial classification 16; Italy 22; Stuttgart 13; United Kingdom 22, 74–5; *see also* entries under France; Stuttgart; West Midlands
- Machine Tooling Trade Association (MTTA) 86–7, 89–90, 93, 96; marketing 124; technology transfer 123
- machinery industry 8; economic performance in 1990s 16–21; France 14, 15; geographical concentration 13; Germany 14; industrial classification 16; industrial districts 13; Italy 14; local collective competition goods 14; local production systems 21; recession of 1990s 14–16; technological change 122; United Kingdom 14, 15
- Magic Media Company 265, 266, 268
- Manchester 241, 259
- Manitou 112
- Mannesmann 142
- Manufrance 161
- Marchington, Tony 249
- markets ; characteristics of 5; and governance 91; as model of governance 3; small-and-medium-sized enterprises (SMEs) 119; and varieties of capitalism 230–1
- market information, St Etienne 166–8
- marketing 124, 157
- Marshall, Alfred 131, 232
- Maybach, Wilhelm 49
- media industry ; as new industry 261; *see also* Cologne, media industry
- Merlin-Gerin 308, 313
- Meylan 313
- Mezzogiorno 31, 197
- MFL 109
- Milton Park Centre 249–50
- Modena 14, 24, 123; industrial districts 6; packaging machinery industry 13, 22
- Modena-Bologna District 9
- Monsanto 249
- Mussi, Fabio 212
- National Aeronautics and Space Administration (NASA) 30
- National Agency for Energy and the Environment (ENEA) 293
- National Centre for Popular Music 193, 194
- National Institute of Nuclear Physics 293
- National Insurance Institute (INPS) 203
- negotiation, the association 3
- neo-liberalism 5, 119; governance forms 120
- NetCologne 264
- Netherlands Broadcasting Services Corporation (NOB) 266, 268
- networked firm model 43, 49, 52, 56–65, 121, 158, 338–9; dangers of 126; growing importance of 125; local production systems 139, 332; types of 339
- New Wave Logistics 148
- Neyrpic 308
- Niederrhein 151
- Nolan, Peter 255
- Nord-Rhein Westfalen (NRW) 14; European Structural Fund 151–2; Further Training Initiative 158; industrial decline 17; Objective 2 Programmes 151–8
- NUM 108, 113
- Oxford Asymmetry 250, 253
- Oxford Biomedica plc 242
- Oxford Biosciences 249
- Oxford, biotechnology industry 9, 241, 257–60, 322; diversity of 242; global nature of 245; government initiatives 250–3; incubator process 249; informal networks 325; local collective competition goods 247–57; local entrepreneurial expertise 249; local initiatives 247–50, 253–7; mentoring services 255–6; nature of 242; Oxford Trust 249–50, 254–6; public policy

- 325; reasons for location 243–7; research centres 243; size of 241; start-ups 246–7; technology transfer 247–9, 258; untraded knowledge externalities 245–6
- Oxford Brookes University 243
- Oxford Centre for Innovation 249
- Oxford Glycosciences 249
- Oxford Innovation Ltd 250, 255
- Oxford Instruments 249
- Oxford Investment Opportunity Network 250
- Oxford Molecular 249
- Oxford Science Park 250
- Oxford Technology Venture Capital Trust 254
- Oxford Trust 247, 24950, 254–6
- Oxford University 243; biotechnology industry 247–8; Isis Innovation 248–9, 253–4; Oxford University Challenge Fund 254
- Oxfordshire BioLink 255–6
- Oxfordshire BiotechNet Ltd 255
- Parma 24, 25
- PCI 112
- Peugeot 89, 91, 101, 108
- Peugeot Citroën 101, 112
- pharmaceutical industry ; impact of biotechnology 238; obstacles to entry 237–8; *see also* biotechnology industry
- Piacenza 24–5
- Piombino 9, 335; agriculture 214; characteristics of 197; economic diversification 206; embeddedness 340; employment patterns 200–2; environmental development 206, 207–8; governance of local economy 222–3; infrastructure 206; local collective competition goods 224; political culture 200; public funding 204–6European Union 204–5, 207–9national 209–11objectives 206–7; revitalization, assessment of 215–17; small-and-medium-sized enterprises (SMEs) 206, 207, 208–9, 214; steel industry decline of 200–4, 205–6employment in 198–9, 200–3evolution of 198–9obstacle to diversification 199restructuring 199revival of 216–17; tourism 213–14; unemployment 201, 203; Val di Cornia Territorial Pact 213–15
- Pisa 9; economy 293; local industrial system 340; research centres 293; software industry 303–5, 322Aurelia society 301financing of 295–6local collective competition goods 298–303local context of 293–5local relationships 295–6origins of 293–4Pisa Research Consortium (CPR) 295, 302–3Polo Tecnologico di Navacchio 301–2production characteristics 295–7regional policy 325–6relations with university 294research centres 295small-and-medium-sized enterprises (SMEs) 296start-ups 295–6structure of 292–3training 300–1universities 300–1, 304; universities 293
- Pisa Research Consortium (CPR) 295, 302–3
- Pisa, University of 293, 300
- Pôle productique régional* 174
- Polo Tecnologico di Navacchio 301–2
- Porsche, Ferdinand 49
- Powderject Pharmaceuticals 249
- Prato 28, 38
- procedure, governance forms 4, 120
- Prodi, Romano 197, 199
- PSA 101
- public policy 218–20; France 324; Germany 50; high-tech districts 324–6, 328–9; in steel cities 220–4; United Kingdom 325

- Questor Capital Management 254
 Rationalisierungskuratorium der deutschen Wirtschaft (RKW) 58–9
 Reggio-Emilia 24
 regional policy ; European Union 135–7; France 115–16, 174, 176, 317; Germany 50, 59, 69–70, 147, 150–1, 158, 267–8, 269–70, 277, 278, 325; Italy 32–5, 32–5, 119, 325–6; United Kingdom 85–6
 regulation ; governance concept 2; Italy 36–7; modes of 3
 Rems-Murr-Kreis 53
 Renault 101, 108
 Renault Automation 101
 René Brizard 109
 research and development ; France 103, 107, 112, 114, 168–70, 306, 315; Germany 58, 267; high-tech industry 235–6; United Kingdom 76–7, 85, 90
 Rheinstahl-Konzern 144
 Rhône-Alpes 8
 Richards, Brian 249, 254
 Richards, Graham 249
 Romagna 33
 Rootes 83
 Rover 89, 91
 RTL 263, 264, 268, 270, 272
 Ruhr, industrial decline 17
 Ruhrort Meiderich 143
 Sainsbury, Lord 252
 Sanderson's 194–5
 Sasib 25, 42
 Sassuolo, tile industry of 25
 Schneider 313
 Sezione speciale per l'Assicurazione de Credito alle Esportazioni (SACE) 32
 Sharp, Hugh 187
 Sheffield 9, 335, 340–1; chambers of commerce 185; city council 222central government 185–6, 186–7economic intervention 182economic policy 181–2, 183Employment Department 182inadequacy of 182Labour control of 181public spending 183; Cultural Industries Quarter (CIQ) 191, 193–4; E-campus 191, 193, 195; economy lack of diversity 183–4service sector 184; employment patterns 180, 188–90; European Union funding 187, 188, 192; *The Full Monty* 191; governance of local economy 222; image 188, 191; information technology 194–5; international investment in 195; local collective competition goods 224–5; marketing of 190–1; National Centre for Popular Music 193, 194; physical environment 191; regeneration Economic Regeneration Committee (ERC) 185, 186partnership and governance 185–8; service sector 188–90
 Sheffield First Partnership 187
 Sheffield Science Park 193; small-and-medium-sized enterprises (SMEs) 184, 190, 192, 193, 196; Sports Institute 192; steel industry collapse of 180corporate hierarchy 181; Training and Enterprise Council 190; unemployment 183; universities 195; Urban Development Corporation (UDC) 186; World Student Games (1991) 192
 Sheffield One 195
 Sheffield University 195; Aerospace Manufacturing Research Centre 195
 Siderfor 212–13, 216
 Siemens 62
 Siemens, Carl Friedrich von 58
 Single European Act 136
 Single European Currency, impact of 20
 small-and-medium-sized enterprises (SMEs) 1; communitarianism 39–40; cooperation and local collective competition goods 39–44; economic growth

- 1; encouraging 9; France 99, 100, 108, 109, 111, 112, 116, 162–3, 164–6, 306, 313, 314; free market 119; Germany 46, 50, 51–2, 68; high-tech districts 333; individualism 40; information technology 284; Italy 214, 296, 303; local collective competition goods 229, 331, 333–4; local economic specialisms 7; local production systems 81–2, 331; localized supplier hierarchies 5; machinery industry 13; promotion of systems of 335–6; public policy and creation of 218–20; United Kingdom 76, 85, 86, 87, 88–9, 184, 190, 196, 251
- SNF 162
- social order, models of 3
- social rules, cooperation 42
- Società Parchi Val di Cornia 212, 215
- Société d'Outillage Mécanique et d'Usinage d'Artillerie (SOMUA) 100
- Society of Motor Manufacturer Traders (SMMT) 89–90
- software industry ; European model 284; factors shaping 284; *see also* entries under Italy; Pisa
- solidarity, community 3
- specialization, coordinated 48
- specialization, flexible 335; Baden- Württemberg 15; Cologne 261; machinery industry 13
- St Etienne 9, 335, 341; collective competition goods 178; finance and grants 170; market information 166–8; quality standards 170–1; research and development 168–70; training 171–2, 176; economic development policies 172–8; development initiatives 174–8; public investment in 172, 173–4; regional policy 174; tertiarization of 172–3; urban renovation 173; foreign investment in 164, 166; governance of local economy 223–4; industrial decline 161; industrial development 160–1; industrial sector 163–4, 166, 178; *Lanceur d'entreprise* 175; land development 174–5; local collective competition goods 225; population 161; problems of 161–2; regional policy 176; small-and-medium-sized enterprises (SMEs) 162–3, 177, 178; characteristics of 164–6
- St Etienne Metropole 175; tertiary employment 162
- Stadtsparkasse Köln 266, 275
- state, the 3, 22, 31–2, 221, 341
- steel industry 7; decline of European 132–5; declining importance of 218; employment in 134, 135; EUROFER-Cartel 133; EUROFER-II-Cartel 134; European Coal and Steel Community (ECSC) 133, 134; European steel policy 133–5; governance and public policy 220–4; liberalization 134; productivity 134; public policy and restructuring of 218–20; quota system 134; state, the 221; *see also* Duisburg; Piombino; Sheffield; St Etienne
- Steinbeis, Ferdinand 47
- Steinbeis Foundation 51, 64, 70
- Stuttgart 9, 14; governance structure 50; industrial districts 6; local productive systems (LPSs) 332–3; machine-tool industry 13, 22, 119–20; associational bargaining 70–1; bankruptcies 68; Centre for Innovative Technologies (ZFS) 61–2; changing governance forms 57–65; cooperation 57, 58, 59, 62, 63, 68; Diversified Quality Production (DQP) 47, 50; economic crisis 65–6; economic performance in 1990s 52–6; employers federations 71; employment in 55, 67; government policy 50, 51–2, 58–9; historical origins 47–9

- industrial associations 64–5local collective competition goods 49, 51, 59, 63–4marketing 124networked firm model 56–65over engineering 60public policy 50, 60–1regional policy 50–1, 59, 69–70research and development 58, 61restructuring 66–7small-and-medium-sized enterprises (SMEs) 50, 51, 56, 68sourcing of components 53, 60, 67–8success strategies 72–3technological change 50, 52, 56–7, 59–60technology transfer 123training 49, 51, 60–1, 62–3, 67, 124–5vertical relationships 50
- Stuttgart, University of 49, 60–1; Institute for Laser Tools (IFSW) 62; Institute for Steering Technology for Machine Tools (ISW) 61; Institute of Machine Tools (IfW) 61
- substance, governance forms 4, 120
- Südwestmetall 64, 71
- supplier chains, value of 121
- supplier hierarchies, rise of 5, 6
- Synchroton, the 308
- Syndicat de la machine outil, du soudage, de l'assemblage et de la productique associée (SYMAP) 113–15
- Taiwan 77
- technology transfer 123; biotechnology industry 247–9, 258–9; Fifth Framework Programme 86; packaging machinery industry 29–30; Technology Transfer for Sectoral Innovation (TETRIS) 302
- Télémécanique Electrique 108
- territorialization ; local productive systems (LPSs) 336–9; multilevel governance 342–3
- Thuasne 162
- Thyssen, August 141, 142
- Thyssen-Krupp Steel Company 139, 144, 146, 219
- trade unions ; Germany 50, 64, 69, 70–1, 276; Italy 38–9, 213
- training 124–5; France 107, 113, 170–2, 176; Germany 49, 51, 60–1, 62–3, 67, 124–5, 158, 267–8, 278–81; Italy 28–9, 35, 125, 300–1; United Kingdom 79, 125, 190
- Training and Enterprise Councils (TEC) 79, 81, 121
- transaction-cost theory 2
- Triumph 83
- Trumpf 59, 70
- Unione Costruttori Italiani Macchine Automatiche (UCIMA) 29, 37
- United Kingdom 4, 8; biotechnology industry 239–41, 257–60centres of excellence 243government initiatives 250–3spatial agglomeration 243–5; chambers of commerce 87; Department of Trade and Industry 79, 86, 250Achieving Competitiveness through Innovation and Value Engineering 86biotechnology industry 251–3Business Link Programme 87Foresight programme 86–7Forum Action Group 89Quality, Cost Delivery programme 90'Step Change' programme 89, 96United Kingdom Benchmarking Index 87; Enterprise Zones 186; European Union funding 222; government policy 78–9, 119; industrial districts 15; Industrial Reorganization Corporation (IRC) 76; local government 184; local regeneration 182; machine-tool industry 22, 74–5decline of 77–8employment in 77evolution of 75–8geographical concentration 79–81governance modes 84–91lack of new products 75–6local collective competition goods 79rationalization of 76research and development 76–7, 90short-termism 78skill shortages 75small-and-medium-sized enterprises (SMEs) 76state agencies 84–8

- supply chains 91trade association 86–7under-investment 75*see also* West Midlands, machine-tool industry; machinery industry 14, 15economic performance in 1990s 17, 18; manufacturing industry 78, 83–4, 97, 257; motor industry 84; quality standards 79; regional development agencies 251; role of market 231; small-and-medium-sized enterprises (SMEs) 76, 85, 87, 88–9, 184, 190, 196, 251; technology transfer 123; training 79; Urban Development Corporation (UDC) 186; Urban Regeneration Companies (URC) 188; *see also* Oxford; Sheffield; West Midlands
- United States ; Bayh-Doyle Act (1980) 248; dedicated biopharmaceutical firms (DBFs) 238; machinery industry 56–7; role of market 231; technological innovation 232
- Usinor 199
- Val di Cornia Cultural and Environmental Parks System 213
- Val di Cornia Territorial Pact 213–15
- Vauxhall 84
- Verein Deutscher Ingenieure (VDI) 48, 64–5
- Verein Deutscher Maschinen- und Anlagenbauer (VDMA) 48, 50, 64, 69, 70–1
- Vereinigte Stahlwerke AG (VESTAG) 141–2, 143
- Vodafone 264
- Walsall 81
- Warwick, University of 94
- Warwick Manufacturing Group 90
- Weingarten 48
- West Midlands 8, 9; Advantage West Midlands 87, 88; Birmingham Employers' Forum 88; Innovation Relay Centre 86; machine-tool industry 22associational functions 88–90community governance 90–1concentration of 81cooperation 96corporate hierarchy 91evolution of 82–3governance modes 84–91local government 85marketing 124regional policy 85–6research and development 85, 90small-and-medium-sized enterprises (SMEs) 85, 86, 87, 88–9, 92state agencies 84–8supply chains 91, 96technology transfer 123trade association 89–90training 125unemployment 83universities 90use of agencies 92–7; manufacturing industry 83–4; 'The Chamber' 87; 'Accelerate' project 88–9
- West Midlands Development Agency (WMDA) 85–6, 87–8
- West Midlands Enterprise Board 85, 125, 183; *see also* Birmingham; Coventry
- West Midlands Development Agency (WMDA) 85, 94
- West Midlands Enterprise Board 85, 125, 183
- West Midlands Metropolitan County Council 85
- Westdeutscher Rundfunk (WDR) 260, 263, 269–71, 272
- White Rose Biotech Exploitation Platform 259
- William Morris 83
- Williams, Peter 254
- Wood, Audrey 249
- Wood, Martin 249
- World Student Games (1991) 192, 222
- Yamanouchi 250
- Yamanouchi Research Institute 255
- Yamazaki 78
- York 241
- Yorkshire Forward 195