

TOWARDS GLOBAL LOCALIZATION

The computing and telecommunications
industries in Britain and France

Philip Cooke, Frank Moulaert,
Erik Swyngedouw, Olivier Weinstein
and Peter Wells

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Volume 2

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For Jack Dyckman

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PREFACE

This book is dedicated to Jack Dyckman who died in the spring of 1987. Jack's last post had been Director of the Johns Hopkins European Centre for Regional Planning and Research at Lille in France. The research project on which this book is based had its origins in a joint venture between the Centre and the Department of City and Regional Planning at the University of Wales College of Cardiff. The occasion of the project's birth was an evening at the Brasserie de la Paix, hosted with typical generosity by Jack at his favourite restaurant in Lille.

Jack's death occurred between the submission of the application for funding to the Franco-British scheme of the CNRS and ESRC and the announcement of the successful outcome of the bid. We are grateful to both research councils for their support. We also hope Jack would have been pleased with the final product of his and our efforts.

The research itself was led from Britain by Philip Cooke and from France by Frank Moulaert, the Deputy-Director of the Johns Hopkins Centre, aided by Erik Swyngedouw who held an appointment there. Subsequently, Olivier Weinstein, Martine Lemattre and Patrice Grevet from the University of Lille joined the French team. Peter Wells became the research fellow on the British side. The cross-national team proved to be an exceptionally cordial group of colleagues and the experience of doing research to a tightly defined common format in two strikingly different countries was a rewarding and, in many respects, a formative experience. Many of us have subsequently engaged in other cross-national research projects, enthused by the stimulus of international collaboration.

Many colleagues helped us to develop our thinking and to deal with technical or theoretical problems on the way to completing the research. We would like to thank especially Kevin Morgan, Alain Lipietz, Richard Florida, Gordon Clark, Benjamin Coriat, Louis Albrechts, Luc Soete, Ash Amin, Peter Van Hoogstraten, Anna Lee Saxenian and François Bar, who at various times commented on aspects of our work. Above all, we wish to thank the business managers of firms we interviewed who, without exception, gave us much more of their time than we expected to tell us what was going on in the fast-moving industries we had chosen to study. We would like to think that all who knew him would be happy that the result of our collective efforts is dedicated to Jack Dyckman.

*Philip Cooke, Frank Moulaert, Erik Swyngedouw
Olivier Weinstein, Peter Wells*

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CHAPTER ONE

Computing and communications in the UK and France: innovation, regulation and spatial dynamics – an introduction

Philip Cooke

The aims of the book

This book is a study of changes taking place in two key advanced-technology industries: computing and communications (C&C). The study is broadened by its focus on the transformation of the industries in two major European economies: Britain and France. It could be said that the two master technologies of C&C have been tending to converge in the past decade, but the policy environments of Britain and France have diverged radically during the same period. In France there has been a continuation of *dirigisme* in the fields reported here, industrially and territorially. In Britain, the 1980s saw a radical experiment in withdrawal or diminution of government support for both industries (but particularly – through privatization – of the telecommunications sector) and regions.

Thus, a major theme of this book is to what extent the dynamics of economic development and industrial reorganization are dictated by pure market forces, as against the force of government policies seeking to intervene in and shape the competitive market. The development of C&C in these two countries offers a valuable laboratory in pursuit of this aim, precisely because of the differences in the posture of state policy amid universal technological trends.

A second major aim of the book is to explore the relevance of a broad

macroeconomic perspective, the “regulationist approach” (Lipietz 1987, Boyer 1988). This school of thought purports to explain the intimate relationships between particular forms of industrial organization and institutional framework that persist over time, and why they change. It is a macro-perspective that subsumes some theoretical propositions, among which those addressing questions of production flexibility, technological innovation, inter-firm institutional structures, globalization and deregulation of markets by governments are a few of the more prominent. Rather unusually, this book examines the validity of the regulationist approach by looking at both macro- and microeconomic phenomena, attempting in the most testing way to establish the empirical credentials of the perspective. Thus, the extent to which firm behaviour in either of our target sectors can be understood in terms of “regulation school” propositions is taken as at least a provisional judgement of the theoretical validity of the approach.

The third main aim of the book is to see, again with the aid of the regulationist perspective, whether a good explanation can be provided for the spatial shifts – both global and local – described in the main empirical sections of this study. It is fair to say that one of the general attractions of the regulationist approach lies in its sensitivity to spatial matters. Accordingly, the perspective has been taken up with some gusto in the spatial analytic disciplines: economic geography, regional science, urban and regional studies (see, for example, Scott & Storper 1986, Leborgne & Lipietz 1988, Moulaert et al. 1988,). Since one of the more interesting features of contemporary economic change is an apparent revaluation of the importance of geographical location and linkage, the book seeks to explain this by teasing out the interactions between organizational and technological innovation by firms, and institutional adjustments in the environmental context in which firms operate. Moreover, since policy-makers from the local to the supranational level express an acute interest in the development of these key advanced technologies, seeking to gain advantage for their territories in the competitive struggle, we hope to shed light on the processes of change, to enable appropriate policy conclusions to be drawn.

There are five key issues which form the broad structure of what is discussed in the book. First, it is necessary to draw attention to certain apparently pervasive technological changes which have in turn led to innovations in both the products and the processes of their production. Secondly, it is vital that the institutional structures that permeate the more directly economic pursuits of firms are presented along with key changes within these pursuits. Next, attention is drawn to two important geographical scales by which it is relevant to consider the effects of these

The aims of this book

technical and institutional changes. Hence, the third issue concerns the macro-spatial level and the question of “globalization”, while the fourth relates to the micro-spatial, or regional and local, shifts occasioned by the developments occurring in C&C industries. Finally, analysis of the sectoral dynamics of three crucial activities must be foreshadowed, these being the manufacture of computing and communications equipment, and the delivery of specialist value-added services to which they give rise. In what follows, each of these five core areas of the theoretical and empirical research will be outlined, and key elements of each will be highlighted.

Innovation, technical change and the firm

New products and new methods of producing them have always been crucial competitive weapons to firms. However, in the past two decades there has been a huge leap in the rate of product and process innovation, particularly in the computing and communications industries. An exponential growth of new products in telecommunications is demonstrated in Ungerer & Costello (1988), and the profile for computing is comparable, while that in communications services is sharper still and over a much shorter period (Mansell 1989).

A striking feature of innovation in these industries is the noticeable shift in the processes underpinning it. Hitherto, the predominant source of innovation has been the large hierarchical corporation with a divisional structure, one of the key departments of which is research & development (R&D). Whatever organizational changes may have been instituted within large C&C corporations in recent years – and there have been many, as they have sought to cope with the twin uncertainties of heightened competition and more rapid rates of technological change – the R&D department has survived more or less unscathed. However, its capacity for “stand-alone” innovation may have diminished. One reason for this is that innovation has become a far more interactive process than it was as a giant corporation such as IBM grew to prominence. Recent studies show a pervasive increase in the amount of corporate innovative activity occurring through interaction between the innovator and user (Hakansson 1989). This growth of “user-power” is, in itself, something of an innovation and one that has been occasioned by the greater choice a user now has in a more competitive market, and the deepening of markets as more and more users see the potential competitive advantage of investing in C&C. Hakansson (1989) shows that this interaction between client and producer is the most

widespread form of inter-firm co-operation in the innovation sphere, accounting for 75% of such co-operative relationships. Moreover, they are the longest-lived form of co-operation, averaging ten years durability. Among the reasons for increased user-producer collaboration in innovation are: the specificity of user needs demanding “bespoke” applications; the prospect of market enhancement through customer “lock-in”, and through learning how to develop new applications for sale elsewhere; and the continuous learning that may be afforded from the user’s growing ability to demand “aftercare” from the producer, once installation has been completed.

A different kind of innovative learning by interaction comes from heightened collaborative efforts between producers (Lundvall 1988). Specifically, the interaction here is likely to be between a larger customer firm and a smaller supplier firm in a similar or related component or service-supply industry. In parallel with user-power is what can be termed “supplier-power” (Cooke & Morgan 1990): this is a situation where, for reasons of increased competition, a firm is forced to reduce, say, materials costs by subcontracting production to one or more independent suppliers. Where suppliers have “strategic competences” (Teece 1986), they may be in a position to demand not the short-term multi-supplier contract, that most customers require to maintain control over the relationship, but long-term single-supplier status. To the extent that the latter position is approached, if not achieved, the relationship between customer and supplier will necessarily have changed from a competitive market relationship to one of increasing trust and confidentiality (Granovetter 1985). Such relationships can result in innovation through learning by interacting. Firms jointly develop and produce, and added value stems from the exchange of the know-how each partner possesses.

The third form of innovative learning by interacting is the inter-firm agreement between equals or near-equals, as distinct from the previous two categories. Though this is one of the most widely discussed innovation processes in the relevant literature, it is much less important than user-producer interaction and not necessarily more important than customer-supplier interaction. Nevertheless, it has attracted attention because it seems to be a new form of relationship between potentially competitive rivals (Chesnais 1988, Mytelka 1990). Strategic alliances, as such collaborations are often referred to, are a prime focus of the micro-analysis presented in this book. They are important, especially so in C&C, as forms of pre-competitive as well as competitive innovation and related activity, but also because they often presage acquisition or merger

strategies which are of importance to industry dynamics and competitive position. Ultimately, as is argued in Chapter 2 of this book, innovation is a key element of “knowledge-intensive production”, and, once the inter-firm interaction chains are developed, this progresses into a form of competition in which economies of permanent innovation begin to predominate.

Technological change of this permanent, in-built or embedded kind is what characterizes the innovation strategy of the leading Japanese firms, but it is not confined to them. Some leading Western corporations have, through either emulation or collaboration, learned from their interactions with the key competitor firms. The most important value-increment accrued from the quest for permanent innovation is what Weinstein in Chapter 2, following Klein (1986), refers to as “dynamic flexibility”. Flexibility is an over-used term in discussions of the distinguishing characteristics of contemporary industrial organization, in contrast to those of previous production regimes. The fact that it crops up so often in both academic and normal discourse signifies its pervasive presence if not its academic rigour. However, Weinstein’s analysis goes some way to redressing the latter weakness.

Weinstein contrasts “static flexibility”, seen as the simple capacity of a firm to adjust its current product-mix and production technology to adapt to changing demand, with “dynamic flexibility”, which is a far more transformative concept and practice. A dynamically flexible firm is not only capable of meeting short-term market fluctuations but is able to change its framework of operations to absorb and optimize the value embedded in innovative technologies. Organizational change and technological change are intertwined under conditions of dynamic flexibility. In particular, the existence of a high degree of responsiveness on the part of the organizational and technological departments is a defining characteristic of dynamically flexible production. In exploring this relationship in C&C industries the book, and in particular Chapter 2, assists considerably in our understanding of more macroeconomic processes of adjustment, such as those addressed in the regulation school of economic thought.

Regulatory institutions and the networking propensity

The regulation school macro-perspective is used in this book as a “critical heuristic”: a model that orientates the research process (and will be tested

against the empirical reality of the computing and communications industries). Theoretical attention is usefully drawn to both matters of economic organization and appropriate institutional frameworks. This is done by the conceptual devices of the “regime of accumulation” and the “mode of regulation”. As may be seen in Chapter 3, there is widespread interest in the extent to which a transition is occurring in both the broad accumulation regime and regulatory mode by which the economic development process in the advanced economies is organized.

The regulationist perspective postulates that over lengthy periods of time the accumulation regime and the mode of regulation come into a reasonably synchronized relationship. The ways in which businesses are organized, their forms of work organization, the technology used, their management practices and their posture towards markets – display, despite variations at the micro-level, certain recognizable broad characteristics. Moreover, the institutional framework, which envelops and pervades key aspects of business activity, itself takes a recognizable general form across national economies. The kinds of state intervention in support of economic activity (monetary, budgetary and fiscal arrangements); the degree and kind of deployment of policy instruments designed to support businesses; the rôle of informal regulatory institutions such as business associations, industrial relations practices and local chambers of commerce; and even the expectations of workers and consumers – all come to share some common and complementary features. There will also be elements of dissonance present in these relationships; the system is by no means closed.

A key claim of the work informed by this broad perspective is that, since the 1970s, one set of relationships between the accumulation regime and the regulatory mode has been discernibly yielding ground to a new set of such relationships. It is proposed that the era from approximately the 1920s to the 1970s in the USA, and the 1940s to the 1970s in Europe, can be characterized as Fordist. That is, the predominant model – not everywhere implemented, but perceived as a highly modern, impressively productive system to be aspired to – was one that originated in the eponymous American automobile firm. Among the key, and perhaps idealized, features of that micro-regime of accumulation were: flow-line assembly, detailed division of labour through task-specification for workers, mass-production of relatively standardized products, a bureaucratic divisional management hierarchy, and a market disposition based on the idea of stand-alone competition.

Crucially, what links the micro-regime of accumulation to the micro-regulatory mode under Fordism is wage bargaining. To move towards

synchronization of mass production with mass consumption, a relatively large increase in wage levels is necessitated. This is ultimately secured through recognition of trade unions for bargaining purposes, but the first step is taken at the micro-level by the firm – historically the Ford Motor Company in this case – raising wages substantially and setting a target which later becomes a standard for other firms to meet. In time, this linkage between mass production and mass consumption in the economy at large becomes generalized. Keynesian demand-management regulates the amount of credit in the economy, institutions of collective bargaining become established, and the welfare state develops. Economic relationships become subject to forms of regulatory institution.

Now, taking this historically situated case of the working-out of the relationships postulated in the regulationist model, to what extent does it work for the key industries explored in this study? Clearly, the answers to that question cannot be prejudged, and will, it is to be hoped, emerge in the chapters that follow. Nevertheless, some pointers can be suggested at this introductory stage, given the published research on, particularly, the histories of the telecommunications and computer equipment industries (the C&C services industry is too young to have a history).

As Hills (1984) shows, the early history of telecommunications in many countries resulted in a small number of large companies already involved in some aspect of electrical or telegraphic production and/or experimentation coming to dominate the market reasonably early. Such was the domination of the Bell Telephone Company that its international activities (taken over by ITT) had to be divested early as a consequence of anti-trust legislation in the USA. In Britain and France a very small group of preferred suppliers came to dominate (initially semi-protected in Britain by the state through the Bulk Supply Agreement). In France, Ericsson and CGTT-ITT performed a similar rôle. In both cases an almost classic Keynesian mixed-economy relationship existed between customer and supplier. That is, the public sector owned the service and undertook R&D, then essentially gave its R&D and experimentation results to the suppliers to work up first as prototypes, then final products. The state was thus bearing the high costs of research while the private sector was reaping profits from a quasi-cartellized set of supply arrangements. This does not sound Fordist in the sense that the early development of the automobile industry in the USA does. In some senses it appears almost as a form of hyper-Fordism, where regulation penetrates and almost substitutes for (UK and France) or creates (USA) the market.

Production of telecommunications equipment includes the classically

Fordist assembly of telephone handsets, often carried out in branch plants in regionally assisted, former heavy-industry areas to where late-Fordist industry often migrated (see, for example, Massey & Meegan 1978). However it also includes non-Fordist production such as cabling, with the case of switchgear being a more customized craft and assembly production process. One feature common in the telecommunications equipment industry is the high level of trade union representation found there in Britain and France. So, in general outline, the telecommunications equipment industry has some unique features, notably a history of close government involvement in its organization and, as a key customer, its markets, with others that could be said to resemble aspects of Fordist production technology. However, by virtue of the technology involved, not all of the industry could be compared to, for example, the automobile industry.

Computing, perhaps, can be so compared in that much of the production of computers involves assembly of electronic components and printed circuit boards on assembly lines and, as the industry has moved more and more towards producing a mass commodity rather than a crafted, one-off item, this is becoming increasingly the case. Offshore production of components and assembly of final product is extremely common, as low-wage platforms have been sought for this labour-intensive process. Like the automobile industry, a large number of early producers gave way to a dominant market-leader (IBM in the USA, ICL in Britain, Bull eventually in France) who was pursued for a time, especially in the USA, by smaller imitators, the numbers of which have now reduced to a handful (and in Britain and France to negligible proportions).

In both Britain and France the state has at various times intervened significantly to restructure the computer industry. In France, even today the main player, Bull, is hugely subsidized by the state through its holding company, as Chapter 6 makes clear. In Britain, the history of ICL is one which is indistinguishable from state involvement, since it was the Labour government, through its Industrial Reorganization Corporation in the 1960s, that gave birth to the company, taking the computer divisions of a number of electronics companies to form ICL. Thereafter, ICL's difficulties in trying, and failing, to compete with IBM have often drawn forth special government assistance in the form of both bail-outs and government purchasing policies. Computer companies tend, however, to be non-unionized, following their US exemplars, and wage-bargaining can be undertaken on the basis of individual, let alone local, contracts.

Thus, from this brief and rapid overview some conclusions may be

drawn. First, both computing and communications display characteristics to varying degrees that may be characterized as Fordist. Secondly, for reasons having to do with the strategic nature of the technology, telecommunications looks historically to have been an almost hyper-Fordist industry, given the degree of state regulation that enshrouded its production capability. Finally, though, the industries, hypothetically at least, differ in their industrial relations cultures: in telecommunications equipment, unions are more common and powerful than in the computer industry.

If the question of whether or not the two industries can be truly characterized as Fordist can be established only by detailed historical analysis, nevertheless another more germane question arises. If, as the regulationist perspective suggests, Fordism is declining to be replaced by a newer regime of accumulation and mode of regulation, what general configuration do these now display, and is there evidence that C&C industries are being transformed accordingly? In Chapters 6, 7 and 8 these issues are tackled as a major theme of the book.

Put simply, Chapter 3 suggests, along with common parlance in the appropriate literature, that we are entering a post-Fordist economic regime with an associated – broadly post-Keynesian – mode of regulation. The term post-Fordism is something of a convenience. The forms of business organization which have been argued to be post-Fordist include the following: substantial dependence upon networks of suppliers and the elaboration of supply-chains; intensive use of programmable assembly, facilitating a high degree of production flexibility; matrix-like and more decentralized, less bureaucratic, management structures; higher skill-densities in workforces; more flexible working practices than hitherto; and a heightened tendency towards collaborative R&D, technology transfer and marketing arrangements among firms.

At the heart of post-Fordism is a greater degree of *integration* inside and between firms, and in terms of functions and organization. To some extent, integration may also extend beyond the firm into the micro-regulatory sphere; that is, there may be greater interaction with the institutional context of local and regional as well as larger-scale governmental bodies, business associations, chambers of commerce, training providers, universities, and so on. The success of such practices depends crucially on the quality of *networking* undertaken by firms and their institutional support systems. Communications networks – the very technologies produced by the computing and communications industries – are of central importance to the efficient and effective functioning of business networks. Firms in these two sectors are often leading-edge users as well as suppliers of such

expertise, as Chapter 8 shows. The information and communications network infrastructure is what enables but also demands the flexibility supposedly characteristic of the post-Fordist firm.

Globalization and corporate strategy

The growth of the world economy is presently accompanied by the diversification of the corporate origins of the businesses responsible for global economic expansion. In the relatively recent past, the internationalization of investment, as distinct from trade, was stimulated by large corporations operating transnationally from a few national economies (the USA, UK and some other European countries). Now it is not uncommon for relatively insignificant countries (in economic terms) to be the originators of what can be called global corporations: Switzerland's pharmaceuticals and food industry giants come to mind, as do South Korean electronics and automotive firms, for example. Moreover, a proportionately greater share of such corporations originate from outside the USA than has historically been the case. In the words of the Japanese business-strategy analyst Ohmae (1985), such corporations are seeking to be as fully economically active in the centres of "Triad power" as possible, the Triad in question being the three main global markets of the USA, Europe and Japan.

These developments are the subject of Chapter 4 of this book, which examines the growth of global economic investment activity and market penetration, not only with reference to the information industries that are the focus of the book but to others, such as financial services, which are the most globalized of all. Despite the ubiquity of financial services within and beyond the "Triad" markets, stimulating the development of important financial centres in developing-country cities such as Bombay, São Paulo and Nairobi, computing and communications are certainly highly internationalized industries well on the way to becoming global. That is, no longer do American firms dominate world markets supremely, as they used to do. Rather, major challengers have arisen in Japan and, to a lesser extent Europe – particularly in the case of computing, where indigenous firms are weak. Some Japanese firms have the strategic aim of, for example, outperforming IBM in computing, as Fujitsu have gone on record as saying, and AT&T in communications, as is the case with NEC. European firms such as Siemens in computing and communications, and Alcatel in communications, have professed aims of becoming, or consolidating their

positions as, global corporations. This means not only selling to US and Japanese markets, but also establishing production, design and research facilities in those markets. There are, of course, considerable political difficulties and obstacles in achieving this. But there are also ways round them, and firms with global intent have been learning a considerable amount about these in the past decade or so.

One of the key reasons globalization has begun to occur is precisely because of the progress made by computing and communications technologies themselves. These enable corporations to deepen their vertical structures of production in host countries and to interchange what may be their own internal technical, production or marketing complementarities across country and continental boundaries. The case of IBM is instructive in this respect. That corporation was organized such that by the 1970s it had distributed fundamental research centres in the USA and Europe, and a multitude of development laboratories throughout the USA, Europe and in Japan. However, there was no necessary downstream complementarity in the production specialisms that might also coincidentally be located in particular countries or even continents. Intra-corporate electronic networking provided the crucial highways down which such complex functional and spatial interactions could be co-ordinated. Of course, IBM has long played the part of “corporate exemplar”: other companies observe and learn from the best practice of the world’s leading computer manufacturer; thus the experience has slowly become more generalized.

However, one of the open questions about globalization, which this research was committed to addressing, concerned the extent to which a producer and production-led IBM-style model of global supremacy still pertained. As will be recalled from the previous section, theory suggested that the era of Fordist producer-power might well be expected to be under challenge from new models of industrial organization post-dating Fordist production. As will be seen in Chapter 6, IBM – along with its hot pursuers DEC, Hewlett-Packard and the like in computing – had been assailed by what can only be called the decline of producer-power and the rise of user-power. The demands of the market, with heightened competition, appear to have pushed even the powerful IBM down developmental pathways which cause them to build upon and extend their networking competences in new ways. All computer and communications companies are prey to the force of the global market pulling them out of their national bases, both to learn from the innovation specialities of technologists in other countries and to meet an ever-discerning customer demand.

As well as significant changes in markets, and developments in