

CLASS ANALYSIS AND THE INFORMATION SOCIETY AS MODE OF PRODUCTION

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Abstract

In analysing the current usefulness of a class analysis of the media this article places the political economy of the media in the context of a political economy of the Information Society. It argues that the Information Society does not refer to one thing or trend, but is made up of a number of competing, and often contradictory analyses of the development of the mode of production, each with different concepts of the role of information in economic development and different definitions of information workers. Media centric versions of the Information Society are then critiqued in the light of empirical evidence. Finally an assessment is made of what Information Society theory can contribute to our understanding of changes in the structure of the labour market associated with the growth of information work in relation to class and of globalisation through the concept of the death of distance.

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This paper is focused on the question of the continuing usefulness of a class analysis of communication as a defining characteristic of a critical, left or progressive approach. In response to this question I should say first that it seems to me that it is the primary function of critical scholars to analyse the world as it is. The purpose is to show what is going on and with what consequences and for whom without worrying as to whether it is left or progressive.

However it is undoubtedly the case that much critical scholarship has seen itself and been seen by others as based upon a class analysis. It is also the case that classes – in the classic sense of social groups whose broad life chances, relative social power, and possibly also views of the world, are determined by their sources and levels of income – exist and remain one important basis for the analysis of social structure and dynamics.

The left's use of class analysis is, however, more specific than this. It has been characterised by two basic arguments. First that the basic social cleavage is between owners of capital and labour and that this cleavage is conflictual because it is exploitative. Second that from this basic cleavage can be derived distinct ideologies, political programmes and perhaps cultural tastes. Within this broad framework critical communication scholars have either analysed the media as exemplars of class division at the point of production within a broader political economy or they have analysed them as vehicles for ideological domination.

It is my view, for what it is worth, that the class based dominant ideology approach has for long been a busted flush. We do not require it in order to explain the relatively smooth reproduction of capitalism and it has proved an unreliable vehicle for explaining the nature of the social, political and cultural beliefs and practices of individuals and groups. In fact most current critiques of this type are broadly liberal in origin (they are none the worse for that).

This then leaves us with the production based concept of class and its relationship to an analysis of the political economy of the communication sector. In this paper I will illustrate my views of its relevance and usefulness through an outline analysis of information society policy rhetoric and of current developments in the media sector within that framework. Above all, the classic Marxist version of class, derived from Smith and Ricardo, saw the basic class structure as derived from the relations of production of a given mode of production and future changes in class structure and relations as stemming from major shifts in the mode of production. From a class analysis perspective therefore, the key question posed by Information Society thinking is whether it is, as some claim, a new mode of production.

My argument in this paper starts from the assumption that, in the present period, we need to tackle the political economy of media within the wider political economy of the information society. There are at least two indications that this is the case. During the period of "irrational exuberance" that marked the so-called dot-com boom of the late 1990s the financial markets created a new sector, TMT (Technology, Media and Telecommunications), under the assumption, erroneous as we shall see, that their economic dynamics and thus financial futures were as though one. Regulatory policy both in the US, Europe and the WTO is driven by a rhetoric that legitimates changes in intellectual property law, the deregulation of media and telecommunication markets and liberalisation of world trade in cultural services as the removal of barriers to innovation and competition required for the development of the information society.

The political economy of the media is in particular linked to information society thinking in two specific ways. On the one hand it is argued that the media are a key growth sector, creating jobs and export earnings, and that therefore economic and regulatory policy in each country must be designed to ensure that supposed barriers to this growth and to national competitive success on global markets for media products and services are removed. It is this view that is captured in designating the creative or copyright industries as the focus of attention and in seeing the World Wide Web and multi-media as the revolutionary driving forces. On the other hand it is argued that the media sector's economic history, structure and dynamics are precursors for the whole economy as it becomes an information economy, producing, distributing and consuming symbolic goods and services. It is this view that is captured in the terms knowledge, weightless and digital economies.

The central argument of this paper is that in order to test these claims and the efficacy, or otherwise, of the policies which derive from them it is necessary to deconstruct the information society discourse. In so doing we will see that there are a range of different economic theories/analyses, each with its own history, intertwined in the concept of the information society. These theories are each a response to specific economic/social problems with different policy goals. They require specific empirical testing and benchmarking. For instance, the notion that broadband penetration per se tells us anything useful or meaningful as a benchmark about wider economic and social dynamics is a bizarre fetishism. What is more both the analysis and the goals are in part contradictory. For instance, and I will return to this, a theory of price based market competition drives deregulation and competition law, while a Schumpeterian theory of growth based upon market entering innovations and driven by the excess rents that the resulting technical monopoly produces drives innovation policy. Each has something to recommend it, both as analysis and prescription, but from a policy perspective you have to choose between one or the other.

The range of theoretical/empirical analyses and the related policies and policy discourses jostle beneath a number of names – information, knowledge, creative, copyright, digital, e- economy or society. Often the names appear to be used randomly. But their choice may reflect the nature of the explanatory theory being deployed or the interest being promoted. For instance digital nuances the discourse towards the ICT (Information and Communication Technologies) industries; e-economy towards Net based business processes; information and knowledge towards science, innovation, and research and development; creative and copyright towards the media and cultural industries. One of the great ideological advantages of the information society discourse is that in its vagueness of concept and nomenclature it enables many to jump on the bandwagon and find a seemingly comfortable home in its promiscuous warmth. Witness the ways in which education, and especially higher education, has uncritically adopted it as it fights at the fiscal trough.

Let me then turn to deconstructing Information Society discourse as a range of theories which try to explain what is happening to the capitalist economy and as a range of policy responses to problems thrown up by those developments. Sometimes these problems and responses will be found at a very general level among economists, corporate strategists and managers and national and international

policy makers. For instance how to explain and then what to do about stagnation, evidenced by falling rates of productivity growth and rates of profit in the leading industrial economies in the 1970s and 1980s. Or, and these are related, how to understand and respond to the implications of the shift from manufacturing to services. Sometimes they will stem from the interests of an industry and its lobbyists – for instance the marketing needs of ICT hardware and software industries or the investment needs, and intrasectoral competition of telecom operators.

1. Knowledge as the Core of Value Added

This is Daniel Bell's "Post-Industrial Society" thesis. It stresses the centrality of organised technical innovation through harnessing science to capitalist growth. In this model ICTs are both a key exemplary product of this innovation process and also a tool within it. It places a stress on industrial research and development (R & D) and on relative rates of R and D spending as a test of national competitiveness – see for instance current EU policies. It is this model that now drives UK research policy and its search for elite, "world class research" centres. It is associated with theories of systems of innovation and endogenous growth theory – for instance stress on university/industry collaboration, industrial clusters, the intrafirm learning curve and the knowledge organisation (see Castells 1996 and the concept of the network firm). It has become associated with –

2. Schumpeterian Growth Theory

Much Information Society analysis and policy is, often without knowing it, Schumpeterian. Indeed one could argue that he is at present the most influential of the great economists, that we have passed through Keynesianism and Monetarism and are now passing through Schumpeterianism. So it is important to be clear what Schumpeter was arguing and to what problem in capitalist development and its theorisation he was responding. It was widely recognised at the time Schumpeter (Schumpeter 1934; 1939) wrote that the classic explanation of capitalist dynamics, and at the same time its legitimation, namely interfirm price competition, was leading to stagnation, static sectoral oligopoly and normal profits and thus an investment slump. It was in this context that state planning and direction of investment looked attractive. Schumpeter's response was to argue that interfirm price competition was not the secret of capitalist growth – that it did indeed, as Walrasians argued, lead to equilibrium but a static equilibrium. The secret of capitalist growth was not competition through price between homogeneous commodities but the innovation of new heterogeneous products or processes which created new markets. However there was a high risk associated with innovation and thus the innovating entrepreneur (the *deus ex machina* in Schumpeter's system) required the promise of a monopoly in the new product and thus superprofits or rents. It is essentially this theory that was used to defend Microsoft against antitrust action.

This theory of the centrality of innovation and the entrepreneur to capitalist growth, and the innovation encouraging policies associated with it (everyone's search for the next Silicon Valley), has to face two problems. First, as I have noted above, and as the Microsoft case illustrates, it is quite incompatible with the neo-classical equilibrium model of market competition, and especially price competition, which underpins deregulation and competition policy. Secondly it raises the question of how long the monopoly should last if it is not in its turn to lead to stagnation. In Schumpeter it is assumed that innovation is external to the market

and will always lead to a renewed process of market entry which will break the monopoly of the previous generation of successful innovators. However, much recent work has focused on barriers to market entry; on first mover advantage, intrafirm learning curves, constant returns to scale, path dependency and lock-in, all of which cast doubts on the Schumpeterian model and point more to a renewal of Chandler's model (Chandler 1977) of the dominance of economies of scale and scope and thus constant consolidation. I want to stress that this is a real and important argument about economic growth but it is about general processes of innovation, risk and reward which have not been changed as some would argue by ICTs. They connect with debates about the media in only one respect to which I will return – one of the arguments used to justify copyright extension, as also the widening of patent protection, is that it is to ensure the returns which motivate the creative entrepreneur.

3. Digitalisation and the Frictionless Economy

One version of the new information economy argument is a version of interfirm price competition as the key determinant of economic growth and consumer welfare. Its variant as applied to the media sector and the impact of the Internet is disintermediation. This approach focuses on transaction costs and in particular on the costs of information as key structural determinants of markets and argues that ICTs are creating both more transparent markets and thus both greater consumer choice and lower prices, and are at the same time making firms both more efficient and more flexible by drastically lowering transaction costs. From this perspective e-business is the core of the information society. So far as the media sector is concerned the issue is whether web based distribution and transaction systems have or have not radically shifted the relationship between symbol production and consumption and thus the basic economics of the industry – in particular has it broken the power of the distribution based conglomerates. The music industry is clearly at present the focus of this debate.

4. The Information/Copyright/Creative Industries as the New Growth Sector

This version of Information Society theory has been particularly attractive, both to those who study the media and those who work in it, for obvious reasons. Here much theorising is part of a long tradition which first focused on the shift from manufacturing to services and was then developed in Post-Fordist theory. This analytical tradition stressed the problems associated with the market exchange of intangibles (associated with a general growth of interest in information economics), with the increased importance of human capital, and with necessarily low productivity in the service sector. For the purposes of our discussion on the relevance of class it is important to stress that this approach, linked to the focus on innovation, was closely linked to theories of labour market restructuring, the rise of the so-called service class and, for instance in Bell and his followers such as Castells, a shift in the axial principle and thus in the basis of class power from industrial capital invested in tangible machines, plants and homogeneous labour power and to human capital invested through education and training in heterogeneous knowledge workers themselves. On the consumption side this approach also stressed the increased freedom of more knowledgeable consumers and links to the frictionless market approach. So far as the media are concerned the view of the information industries as key growth sectors has underlaid much of the drive to deregulation and the reform of intellectual property.

In my view this approach has tended a) to take the propaganda (or wish fulfilment) of the media sector itself at face value, and b) failed to distinguish the economics of content production from the economics of distribution. Critical scholars have been as guilty, perhaps more guilty of these failings, as anyone else. In my opinion this leads, for instance, to an absurd exaggeration of the power, reach and importance of media conglomerates and moguls.

When all is said and done it would be my contention that most of what is now called the information economy/society is in fact the service economy/society revisited.

5. The Mediacentric View of the Information Society

As I have said there is one version of the development of the information society which sees it as a shift from an economy dominated by material goods production to one dominated by the production, distribution and consumption of information or symbolic goods and services. This view was encapsulated in Negroponte's slogan "from atoms to bites" and is sometimes expressed as the information economy's weightlessness. This general position was also a central aspect of Post-Fordist theory and of Alvin Tofler's *Third Wave* (Tofler 1981). It has been central to the ideology of the Internet and dot.com boosters. It has been too readily accepted in my view by soi-disant post-modern radicals such as Scott Lash.

There has been a seamless move from this general argument to see the media sector, now retitled the information industries, as the major economic beneficiaries of this development. The policy imperative is well captured in the title of a recent OECD report "Content: the new growth industry." In examining the reality of this argument we need first to be extremely wary of the slippery term "creative" and thus the slide in the policy discourse from media or information industries to creative industries. No one of course can be against creativity. Its recent high valuation within information society discourse stems from a) the high value placed upon innovation, b) the stress in developed economies on the returns to human capital and its relation to a high skill/high value added strategy in the face of competition from cheap labour economies, and c) the centrality in production in service dominated economies of human to human relations rather than human to machine. It has little to do with creativity in the artistic or cultural sense, although the cultural industries and some sectors of education have adopted the creative industries nomenclature in an attempt to capture the concept of creativity exclusively for themselves. In fact the claimed economic weight and growth prospects of the "creative industries," certainly within the UK policy realm, rested largely on the inclusion of computer software and industrial design. Within the media sector itself it was traditional print publishing that loomed largest rather than the high tech electronic sectors.

So what is happening in the media sector? In order to understand the structure and dynamics of the media sector in relation to the larger economic context, whether of an information economy or not, we need to make a crucial distinction that is too often ignored. The media industries serve two distinct markets – that for intermediate goods and services as well as that for final consumer demand or, as Marxists used to say, Dept. 1 and Dept. 2. This is important because central to classic political economy has always been the problem, in relation to the analysis of reproduction, of the business cycle and crisis of the co-ordination between Dept. 1 and Dept.

2. It is also important because information industry growth in recent years, as Charles Jonscher (Jonscher 1983) pointed out long ago, has been largely in business services NOT in final consumer demand. But it is the media as suppliers of goods and services to consumers in their leisure time that has dominated attention and analysis. The problem is further complicated in the media sector by advertising. Advertising is a business service. Its cyclical growth dynamic is determined by corporate profitability and the intensity of competition between firms. But it is an essential ingredient in the financing of consumer media. Thus the media sector marches to two tunes which, as the most recent cycle shows, are often out of sync. It is important to stress that there is a deep contradiction between the growth of business information services and of advertising on the one hand and the claims of the information society (read new economy) advocates that ICTs in general and the Internet in particular make the economy more productive and efficient thus increasing consumer welfare by making markets more transparent and in Bill Gates words "frictionless." In fact this claim does not stand up to any serious analysis, but if it were true the prospects for the media broadly understood would not be good.

So far as consumer media are concerned we can observe a modest growth above the growth rate of GDP a large component of which has been a cyclical boom in advertising (now followed by an equally severe slump) a large fraction of which was internal to the information sector itself (dot.com advertising, etc.). But this has been largely a relative price effect since consumption itself has not risen proportionally. Indeed it is better to understand recent media developments as intensified competition for stagnant demand than as driven by explosive demand growth. The result of this has been the rise in the price to consumers of each unit of media consumption time, in economic theory not a good recipe for dynamic sectoral growth. Of course the information society theorists were arguing that prices would fall because of the cost of distribution was falling. This was central to the whole Third Wave, deregulation argument that saw the Internet as the provider of nil cost information abundance. Unfortunately they overlooked both the rising relative costs of production (including importantly rising marketing costs) and the demand side. In fact rising disposable income has not been mainly channelled towards media demand growth. Rather it has gone to higher cost, but now affordable, ways of enhancing leisure, tourism, restaurants, interior decoration, fitness, and health and beauty (It should not be forgotten that the largest service sector growth has been financial services, themselves a major driver of both ICT investment and information society boosterism).

The big story of the last decade in the media sector has not been growth in demand but a struggle for market share, which has taken the form of a struggle over distribution. If we look at US figures we see that the result has been declining margins, declining rates of return on capital and declining rates of profit, especially in the high growth sectors of cable and satellite. Beneath the froth we see a classic over investment boom driven by a search for market share during a period of technological uncertainty in distribution. To this extent the media are part of TMT since it was this sector that fuelled the general over investment boom that characterised the new economy period of irrational exuberance.

In part this was a side effect of developments in the telecom sector. Driven by regulatory induced competition and technological uncertainty telecom operators,

both incumbents and new entrants, overbuilt networks and at the same time went in search of the increased traffic that would provide the economies of scale essential to make those network investments pay back. The economics of the sector are such that it was a “last person standing takes all” game. As part of this strategy the telecom operators bought into the argument, at least temporarily, that it was media consumption that would eat up the bandwidth they were so profligately providing. Hence the Content is King/Content; the new growth industry arguments and the search for so-called killer applications. On the other side the media industry bought into the convergence argument – that digitalisation enabled the exploitation of a range of content across delivery platforms and that to ensure economies of scale and scope it was necessary to be present on all platforms. Vivendi/Universal and AOL/Time Warner stand as decaying monuments to the fallacies of this strategy.

Here I would like consider what implications my analysis has for a class analysis of the media sector. The critical approach has focused overwhelmingly on concentration of ownership. The underlying argument is that the media, because privately owned and controlled, are vehicles for the propagation of ruling class ideology and that therefore concentration strengthens this power. The proposed alternatives are either public service or working class owned and controlled media. It is important to stress that the critique of concentration per se is more of a liberal than a left critique. It is also important to stress that the critique of commercialisation that often accompanies it is often closer to the elitist mass culture critique than to a class analysis.

One version of the information society argument (Third Wave, Internet, etc.) is that it will/has produced a multiplicity of content (e.g., de Sola Pool’s *Technologies of Freedom*, 1984). The alternative left argument has focused on concentration and commercialisation. In my view both positions largely miss the point.

While the plurality boosters are largely simply wrong the left has both exaggerated the extent of concentration and the power of conglomerates. On the one hand both parties fail to recognise that the mass media are, by their very nature, for better or worse the products of economies of scale and scope and thus are by their very nature concentrated. Diversity and mass media are simply contradictions in terms.

It is also the case, at least for the US market, that concentration has not increased either within sectors or cross sectorally. What has taken place is a shift from private to public company control and thus an increased financialisation. This has important consequences but they are not those of concentration. It is not ideological control that drives the managers of these companies but the drum beat of Wall Street, quarterly returns and the stock price. To improve these they would happily advocate a Bolshevik revolution if necessary. The bottom line in my view is that you simply do not need a dominant ideology explanation for the relative stability and reproduction of the capitalist system.

6. Digitalisation and the Death of Distance

This approach links a shift to an economy of intangibles to an analysis that sees the rapidly reducing costs through digitalisation of communication transport and switching as the key economic determinants where globalisation is a key aspect of the information society. According to this view a key historical determinant of achievable market size and thus of the general efficiencies derived from econo-

mies of scale and scope at the level of both firm and economy have been transport and communication costs and barriers. Their removal or reduction therefore leads to the realisation of capitalism's promise of a global market both in the production and sale of tangible commodities and increasingly in services. This in its turn leads, it is argued, to the declining regulatory power of nation states and the need to remove regulatory barriers to global flows and exchanges of all sorts. That there is some truth to this argument is certain. The issue is the extent of the effect and whether the process is on balance beneficial or negative and in each case for whom. In my view the extent and speed of globalisation has been much exaggerated and its effects insufficiently disaggregated. But it must also be stressed that there is a perfectly good critical/progressive case to be made for globalisation in the media sector as elsewhere.

7. Finally, Information Workers

It is clear that much thinking about the information society derives from the post-industrial tradition. Central to Daniel Bell's original thesis, and explicitly derived from Marx's own approach, was an argument about class power and its relationship to what Bell saw as a new mode of production within a stage theory that went feudalism, industrial capitalism, post-industrialism (Bell 1980). According to Bell, following Marx, industrial capitalism and its associated class structure was based upon capital's control of the physical means of production enabling them to control and exploit propertyless labour – so far so familiar. Bell then argued that the growth and value added of the nascent post-industrial economy was based upon the mobilisation/exploitation of knowledge (in particular scientific knowledge) which was not owned by capitalists but embedded as human capital in workers. Bell's thinking, derived in part from his Trotskyist past, was clearly part of a wider current of thought about the changing nature of capitalism and its implications both for capitalist development and for class politics. I mention Burnham and Galbraith as examples. Indeed it was precisely against this current of thought and its counterposing of a planned, bureaucratised industrialism and the social-democratic politics that went with it, as against an anarchic, competitive capitalism that Schumpeter developed his analysis.

The Bell approach then went on, first in the US in the work particularly of Porat, and then more widely through the OECD, to count information workers. In the early 1980s the percentage of information workers was seen as the key indicator of national economic development, holding much the same talismanic status then as broadband penetration has now.

The continuing power of this paradigm can be seen in the centrality given to "networkers" in Castells' trilogy (Castells 1996).

Indeed it would be hard to exaggerate the influence on both thinking generally and on policy of this approach. We can see it in particular in the policy stress now given everywhere, associated with the work of such gurus as Michael Porter and with endogenous growth theory, to the contribution to relative national competitiveness of education and training. It is, I think, a particularly well entrenched position precisely because it is designed to appeal to intellectual elites everywhere and to those potential centres of critical thinking we call universities.

For our purposes there are here both theoretical and empirical questions at issue. Empirically we need to place the claims made for a shift in labour composition

against actual figures. In doing so we need firmly to distinguish between high level scientific research and development, the varied skill levels needed for different applications of technology and the embedded “touchy/feely” skills involved in much managerial and service work. Pace Bell claims (reference) it is largely the demand for the later that has increased. So far as levels of remuneration are concerned while in some specialised sectors a star economy and wider wage differentials have developed this has not and cannot be generally replicated. Indeed US data seems to show that, as one would expect, an increase in the supply of graduates lowers their market price. Nor as certain management gurus and politicians have argued has the increased importance of embedded human capital led to a shift in power between employer and employee or to the claimed resulting development of a generalised freelance, portfolio worker culture. Indeed all current evidence points to a remarkable stability over time in the average length of employment with one firm. Contrary to the hype on both right and left the OECD economies are not becoming significantly more part-time or freelance, even in the US. What does appear to be true, and this chimes ill with claims to higher productivity associated with high skill information work, and in passing has serious implications for a media growth scenario, is that the long term trend within industrial capitalism of reduced working hours appears to have stopped or possibly reversed and this is particularly true for the high tech-high skill workers and service workers. This may of course be a temporary response to skill shortages but this seems unlikely.

At a theoretical level what is at issue is how useful a general class approach that simply opposes capital to labour is in analysing changes in the labour market and their possible wider sociological and political effects as opposed to a more Weberian status group analysis which takes the division between capital and labour as given and then analyses shifts in the internal composition of labour. This is, in my view, of particular relevance in a situation in which capital has become more socialised and labour less homogenous. The problem for a general class analysis is the Marxist concept of exploitation. There are two versions of this: One stresses the labour theory of value and thus sees any returns to capital as theft from workers; the other stresses alienation and thus sees the labour process as the villain rather than the wage bargain. In practice these two may of course be combined. I have to confess that while I fully understand the Hegelian roots of alienation it in general remains a romantic load of hogwash and no basis for a sensible analysis of the social relations of capitalism. This does not of course mean that there are not unpleasant, stressful and unhealthy forms of work into which people are forced by economic necessity and too often for levels of pay, which are a disgrace and that this is not a proper matter of social and political concern. But I see little evidence either theoretical or practical that some generalised concept of class struggle will do anything to address the problem.

So, at a general level we are left with the division between wages as a return to labour and profits as a return to capital. While there is indeed a fluctuation in their relative shares, what is striking is the long-term stability of the shares in all developed industrial capitalist economies at around 65% to wages and 35% to profits. Any economy that at least reproduces itself, let alone grows, needs a mechanism for dividing output between current consumption and investment. The issue therefore is not the consumption levels of a few egregiously wealthy capitalists, as the

populist media coverage of fat cats might lead one to believe, but whether current mechanisms are either economically or socially the most efficient and/or whether there is a viable and superior alternative. This, in practice, is what most economic policy debates are about. The second issue is then not the division between capital and labour but the distribution among labour and a general class analysis is just not useful, in my judgement, in either explaining the current mechanism and structure of distribution or in developing any alternative. To take one relevant example, the recent history of the US corporate sector, of which the revealed financial scandals were only the most flagrant form, involved through the exploitation of stock options and the manipulation of employment contracts a massive transfer of resources (in effect a theft) from shareholders by senior managerial employees, NOT some exploitative behaviour by a capitalist class vis-à-vis workers. Similarly the AOL/Time Warner merger involved AOL shareholder managers stealing from Time Warner shareholders. One can take what view of such shenanigans one likes but they are not a question of class and class exploitation except in cases where pension funds were raided to the benefit of shareholders. Similarly much economic policy, including information society policy, is the outcome of intracapitalist struggle, for instance between finance and industrial capital, with no necessary impact on broader class relations.

References:

- Bell, Daniel. 1980. The Social Framework of the Information Society. In T. Forester (ed.), *The Microelectronics Revolution*, 500-549. Oxford: Blackwell.
- Castells, Manuel. 1996. *The Rise of Network Society*. Oxford: Blackwell.
- Chandler, Alfred. 1977. *The Visible Hand: The Managerial Revolution in American Business*. Cambridge, Mass.
- De Sola Pool, Ithiel. 1984. *Technologies of Freedom*. Cambridge, MA: MIT Press.
- Jonscher, Charles. 1983. Information Resources and Economic Productivity. *Information Economics and Policy* 1, 1, 13-35.
- Schumpeter, Joseph. 1934. *The Theory of Economic Development*. Cambridge, MA:
- Schumpeter, Joseph. 1939. *Business Cycles: A Theoretical, Historical and Statistical Analysis of the Capitalist Process*. New York: McGraw-Hill.
- Tofler, Alvin. 1981. *The Third Wave*. New York: Bantam Books.