

The Strategic Value of Policy Research in the Transition to Information Economies

William H. Melody

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The Importance of Public Policy Research

Major public policy decisions influence the course of development of the economy and of society, promoting some avenues while constraining others. They provide direction and guidance for day-to-day decisions by organizations and individuals operating within their ambit, which in aggregate have pervasive effects that ripple throughout society. Although policy formation is often thought to be the prerogative of governments, in reality it is much more broadly based. Policy is made by those organizations which are in a position to make major decisions affecting the course of development of society. In modern capitalist societies, this means policy in some vital areas-say in relation to investment and employment-is determined as much by the larger corporations in key industries as by the central government. In most countries, a degree of influence over certain areas of domestic policy is exercised by transnational corporations, national governments of other countries, and international agencies.

Most new scientific and technical knowledge is obtained because of a sustained policy commitment to long-term programmes of research, often involving great effort and expense. But the knowledge from which major economic and social policies are developed is frequently not informed at all by new research, or even by research which already has been completed. There is a widespread belief that policy making on these issues is largely the implementation of personal preferences and ideologies, not requiring a serious assessment of alternatives or implications. This lack of awareness by policy makers of the severe limitations of their knowledge about the economic and social implications of policy choices can make them oblivious to the need to undertake research in order to become more informed. Even worse, it allows policy makers to be wrong with confidence. As the American humourist Will Rogers observed: 'the trouble isn't what they don't know; it's what they do know, that isn't so.

Information, Communication, and Institutions

The structure and character of all institutions are significantly influenced by the state of information. Institutions are created from the development of a need or desire to share information, thereby cultivating patterns of interaction - of communication or information exchange. Institutions become structured in particular ways to achieve the desired internal and

external information flows. The institutional structure changes when, for whatever reason, the communication processes and information flows are changed. And institutions die when the incentive or the ability to maintain the information flows and communication links ceases.

Informational Characteristics of Organizations

Institutions can therefore be described according to their informational characteristics. One way to study institutional dynamics is to focus directly on an institution's changing information and communication structure. Equally significant for economic analysis is the fact that institutions also generate information for the external environment that is then employed by other organizations and individuals for decision making. For any particular institutional structure in society, there will be an associated information and communication structure which will influence how that society functions. Some institutional structures will provide stronger incentives for the creation and diffusion of information than others. Moreover, the type and quality of information are likely to change as a result of changes in institutional structure. If institutional change is desired, it may therefore be necessary to change the information structure as a prerequisite to, or as an essential aspect of, effective institutional change.

The importance of information flows and communication patterns to the establishment and maintenance of particular institutions has been well understood, at least by some policy makers, since earliest times. Trade routes and communication links were deliberately designed to maintain centres of power and to overcome international comparative disadvantages. For example, Britain still benefits substantially from its historically established communication links with its former colonies, long after the empire's formal demise. Universal telephone service has been adopted as a policy objective in many countries to encourage economic and social interaction within the country in order to help promote national unity. The EU is attempting to foster a new European identity by promoting increased communication and information exchange as a basis for stimulating greater trade between its member countries and for the creation of both a European market and a European culture. Thus, those factors that influence information and communication structures are central to the study of all institutions, and are sometimes controlling with respect to economic institutions.

The Information and Communication Sector

The information and communication sector of the economy consists essentially of the new electronic ICTs as well as the more traditional forms of information and communication, such as libraries, publishing, and the postal service. Stimulated by rapid and continuing technological change, this sector has experienced a high rate of economic growth over

a long period. Moreover, the direct economic effects are compounded by the fact that major parts of this sector provide important infrastructure services or enabling functions which affect the operation and efficiency of manufacturing, agriculture, government agencies, and almost all other industries and institutions. Many analysts believe that information gathering, processing, storage, and transmission over efficient telecommunication networks will provide the foundation on which technologically advanced nations will close the twentieth century as so-called 'information economies' or 'information societies'-societies that have become dependent on complex ICT networks and which allocate a major portion of their resources to information and communication activities. The expansion of the information and communication sector helps to integrate domestic economies more easily into the international economy by means of efficient international ICT networks. As international economic integration expands, the impact of domestic public policies in all nations becomes more complex and their objectives more difficult to achieve. Control over the domestic economy by national governments is weakened. These developments are forcing governments to recognize the need for a full range of international trade policies addressed not only to direct trade in information and communication equipment and services, but also to the implications of world-wide information and communication networks for other industries.

In addition, growth opportunities are opening in a wide variety of information and communication content and service markets, trading in both public and private information. Although these markets are adding value to information, they are very imperfect markets which are often characterized by international monopoly. They raise important policy issues concerning government regulation of monopoly power in national and international information markets and government activities with respect to access by the public to traditional types of public information. Determination of the appropriate limits to place on the commoditization of information requires in-depth research, public debate, and the crafting of wise public policy if the citizenry is to be more informed-rather than less-in the information economy.

ICTs and the Limits of Markets

The convergence of rapidly improving computer and telecommunication technologies has had a profound impact upon economic institutions. The growing significance of electronic information and communication networks is fundamentally altering the nature of markets and the structure of industries, as well as the competitiveness of firms and the prosperity of regions. They are affecting the internal structure of organizations and the information environment through which consumer behaviour is formed. We can follow the latest strategic developments in the newspapers daily. But what is the significance of these developments?

When information and communication networks undergo fundamental change, traditional explanations of economic and social processes may be rendered obsolete. The new ICT systems are often more complex than the old. Ironically, in an age where information and communication systems are more sophisticated and comprehensive than ever before, the planning horizons for decision makers of all kinds are continuously being reduced because of a growing inability to forecast even short-term future developments. Seldom has a subject attracted such attention, yet yielded so little critical insight into its long-term implications for society.

Major technological advances in telecommunication are pushing back the extensive geographical limits of markets to global dimensions in an increasing number of industries. Major technological advances in microelectronics and the computer industry have pushed back the intensive limit of information markets by reducing the cost of generating more and more kinds of data. What are the implications of markets without geographical limits and of an enormous expansion of information in the so-called information economy?

Conventional economic theory would suggest that more information and better (and cheaper) communication can only improve the functional efficiency of markets. It should lead to expanded competition and an increased role for the market in allocating resources in society. More considered research and experience since the 1970s, particularly in currency and stock markets, suggest that this analysis is oversimplified. In particular, it suggests that improved information and communication networks may be fundamentally altering the structure of markets so that, at least in many instances, they become more unstable, function less efficiently, and play a less significant role in allocating resources. If this is true, stable economic growth and development will require an increased role for informed public policy direction of markets, resource allocation, and economic activity more generally.

The Extension of Market Boundaries: Theory and Practice

According to conventional market theory, an expansion of available information, together with enhanced and improved telecommunication, should permit more efficient decision making and the extension of markets across geographical and industry boundaries. This should increase competition. It should allow resources to be allocated more rapidly and efficiently. The conditions of real markets should approximate more closely to the assumptions of theory, where markets are frictionless and operate under conditions of perfect information. Indeed, much of the literature on the information economy considers these developments to provide unmitigated benefits to society.

However, closer examination indicates that the benefits of these technologies

are not likely to be distributed uniformly across markets; that certain segments of society will be made poorer both in absolute as well as relative terms; and that the structure of markets in many industries will be made less competitive. Although these new technologies permit many markets to be extended to the international and global level, it is the largest national and transnational corporations and government agencies which have the greatest need for, and the ability to take full advantage of, these new opportunities. For them, the geographic boundaries of markets are extended globally-and their ability to administer and control markets efficiently and effectively from a central point is enhanced. These changes have been a significant factor in stimulating a wave of mergers and takeovers involving the largest transnational corporations throughout the 1990s. The application of ICTs can reduce substantially the economic disadvantages of increasing administrative costs and reduced effectiveness of information processing and communication in very large organizations.

Oligopoly Tendencies

The manner in which these technological developments are being implemented opens possibilities for creating significant barriers to entry for all but the largest firms, thereby accelerating tendencies toward concentration. In fact, smaller firms in many industries are likely to find themselves disadvantaged because of the new technological developments. For example, telecommunication systems in many countries are being redesigned to meet the technically sophisticated digital data requirements of high-volume, multipurpose, global users. When it comes to traditional, simpler communication requirements-such as basic telephone services and narrowband digital services like those available on the Internet in the mid-1990s-the newer upgraded systems will serve quite well, but at substantially increased cost to smaller users.

Unless there is public policy intervention, the telecommunication options available to small, localized, and even regionalized businesses are not likely to reflect their unique needs. Rather, their range of choice among services and prices on the common telecommunication network is likely to be dictated by the global needs of the largest firms and government agencies. In a similar fashion, the terms and conditions for access to many new databanks provide substantial benefits to transnational corporations with high-volume information needs-but the costs are prohibitive to small domestic companies, non-profit organizations, and individuals, particularly in developing countries.

The new competition that has developed in most major industries from the globalization of markets is intensifying oligopolistic rivalry among transnational corporations. The firms which can leap across market boundaries are already dominant in their respective product/ service and geographical markets. Their entry has a considerable impact on the structure of the supply side of the market just entered, which stimulates a major strategic response from the established

dominant firm(s). This is not dynamic competition responding to the invisible hand of market forces reflecting consumer sovereignty, as assumed in economic theory. Instead, it is a type of medieval market jousting, an oligopolistic rivalry for the control of market territory. The rivalry is directed to obtaining a long-run position of market entrenchment and dominance in particular domestic or foreign national markets. Well-publicized illustrations of this are the strategic positioning of the world's largest telecommunication operators with respect to constructing fibre-optic cable links to households in many developed countries and of the largest media conglomerates to acquire the world's stock of entertainment video content.

Transnational corporations are often assisted in attempting to achieve these long-term dominant market positions by their respective governments, who sometimes even participate in international marketing. Thus, the oligopolistic rivalry among such corporations involves a strong element of nationalism and direct government involvement on both the demand and supply sides of the market exchange. This is increasingly evident in the continuing negotiations between Europe, the USA, and Japan about the conditions of market access in industry after industry. In addition, adoption of the new ICTs has tended to increase the significance of fixed overhead costs in many industries, not only for information and telecommunication activities, but also with respect to greater centralization of functions and capital/labour substitution. For example, increased R&D and software costs in many areas are requiring significantly higher sales volumes to reach profitability. Therefore, the inherent instability in oligopolistic markets, long recognized in economic analyses of older industries like oil, is magnified by the instability created by an increased proportion of overhead costs.

Increasing Risk and Uncertainty

Taken collectively, the changes discussed above introduce new elements of risk and uncertainty into the economic system. However, the greater the geographical coverage of a transnational corporation, the more its risk and uncertainty can be diversified, although not for the particular production locations dependent on it. Indeed, major structural imbalances in regional economic development have been well documented by the UN, IMF, the World Bank and other organizations.

These developments have dramatically exposed the contradiction inherent in the market theory that 'perfect' information may not, in fact, promote markets which function efficiently. Rather, with 'perfect' information markets may not function at all. Market exchanges recognize different perceptions-presumably based on different information-of the value of the items being exchanged. After all, there must be both buyers and sellers. As the range and diversity of their perceptions is narrowed by improving information and communication, greater instability may be built into the market system. For instance, if virtually all major financial analysts receive the same new information at the same time and plug it into what are essentially similar generic economic models,

they are likely to reach the same general conclusion. A 'lemming' effect can then take hold, as was recognized in the 1987 and 2000 stock market collapses, and is being observed in increasing currency and stock market fluctuations. The current revolution in telecommunication technology can be compared in certain respects with the effect which the introduction of the telegraph had on the structure of markets in the nineteenth century. For instance, a detailed study of these developments in the USA concluded (DuBoff 1983):

The telegraph improved the functioning of markets and enhanced competition, but it simultaneously strengthened forces making for monopolisation. Larger scale business operations, secrecy and control, and spatial concentration were all increased as a result of telegraphic communications. . . increasing market size helped 'empire builders' widen initial advantages which at first may have been modest.

This assessment provides a useful benchmark for examining global developments in the 1990s. If the direction of change indicated here is correct, there will be a paramount need for sound public policy at both the national and international levels. The future global information economy is likely to require policy guidance and economic management of a higher order if reasonably stable economic and social development is to occur in the future information economy. Indeed, the 1990s have seen a major restructuring of the role of government policy in the direction of more specialized and sophisticated policy making at both national and international level. The role of government regulation remains strong, despite the rhetoric of deregulation and privatization that has been popular in many countries-and the many applications of these approaches in telecommunication, broadcasting, and other industries.

In fact, the deregulation movement created many regulatory agencies, but abolished few. For example, the deregulation of BT in the UK required that the Office of Telecommunications (OfTel) be created to provide a more detailed, knowledgeable, and sensitive kind of regulation and general economic management of a more complex industry environment. By the mid-1990s, there were about a dozen new regulatory agencies created in the UK, several of which have jurisdiction over some aspect of the information and communication sector. With ICT convergence, the UK has recently merged its telecom, broadcasting and IT regulation into a single agency, Ofcom. The pattern of development in the UK reflects a pattern being repeated in many countries.

Current debates about the future roles of international agencies

like the new World Trade Organisation (WTO) and the World Intellectual Property organization (WIPO) are really not about the necessity for regulation, but rather how best to adapt and restructure international regulation for the services and information-based economy of the future.

Research as a Strategic Resource

There has been a growing recognition that research capability may be a strategic resource which can provide significant benefit to the economy. Scientific and technical research has been seen as a stepping stone to the creation of new technologies which will provide firms and nations with a competitive advantage in the global market economy. The information and communication sector is viewed by many government policy makers as the key to national industrial and economic policies. Economic growth, employment, and the 'wealth of nations' are seen as following directly from investment in R&D applied to technological advance in this area. Massive research initiatives in Europe, Japan, and the US have been premised upon an unwavering faith in a chain of causal links that connect R&D investment with economic prosperity.

Investment in R&D has actually become a competitive arena for the development of commercial strategies directed to achieve economic success in global markets. However, the chain of reasoning that links investment in R&D to scientific advance, technological development, innovative applications, increased efficiency, market advantages, and the generation of jobs and economic growth involves substantial uncertainty at every step. There is much more to economic prosperity than investment in R&D.

A second category of strategic research encompasses the human, social, and institutional aspects of the information technologies, including the effects of investing in technological R&D and of applying new technologies, and the range of economic and social implications. These technologies must be used by humans working in organizations for the efficient provision of public services or the efficient production of goods and services that will command acceptance in the marketplace. Research which examines the economic and social policy dimensions of changes in ICTs is as important to economic success as investment in technical R&D. There is no way that R&D can compensate for an inadequately trained labour force, inefficient management, unresponsive bureaucratic institutions, or inadequate understanding of market demands and social needs. Historically, it has been extremely difficult for policy research to be undertaken unless the researcher is employed by, or is a consultant to, an organization that has a direct vested interest in particular policy issues, i.e. the government policy making agency or an organization directly

affected by its decisions. It has been particularly difficult for most academic researchers, although they are in a unique position to provide a substantial contribution to the policy process in at least two important respects.

First, the absence of a close connection with institutions having a direct vested interest in the immediate results provides a detachment that permits them to address the long-term societal implications of issues more thoroughly, independently, and continuously than even the policy making agencies. Second, by training and vocational practice, the perspective of academics should be more compatible with the conduct of research on long-run implications for society than that provided by any other institutional environment. For many types of policy questions, independent academic enquiry can provide an assessment of particular aspects of reality that elude special-interest research.

Due in part to the slow development of a significant body of such research by the mid-1990s, a great deal still has to be done in the development of a conceptual and descriptive map by which we can measure the size, structure, and implications of the information economy. Without this background information, neither policy decisions by government nor market decisions by corporations are as informed as they should be-or could be. This is certainly one contributing factor to the limited planning horizons that constrain both corporate and government decision making.

The major difficulty to date has been developing a thorough understanding of the important dimensions of information and communication policy issues, particularly when it comes to assessing the long-term implications. There has been a tendency for governments to recognize only those immediate issues which have been thrust before them, generally in fragmented fashion, outside either a long-term or a systemic context. There are, and will continue to be, many important issues of short-term policy that can be separated from the long-term total system context. Nevertheless, the unique aspect of developments in the information and communication sector is that there are so many fundamental issues that cannot be separated in this way. The long-term economic and social implications of information and communication developments provides the challenge for policy research.

Growth and Development in the Information Economy

The concept of the information society owes much to the well-publicized speculations of Daniel Bell (1973) about the future 'post-industrial' or 'information society'. People working in such long-established and well-settled sectors of society as education, libraries, printing, consultancy, administration, and the entire bureaucracies of every organization in the world were suddenly reclassified as part of the information sector

and transformed into pioneers in the progressive and futuristic information society.

Difficulties in Analysing the Information Economy

Did the information sector really grow without anyone recognizing it? Or has there always been a very large information sector? Its creation essentially was a re-labelling exercise. But it did help to focus attention on the important and unique role of information in society. At about the same time, major studies of the US economy were under way at the US Department of Commerce (Porat 1971). This built on the pioneering work of Machlup (1962; 1980), which attempted to document the size and proportion of the labour force involved in the information sector. Similar studies were done in other countries, by the OECD, and by other organizations. These have demonstrated that a majority of the labour force in many industrialized countries is employed in the information sector (OECD 1986)..

There is a serious difficulty in interpreting these statistics because they have not been developed within a theoretical or conceptual framework that permits substantive economic analysis. ICTs create new jobs, but they also substitute for old jobs (Freeman and Soete 1994). The substitution effect may be the greater-but surely the most developed information economy is not the one with the most bureaucrats and administrators. In addition, most information workers are also workers in other industries, including manufacturing and agriculture.

A widespread belief has existed that information technology has been providing a basis for major increases in productivity for the past two decades. Yet Robert Solow, Nobel prize winner in economics for his work on growth theory and productivity, has observed that the information technology revolution shows up everywhere but the productivity statistics. There are essentially two conclusions that can be drawn from this. One is that ICTs have not provided a significant basis for productivity improvement, which mounting evidence appears to discount. A second, which deserves more serious attention, is that the underlying economic theory is not capable of capturing the productivity effects of ICTs.

One crucial weakness of current economic theory in dealing with information and communication is the tendency to assume that it is both perfect and costless. Moreover, as a commodity it is almost impossible to quantify information output in any meaningful way. We can count printed pages, hours of television production, minutes of conversation, numbers of business lunches, and lectures. But these are measures of the information packaging unit, not the information content. It has been observed that what economic analysis needs is a unit of information comparable to the 'bit' from information theory, a unit of knowledge

that was once called a 'wit'. Unfortunately, such a unit has not yet been defined. Clearly we have a long way to go in our attempts to develop an understanding of the evolving information economy and its implications.

The Economy of Knowledge and Learning

We might seek counsel from one of the founding fathers of economics as a basis for directing appropriate policy in relation to the evolving information economy. The first chapter of Adam Smith's *Wealth of Nations* (1776), often cited as the philosophical bedrock of economic policy being applied in many industrial countries today, emphasizes that knowledge is the most important single factor in economic development. In simple terms, economic development is reflected in a growth in per capita output, which in turn derives primarily from an increase in the productivity of labour. Whether this comes from new technologies or from the greater skill, dexterity, and industriousness of the workforce, it represents an improvement in knowledge. Development therefore cannot be achieved by the simple accumulation of physical capital. It requires a change in the structure of both material and human capital which derives from an increase in knowledge.

Unfortunately, a recognition that economic development is primarily a process of acquiring and diffusing knowledge has not penetrated mainstream economic analysis. The economics of knowledge and of learning in the development process remain at the fringe of economics. It is not incorporated into the economic models that have traditionally dominated policy thinking and prescriptions.

Certain rudimentary principles would appear to be self-evident in any dynamic economic system. First, the total stock of knowledge is constantly being dissipated by changing social conditions, age, death, and, sometimes, emigration. Unless a programme of knowledge maintenance is in place (i.e. education and training), the stock of knowledge will decline, retarding economic development. Second, increased productivity and economic development require both the acquisition of knowledge and its diffusion throughout society. The acquisition of new knowledge is essential, but the major stimulus to economic development comes from its widespread dissemination.

In modern times, the rapid development of the USA and Japan, for example, has been associated with the allocation of a relatively large proportion of economic resources to the knowledge sector, with a major emphasis on diffusing knowledge throughout the population via a variety of formal and informal education and training programmes. Studies of productivity improvement in the USA since the 1940s attribute about 40 per cent to the maintenance and improvement of educational qualifications of the average worker and about 33 per cent to the growth of new knowledge, i.e. new technologies (Denison 1985). Despite evidence like this, the expansion and

diffusion of knowledge across the population has not been the cornerstone of national economic development programmes in most countries in the 1990s.

Research to Assist Policy Decisions

As subjects of study and research, the core ideas of 'knowledge', 'information', 'communication', and even 'technology' have always been very difficult to grasp. They have been far too pervasive and elusive to fit comfortably within the conceptual framework of any established discipline- and multi-disciplinary efforts have had to proceed without a common theoretical foundation. Initiatives have therefore tended to be very limited and heavily constrained by the parameters of a particular academic discipline (such as biology, psychology, or information processing) or by a specific industry interest (like journalism, broadcast media, or telecommunication).

As information and communication have become more central to economic and social activity more recently, there has been a gradual recognition that these core ideas must be moved from the periphery of social science research to the centre. Moreover, new initiatives cannot be developed solely within the framework of traditional academic disciplines because the newly developing knowledge is also urgently needed by policy makers in industry and government. A number of major programmes, policy research centres, and other initiatives have been established, beginning in the 1980s, to help shape the evolving core disciplines which will be central to education, training, management, policy development, and citizenship in the information economy of the twenty-first century.

An illustration of a successful programme has been the UK Programme on ICT (PICT), a network of six university-based policy research centres. It has established a comprehensive foundation of research literature, played a significant role in policy debates on many issues in the UK and Europe, as well as acting as a catalyst for related activities elsewhere. For example, PICT researchers helped form a formal European network of research centres focused on ICT policy issues, ENCIP. Later, an informal global network of researchers and research centres, LIRNE.NET, has begun working through the Internet.

Despite such continuing activity, we still understand far too little about the essential characteristics of the information economy. However, there are some key things we do know:

1. knowledge as an economic resource will be more central to information economies of the 21st century than to the industrial economies of the twentieth century;
2. sound public policy will be essential to provide guidance and direction in a more complex and potentially more unstable economic and social environment; and

3. economic and social research will be an essential ingredient to the development of informed public policy.

Those nations and sectors of the economy which establish a commitment to long-term policy research will have a clear advantage over those that do not. The serious pursuit of 'knowledge about knowledge' must therefore be central to all successful information economies of the twenty first century.